



Doctoral Thesis

**Private Finance for Nature-based Solutions in  
Developing Countries: A Study of Kenya  
with Perspectives from Costa Rica**

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April 2025

A thesis submitted in partial fulfilment of the requirements for the degree of Doctor of  
Philosophy at University College London, United Kingdom

# Declaration of authorship

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Lydia Zemke  
Cambridge, Massachusetts, April 2025

# Abstract

The global climate finance gap is substantial. Despite the recognized potential of nature-based solutions (NbS) for climate action, they remain critically underfunded, with more than 80% of the estimated funding coming from public sources. This contrasts sharply with broader climate finance figures, where the majority comes from private sources. Although policymakers advocate for an increased role of the private sector in addressing policy challenges, the topic of private climate finance remains underexplored, especially in developing nations.

This thesis examines the dynamics of private climate finance deployment for NbS in three empirical cases in Kenya, drawing on insights from Costa Rica's Payment for Ecosystem Services programme and other NbS initiatives in the country. How are private climate finance and NbS conceptualised within the UNFCCC, and how are they, in turn, translated at the national level in Kenya and Costa Rica? How is private climate finance currently deployed for NbS? How do the roles and drivers of private climate finance shape NbS implementation? What are the barriers to and enablers of private climate finance for NbS? To what extent does private climate finance for NbS support the achievement of the Paris Agreement Goals and the broader transition toward sustainability?

The empirical cases highlight the emergence of voluntary carbon markets as a dominant financing instrument for NbS. The study reveals the need for a more nuanced understanding of private climate finance flows, especially in terms of financing sources. The analysis suggests that examining the beneficiaries of the ecosystem services provided by the NbS helps clarify the roles and motivations of private actors, as well as their potential financial contributions. Costa Rica's state-centred approach demonstrates that public climate finance can be effective in supporting NbS, but also highlights potential limitations in attracting private investment. At a broader level, the study reveals the various ways in which private actors engage with NbS.

# Impact Statement

This thesis makes an important contribution to the state of knowledge on climate finance and NbS, with implications for policymakers, scholars, and industry professionals.

The study responds to the growing recognition among policymakers of the need for a transformation in financial flows to achieve global environmental goals. Governments at all levels have shown an increasing interest in the restoration, conservation, and more sustainable use of land to achieve these goals. They have simultaneously also called on greater private sector engagement to help finance the transition. Informed policymaking requires empirical evidence and lessons from the field; however, the current state of knowledge is confined to studies on NbS in urban areas, with a limited focus on *private* climate finance. This study informs policymakers who are considering actions to support NbS implementation in a *developing* country context. This is particularly important, given that large portions of remaining intact nature and biodiversity are located in the Global South. By conducting an in-depth investigation into the current deployment of private climate finance for NbS in three cases, the study reveals the current dynamics of climate finance, providing policy considerations for addressing the barriers and supporting enablers of private climate finance for NbS. Given the location of the empirical studies and analysis, the study's findings are particularly relevant and valuable to policymakers in Kenya and Costa Rica.

Despite recent advancements in academia's conceptualisation of NbS, substantial data gaps exist in how climate finance interacts with NbS. This study sheds light on the current roles of private climate finance and drivers of non-state actors contributing financial resources to NbS. It presents a new approach to studying the deployment of private climate finance for NbS, which could be built upon and utilised for analyses in other geographical contexts. Moreover, the empirical case studies offer a detailed account of how the conceptualisation of climate finance and NbS within the UNFCCC translates into the on-the-ground deployment of private climate finance for NbS.

For industry, the study provides useful examples of NbS implementation, which can be used to inform private actors who are considering supporting NbS. For instance, over 400 non-state organisations, primarily private sector entities, committed to disclosing their nature impacts, risks, and dependencies on nature through the TNFD framework with the intention of moving towards a nature-positive pathway. These industry actors would benefit from case studies to inform their strategy and decision-making. The analysis emanating from the empirical cases can also be helpful to NbS project developers who would benefit from best practices and approaches for leveraging private climate finance. The study also introduces a more nuanced model for understanding the roles, drivers and deployment of private climate finance for NbS.

# Positionality statement

My training in Political Science, International Development Studies, and Management Studies, combined with my roles in global policy, has shaped how I frame my research.

As a researcher-practitioner, I had gained nearly a decade of experience working in public policy and environmental finance prior to starting my doctoral research, including at the United Nations and various consulting roles at organisations such as Vivid Economics (now part of McKinsey and Co.), NatureFinance. These experiences deepened my understanding of the systemic challenges involved in mobilizing financial resources for the environment and sparked my interest in the role of private capital.

I acknowledge that my professional experience informs my perspective and introduces certain assumptions and biases. I also recognize that the communities studied in my research operate with distinct priorities, constraints, histories and knowledge systems. This awareness shaped my research design, including the interview protocols and the analysis of findings.

Reflexivity, transparency and the use of a flexible methodological approach have been central to my research process. These practices allowed me to examine my role in conducting this research project critically and to engage more thoughtfully with diverse perspectives throughout the study.

# Acknowledgements

A doctoral dissertation may be an independent endeavour, but it takes a community of support to complete one. I am indebted to many who have helped make this journey possible.

First and foremost, I would like to thank my supervisor, Arthur Petersen, who, with three doctoral degrees to his name, has provided invaluable insight into how one completes a PhD thesis. His supervision has also gone well beyond that, providing reliable and consistent feedback while always striking the right balance between flexibility and pressure to get on with it— a much-needed skill when guiding a part-time PhD student. I would also like to thank my other academic advisors, both formal and informal alike: Josh Ryan Collins (University College London), Kenneth Oye (Massachusetts Institute of Technology), and the late Calestous Juma (Harvard Kennedy School). I have spent countless hours thinking through my research with Ken, and no person has provided me with more clarity as I articulated my study and analysed its findings.

I also want to acknowledge the support I have received from friends and extended family members who have opened their homes to a doctoral student on a budget while travelling to conduct research. Friendships have been a pillar for me throughout my programme. I am grateful to the friends who have been there long before I embarked on this journey, as well as the new ones I met during my PhD studies, including fellow researchers and students. Their wisdom, companionship and words of encouragement have been invaluable.

The Fulbright programme provided me with the opportunity to continue my research at the Belfer Center for Science and International Affairs at Harvard University (2021-2023). I would like to thank Henry Lee (Harvard Kennedy School) for welcoming me into his research group and making this experience possible.

My research has always been motivated by a desire to address practical societal challenges. I was fortunate to have the opportunity to work in my field while pursuing my doctoral studies. I deeply appreciate my colleagues at various organisations and employers who have shown encouragement and accommodation as I pursued both academic and professional goals simultaneously.

Finally, I would like to thank my family for their love, patience, and understanding throughout this journey.

*For my mother*

*“At first, I thought I was fighting to save rubber trees,  
then I thought I was fighting to save the Amazon rainforest.  
Now I realise I am fighting for humanity.”*

— Chico Mendes



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# List of Acronyms and Abbreviations

|               |                                                                                                                                 |
|---------------|---------------------------------------------------------------------------------------------------------------------------------|
| ACES          | Association for Coastal Ecosystem Services (United Kingdom)                                                                     |
| AfDB          | African Development Bank                                                                                                        |
| AFOLU         | Agriculture, forestry, and other land use                                                                                       |
| ALM           | Improved agricultural land management (ALM) practices                                                                           |
| A/R           | Afforestation and/or reforestation                                                                                              |
| ARR           | Afforestation, reforestation, and revegetation                                                                                  |
| ASAL          | Arid and semi-arid lands                                                                                                        |
| BAU           | Business-as-usual scenario                                                                                                      |
| CBK           | Co-operative Bank of Kenya                                                                                                      |
| CFA           | Community Forest Association                                                                                                    |
| CPR           | Common-pool resources                                                                                                           |
| CSDR          | EU Corporate Sustainability Reporting Directive                                                                                 |
| CSR           | Corporate social responsibility                                                                                                 |
| DFI           | Development Finance Institution                                                                                                 |
| EABL          | East Africa Breweries Ltd.                                                                                                      |
| ESG           | Environmental, social, governance                                                                                               |
| IADB          | Inter-American Development Bank                                                                                                 |
| CIAT          | International Centre for Tropical Agriculture                                                                                   |
| IFAD          | International Fund for Agricultural Development                                                                                 |
| IFC           | International Finance Corporation                                                                                               |
| IPLC          | Indigenous Peoples and Local Communities                                                                                        |
| FIFCO         | Florida Ice and Farm Company S.A. (Costa Rica)                                                                                  |
| FEMSA         | Coca-Cola FEMSA (Latin America)                                                                                                 |
| G20           | Group of 20 of the world's major economies                                                                                      |
| GEF           | Global Environment Facility                                                                                                     |
| GCF           | Green Climate Fund                                                                                                              |
| Ha            | Hectare                                                                                                                         |
| LDN Fund      | Land Degradation Neutrality Fund                                                                                                |
| MRV           | Monitoring, review and evaluation                                                                                               |
| NA            | Not applicable                                                                                                                  |
| NCWSC         | Nairobi City Water and Sewerage Company                                                                                         |
| NDC           | National Determined Contribution under the UNFCCC                                                                               |
| NbS           | Nature-based Solutions                                                                                                          |
| KenGen        | Kenya Electricity Generation Company                                                                                            |
| KPI           | Key performance indicator                                                                                                       |
| KSh           | Kenyan Shilling                                                                                                                 |
| REDD          | Reduced Emissions from Deforestation and Degradation                                                                            |
| REDD+         | Reducing emissions from deforestation and forest degradation in developing countries, as well as forest conservation activities |
| PES           | Payment for Ecosystem Services                                                                                                  |
| PSA Programme | Payment for Ecosystem Services Programme (Costa Rica)                                                                           |
| PPP           | Public-Private Partnership                                                                                                      |
| SACD          | Sustainable Agriculture Community Development                                                                                   |

|         |                                                                                                       |
|---------|-------------------------------------------------------------------------------------------------------|
| SDG     | Sustainable Development Goals                                                                         |
| SIDA    | Swedish International Development Cooperation Agency                                                  |
| SINAC   | <i>Sistema Nacional de Áreas de Conservación</i> [National System of Conservation Areas (Costa Rica)] |
| TNC     | The Nature Conservancy                                                                                |
| TNFD    | Taskforce for Nature-related Financial Disclosures                                                    |
| TSFF    | The Sall Family Foundation                                                                            |
| UN      | United Nations                                                                                        |
| UNCBD   | United Nations Convention on Biological Diversity                                                     |
| UNDP    | United Nations Development Programme                                                                  |
| UNEP    | United Nations Environment Programme                                                                  |
| UNEP-FI | United Nations Environment Programme Finance Initiative                                               |
| UNFCCC  | United Nations Framework Convention on Climate Change                                                 |
| USD     | United States Dollar                                                                                  |
| UTNWF   | Upper Tana Nairobi Water Fund (Kenya)                                                                 |
| WBG     | World Bank Group                                                                                      |
| WHO     | World Health Organization                                                                             |
| WRMA    | Water Resources Management Authority (Kenya)                                                          |



# Chapter 1. Introduction

## 1.1. Finance, Climate, and Nature-based solutions

Nature, climate and development are inextricably linked (Foley et al., 2005; Rockström et al., 2009; Stern, n.d.; Dasgupta, 2021; Costanza et al., 1997). The impacts of climate change are becoming increasingly evident with rising temperatures, more frequent and extreme weather events, changing rain patterns, and rising sea levels recorded (Climate Action Tracker, 2025; IPCC, 2023; UNEP(a), 2022). These changes carry substantial socio-economic consequences, including physical damage to properties, agricultural disruptions, health impacts, and population displacements.

Climate change is rife with paradoxes.<sup>1</sup> Perhaps the most striking is that vulnerable communities, many of whom are located in developing countries, have contributed the least to climate change but are expected to bear its biggest impacts (Ravindranath and Sathaye, 2002; Chinowsky et al., 2011; IPCC, 2023).

### ***Finance for climate change***

The scale of financial resources necessary to mitigate and adapt to climate change is substantial. It is estimated that emerging markets and developing countries, excluding China, need approximately USD 2.4 trillion<sup>2</sup> annually by 2030 (Bhattacharya et al., 2024). Of this amount, it is estimated that about USD 1.6 trillion is needed for the clean energy transition and about USD 250 billion per year for adaptation and resilience annually (Bhattacharya et al., 2024). An estimated USD 275-400 billion<sup>3</sup> per year is needed by 2030 to protect natural capital in developing countries, excluding China (Songwe et al., 2022).

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<sup>1</sup> Among the paradoxes of climate change are: (i) the growth paradox: the pursuit of economic growth entails an overreliance on the consumption and extraction of natural resources and emission of pollution, which is currently incompatible with the boundaries of the planetary system (Edwards, 2021); (ii) the justice paradox: climate change disproportionately affects vulnerable communities and developing countries that have contributed the least to greenhouse gas emissions (Burkett, 2013); and (iii) the innovation paradox: technological advancements have the potential to mitigate climate change, but reliance on unproven or underdeveloped technologies carries risks and uncertainties, including the potential of adverse effects on the environment and people (van den Bergh, 2013).

<sup>2</sup> Figure derived from the Independent High-level Expert Group (IHLEG) on Climate Finance submitted for UNFCCC COP26. It assesses the finance gap for developing countries, excluding China, in four areas: a just energy transition, adaptation and resilience, loss and damage, and the conservation and restoration of nature (Bhattacharya et al., 2024).

<sup>3</sup> The estimate presented here is a subcomponent of the IHLEG's broader USD 2.4 trillion annual financing need and focuses specifically on the USD 275-400 billion required annually by 2030 to protect and restore natural capital (e.g. activities that halt and reverse biodiversity).

In 2009, the international community established the first global climate finance target, pledging to mobilise USD 100 billion<sup>4</sup> annually by 2020 in new and additional funding to support developing countries in mitigating and adapting to climate change. In 2024, this target was tripled—the international community aimed to provide USD 300 billion annually by 2035 (UNFCCC, 2024a). Similarly, under the UNCBD, countries set a global target, aiming to mobilise USD 200 billion<sup>5</sup> annually by 2030 for developing countries to support them in achieving the goals and targets under the Kunming Montreal Agreement (SCBD, 2022).

The private sector plays an important role in socio-economic growth and sustainable development. In Africa, the private sector accounts for over 80% of total production, two-thirds of total investment, and three-quarters of credit within the economy (African Union, 2021, para. 1). It also represents the primary source of employment for people and is a driver of rising living standards; an estimated nine out of ten jobs in the developing world coming from the private sector (Spicer and Bousuet, 2019).

The scale, allocation, type, and source of climate finance for developing countries have been debated and criticised, particularly in the UNFCCC context. The international community's failure to meet the USD 100 billion climate finance pledge by its target year, 2020, exacerbated tensions between the Global North and South.<sup>6</sup> Although this target was met two years later, developing countries have criticised it as insufficient given the magnitude of their needs (OECD, 2023a). Current estimates point to climate adaptation costs in low-income countries as being “5 to 10 times as high as current flows of public funding (UNEP, 2021a)” (Seddon, 2022).

Another point of contention in the discourse on international climate finance is referred to as the ‘mitigation bias.’ Globally, the allocation of finance is heavily skewed toward climate mitigation efforts, receiving nearly 90% of total global climate finance, leaving only about 10% for climate adaptation activities. This imbalance is less pronounced in multilateral climate finance flows directed toward developing countries, where approximately 58 % is allocated for mitigation and 42 % for adaptation (OECD, 2022a). This bias suggests a preference for

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<sup>4</sup> This figure is defined as “new and additional” financial resources, primarily public finance, pledged by developed countries for climate mitigation and adaptation activities in developing countries.

<sup>5</sup> This figure represents both public and private finance, mobilized from developed countries, to support the implementation of activities to halt and reverse biodiversity loss in developing countries.

<sup>6</sup> The extent to which the target was missed varies according to assessment. The Organisation for Economic Cooperation and Development (OECD) estimates that developed countries raised USD 83.3 billion per year, falling USD 17 billion short of their USD 100 billion pledge by 2020 (OECD, 2022a).

international climate finance to prioritise emissions reduction over helping developing countries adapt to the adverse effects of climate change.

The type of financial instruments used in providing climate finance to developing countries has also been criticised. A large portion of international climate finance flowing from developed to developing countries has been deployed as loans rather than grants, raising questions about the equity and true nature of the financial support mobilised for the Global South. A reliance on loans risks burdening economically vulnerable nations with additional debt.

Finally, the effectiveness of international climate finance has also come under scrutiny. A recent global stocktake on adaptation progress reveals limited evidence of transformational adaptation and negligible outcomes in reducing climate risks (Berrang-Ford et al., 2021). These findings highlight the need for greater accountability and effectiveness in deploying climate finance to ensure meaningful, long-term impacts for developing countries.

### ***Nature and NbS***

Nature plays a vital role in regulating the climate system, absorbing carbon dioxide, and providing critical ecosystem services that support life on our planet (Rockström et al., 2009). The water we drink, the air we breathe, and the food we eat rely on the ecosystem services nature provides (Dasgupta, 2021, p. 45). Simultaneously, climate change poses significant risks to nature, threatening biodiversity, disrupting ecosystems, and jeopardising the delicate balance upon which humanity depends (Walther et al., 2002; Parmesan, 2006; Díaz et al., 2019; Garcia et al., 2014).

Nature-based solutions (NbS) are “actions to protect, conserve, restore, sustainably use and manage natural or modified terrestrial, freshwater, coastal and marine ecosystems, which address social, economic and environmental challenges effectively and adaptively, while simultaneously providing human well-being, ecosystem services and resilience and biodiversity benefits” (UNEA, 2022, p. 2).<sup>7</sup>

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<sup>7</sup> 'Nature-based solutions' (NbS) and 'natural climate solutions' (NCS) are often used interchangeably but there is a subtle distinction. Both focus on using nature and its ecosystems to address environmental challenges, particularly those related to climate change. *NbS* refers to approaches that utilise nature and its processes to provide sustainable and cost-effective solutions to various societal challenges (e.g. biodiversity loss, water scarcity, pollution, and climate change). *NbS* aim to promote the conservation, restoration, and sustainable management of ecosystems, which in turn provide multiple benefits to both people and the environment. These solutions can be applied in urban and rural areas and encompass a wide range of interventions, such as reforestation, wetland restoration, green infrastructure development and sustainable agriculture. The primary focus of *NbS* is to address a broader range of environmental issues beyond climate change, although they can also contribute to climate change

Countries are increasingly recognising the potential of NbS for climate action, with 84% of revised Nationally Determined Contributions (NDCs) incorporating NbS (Nature-based Solutions Initiative, 2022). Research highlights the multiple benefits of NbS in addressing climate challenges. First, estimates indicate that NbS could represent nearly 40% of the climate mitigation needed by 2030 (Griscom et al., 2017). This makes NbS a critical component of global mitigation efforts. Second, NbS enhances climate resilience by reducing exposure to the potential impacts of climate change. For instance, the restoration of ecosystems, including healthy soils and vegetation, can mitigate the risks and impacts of flooding, droughts, and landslides (Seddon, 2022). Similarly, restoring mangroves along coastlines protects communities from soil erosion and extreme weather events, such as tsunamis and tropical cyclones. Mangroves also enhance marine biodiversity, supporting rural fishing communities' livelihoods. Notably, mangroves can sequester up to five times more carbon than tropical forests, making them a powerful tool for mitigation and adaptation (Donato et al., 2011).

Despite the potential for 'triple wins' through NbS and their overwhelming inclusion in country NDCs, NbS remain critically underfunded (Atteridge et al., 2022; UNEP, 2023a). Only about USD 154 billion<sup>8</sup> per year is channelled into NbS for climate action globally (UNEP(a), 2022). This is a fraction of global climate finance flows estimated at USD 1.3 trillion<sup>9</sup> in 2021/2022 (Buchner et al., 2023). Studies suggest that NbS investments must triple by 2030 to meet global climate and nature goals (UNEP(a), 2022). The current NbS financing gap between 2020 and 2050 is estimated at USD 4.1 trillion<sup>10</sup> (UNEP, 2021b). The latest figures point to current investments primarily coming from G20 countries, which represent 90% of global investments in NbS (UNEP(b), 2022). Moreover, the vast majority of G20 NbS investments (87%) are invested internally towards domestic government programs rather than in the form of official development assistance for the Global South (UNEP(b), 2022). Finally, only 17% of

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mitigation and adaptation. NCS are a subset of nature-based solutions specifically aimed at addressing climate change, often focused on climate mitigation. They emphasise the use of natural ecosystems to mitigate greenhouse gas emissions and enhance carbon sequestration, thereby helping to stabilise the climate. NbS have a broader scope, while NCS specifically focus on leveraging natural ecosystems to address climate mitigation through carbon sequestration and emissions reduction.

<sup>8</sup> This estimate defines NbS as "actions to protect, sustainably manage, and restore natural or modified ecosystems that address societal challenges effectively and adaptively." Investment estimates include both public and private flows for climate mitigation and adaptation through NbS.

<sup>9</sup> This estimate defines global climate finance as including both public and private flows that contribute to climate mitigation and adaptation across sectors, such as energy, transport, NbS.

<sup>10</sup> This figure is a long-term estimate of the investment gap for aligning NbS financing with global climate, biodiversity, and land degradation neutrality goals from 2020 to 2050.

total global investments in NbS come from *private climate finance*, representing only USD 26 billion per year<sup>11</sup> (UNEP(a), 2022).

The finance gap is a common barrier to NbS implementation (Seddon et al., 2020; UNEP, 2022). Understanding the dynamics of climate finance for NbS is critical given its key role as an enabler of the transition towards sustainability. Multiple climate finance sources and instruments exist for NbS, ranging from public to private sources, and increasingly blended finance. Financial instruments include climate funds, debt-for-nature swaps, sustainability-linked bonds, payment for ecosystem services, carbon and biodiversity credit markets, disaster risk insurance, and other green financial products (Haites, 2013). More traditional sources of climate finance come from government budgets, multilateral development banks, and official development assistance (Haites, 2013; Denke et al., 2023).

Environmental degradation is often framed as a market failure. Neoclassical Economics argues that market prices fail to capture production and consumption's social and environmental costs (Koellner, 2013). When forests are cleared to make way for agriculture, the price of the resulting products does not account for the costs associated with the environmental damage caused in producing them.

The neoclassical economic perspective maintains that market conditions must be corrected to support the transition towards sustainability (den Butter and Hofkes, 2006), as the market alone cannot account for negative externalities (Pigou, 1920; Baumol and Oates, 1988). Public goods, such as clean water, open space, nature and biodiversity, often have non-rivalrous and non-excludable features, characteristics that incentivise individuals to free-ride on the efforts of others (Perrings, 2021). For example, biodiversity underpins most major ecosystem services that humans benefit from—including food, medicine, crop pollination and water purification—but few are incentivised to protect it (Deke, 2008).

The result is that environmental public goods are systematically undervalued, and the underlying environmental assets are underconserved (Dasgupta, 2021; Perrings, 2021). This explains, in part, why one of the main policy instruments to protect the supply of public goods involves internalising negative externalities through mechanisms like taxation, subsidies for more sustainable alternatives, regulation, and market-based mechanisms (Kedward et al.,

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<sup>11</sup> This figure consists of capital mobilized from private actors, such as corporations, commercial banks, and investors, that is directed towards NbS to achieve global climate, biodiversity, and land degradation neutrality goals from 2020 to 2050.

2023). If a clean environment is considered a public good, private actors have little incentive to maintain it, and stakeholders tend to free ride on the benefits. Framing nature as a public good means that it is difficult to subject its protection to market competition and, by extension, private climate finance. In other words, we should expect nature to continue being funded through public sources.

However, recent NbS initiatives indicate the involvement of private actors (Schultz, 2024). The term ‘private sector’ is used here to describe “the part of the economy of a country that is not under the direct control of the government” (Oxford Learner’s Dictionaries, 2025, para. 1). This thesis refers to the private sector as all non-state organisations and individuals. It includes the for-profit organisations and not-for-profit organisations, encompassing civil society, individuals, investors, philanthropic entities, and local and global corporations. While I distinguish between for-profit and not-for-profit entities, this thesis considers both types as private climate finance. Unless otherwise specified, ‘private climate finance’ should be understood to include contributions from both for-profit and not-for-profit sources.

Despite the difficulties outlined above, recent international discourse has increasingly centred on a narrative that positions *private* capital as essential for financing the implementation of international environmental agreements (Pauw, 2017; Lankes, 2021; Karolyi and Tobin-de la Puente, 2023a). This perspective has become mainstream in discussions on climate and nature finance. Both the UNFCCC and the UNCBD have placed growing emphasis on the role of the private sector in achieving the objectives of the Paris Agreement (Gabor, 2022) and the Kunming-Montreal Global Biodiversity Framework (Kedward et al., 2023).<sup>12</sup> Moreover, discussions and publications from entities such as the UNFCCC Standing Committee on Finance,<sup>13</sup> the Global Finance Alliance for Net-Zero (GFANZ, 2025),<sup>14</sup> The United Nations Environment Programme (UNEP(b), 2022), as well as international financial institutions and development banks, such as the International Monetary Fund (Li et al., 2022) and the Private Sector Facility of the Green Climate Fund (GCF, 2025; Kalinowski, 2024a) have further strengthened this narrative. Critics argue that this emerging paradigm—which Gabor (2022) refers to as the ‘Wall Street Consensus’—promotes the mobilisation of private climate finance

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<sup>12</sup> See Target 19, para. c., of the Kunming-Montreal Global Biodiversity Framework (SCBD, 2022).

<sup>13</sup> “[...] *the private sector could provide an average of 70% of the USD 32 trillion global investments needed, ranging from 50% to 95% across regions with different levels of market maturity. To unlock private investments, increased and well-targeted public support will be needed, such as policy and regulations targeting net zero, market building, direct investment and blended finance*” (UNFCCC, 2022a, pp. 67–68).

<sup>14</sup> “*Putting the world on a path to net zero means tripling decarbonisation investment for 2021-2025 compared to 2016-2020. Private actors could provide 70% of this financing, offering huge opportunities for investors*” (GFANZ, 2025).

as a development priority with an emphasis on the role of the state through multilateral development banks and donor agencies to de-risk investments and create more bankable projects (Gabor, 2022). Governments are effectively using public funds to subsidise private actors through the provision of grants and loans.

There have been calls for more research on finance within the broader context of the transition towards sustainability (Steffen and Schmidt, 2021), as well as on market-based mechanisms for NbS (Chausson et al., 2023). Existing studies have focused on financial actors and the broader systemic context in which they operate (Geddes and Schmidt, 2020; Hafner et al., 2020; Loorbach et al., 2020; Naidoo, 2020). For instance, Nykvist and Maltais examine the role of the financial sector as a driver in the transition towards sustainability (Nykvist and Maltais, 2022). To date, debates around the private sector's role in providing climate finance have given limited attention to its specific engagement with NbS at the implementation level. Consequently, significant knowledge gaps persist regarding the dynamics, drivers, and roles of private climate finance in supporting NbS, particularly in the context of a developing country (Karolyi and Tobin-de la Puente, 2023).

## **1.2. Research aims and questions**

Amid the growing emphasis on private climate finance for implementing the UNFCCC and the recognised potential of NbS for climate adaptation and mitigation, this thesis examines the dynamics of private climate finance in supporting NbS for climate action in developing countries. The primary research question guiding this investigation is:

*What is the role of private climate finance in implementing NbS in developing countries?*

NbS present a compelling area of study for several reasons. NbS are gaining increasing attention in academic and policy circles as a cost-effective option for climate action because of their ability to address climate mitigation and adaptation while also taking into consideration broader environmental and socio-economic considerations, such as food security (Donatti et al., 2022; Key et al., 2021; Seddon, 2022; UNEP(a), 2022). My underlying belief is that investments aimed at achieving the goals of the Paris Agreement will fall short of their potential unless they also address the needs of vulnerable populations. NbS hold promise for developing countries, where their lower reliance on high-tech and capital-intensive solutions may make them more accessible and scalable. Finally, the grey literature highlights the

growing interest among policymakers and businesses in exploring how private climate finance can be channelled toward supporting NbS initiatives.

This thesis advocates neither for NbS nor for private climate finance. It investigates the emerging paradigm of climate finance in the UNFCCC, which has increasingly moved towards emphasising *private climate finance* (Chapter 4), while also recognising the interlinkages between nature and the climate system. I investigate the empirical evidence on the deployment of private climate finance for NbS in developing countries, focusing on Kenya and Costa Rica (Chapters 5-7). What is the role of private climate finance for NbS implementation for climate action in a developing country? More specifically, what services or advantages does private climate finance for NbS provide? How does private climate finance interact with and influence other stakeholders, finance types (e.g., public finance), and entities supporting NbS initiatives? What are the continued challenges, and what drives private sector interest in financing NbS? This thesis recognises that empirical evidence is important in shedding light on successful strategies to scale the adoption of NbS. The bottom-up country case study analysis is an attempt to address this gap.

My research consists of five sub-questions. These questions make for a good start on enhancing our understanding of private climate finance for NBS in a developing country, although they do not exhaust the list of issues that could be explored about private climate finance for NbS. I return to this in the discussion chapter of the thesis.

1. *How are private climate finance and NbS conceptualised in the UNFCCC and national policy contexts?*
2. *How is private climate finance deployed for NbS implementation in Kenya, and how does this compare with the state-centred approach in Costa Rica?*
3. *How do the roles and drivers of private climate finance shape NbS implementation in Kenya?*
4. *What are the barriers to and enablers of private climate finance for NbS?*
5. *To what extent does private climate finance for NbS support the transition towards sustainability?*

The first sub-question examines the importance of international dynamics. It investigates the historical context and conceptualisation of private climate finance in the UNFCCC and the emergence of the NbS concept. This question also examines the national contexts by exploring how Kenya and Costa Rica incorporate NbS and private climate finance into their national strategies.



The second sub-question delves into the empirical evidence on how private climate finance is currently deployed on the ground for NbS implementation in three cases in Kenya. This is a crucial area of inquiry, given the limited understanding of actual practices, particularly in developing countries. By investigating case studies, this question aims to clarify how private climate finance for NbS is being mobilised and deployed.

The third sub-question builds on this empirical analysis by identifying the key drivers of private climate finance for NbS. What roles and motivations encourage private climate finance to contribute to NbS? These questions aim to identify the factors that influence investment decisions and the strategic interests driving private sector engagement in NbS projects.

The fourth sub-question examines the specific barriers and enablers present in each of the NbS empirical case studies. What obstacles hinder investment, and what factors facilitate it? Understanding these dynamics is essential for identifying the conditions for scaling up NbS financing.

The fifth sub question examines the extent to which private climate for NbS supports the transition towards sustainability in terms of the achievement of the Paris Agreement Goals, but also the broader transition towards sustainability.

To address the research questions, my research design applies two complementary research approaches. The first is a top-down analysis (Chapter 4) that examines climate finance and NbS within the framework of the UNFCCC, while also considering how national contexts influence the implementation and financing of NbS in developing countries. The second is a bottom-up approach (Chapters 5-7), which constitutes the bulk of the analysis and explores the empirical realities of NbS implementation through detailed case studies in Kenya.

I selected three empirical cases of NbS located in one primary country (Kenya), complemented by insights from a second country (Costa Rica), representing two distinct regions: Africa and Latin America. Both continents harbour significant natural reserves at risk of degradation and loss. Africa is home to 25% of the world's known mammal biodiversity (UNEP-WCMC, 2016a) and contains the second-largest area of tropical rainforests (Malhi et al., 2013), while Latin America holds half of the world's species (TNC, 2022a), more than 30% of Earth's available freshwater, and almost 50% of its tropical forests (UNEP-WCMC, 2016b).

Africa faces formidable development challenges. Its population growth rate is three times higher than the global average, with expectations of doubling by 2050 (The Economist, 2020). The region also faces serious environmental challenges. According to the United Nations, approximately 65% of the continent's surface area is degraded (UNCCD, 2020). Land degradation, deforestation, and biodiversity loss pose a major threat to food security, public health, and economic livelihoods (IPBES, 2024). Africa is also perhaps the starkest example of a region that, despite its very low contribution to greenhouse gas emissions, remains among the most vulnerable continents in the world (AfDB, 2023). The aim was thus to analyse a country that takes regional leadership on the SDG agenda and faces development challenges. This country was expected to represent a mix of successes and failures in its achievements.

The private sector plays a vital role in socio-economic growth and sustainable development. In Africa, the private sector accounts for over 80% of total production, two-thirds of total investment, and three-quarters of credit within the economy (African Union, 2021, para. 1). It also represents the primary source of employment for people and thus a driver of raising living standards, with nine out of ten jobs in the developing world coming from the private sector (Spicer and Bousuet, 2019).

### **1.3. Research contribution**

The in-depth examination of private climate finance deployed for NbS in a developing country represents makes a contribution to the literature. The relationship between nature, finance, and development remains underexplored. Our understanding of *private* climate finance is still nascent, with very little research focused on practical insights from NbS implementation in developing countries. Addressing environmental issues effectively at scale requires understanding how to finance its solutions. We need an understanding of the organisations, networks, and drivers of NbS financing and insights from case studies. This thesis aims to begin filling this gap by combining a top-down and bottom-up analysis of private climate finance for NbS in a developing country context.

Finally, a noteworthy aspect of this research is its integrated approach, drawing upon and synthesising distinct and somewhat autonomous bodies of literature on NbS and climate finance in a developing country context. This fills a gap, as limited research exists on the specific interplay between these topics.

## 1.4. Structure of the thesis

The remainder of the thesis is structured as follows. I begin with a literature review (**Chapter 2**) to establish the state of knowledge on private climate finance for NbS in developing countries. I draw on the academic and grey literature on finance and NbS. The literature review highlights a significant knowledge gap in available data and understanding how private climate finance is deployed for NbS in developing countries. The third chapter presents the methodology and research approach (**Chapter 3**). I detail the data collection phases and justify gathering empirical data through qualitative interviews. I explain how the case study method was used to study three empirical cases of NbS implemented in Kenya. Here, I explain the research approach and present an overview of the case studies in Kenya.

Next, I present the results (**Chapters 4 to 7**). The first chapter (**Chapter 4**) adopts a top-down perspective to explore the dynamics of climate finance for NbS within the UNFCCC and the national contexts of Kenya and Costa Rica. How have private climate finance and the implementation of NbS historically been conceptualised under the UNFCCC (section 4.2.1)? What is understood as an enabling environment for finance in a developing country? To what extent are NbS implemented in Kenya and Costa Rica (section 4.3.)?

The subsequent empirical chapters (**Chapters 5-7**) present the findings of the bottom-up analysis of the empirical cases on NbS: Komaza (**Chapter 5**), Mikoko Pamoja (**Chapter 6**), and the Upper Tana Nairobi Water Fund (**Chapter 7**). Each empirical case begins with an overview of the relevant literature. I examine how private climate finance is deployed in the NbS, the role of finance, and the barriers and enablers, including the influence of policy. At the end of each chapter, I integrate relevant findings from Costa Rica's Payment for Ecosystem Services programme and other relevant interventions.

The thesis concludes by discussing the key insights on private climate finance for NbS in Kenya, drawing comparisons with Costa Rica and considering implications for developing countries (**Chapter 8**). I identify patterns across NbS case studies and their implications for theory and practice. It also outlines the study's limitations and proposes avenues for future research to advance the understanding of private climate finance for NbS.

## **Chapter 2. Literature review on climate finance for nature-based solutions**

### **2.1. Introduction**

Research addressing the intersection of private climate finance and NbS in developing countries is sparse and inherently interdisciplinary. This chapter examines the state of the literature on climate finance and NbS, including their conceptualisation and deployment (sections 2.2, 2.3, 2.4). I examine the historical, political, and economic foundations of climate finance, and how they shape private climate finance within the UNFCCC. I draw on the political science literature to understand the roles, drivers, barriers and enablers of private sector cooperation on NbS (sections 2.5.1 and 2.5.2). The final section introduces frameworks that support the study (section 2.5.3). In addition to the literature review in this chapter, I present targeted literature relevant to each case study at the start of the corresponding empirical chapters (Chapters 5-7).

### **2.2. Climate finance**

#### **2.2.1. Conceptualising climate finance**

Achieving the UN SDGs and the UNFCCC Paris Agreement requires both a significant increase and a transformation of global financial flows. The term ‘climate finance’ emerged around 2009, and gained increasing use with the adoption of the Paris Agreement, which linked climate finance obligations with the 2°C global warming threshold (Zahar, 2016). Climate finance, as defined by the UNFCCC, is “local, national or transnational financing—drawn from public, private and alternative sources of financing—that seeks to support mitigation and adaptation actions that will address climate change” (UNFCCC, 2025a, para. 1). The concept of mobilising finance to support environmental objectives can, however, be traced further back. For instance, the Stockholm Conference on the Environment (1972) recognised the responsibility of developed countries to compensate developing countries for environmental damage (Ciplet et al., 2022; Newell and Roberts, 2016; Pauw, 2017; Pickering et al., 2015).

There are several rationales for transferring financial resources to developing countries for climate adaptation and mitigation purposes. Some are based on ethical reasons associated to climate change (Eyckmans et al., 2016; Kolstad et al., 2014; Kverndokk and Rose, 2008), emphasising the need to support poverty alleviation and climate resilience, while others are politically oriented, viewing financial resources as a means to achieve the goals of international environmental agreements (Carraro et al., 2006). The international community has

acknowledged the responsibility of polluting countries. The ‘Principle of Common but Differentiated Responsibility and Respective Capabilities,’ formalised at the Rio Conference (1992) and enshrined in the Paris Agreement (2015), recognised the responsibility of historic polluter countries with strong economic capabilities to take the lead on climate action and an obligation to support developed countries with climate finance.

Global climate finance flows have increased from USD 364 billion tracked in 2011 to USD 1.46 trillion in 2022<sup>15</sup> (Naran et al., 2024). This growth is primarily driven by clean energy investments (i.e. climate mitigation) and improvements in data tracking. The IPCC estimates that overhauling global energy systems will require annual investments ranging from USD1.6 trillion to USD3.8 trillion<sup>16</sup> until 2050 (IPCC, 2018). The cost of adaptation in developing countries is estimated at USD 215 billion per year (UNEP, 2023b), while an additional estimated USD 387 billion per year is needed to implement domestic adaptation priorities (UNEP, 2023b).

However, an accurate and comprehensive assessment of climate finance flows remains elusive (UNFCCC, 2022b). First, differences in operational definitions of climate finance across countries and institutions, as well as reporting approaches, render data compilation and comparisons difficult. Second, major data gaps persist and lack granularity around sectors, intervention areas, and sources, especially with regard to domestic and private sector flows.

Although, to date, the majority of climate finance for NbS is provided by public sources, there are increasing calls for private climate finance to play a more significant role. The Paris Agreement emphasises the role of the private sector in Article 2.1(c) where it calls for financial flows to be aligned with the transition to a climate-resilient future (UN, 2015). The GCF, the UNFCCC’s financing mechanism, has objectives to leverage private-sector investments (Baratti, 2023; Kalinowski, 2024b) and has established a workstream on NbS (GCF, 2023a). Recently, the Glasgow Climate Pact adopted a decision recognising the “critical role of protecting, conserving and restoring nature and ecosystems in delivering benefits for climate

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<sup>15</sup> This estimate represents tracked financial flows from public and private sources, both domestic and international, directed toward climate-related projects. The figure (USD 364 billion in 2011) covers investments in mitigation (e.g., energy, transport, buildings, industry, AFOLU, water, and infrastructure), adaptation, and projects with dual benefits. The coverage and confidence of tracking vary by source flows from public international finance are more comprehensively tracked, while domestic public and especially private sector investments remain underreported due to data limitations. (p. 11, Naran et al., 2024).

<sup>16</sup> IPCC Special report (2018) assess investment needs to decarbonize energy supply, increase energy efficiency, electrify transport and eliminate fossil fuel infrastructure without carbon capture.

adaptation and mitigation (UNFCCC, 2021)” (UNEP, 2022, p. 58). A gap in private climate finance for NbS has been noted, with calls for more research into the nature (Karolyi and Tobin-de la Puente, 2023b).

## **2.2.2. Historical, political and economic foundations of climate finance**

### ***International context***

Today’s global climate finance architecture is the result of a complex interplay of historical legacies, political dynamics, and economic priorities (Gupta, 2014). While many attribute the origins of climate finance to the signing of the UNFCCC in 1992, its foundations go back further and are deeply intertwined with the evolution of international development finance. Understanding these foundations reveals the forces that have led to today’s global environmental policy agenda, and how it came to be dominated by an emphasis on markets and private actors.

After the end of World War II, the agreements adopted at the Bretton Woods Conference (1944) established the new, post-war international political and economic order of the 20<sup>th</sup> century. The formation of multilateral organisations such as the World Bank Group and the International Monetary Fund, provided donor countries with an institutional framework to disburse financial assistance, first for the reconstruction of Europe, and later newly decolonized nations and developing countries.

The international finance paradigm focused on large-scale public transfers, often bilateral, but increasingly through the deployment of official development assistance. Wealthy states used foreign aid as a mechanism of control over recipient countries (Blair et al., 2022; Milner and Tingley, 2010; Riddell, 2014). As the Cold War took hold, the institutionalization of aid increased, laying the foundations for environmental and climate finance (Rist, 2006; Sachs, 1992). Recipient nations became increasingly reliant on the Global North. The 1970s and 1980 debt crises in Latin America and Africa exposed the conditionalities and constraints often imposed on developing country recipients (Lucchini, 2025; Martins, 2019; Whitfield, 2009; Wood, 2024), leading many to question its effectiveness.

The end of the Cold War marked the beginning of western liberal capitalism as the dominant framework for international development and environmental policy, fundamentally reshaping its governance (Stiglitz, 2002; Williamson, 2002). The ‘Washington Consensus’ ushered in an

emphasis on market liberalization, privatization, global capital markets, a reduction in public spending and a preference for private capital. The Kyoto Protocol's introduction of market-based Clean Development Mechanism (1997) (Newell and Paterson, 2012) provided a mechanism to attract private capital into low-carbon projects in the Global South while allowing the North to meet emissions targets.

The shift towards neoliberalism in the latter half of the century reflected the rising dominance of financial motives, actors, markets, and instruments. This 'financialisation' was grounded in the assumption that markets are more efficient at allocating financial resources, emphasising the centrality of markets and profitability considerations while viewing grant-based aid as less efficient. Power moved to private actors as could be seen with the rise in risk analytics, ESG ratings and market-driven frameworks such as the Task Force on Climate-related Financial Disclosures and the Glasgow Financial Alliance for Net Zero.

Climate finance was initially framed as a responsibility of the Global North in a spirit of redistributive justice for historical emissions. The principle of Common but Differentiated Responsibilities and Respective Capabilities (CBDR-RC) under the UNFCCC recognized that countries and varying degrees of historical contributions to greenhouse gas emissions and capacity to respond to the shared obligation to address climate change.

As economic liberalism took hold, climate finance became increasingly seen as an investment opportunity with financial products (e.g. green bonds, sustainability-linked loans) imbedded into investment frameworks. Responsibility increasingly became delegated to financial actors, such as institutional investors, asset managers, and financial intermediaries. Governments were prescribed supporting roles, responsible for laying the regulatory and policy frameworks that encourages 'de-risking investments' and 'crowding in' private finance.

There are inherent limitations to the neoliberal foundation and the increasing financialisation of political and economic governance. Critics point to the competing interests and incompatibility between private finance and broader socio-economic and environmental objectives (Bernards, 2023). For instance, critics have highlighted greenwashing by large polluting companies that claim carbon neutrality through the purchase of carbon credits, without taking actions to reduce their emissions. (Galecka-Drozda et al., 2021; Schmuck, 2023; Seymour and Langer, 2021; Van Eijkern, 2024). This approach preserves the status quo rather than the long-term systemic change needed for meaningful climate actions (In and Schumacher, 2021; Li et al., 2023).

The financialization of international environmental governance has also been criticized for posing potential risks (Robertson, 2012). Assigning purely economic values to nature results in its ‘commercialisation’ as an economic asset, such as through carbon and biodiversity credits (Smessaert et al., 2020)

There are also ethical concerns that NbS, implemented through top-down approaches, do not take into proper consideration the needs of communities and obtain their proper consent (Melanidis and Hagerman, 2022). The potential adverse outcome is the perpetuation of power asymmetries between the Global North and South.

Recognizing the limitations of the financialisation of environmental interventions, this study adopts the perspective that mobilising finance should not be seen as the solution but as one critical component, one among many, for scaling and sustaining environmental action when deployed in the right context. Any analysis of climate finance must be understood not only as a technical challenge but one embedded in power relations, path dependencies, and the stakeholder interests.

Climate finance thus needs to be understood within the broader evolution of development finance. Power relations between donor and recipient countries affect climate finance coordination from international to national and subnational levels (Omala, 2023). Development finance institutions are the main mechanisms for official development assistance, including climate finance, but studies have shown that grants no longer represent the main financial instrument, with increasing amounts of loan and debt-based climate financing (Bracking and Leffel, 2021). The emergence of financial instruments such as concessional loans, outcomes- or performance-based payments and blended finance represent a shift from market-based and risk-sharing approaches.

### ***National contexts of Costa Rica and Kenya***

Costa Rica and Kenya have emerged from distinct political and economic histories, which in turn shaped the dynamics of private climate finance in each country. Costa Rica, a former Spanish colony, obtained independence in 1821, and developed into a relatively stable democracy since 1948 (Rankin, 2012). Small, and technocratic, the country quickly moved to abolish its military in 1948, turning instead towards building the foundations of a social democracy that directed funds into education, health and environment (Alvarez-Echandi,



2023; Rankin, 2012). State-led development emphasized strong institutions and government capacity to receive international aid and leverage domestic finance.

Today, Costa Rica boasts strong developmental achievements, ranking highly across socio-economic indicators and often surpassing its neighbours. It ranks among the top in the region for healthcare, education, and foreign investment, while remaining low in corporate competitiveness (Golob, 2020).

Early on, the country's political leadership recognized the importance of a green future for the country. The country was an early adopter of the concept of payment for ecosystem services and carbon finance, pioneering REDD+ project implementation. Costa Rica also displayed a strong ability to apply a nationally integrated, state-led approach to the financing and implementation of environmental policy, establishing key institutions such as FONAFIFO, SINAC and MINAE. Despite these initial successes and becoming one of the wealthiest countries in Central America by 1980 (Marois, 2005), the country faced its share of challenges. A major debt crisis in the 1980s, revealed a heavy reliance on foreign aid similar to its Central American neighbours led to significant restructuring of the state and "opened the door for neoliberal reform" (p. 103, Marois, 2005). These changes also made way for multilateral negotiations for the country's debt restructuring, which included environmental conditionalities. The country's first national-scale nature finance mechanism emerged in 1997, via a debt-for nature swap, and a national payment for ecosystem service programme funded by its fuel tax and international donors.

Kenya had a very different institutional, political and economic history. Gaining independence in 1963, the country emerged out of an extractive, centralized, top-down colonial legacy (Hornsby, 2013). Its post-independence years were characterized by instability, land conflicts and ethicized politics, with periods of autocracy (Ajulu, 2002; Hornsby, 2013; Orvis, 2006). While the Kenyan Government recognized the state's role in leading development, such as for the building of infrastructure and the agricultural sector, there was a strong focus on encouraging private sector participation early on after independence (Fahnbulleh, 2006).

The early 2000s ushered in democratization and legal reform with a focus on economic growth and the introduction of multi-stakeholder platforms. Today, Kenya has a mixed institutional landscape, displaying on the one hand, strong regional leadership and adopting ambitious legal frameworks, for instance on Africa's adaptation and climate justice agenda, but on the other, displays complex institutional overlaps with agencies and local level governance institutions, and challenges in domestic finance mobilization for development (Njenga et al.,

2006; Ochieng, 2018). The country has taken steps to decentralize some of its financing and planning authority, providing counties with independent budgets and governance models, such as through the County Climate Change Funds (Kiiru, 2016; Murphy and Orindi, 2017). Kenya has several institutional actors involved in environmental governance, including the National Environment Management Authority, Kenya Forest Services, National Treasury.

When taken together, the analysis of historical, political, and economic foundations reveals the importance of understanding climate finance in a historical and institutional context. In both Costa Rica and Kenya, the post-independence period laid the groundwork for their nation's respective development paths, and it is the structural dynamics that emerged during this period that continue to shape the deployment of climate finance today. At the international level, climate finance flows from the Global North to the Global South have, in many ways, been directly inherited from the global development finance agenda (Ciplet et al., 2015). Mechanisms, such as earmarking resource allocations (Graham and Serdaru, 2020), blended finance, concessional loans and performance-based payments are examples. Structural inequalities, power asymmetries, institutional capacities and colonial legacies, which have long influenced development aid, continue to shape the disbursement of climate finance in developing countries. The decisions, deployment, enablers, barriers and outcomes must therefore be understood in both national and international contexts.

## **2.3. Dimensions of climate finance deployment**

### **2.3.1. International vs. domestic climate finance**

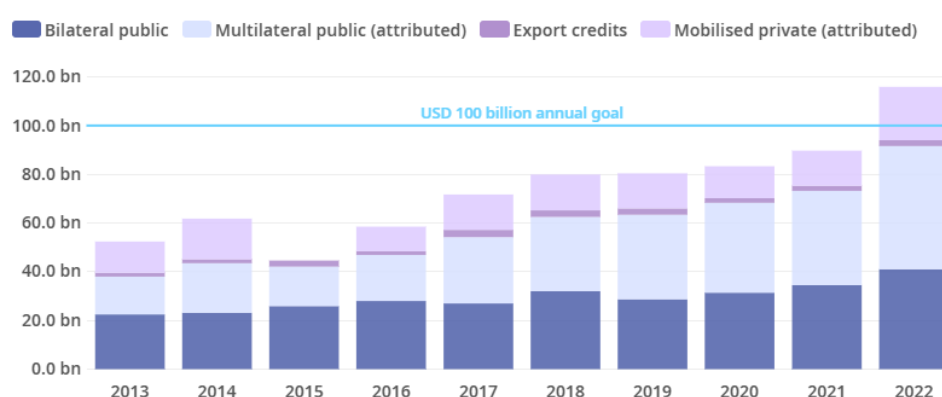
The first dimension for understanding climate finance is whether it is sourced internationally or domestically. 'International' is understood to be any climate finance sourced from the Global North or, in other words, developed countries. It includes both private and public sources. The literature review on climate finance points to a predominant focus on international flows and the application of a top-down approach, especially from the global North to the global South (Buchner et al., 2020, n.d.; IEA, 2017; OECD, 2016). A search on climate finance in Scopus confirmed this bias. Out of 318 search results for 'climate finance,' 111 focused on international dynamics, compared to 52 focusing on national dynamics.<sup>17</sup> However, shortcomings of international public climate finance have been documented (Bowen et al., 2017). This has led some to call for mobilising more sources of finance, such as domestic and private sources.

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<sup>17</sup> Search and analysis were conducted in 2023.

The figure below is an assessment by the OECD of international climate finance, highlighting that the USD 100 billion goal was only achieved in 2022 (OECD, 2024). Additional comments on this figure will be made in the respective sections below.

**Figure 2.1. International climate finance mobilised by donor countries for developing countries in relation to the USD 100 billion target**



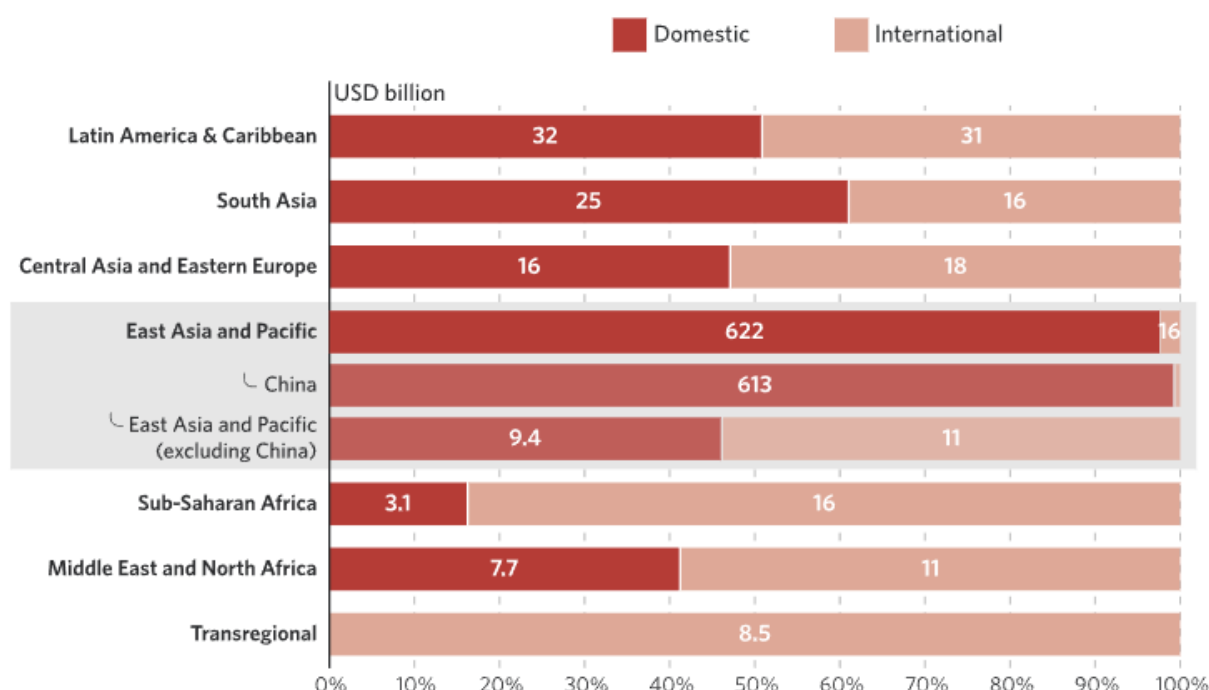
Source: OECD (2024)

\*No private sector data available for 2015

There has been extensive research into development finance and its effectiveness. Some of that literature has examined the twin needs of poverty alleviation and environmental protection (Markandya, 2001; Pearce et al., 1990). Others have examined the effectiveness of climate finance as 'aid' (Bourguignon and Sundberg, 2007; Collier and Dollar, 2004, 2002; Easterly and Pfutze, 2008; Fankhauser and Pearce, 2014).

The second dimension is 'domestic' climate finance, or finance sourced and distributed in the same country. Domestic climate finance is important for several reasons. First, at the global level, approximately three-quarters of climate finance remains in its country of origin (CPI, 2019). Moreover, 58% of the domestically funded climate projects were financed by private sector sources (CPI, 2021). This is different according to the region (Naran et al., 2024). The figure below (Figure 2.2.) reveals, for instance, that only about 15% of climate finance is sourced domestically in Sub-Saharan Africa, but the share is much more balanced in Latin America and the Caribbean, where it is almost equal.

**Figure 2.2. Domestic and international climate finance flows in developing countries (2022)**



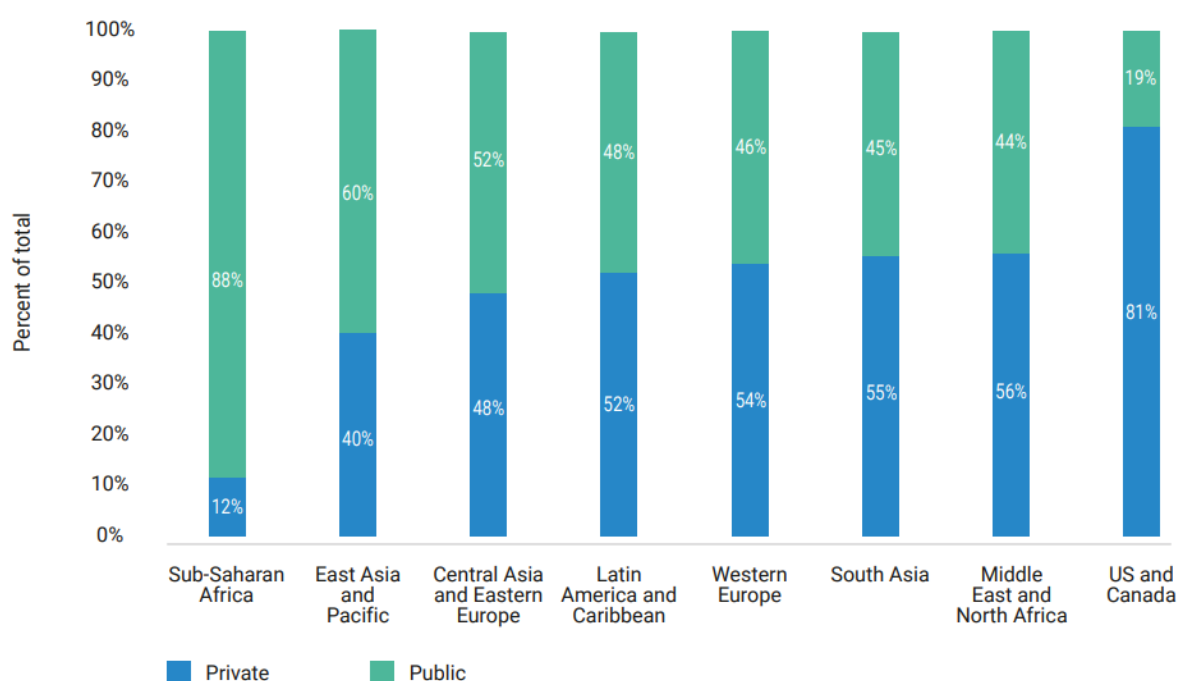
Source: Naran et al. (2024)

There are several benefits of applying a ‘domestic climate finance’ lens (Naidoo et al., 2014). It acknowledges governments’ role in aligning finance with national development plans and climate policy objectives (Watson, 2016). This also allows for a more effective mobilisation of financial resources and directs them towards funding gaps at the national and sub-national levels. The country-driven nature of NDCs provides an opportunity for governments to make financial commitments (Whitley et al., 2018). It could also be viewed as a means for institutional strengthening and domestic ownership of policy agendas: “ensuring domestic ownership of policy agendas by international funds has been a long-standing theme of the aid effectiveness literature” (Winkler and Dubash, 2015). It provides a platform for the exchange of knowledge and internal dialogue between key stakeholders at the national and international levels, as well as between public and private actors (Piron and Evans, 2004; Winkler and Dubash, 2015). Early assessments of climate finance at the national level have been conducted in a few African countries, including Kenya (Government of Kenya, 2021a; Odhengo et al., 2019, 2021), Ghana (Nakouwo and Zhang, 2024). Some have taken a regional approach for assessing climate finance on the continent, but most examine climate finance in energy-related sectors (Doku et al., 2021; Jakob et al., 2014; Michaelowa et al., 2021; Mungai et al., 2022).

### 2.3.2. Public vs. private climate finance

Another dimension in deploying climate finance is its source—whether it involves public or private climate finance. For instance, of the global international climate finance mobilised (see figure 2.3.) in 2021, only USD 14.4 billion was mobilised from the private sector (OECD, 2024, 2023b). The private sector contributes 12 % of total climate finance in Africa (GCA, 2024). This disparity is even more significant among private contributions for *adaptation* activities in Africa, where the figure is estimated to be less than 3 % (GCA, 2024).

**Figure 2.3. Climate finance tracked by region and source (2021-2022)**



Source: GCA (2024)

In recent years, there have been attempts to incorporate NbS into climate finance calculations (Meyers et al., 2020). Finance for NbS is estimated at approximately USD 200 billion, with the majority coming from public sources (~83 %) and only a fraction from private sources (UNEP, 2023a).

**Figure 2.4. Global climate finance flows into NbS**



Source: UNEP (2023a)

Despite the low share of private climate finance, several market-based mechanisms and instruments are driving them, including nature-based carbon and biodiversity offsets or credits and sustainable supply chain investments (UNEP, 2023a) (Landholm et al., 2022b). However, a breakdown of the percentage of these domestic versus international flows is unclear. According to Ecosystem Marketplace, the voluntary carbon market surpassed USD 1 billion for the first time in 2021 (Ecosystem Marketplace, 2021). Some of these markets are driven by regulation in compliance markets. Through voluntary and compliance forest carbon offset markets, payment for ecosystem services has gained popularity in lower-middle-income countries, directing significant private investment into REDD+ programs. Estimates suggest that USD 1.393 billion and USD 3.907 billion have been invested in the voluntary and compliance forest carbon offset market, respectively (Ecosystem Marketplace, 2021). Bonds have emerged as a growing debt financing instrument to direct finance towards NbS, coming in various forms, including green, blue, sustainability, conservation, and restoration bonds. This will be discussed further in the next section.

### 2.3.3. Climate finance instruments

A third dimension of climate finance deployment relates to the specific climate finance instrument or mechanism. The OECD study on climate finance defines climate finance instruments primarily along two categories: grants and debt instruments (OECD, 2021). This is an important distinction in international development finance, as the former refers to funding provided without repayment and thus without an immediate financial return to the provider. Debt instruments, on the other hand, require repayment, usually with interest. Some have criticised the Global North for benefiting from the heavy reliance on debt financing by poorer nations.

Studies on the distribution between grant and loan instruments show varying results. At the global level, the OECD (2021) points to the majority of climate finance for developing countries to be disbursed in the form of non-reimbursable grants (57%), with a significant amount provided in the form of debt instruments (39%) (OECD, 2021). Another study showed that loans are the primary climate finance instruments used by multilateral development banks (MDB), accounting for almost 70 % in 2020, followed by policy-based financing (~12%) and grants (8%) (Xie et al., 2023). Developing countries have criticised the inclusion of debt finance towards the global goal contribution (USD 100 billion), arguing that it goes against the spirit of the Paris Agreement, which aims to provide 'new and additional' finance for meaningful support to developing countries (Gabbatiss, 2021).

There have been several attempts at mapping financial instruments for NbS-related interventions. Kedward et al. (2023) identify financial instruments for nature, but focus on nature conservation, one of the three core components of NbS, alongside restoration and improved land use activities. Brears (2022) compiles an overview of financial instruments for NbS, including both public and private instruments, as well as blended finance mechanisms. The table below builds on the financial instruments identified by Kedward et al. (2023) and Brears (2022), and expands beyond conservation to include instruments addressing restoration and more sustainable land use practices. Table 2.2. also incorporates additional financial instruments (Brears, 2022; CPI, 2019; Deutz et al., 2020; Haites, 2013; UNEP(a), 2022). Table 2.2 below organises these instruments in alphabetical order for the reader's convenience. Den Heijer and Coppens (2023) developed a matrix typology for financial models to differentiate between public and private financiers and return expectations.

**Table 2.1. Financial instruments for NbS**

| Instrument                                        | Description                                                                                                                                                                                                                                                                                                                                                                         | Financing source |        |         |
|---------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------|--------|---------|
|                                                   |                                                                                                                                                                                                                                                                                                                                                                                     | Private          | Public | Blended |
| Biodiversity credits                              | Payments made to a stakeholder to finance restoration and/or conservation actions that result in measurable positive outcomes for biodiversity.                                                                                                                                                                                                                                     | x                |        |         |
| Biodiversity offsets                              | Payments made to a stakeholder to finance restoration and/or conservation actions, compensating for the damaging impacts on biodiversity resulting from their activities.                                                                                                                                                                                                           | x                |        |         |
| Carbon credits                                    | Payments made to a stakeholder to finance actions representing a reduction or removal of a specific amount of greenhouse gas emissions, often generated through emissions reduction projects.                                                                                                                                                                                       | x                |        | x       |
| Carbon offsets                                    | Payments made to a stakeholder to compensate for carbon emissions by investing in projects that reduce or remove an equivalent amount of greenhouse gases from the atmosphere.                                                                                                                                                                                                      | x                |        | x       |
| Nature-based inseting (sustainable supply chains) | Actions to evaluate, monitor and reduce corporate impacts, risks, and dependencies on nature. This approach entails establishing evidence-based targets (e.g. SBTN <sup>18</sup> ) to redirect finance in a way that minimises adverse effects on the environment while concurrently investing in activities that promote a positive impact on nature.                              | x                |        |         |
| Conservation and restoration bonds                | Debt instruments that support conservation and/or restoration projects, aiming to preserve natural habitats and biodiversity while generating a return. Interest payments are directed towards funding conservation activities rather than being given to investors; if successful conservation outcomes are realised, investors receive a performance-based payment upon maturity. |                  |        | x       |
| Concessional loans                                | Also referred to as 'soft loans,' these are debts provided at an interest rate below the prevailing market rate.                                                                                                                                                                                                                                                                    |                  |        | x       |
| Market rate loans                                 | Debt instruments in which funds are borrowed at the market interest rate to support NbS implementation.                                                                                                                                                                                                                                                                             | x                |        |         |
| Debt-for-nature swaps                             | Public debt restructuring transaction in which a portion of a country's debt is forgiven or restructured in exchange for the country's commitment to invest in conservation and environmental projects.                                                                                                                                                                             |                  | x      | x       |
| ESG standards                                     | A set of voluntary standards that evaluate the ESG conduct of stakeholders, commonly used to inform investment decisions.                                                                                                                                                                                                                                                           | x                |        |         |
| Equity                                            | The transformation of capital contributions into shareholder ownership, offering returns on investment based on the entity's performance and growth.                                                                                                                                                                                                                                | x                |        |         |

<sup>18</sup> Science-based Targets for Nature (SBTN, 2025).



|                                       |                                                                                                                                                                                                                                                                                                                                                |   |   |   |
|---------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---|---|---|
| Green/blue bonds and loans            | Debt instruments where proceeds are exclusively directed to funding specified 'green' (terrestrial sustainable environmental activities) or 'blue' activities (marine or aquatic conservation or sustainable ocean management) with predefined environmental or ecological criteria.                                                           | x | x |   |
| Grants                                | Grants are transfers in cash or in-kind for which no legal debt is incurred by the recipient. Grants may also include knowledge management programs (e.g. technical assistance, capacity building).                                                                                                                                            | x | x | x |
| Payments for ecosystem services (PES) | Payments made by stakeholders for the benefits they receive from well-maintained ecosystems.                                                                                                                                                                                                                                                   | x | x | x |
| Policy incentives                     | Regulatory measures, fiscal tools, and supportive frameworks implemented by governments to encourage private and public investment. This may include regulatory reform, such as tariffs, tradable certificates, tax incentives, subsidies, and harmful subsidies reform.                                                                       |   | x | x |
| Risk management                       | Instruments that mitigate investment risks (e.g. export credits, guarantees and finance-enhancing instruments). These instruments are most developed for climate mitigation activities (e.g. clean investments) but are also emerging for NbS.                                                                                                 | x |   | x |
| Risk disclosure frameworks            | A set of voluntary standards that enable stakeholders to identify, measure, manage and disclose their exposures to climate and nature-related business and financial risks. <sup>19</sup>                                                                                                                                                      | x |   |   |
| Sustainability-linked bonds/loans     | Primarily, debt and equity that facilitate the flow of investment capital into companies and projects that have a positive impact on climate and/or nature.                                                                                                                                                                                    | x |   |   |
| Policy performance bond               | Bonds issued by governments or public entities. They tie yields to the extent to which policy objectives are achieved.                                                                                                                                                                                                                         |   | x |   |
| Tradeable permits                     | Tradeable permits are authorisations issued by governments or regulatory bodies that allow companies to emit a specific quantity of greenhouse gases. These permits can be bought, sold, or traded among entities, providing a market-based mechanism for incentivising emission reductions and promoting overall emissions reduction targets. | x | x |   |

Source: Authors adaptation from Kedward et al. (2023).  
Categorisation derived from: Haites (2013), Buchner et al. (2020), UNEP (2023a), Brears (2022).

<sup>19</sup> See, for instance, the guidelines and recommendations published by the Taskforce for Climate-related Financial Disclosures (TCFD, 2025) and the Taskforce for Nature-related Nature Disclosures (TNFD, 2025).

Governments have considerable influence in shaping market-like environmental mechanisms, while also serving as the predominant direct consumer of environmental services (Kedward et al., 2023). Blended finance “combines public and private climate finance so that public money is used to de-risk an investment for the private sector by assuming the position of an anchor investor providing debt, equity or a guarantee to bring the risk/return profile of the investment to a level that can attract private financiers” (Pettinotti and Quevedo, 2023, p. 19). Blended finance often utilises mechanisms such as public-private partnerships or intermediaries such as development finance institutions, which tend to be backed by governments and combine public and private ownership structures (Te Velde, 2011). The table above highlights the extent to which public finance is used to leverage private sources via blended financing structures (Koppenjan, 2015; Liberalesso et al., 2020). There is a growing body of literature that examines climate financial instruments that rely on public or blended finance: conservation and restoration bonds (Brand et al., 2021; Thompson, 2023, 2022), concessional loans (Marsters et al., 2021), debt-for-nature swaps (Brears, 2022), and payments for ecosystem services (Trémolet et al., 2021).

There is also growing interest in the potential for private climate finance instruments for NbS. Despite only representing a small portion of global NbS finance, the number of instruments utilised for NbS is proliferating, many of which are in fact not new but rather repurposed financial instruments. For instance, nature-based inseting (e.g. sustainable supply chains), ESG standards and sustainability-linked bonds or bonds have been expanded to focus on nature or NbS specific intervention areas. Similarly, other instruments, such as biodiversity credits (Anna Ducros, 2022; Peng et al., 2024; Wunder et al., 2025) draw from carbon credit markets. The motivations and roles of private climate finance will be discussed in greater detail in sections below.

#### **2.3.4. Climate finance allocation**

The fourth dimension of climate finance is its allocation or ‘use.’ Which sectors, projects and types of interventions receive funding? Which intermediaries and channels are involved in the deployment of climate finance? The latest UNEP (2023) report estimates that approximately USD 200 billion flows into NbS; however, this figure encompasses climate finance across a broader scope, including land degradation and biodiversity loss. Buchner et al. (2023) offer a narrower scope by only tracking mitigation and adaptation finance current AFOLU investments, which they estimate globally to be at USD 43 billion, or 3.3 % of overall climate finance. However, here too, significant data gaps remain (Nature4Climate, 2025). Because

climate finance tracking methodologies are not standardised, some tag NbS as ‘dual purpose’ for climate and adaptation activities (e.g. Buchner et al., 2023), while others break down NbS finance to a more granular level, using three primary categories: protection, restoration and sustainable land management (UNEP, 2023a). For instance, in short, an exact figure on current annual investments of NbS for climate mitigation and adaptation is absent.

Despite data gaps, some additional insights can be made. First, existing data have long indicated a global imbalance in mitigation-adaptation finance, with the majority of climate finance flowing into mitigation activities. Only about 10 % to 20 % of global climate finance is estimated to flow into adaptation (Buchner et al., 2019), of which the majority is publicly funded (~98%) (Buchner et al., 2021). While this imbalance is stark at the global level, at the intermediary level, the imbalance depends on the financing institution or entity. Development finance institutions in developing countries aim to achieve a greater balance of climate finance or even prioritise adaptation finance. The African Development Bank Group, for instance, disbursed almost half of its climate finance budget (44% of its 5.8 billion climate finance budget) into adaptation activities (AfdB, 2024). The participation of the private sector in adaptation activities has been a challenge, with estimates of less than 3% of total climate adaptation finance between 2019 and 2022 (GCA, 2024), derived primarily from philanthropic actors.

Africa faces the largest adaptation finance gap as a percentage of GDP (approximately 2% of GDP) (GCA, 2024). Moreover, Africa’s climate finance flows are concentrated in only a few countries. More than 50% of adaptation finance flows into 10 countries, while the bottom 10 recipient countries receive approximately 1% of adaptation finance on the continent (GCA, 2024).

Second, at the global level, when examining NbS finance broadly across issue areas, a significant proportion of NbS finance flows into the protection of biodiversity and landscapes and sustainable agriculture, forestry and fishing—both categories from public government sources (UNEP, 2023a). Among private sector finance for NbS, the majority goes into biodiversity offsets and credits and sustainable supply chains (UNEP, 2023a). Negative public financial flows are significantly more substantial than positive investments into NbS (UNEP). Governments are estimated to provide between USD 500 billion and USD 1 trillion in environmentally harmful subsidies annually, a figure that is reportedly up to five times greater than global finance flows into NbS (UNEP(a), 2022; UNEP(b), 2022).

Major data gaps on the deployment of climate finance for NbS, especially in Africa, continue to exist. A recent study on financing sources for NbS in Africa (Pettinotti and Quevedo, 2023) point to very little data available on private climate finance beyond the regional level or urban focus (Biasin et al., 2024). Studies often conflate financial instruments with types of financial flows due to a lack of detailed data. Furthermore, the absence of a breakdown specifying how financial flows are allocated across climate action, biodiversity, and other environmental objectives (e.g., land neutrality goals) results in a lack of clarity about which specific goals are being addressed. Another significant challenge is the substantial gap in private climate finance flows. For example, in the study on financing for NbS in Africa (Pettinotti and Quevedo, 2023), in the category of conservation NGOs, the data only includes expenditures reported by the five largest organisations, leaving out more minor contributors. Additionally, the lack of granularity is apparent in categories such as payments for ecosystem services, which are often classified as a private sector source, even though governments are also known funders of such programs.

### 2.3.5. Typology of climate finance for NbS

The following section consolidates the findings on the dimensions of climate finance by presenting a typology of climate finance adapted to NbS (see Figure 2.5. below). Buchner et al., (2011) provided the first framework for understanding the dimensions of climate finance (Buchner et al., 2011). The dimensions are categorised by *sources* of finance,<sup>20</sup> *finance intermediaries*,<sup>21</sup> *financial instruments*,<sup>22</sup> and *uses*,<sup>23</sup> while *finance channels*<sup>24</sup> cuts across

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<sup>20</sup> Sources of climate finance include both public finance (e.g. from general taxes, carbon pricing mechanisms) and private sources (e.g. philanthropy, global capital markets), as well as blended sources (e.g. offset markets and voluntary/carbon markets) (Buchner et al., 2013).

<sup>21</sup> The concept of finance ‘intermediaries’ recognises that most climate finance is not distributed directly by governments or private actors to end-users. Rather it is often distributed through government agencies and development banks (e.g. bilateral and multilateral banks and agencies) (Buchner et al., 2013).

<sup>22</sup> Finance ‘instruments’ are contractual arrangements and mechanisms that facilitate the allocation of capital towards nature-based solution projects and activities. Buchner et al. (2013) identify seven major categories of climate finance instruments, but this has been expanded by the author in the figure below to include instruments unique to nature-based solutions (e.g. debt-for-nature swaps) but also to cover emerging innovative financing instruments (sustainability-linked bonds/loans).

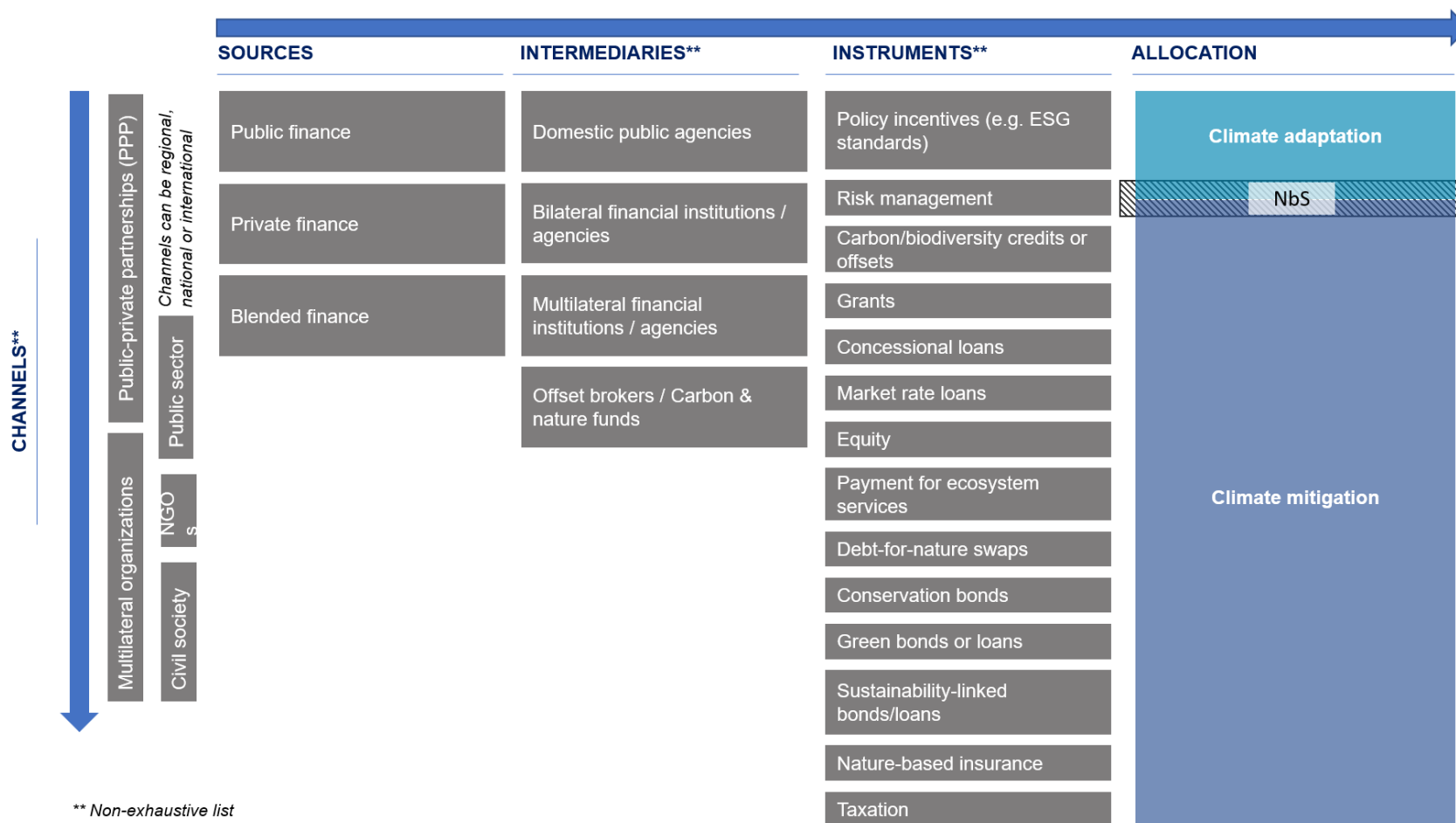
<sup>23</sup> Finance for climate is directed towards climate mitigation (e.g. energy efficiency, renewable energy), climate adaptation, and some having a dual purpose. Finance can also be directed for nature-related conservation and/or restoration purposes (e.g. biodiversity protection; sustainable agriculture, forestry, fishing; water resources, conservation, land management; sustainable supply chains) (Buchner et al., 2013; UNEP(a), 2022).

<sup>24</sup> Disbursement ‘channels’ are those organisations that work directly to disburse funds for nature-based solution initiatives and projects, including those from the public sector, public-private partnerships (PPP), multilateral organisations, NGOs, and civil society (Buchner et al., 2013). Climate adapt

these dimensions. *Intermediaries* play an important role in blended finance by organising transactions, bringing stakeholders together, and facilitating the blending process (Brears, 2022). Both private actors (e.g. private fund managers, local financial institutions, and NGOs) and public actors (e.g. donor countries) rely on intermediaries for the disbursement of funds.

As we have seen above, terminology on climate finance often encompasses multiple aspects: source of finance (e.g., public or private sector, international organisations, bilateral donors); recipient (e.g., developing country governments, private sector, institutions); instruments or mechanisms (e.g., loans, development aid, co-financing, green bonds); and the policy areas being financed (e.g., adaptation, mitigation, or direct/indirect climate change-related activities).

**Figure 2.5. The dimensions of climate finance for nature-based solutions**



Source: Author's own representation, based on frameworks from Buchner et al. (2011), Buchner et al. (2019), UNEP (UNEP(a), 2022)

One of the shortcomings of the Buchner et al. (2011) framework is that it doesn't explicitly examine NbS. To reconcile this shortcoming, more recent publications from UNEP's framework (2022, 2023) have been consulted to be more adapted for climate finance directed at NbS. One of the challenges, however, is that studies often confound finance 'uses' with 'instruments' (see, for instance, UNEP State of Finance for Nature, 2022). UNEP-FI's studies use its own categories of finance but do not use the dimensions of finance consistently. For instance, the assessment of public and private climate finance in terrestrial and marine nature-based solutions calculates the financial flows into specific sectors (e.g. agriculture, forestry, water) in the same category as financial instruments such as payment for ecosystem services and impact investing.

## **2.4. Nature-based solutions**

### **2.4.1. Conceptualising nature-based solutions**

In 1987, the United Nations Brundtland Commission's published *Our Common Future*, laying the foundation for today's modern understanding of sustainable development and the underlying interconnectedness between environmental, economic, and social objectives (Brundtland, 1987). Since then, the concept of nature's provision of ecosystem services has emerged, emphasising the benefits that nature provides for humans (Costanza and Daly, 1992; Daily, 1997; Gómez-Baggethun et al., 2010; TEEB, 2010). Numerous governments and public institutions have since adopted policies that recognise our dependence on these ecosystem services, including conventions under the United Nations (CBD, 1992; UN, 2015), international assessments (IPBES, 2019; MA, 2005; TEEB, 2010), and regional frameworks (European Commission, 2021; UN, 2015).

*"Nature-based solutions are actions to protect, conserve, restore, sustainably use and manage natural or modified terrestrial, freshwater, coastal and marine ecosystems, which address social, economic and environmental challenges effectively and adaptively, while simultaneously providing human well-being, ecosystem services and resilience and biodiversity benefits."*<sup>25</sup>  
(UNEA, 2022, para. 1)

Research on NbS implementation and sustainable development (Chausson et al., 2020a; Cohen-Shacham et al., 2019; Seddon et al., 2021; Spicer and Bousuet, 2019) has grown in

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<sup>25</sup> For an explanation on the difference between nature-based solutions and 'natural climate solutions' see footnote 4 in Chapter 1.

recent years, encouraged by decisions adopted by international bodies, like the United Nations Environmental Assembly and the Rio Conventions (CBD Secretariat, 2023).

NbS are inherently broad in scope, but recent work has aimed to clarify their core concepts and exclusions (Kumar et al., 2020; Moosavi, 2022; Sowińska-Świerkosz and García, 2022). NbS are “inspired and powered by nature, [...] address (societal) challenges, [...] provide multiple services/benefits, [...] and are of high effectiveness and economic efficiency” (Sowińska-Świerkosz and García, 2022, p. 2). Excluded are random actions, post-implementation efforts to incorporate nature, or activities that fail to contribute to biodiversity enhancement (Sowińska-Świerkosz and García, 2022).

One example of NbS is the restoration of watersheds for carbon sequestration, improved water quality and quantity, reduced water treatment plant operation and maintenance costs, and improved biodiversity (Duarte et al., 2013; Espinal-Giron et al., 2023; Kang et al., 2023; Shemie, 2021). Another example is the protection of mangrove forests in coastal areas to reduce flooding, protect local communities and infrastructure from rising sea levels, and improve the biodiversity of local ecosystems (Arifanti et al., 2022; Blankespoor et al., 2017; Damastuti et al., 2022; Menéndez et al., 2020a). A third example is land management practices that integrate trees and other vegetation into agricultural systems through agroforestry to improve soil health, enhance biodiversity, sequester carbon and provide additional income sources to farmers (Kumar et al., 2020; Telwala, 2023; van Noordwijk, 2021).

NbS can provide an integrated approach to address multiple environmental challenges (IPBES, 2019, 2018; Raymond et al., 2023). In terms of climate mitigation, studies have shown that NbS can play an important role in limiting temperatures from rising to 1.5 °C or 2°C above pre-industrial levels (Girardin et al., 2021; Griscom et al., 2017; Roe et al., 2021), especially through the protection of carbon-rich, high-biodiversity ecosystems (Cook-Patton et al., 2021; Noon et al., 2022; Waring et al., 2020). Estimates of the extent to which NbS can limit global temperatures vary widely, depending on the methods and assumptions applied. A report by UNEP and IUCN estimates that NbS could contribute approximately 30 % or 5-15 GtCO<sub>2</sub>e per year (IUCN, 2020). Higher estimates of land-based mitigation globally assume a higher price for carbon (> USD100 per tonne), fewer implementation challenges (e.g. permanence, leakage, additionality, finance, governance, on-the-ground capacity), include a wide range of ecosystems and do not necessarily differentiate between activities such as reforestation and afforestation (Nolan et al., 2021; Seddon, 2022).



In terms of climate adaptation, studies indicate that NbS can strengthen the resilience of local communities (Manes et al., 2021; Seddon, 2022; Turner et al., 2022). However, significant knowledge gaps persist, particularly regarding quantitative analyses of NbS potential. Some studies have undertaken quantitative impact assessments of specific NbS interventions. For instance, mangroves are estimated to reduce property damage from floods by more than USD 65 billion and protect over 15 million people against flooding annually (Menéndez et al., 2020a, p. 1). Certain land management practices, such as improved cropland management and agroforestry practices, can provide significant climate adaptation benefits (Smith et al., 2019). Nevertheless, studies on the potential contribution of NbS for adaptation tend to focus on specific NbS interventions and/or urban systems in developed countries (Goodwin et al., 2024). There is a need for more research on NbS contributions to joint climate mitigation and adaptation objectives, especially considering the existing evidence suggesting shortcomings in our abilities to effectively adapt to climate change (Berrang-Ford et al., 2021). This is of particular importance for developing countries where the gap between the finance needs of climate adaptation and action is widening, currently estimated at 5 to 10 times more than the available funding (UNEP, 2021a).

NbS provide a range of ecosystem services that contribute to the wider UN Sustainable Development Goals (SDGs). The Millennium Ecosystem Assessment (MA, 2005) categorises ecosystem services into four areas: provisioning services, regulating services, cultural services and supporting services (Reid, et al., 2005). Ecosystem services are essential when examining NbS because they determine the benefits stakeholders gain from the restoration, conservation or sustainable management of natural ecosystems. The more types of ecosystem services an NbS provides, the more compelling from a cost-benefit perspective (Seddon et al., 2020).

**Table 2.2. Ecosystem services provided by nature-based solutions**

| Type of ecosystem service | Definition                                                   | Examples                                                                    |
|---------------------------|--------------------------------------------------------------|-----------------------------------------------------------------------------|
| Provisioning services     | Products obtained from ecosystems                            | Food, fresh water, wood, fiber, fuel                                        |
| Regulating services       | Benefits obtained from the regulation of ecosystem processes | Climate regulation, food regulation, disease regulation, water purification |
| Cultural services         | Non-material benefits people obtain from ecosystem services  | Aesthetic, spiritual, educational, recreational                             |
| Supporting services       | Services necessary to produce all other ecosystem services   | Nutrient cycling, soil formation, primary production.                       |

Source: Reid, et al. (2005) and Brears (2021)

At their core, NbS are designed to address the interdependent design of the SDGs (Cohen-Shacham et al., 2019). As Seddon et al. (2020) point out, a significant part of addressing the three central development challenges—climate mitigation and adaptation, biodiversity protection, and human wellbeing—together is crucial. Meeting the Paris Climate Agreement goals relies on the effective conservation, restoration, and management of biodiversity (UNEP(a), 2022), as well as the alignment with social and economic priorities. Recent years have seen an increase in research on the multifunctional design of NbS in addressing climate mitigation (Bastin et al., 2019; Griscom et al., 2020, 2017; Seddon et al., 2020), climate adaptation (Chausson et al., 2020a; Jones et al., 2012; Woroniecki et al., 2023), biodiversity loss (Raymond et al., 2023) and societal challenges (Seddon et al., 2020), but rely primarily on evidence in developed country contexts (Nesshöver et al., 2017). Recently, there has been progress on systematically categorising NbS (Anderson and Gough, 2022; Roe et al., 2021), including domain-specific typologies, such as for water management (Woo and Han, 2020), agricultural landscapes (Simelton et al., 2021), and disaster risk reduction (Nehren et al., 2023).

### **2.4.2. Nature-based solutions in developing countries**

Research on NbS implementation in developing countries is limited (Atteridge et al., 2022) and tends to focus on specific activities (Asamoah et al., 2024; Cooper and Matthews, 2020; Fonseca et al., 2022), regions (Châles et al., 2023; Lechner et al., 2020) or urban areas (Mahmoud et al., 2022; Menon and Sharma, 2021; Pedersen Zari et al., 2019). The literature tends to examine NbS issue areas in isolation, focusing specifically on either climate mitigation (Gopalakrishnan et al., 2019; Jin et al., 2020), climate adaptation (Castelo et al., 2023; Depietri and McPhearson, 2017; Woroniecki et al., 2023), or biodiversity (MacKinnon et al., 2019; Xie and Bulkeley, 2020). Moreover, attention has concentrated on public finance sources for NbS in developing countries. A few systematic reviews on NbS on the continent are beginning to emerge (Asamoah et al., 2024; Olago et al., 2024).

While interest in NbS for climate action in Africa has increased in recent years, case studies on the continent are limited (Dupar et al., 2023). Some exceptions exist, however: NbS interventions for water resource management (Acreman et al., 2021; Boelee et al., 2017; Okello et al., 2024), drought and flood risk mitigation (Kalantari et al., 2018), carbon emission mitigation (Holden et al., 2022) and climate resilience on the continent (Debele et al., 2023). National NbS studies on empirical cases in Africa are beginning to emerge in countries like Ghana (Corti, Assumma and Pittau, 2023), but are concentrated on a few countries, with one bibliometric study suggesting almost half are in South Africa (Nyika and Dinka, 2022).

There are a few studies on NbS in Kenya and East Africa, but they are not explicitly labelled as such. Rather, they are NbS intervention-specific (e.g. flood-drought risk mitigation, water security, food security), thus lacking a holistic approach to studying them (Kalantari et al., 2018). For example, mangroves have been studied in Kenya for their carbon storage potential (Gress et al., 2016) and for broader scientific purposes (Bosire et al., 2014, 2008; Gang and Agatsiva, 1992), but there has been limited research on how these activities function within broader efforts on climate action.

Despite Costa Rica's global recognition for its green transition, NbS-specific research within the country appears limited. For instance, one study (Neumann and Hack, 2022) assessed the costs and benefits of river restoration in metropolitan areas, but such research is scarce. The existing literature on NbS in Costa Rica primarily focuses on water projects (Espinal-Giron et al., 2023; Schröter et al., 2023) and urban areas (Chen et al., 2021). While there are studies on interventions that could qualify as NbS (e.g., green infrastructure), they often do not fully apply the NbS framework to evaluate the broader benefits to people, the economy, nature, and climate change. A recent report on private sector uptake of NbS in Latin America and the

Caribbean highlights the lack of awareness regarding the potential of NbS to build climate-resilient infrastructure while delivering societal benefits (Watkins et al., 2019).

NbS are widely regarded as a compelling approach to addressing climate change in developing countries because they are less expensive than grey infrastructure (Chausson et al., 2020a; Jones et al., 2012), an essential consideration in fiscally constrained economies (Espagne et al., 2021; Kubota, 2005) facing higher costs of accessing finance (Ameli et al., 2021a). Current evaluation frameworks and cost-benefit analyses of NbS are sparse, however, and tend to focus on urban sustainable infrastructure projects (Ciasca et al., 2023; Dumitru et al., 2020; Kabisch et al., 2017, 2016) or case studies in OECD countries (Atkinson and Mourato, 2008; European Commission, 2021). Other NbS studies on financing mechanisms for NbS often focus on developed countries (Thompson, 2023). Studies suggest that NbS can complement engineered systems while providing a few additional advantages (Seddon, 2022). NbS interventions are known to take longer to establish, involve high initial implementation costs, and exhibit varying levels of efficacy, but their long-term costs are generally lower than those of engineered alternatives (Seddon, 2022). Furthermore, research suggests that the potential for climate change adaptation of NbS is particularly cost effective in lower-intensity hazard scenarios, while a hybrid approach that incorporates engineered solutions is effective for high-intensity hazards (Chen et al., 2021; Hynes et al., 2022; Morris et al., 2020; Seddon et al., 2020; Turner et al., 2022).

#### **2.4.3. Limitations of NbS**

Before proceeding to the next section, a note on the limitations of NbS. An oft-cited criticism is a lack of conceptual clarity due to its broad definition (Colléony and Shwartz, 2019; Fernandes and Guiomar, 2018; Nature Editorial, 2017; Nesshöver et al., 2017). However, recent work has sought to address some of these challenges (Nesshöver et al., 2017; Sowińska-Świerkosz and García, 2022).

Some have also expressed concerns that NbS is framed as a 'silver bullet' for climate action, which risks downplaying the potential maladaptive outcomes and inequities of such a narrative, particularly in the Global South (Seddon et al., 2021). The view adopted in this dissertation is NbS is not a substitute for the need to decarbonise the economy. Rather, NbS serves as a complementary approach (Chausson et al., 2020a; Seddon, 2022) and offers important synergies with other development objectives outlined in the UN SDGs (Chausson et al., 2020).

Others have pointed to the slow realisation of co-benefits, as well as the high degree of context-specificity required for successful NbS implementation, rendering them difficult to scale. Additionally, some benefits are non-monetary or difficult, if not impossible, to attribute monetary values towards such as aesthetic beauty (Smessaert et al., 2020)..

## **2.5. Understanding non-state actor behaviour in environmental governance**

The political science literature has long examined the behaviours of non-state actors, arguing that private sector action on environmental issues can be seen as a form of governance beyond the state, shaped by political, economic and regulatory factors. Many ecosystem services are provided by economic goods that are both rivalrous and difficult to restrict access to, making them highly susceptible to overuse and depletion (e.g. fisheries, forests) due to individuals acting in their self-interest and driven to free-ride, leading to what is famously known as the “Tragedy of the Commons” (Hardin, 1968).

Early economic models assumed that there are only two approaches to managing environmental resources: privatisation or state regulation (Hardin, 1968). In other words, either individuals are given property rights over natural resources to provide incentive for their sustainable use, or state control over natural resources establishes clear demarcations for protection and restoration, such as protected areas. According to this binary understanding, non-state actors only cooperate with external incentives or enforcement (Olson, 1965). Formal institutions are understood here to drive economic performance, and therefore, well-defined legislation enables efficient environmental management (North, 1990). Some proponents who share this view further argue that market-based mechanisms (e.g. carbon pricing and emissions trading), imposed via government legislation, are the best approach for internalising environmental externalities and addressing climate change (Nordhaus, 1994).

Ostrom and her colleagues challenged the traditional binary model, advocating for a more nuanced understanding of the types of goods. They expanded the categorisation to four types of goods: private, public, toll, and common-pool resources. Their empirical research on local community resource management demonstrated that common-pool resources can be effectively governed through decentralised, multi-actor governance, thereby preventing the Tragedy of the Commons. Ostrom’s polycentric governance model suggests that ecological challenges are best addressed through multi-actor collaboration and governance, rather than

relying exclusively on governments and markets. (Ostrom et al., 1961). While certain institutional conditions are required (discussed below in section 2.5.2), self-organised systems seem to outperform top-down or purely market-driven approaches to resource management. NbS interventions involve the conservation, restoration or more sustainable management of natural resources which function along Ostrom's concept of "common-pool resources." However, very little is known about the interactions of private climate finance in the management of these common-pool resources.

### **2.5.1. Roles and drivers of private climate finance for NbS**

The roles and drivers of private climate finance are closely linked. The former refers to the purpose that private climate finance seeks to achieve in contributing to the implementation of NbS projects. The roles of climate finance are also closely linked to drivers, as the latter focuses on the main reasons behind private climate finance engaging in NbS. How does it differ from other actors providing financial resources to NbS?

Currently, there is a limited body of literature on the role of private climate finance in NbS. However, there is a growing interest among private actors, particularly investors and insurance companies, who recognise that financing NbS can reduce exposure to climate risks. This underscores the need for further research in this area (Chausson et al., 2020b).

Insights can also be drawn from tangential literature examining private climate finance more broadly. The grey literature suggests that philanthropic or public finance is often required in the early stages of project development for de-risking, commonly referred to as "blended finance" (Brasil-Leigh et al., 2024; GCEC, 2018; GCF, 2023b).

The political science literature identifies several roles of private climate finance. Corporate self-regulation involves firms acting pre-emptively in anticipation of stricter government regulations or mitigating reputational risks (Baron, 2008; Lyon and Maxwell, 2008). Others have demonstrated instances of 'shadow governance' in which private actors attempt to influence regulatory frameworks and markets (Abbott and Snidal, 2009). More recently, private actors have shown to participate in multi-stakeholder transnational governance initiatives to enhance their legitimacy and maintain control over policy discussions (Pattberg, 2005; Schneider, 2019).<sup>26</sup>

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<sup>26</sup> See, for instance, the Taskforce for climate-related financial disclosures (TCFD), Taskforce for nature-related financial disclosures (TNFD) and the Science-based Targets Network (SBTN).

Meanwhile, drivers or motivations behind private sector action on climate change can be grouped into five areas, which often interact to shape private actors' decisions on whether, and how much, financial resources to contribute. The first is regulatory (Adhikari et al., 2015; Gustafsson et al., 2022; Shui et al., 2025). Government regulations and international policy frameworks force firms to comply, such as climate disclosure mandates under the CSDR and corporate net-zero targets. However, sometimes firms undertake voluntary actions in anticipation of regulation or due to one or more of the following factors. The second factor is attributed to pressures from market competitors (Littlewood et al., 2018; Wright and Nyberg, 2024). Studies have shown that employees, investors and consumers have placed pressure on financial actors and firms to demand (Eccles et al., 2014; Lingnau et al., 2022; Onjewu et al., 2023). Firms that attempt to adopt new strategies position themselves as industry leaders, aiming to differentiate and reap the benefits of being first movers. The third factor for consideration is material (Aydoğmuş et al., 2022; Cerciello et al., 2023; Komath et al., 2025). To what extent can climate action provide financial rewards or mitigate financial risks, such as those associated with stranded assets or accessing sustainability-linked loans? Fourth, reputational risk factors influence the extent to which a firm may be motivated to adopt specific climate actions in response to potential social pressures that could impact its brand reputation, employee retention, and consumer trust (Pan et al., 2024). Fifth, there are institutional and normative drivers that influence industry standards and prompt firms within industries to take action (Bremer et al., 2021).

Over the past decade, research has started to examine the key drivers of climate finance (Falcone et al., 2018; Naidoo, 2020; Nykvist and Maltais, 2022; Polzin, 2017; Polzin and Sanders, 2020). 'Drivers' are understood here as factors that influence the private sector to commit financial resources to climate mitigation and adaptation activities.

Drivers of *private climate finance* for NbS can be delineated based on the objective of the capital deployed, operating on a 'Spectrum of Capital,' that ranges from purely return-seeking to impact-only (see Appendix 2B). On one extreme, traditional return-seeking capital is only concerned with financial returns and tends to have limited or no regard for environmental practices, or if it does, its objective is to mitigate risk and enhance value (Bridges Fund Management, 2015). On the other extreme of the spectrum, impact-only finance (e.g. philanthropy) aims to address societal or environmental challenges that are not expected to generate a financial return to investors.

In the context of climate finance, *return-seeking* capital is often driven by one or more of the following factors: regulatory policies and standards (Gunningham, 2020; Mazzucato and

Semieniuk, 2018), market demand (Finance Earth, 2021), consumer preferences (Bethlendi et al., 2022; Shukla and Thakur, 2025), resilience against environmental and reputational risk (TNC, 2019a), investor and stakeholder pressures (Ewers et al., 2019) and other financial incentives, such as carbon pricing or anticipated long-term profit opportunities (TNC, 2019a). Some of these studies focus specifically on emerging markets and developing economies and how the public sector can play an enabling or catalytic role (Prasad et al., 2022a). Moreover, much has been written to suggest that private climate finance operates on spectrum from operates on a range (see Appendix 2B) (Bridges Fund Management, 2015)

The literature that examines the drivers of non-returning seeking philanthropic capital for NbS is limited to specific interventions (Woodside et al., 2023), or do not necessarily examine the drivers of philanthropic capital (Cassin et al., 2021), but rather its broader deployment (Thompson et al., 2023).

There are two ways in which the scholarship conceptualises for-profit private action for NbS (Panwar et al., 2023). First, the private sector can be perceived as organisations possessing significant capital that can be channelled to close the NbS finance gap. In this conceptualisation, the private sector serves as a source of capital for NbS driven by philanthropic or impact-related reasons with a limited return (Panwar, 2023). A second role for the private sector is to encourage businesses to adopt practices that incorporate NbS into their business models, thereby expecting a return on investment. In short, the grey literature uses simple categories to classify NbS finance into two overarching categories: (1) efforts to reduce harm or mitigate negative financial flows and (2) efforts to increase positive financial flows toward nature, currently estimated at USD 200 billion annually.

However, it is still unclear whether sufficient returns on investment can be generated for private actors to be incentivised to finance NbS. Despite promising high social returns on investments, their “superiority only becomes visible if all [ecosystem] services are considered” (Kabisch et al., 2017). Much of the literature focuses on *societal* returns on investment of NbS (Chelli et al., 2025; Kouchakpourchali, 2024; Vasiliu et al., 2023). Others have pointed out that it is not just a question of how to increase private climate finance for NbS, but how to reduce negative flows on nature, such as environmentally harmful subsidies, estimated in the trillions of dollars annually (UNEP, 2023a). Investors typically seek competitive financial returns, diversification, standardised investment returns, and scalability. Research on adjacent topics suggests that meeting these conditions for NbS projects may be challenging (Dempsey and Suarez, 2016; Kay, 2018).



Thus, our understanding of the drivers, specifically on NbS private financing is sparse with a few exceptions (Brears, 2022; den Heijer and Coppens, 2023), but tend to focus more on barriers and enablers, which will be discussed in the next section. (2024) argue that determining the monetary value of an NbS intervention enables the identification and eventual incentivisation of private stakeholder investment. Others who have examined the drivers of NbS finance focus on a specific region, often in developed countries such as Europe (zu Ermgassen et al., 2025). It is thus unclear whether return-seeking private capital for NbS is driven by the same motivations as broad climate adaptation and mitigation finance or whether there are other drivers or nuances that are particular to private investments for NbS (McQuaid et al., 2021). The few studies on the deployment of private climate finance for NbS do not examine drivers in Africa (Pettinotti and Quevedo, 2023) or Kenya (T. Smith et al., 2022).

Academics and studies in the grey literature have noted these major gaps and called for more research into financing NbS and nature (Atteridge et al., 2022; Karolyi and Tobin-de la Puente, 2023b).

## **2.5.2. Barriers to and enablers of private climate finance for NbS**

### ***Barriers to private climate finance for NbS***

Finance is often a barrier to NbS implementation (Dorst et al., 2022; Ershad Sarabi et al., 2019; Kabisch et al., 2017; Nesshöver et al., 2017; Seddon, 2022). The barriers to mobilising private climate finance for climate action are numerous (Clark et al., 2018; Waygood, 2014) and NbS (Brears, 2022; Kedward et al., 2023; Knight et al., 2022) and can be attributed to: short-termism, information gaps, high transaction costs, an undervaluing of natural capital, reliance on voluntary mechanisms, and marketability challenges.

For-profit entities are known to prioritise short-term profitability in decision-making, which conflicts with the upfront costs and relatively long time horizon for NbS benefit accrual, typically requiring decades (Clark et al., 2018; Kedward et al., 2023; Waygood, 2014). NbS requires patient capital and a high tolerance for uncertainty. This uncertainty stems in part from the lack of experience in implementing NbS, as well as costs associated with setup, monitoring and reporting against baselines (Kedward et al., 2023). NbS projects tend to be small-scale and localised, and must adapt to local contexts and stakeholders, which increases transaction costs. Attracting the necessary capital, market size, and efficiency to engage large-scale

private investments remains a significant challenge, with some arguing that heavy reliance on the private sector alone is unfeasible (Kedward et al., 2023).

Another challenge for private actors is related to information gaps around the opportunities and benefits of investing in NbS. Despite a growing body of academic literature on natural capital, emerging from the fields of applied ecology and ecological economics (Costanza and Daly, 1992; Helm, 2015; Jansson et al., 1994), its adoption by businesses has been limited. Natural capital remains undervalued in corporate decision-making (Clark et al., 2018; Toxopeus and Polzin, 2021), though recent initiatives have attempted to enhance methods for valuing natural capital (e.g. natural capital accounting and TNFD).<sup>27</sup> The role of the natural environment in adaptation and climate resilience, particularly in developing countries, is also less well understood, especially among the private sector (Kapos et al., 2019). Measuring effectiveness and monitoring results based on an established and standardised baseline also remains a challenge (Chausson et al., 2020a; Price, 2021a).

The non-exclusionary nature of NbS benefits, in which no single party or organisation accrues all benefits, means that NbS often requires appropriate risk-sharing arrangements between actors (Seddon et al., 2020). There is also a perceived tension between achieving positive ecological outcomes and generating competitive financial returns. As Kedward et al. (2023) explain, these goals are often in conflict, especially for public economic goods where the incentive to free ride is strong and there are few consequences for benefiting from others' investments while others bear the cost of environmental degradation. This is the main explanation given for why, to date, public finance has been the primary global source of funding for NbS.

Other challenges to mobilising private climate finance for NbS include a lack of markets upstream, a lack of projects (supply side), and a lack of mobilisation tools to scale NbS projects (Lankes, 2021). Finally, the limited capacity and/or access to co-financing options, increasingly a requirement to access finance, is a barrier for developing countries in tapping into international climate finance (Mohieldin et al., 2023; "Scaling Up Adaptation Finance in Developing Countries," 2023). Path dependence is also considered by some as a major inhibitor of change as it leads to self-reinforcement or 'lock-ins' that are detrimental to the uptake of NbS (Davies and Laforteza, 2019).

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<sup>27</sup> See for instance, the World Bank initiative WAVES (Wealth Accounting and Valuation of Ecosystem Services), the Natural Capital Declaration (2012), UNDP's The Economics of Ecosystems and Biodiversity (TEEB), and the Taskforce on nature-related financial disclosures (TNFD).

### ***Enablers of private climate finance for NbS***

Ostrom's work contended that multiple principles and conditions were necessary for the successful governance of common-pool resources (CPR). CPR management requires local participation, adaptive context-specific governance, trust among stakeholders, and monitoring mechanisms.

Enablers for the implementation of NbS have received considerable attention in the literature (Gómez et al., 2023; Martin et al., 2021; Price, 2021b; Sarabi et al., 2019). Enablers are here understood to be mechanisms that support, facilitate or accelerate the flow of finance for NbS.

Public policy can play a role in incentivising private climate finance for nature and climate to create an enabling environment for finance (Brasil-Leigh et al., 2024; McNicoll et al., 2017; Price, 2021a). Environmental policies can be used as part of a broader national development policy given the role that governments play in directing economic development (Larcom and Swanson, 2013). State intervention (e.g. regulation, incentives, moral suasion) can be used to encourage the private sector investment into green industries and the protection of the environment simultaneously. Regulation, for instance, can be used to drive industries to develop cutting-edge green technologies, while incentives can be used to encourage the private sector to make greater investments in research and development for the green economy.

In some countries, financial and technical constraints may be so significant that measures, such as financing technical assistance, may be more effective in closing financing gaps than providing development aid-style climate finance (Fankhauser et al., 2016).

Public finance and public policy can support stakeholders in leverage greater public and private climate finance sources for NbS. For instance, the need for public policies to reorient subsidies and fiscal policies that negatively impact nature (UNEP, 2023). Others have shown, while there is no one-size fits all financing approach for NbS, guarantees can drive private capital (Brasil-Leigh et al., 2024). Financial instruments include “payments for ecosystem services (PSA), tax incentives, green bonds, resilience bonds, insurance schemes, and water user fees.” (Price, 2021b, p. 19). Multilateral finance institutions also play a role in encouraging NbS for climate resilience and disaster risk reduction in developing countries, such as the World Bank's the Global Facility for Disaster Reduction and Recovery (World Bank, 2025), UN

Environment (UNEP, 2019), UNDP (UNDP, 2025), the Green Climate Fund (GCF, 2023c), Asian Development Bank, and the International Fund for Agricultural Development (IFAD, 2021). Costa Rica's PSA scheme is often cited as a successful example of restoring and conserving its natural capital (GCA, 2019; Price, 2021b).

Suggestions have been made on how to address the information gaps on returns and impacts. Research is needed on NbS at the national and sub-national level, primarily via detailed case studies, while country databases and greater transparency on benchmarking could help reduce transaction costs (Knight et al., 2022). Another major bottleneck is standardisation and structures. Efforts to enhance standardisation, establish a set of criteria, and definitions and metrics for NbS outcomes have also been noted as important (Knight et al., 2022).

### **2.5.3. Frameworks for examining climate finance and nature-based solutions**

This section examines the additional frameworks that support our understanding of the dynamics that shape private climate finance for NbS.

The Political Science literature document the evolution of the private sector's role in environmental issues. As mentioned above, in the early years (prior to the 1990s), addressing environmental issues was generally considered a government responsibility. As such, climate change was viewed as a public goods problem, requiring state intervention (Hardin, 1968). In the late 1990s, debates arose over whether command-and-control style regulation or market-based instruments were more effective in addressing climate change. At the turn of the century, scholars began examining private actors as autonomous entities that behave independently and often beyond the scope of government mandates. This understanding expanded to the multi-actor governance models developed by Ostrom and colleagues, and the concept of transnational climate governance. This subsequently culminated in the perspective that businesses are agents of systemic transformation. In this view, firms themselves play a role in reducing environmental harm (Geels, 2011). Private actors were taking on an increasingly significant role in addressing global environmental issues, citing voluntary initiatives, such as the early adoption of corporate net-zero targets and voluntary environmental certification schemes, as a form of self-regulation (Cashore, 2002).

Since then, criticism has emerged regarding both the corporate sector's stance on climate change and its role in financing climate action. The first criticism argues that the financialisation and market-driven approach to addressing climate change prioritises market rationale over socio-ecological outcomes. Private finance and corporate actors prioritize high-

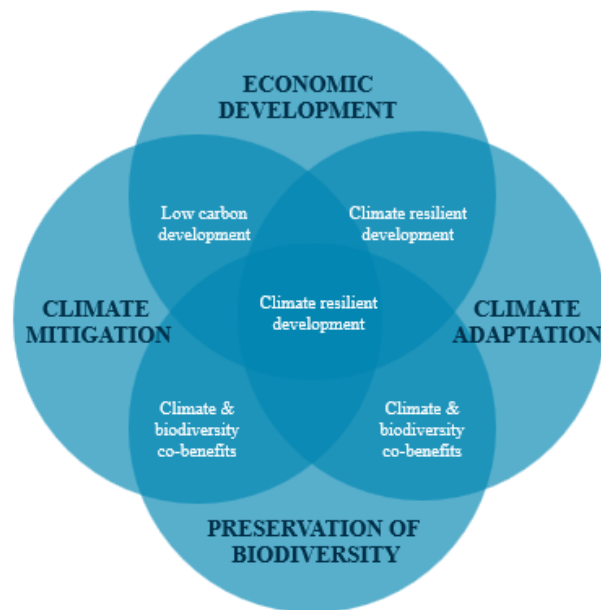
return investments over short time frames, which contradicts the required systemic transformation, requiring long-term thinking (Bhandary et al., 2021; Prasad et al., 2022b). Proponents of the “Wall Street Consensus” view have contended that public budgets are being used to de-risk private capital to make projects “investible” at the taxpayer's expense (Gabor, 2020). In other words, diverting public funds to enable private gains (Mazzucato and Penna, 2016).

Some are sceptical of the benefits of private climate finance, citing concerns that it could reinforce global financial hierarchies and North-South inequities. The higher cost of finance for developing countries is already exacerbating a climate investment trap (Ameli et al., 2021b). Moreover, the international development finance regime's disbursements of loans to developing countries (IIED, 2024) is argued to increase financial dependence on Western institutions, placing greater financial burdens on poorer nations. Others argue that a lack of accountability of private sector actions on climate change issues makes them highly susceptible to greenwashing (Lashitew, 2021). Finally, some have expressed concern that extensive reliance on the private sector, may undermine democratic oversight and prioritise corporate interests at the expense of the public interest (Widerberg and Pattberg, 2014).

### ***Climate resilient development and nature-positive***

The climate-resilient development framework combines climate mitigation and adaptation actions within wider environmental and development challenges. It incorporates strategies that: (1) reduce exposure and vulnerability to climate hazards, (2) reduce greenhouse gas emissions, and (3) conserve and restore biodiversity, and (4) address socio-economic development needs (IPCC Working Group II in the Sixth Assessment Report, 2022).

**Figure 2.6. Climate resilient development framework**



Source: Author's own adaptation building from Mitchell and Maxwell (2010) and IPCC (2022). Author's addition of preservation of biodiversity.

The framework brings together concepts and strategies that have previously been dealt with in isolation, recognising the potential overlaps and feedback loops in the transition to a net-zero, nature-positive future.<sup>28</sup> Both co-benefits and trade-offs lie at the intersection of action (Karlsson et al., 2020; Smith and Raven, 2012). For instance, co-benefits of the preservation and/or restoration of biodiversity may include increased carbon storage, air quality, water quality and water supply (Onaindia et al., 2013).

The framework recognises that climate action should not be treated as a self-standing activity, assessed at the micro-level to determine cost-benefit analyses of specific response options, but rather within a systemic, holistic discussion that includes wider macro-economic trends and environmental challenges (Fankhauser and McDermott, 2016).

The climate resilient framework reflects the growing recognition that our economy and society depend on a well-functioning ecosystem and its services. Other frameworks (Locke et al.,

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<sup>28</sup> This is reflected in the increasing number of national NDCs which emphasise synergies and co-benefits between climate adaptation and mitigation. For instance, 50% of Parties considered mitigation co-benefits resulting from their adaptation action and/or economic diversification plans. See the (United Nations Framework Convention on Climate Change (UNFCCC), 2022).

2025 forthcoming) argue for a 'nature positive' conceptual shift, which describes a change from the sustainable development 'sweet spot' described in the figure above to an embedded framework in which the economy is placed firmly within society and the environment (Locke et al., 2025 forthcoming).

## **2.6. Conclusion**

The achievement of the UN SDGs and Paris Agreement objectives requires a fundamental transformation of financial flows. NbS has gained prominence both in the academic literature and in policy-making circles as having the potential to address joint climate mitigation and adaptation objectives while simultaneously addressing broader socio-economic considerations.

Despite these advances, significant knowledge gaps exist, especially in developing countries. There is little knowledge on the dynamics of how private climate finance is mobilised for NbS. How is it currently being deployed and what are the biggest enablers and barriers on the ground? Is the literature's conceptualisation of the roles and drivers of private climate finance reflective of the experience on the ground with NbS implementation? Existing research concentrates on public funding sources for NbS, despite the international discourse increasingly highlighting the need for private climate finance to address global environmental objectives.

While there are emerging reports that examine that begin to address some of these questions they tend to be based on secondary literature or rely on interviews conducted with financial sector experts (Knight et al., 2022). They do not examine the intricacies of private climate finance deployment for NbS implementation with empirical case studies. The insights also draw from carbon markets but do not necessarily apply to broader NbS interventions. Moreover, the current evidence base is biased mainly towards interventions in developed countries and urban areas. A general lack of awareness and understanding of private climate finance for NbS points to the need for more research.

## **Chapter 3. Research Methodology**

### **3.1. Research paradigm**

#### **3.1.1. Epistemological and philosophical considerations**

Epistemology is concerned with the nature of knowledge. Reality is pluralistic and dynamic, containing both objective and subjective dimensions (Shah et al., 2018). There is no singular truth; reality is socially constructed through the interactions between actors and institutions within a given historical context. This requires interpretive understanding to reveal the meanings, motivations and power dynamics that shape actions.

Absolute objectivity is thus difficult to achieve in a reality that is constantly evolving and shaped by social and contextual factors (Biesta, 2010; Biesta and Burbules, 2004). The philosophy of pragmatism provides a bridge between subjective and objective perspectives, allowing for a mixed methods approach which combines qualitative interviews with the case study method (Morgan, 2007; Shields, 1998; Sleeper, 2001). This applies well to the study of private climate finance for NbS as it involves both financial data on its deployment and context-specific socio-political dynamics. By being flexible and allowing for diverse research methods, pragmatism helps researchers identify the objective and subjective viewpoints of the social phenomenon being studied (Shah et al., 2018).

I adopt a pragmatist epistemology, which emphasises knowledge's practical, evolving, and context-dependent nature, encouraging methodologies to address practical societal challenges (Dewey, 1938; Teece, 2007). "The domain of knowledge and the domain of human action are not separate domains, but are intimately connected" (Biesta and Burbules, 2004, p. 15). This approach makes it particularly effective for the interdisciplinary nature of environmental studies and the social sciences (Rorty, 1982) and aligns well with my goal of providing actionable insights. A research paradigm based on pragmatism is suitable to explore how processes can be designed to address policy-relevant challenges and enable organisations to adapt. The paradigm is also appropriate for this study as it recognises the multi-level dynamics that either enable or create barriers to implementing NbS.

This research adopts an inductive reasoning approach to investigate private climate finance for NbS implementation aimed at climate mitigation and adaptation in a developing country. Inductive reasoning is a methodological approach that enables the researcher to generate theories, concepts and conclusions from specific observations and data. This approach is common in research methods that involve interviews and case studies rather than testing pre-

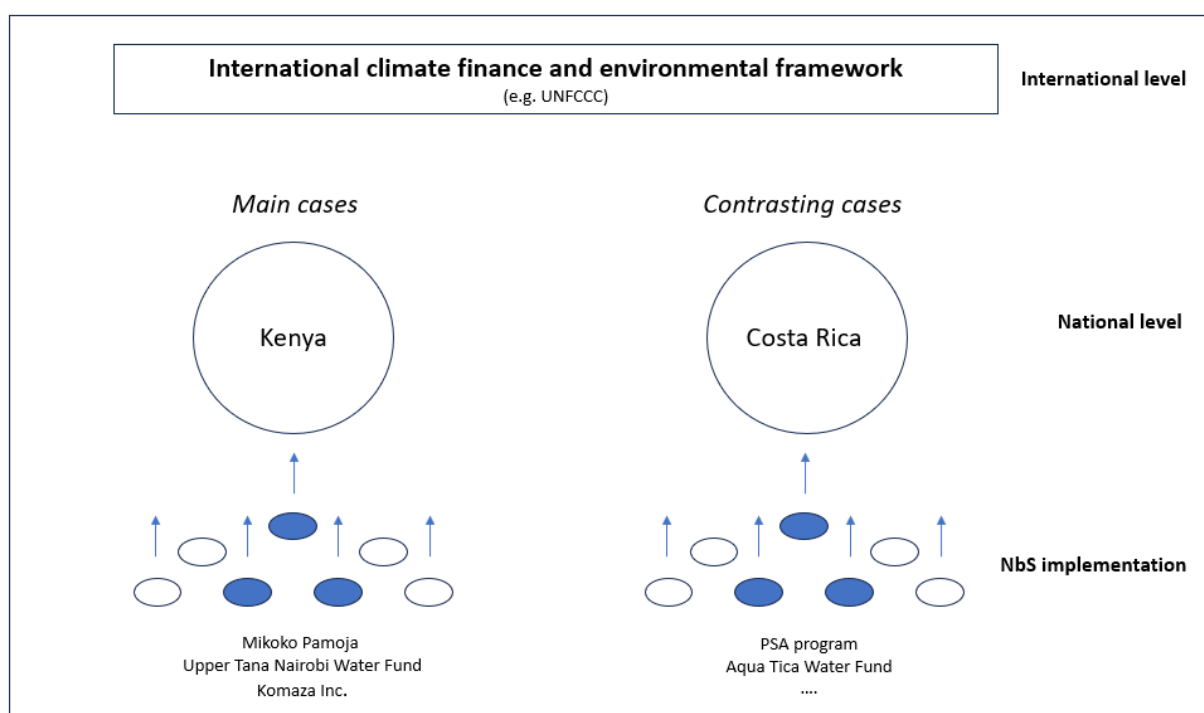


existing hypotheses. Inductive reasoning is appropriate here given the underexplored and undertheorized research topic. The objective is to obtain rich and contextual insights to generate specific observations from the empirical data before allowing for patterns or explanations to emerge.

### 3.2. Research design

The research design adopts an exploratory approach, with descriptive components, to gain insights, identify patterns, and generate hypotheses for further investigation. The research design reflects the limited existing research in the field and theoretical frameworks on the intersection of private climate finance, NbS, and development. I structure the analytical levels as shown in Figure 3.1 below.

**Figure 3.1. Framework applied for studying private climate finance for the implementation of nature-based solutions**



Source: Author

The research design can be understood to involve two primary components. The first adopts a top-down approach, studying private climate finance and NbS at both international and

national levels. It assesses the conceptual evolution of climate finance, the role of *private* climate finance under the UNFCCC, and the development of NbS as an intervention for climate adaptation and mitigation (Chapter 4). While NbS is relevant to the three Rio Conventions and the broader UN Sustainable Development Goals (SDGs), I narrowed the scope to the Paris Agreement Goals.

To provide greater context and depth, the chapter also explores these topics at the national level in Kenya and Costa Rica. Investigating the barriers to mobilising climate finance in developing countries sheds light on the interplay between international and national dynamics. To identify knowledge gaps and critical questions regarding the mobilisation of climate finance in these regions, interviews were conducted with climate finance experts. These discussions helped highlight areas where further research could enhance understanding and facilitate more effective financing strategies for climate action in developing countries

The second part of the research adopts a bottom-up perspective, employing the case study method (Yin, 2009) to investigate the implementation of NbS (Chapters 5-7). I focus on three empirical case studies in Kenya. Each NbS case study is an initiative or project that leverages private climate finance and focuses on a specific NbS intervention area and ecosystem (i.e. forestry, mangroves restoration, sustainable watersheds). This diversity of NbS initiatives is representative of the broad spectrum of NbS. The deployment of private climate finance is examined through the framework prepared by the Climate Policy Initiative (Buchner et al., 2013) and UNEP-FI State of Finance for Nature (UNEP, 2023) presented in the literature review. The decision to select all three empirical cases in one country was guided by a desire to help control for variations and reduce the risk of confounding factors.

Kenya was selected as the jurisdiction for the three empirical cases due to several appealing features. First, Kenya can be considered a regional leader in climate finance, as it was among the first developing countries to conduct a national-level assessment of the climate finance landscape (Frederico Mazza et al., 2021). The availability of national data on climate finance makes Kenya a practical choice for analysis. Furthermore, Kenya faces significant environmental challenges reflective of those seen on the broader African continent to varying degrees: deforestation (Duguma et al., 2019; Kweka et al., 2016; Masese et al., 2012; Ngigi and Tateishi, 2004; Njora and Yilmaz, 2022), soil erosion and agricultural land degradation (Chapman et al., 2021; Cohen et al., 2006; Maeda et al., 2010; Mganga, 2023a), water insecurity (Akoko et al., 2020; Mulwa et al., 2021a; Nyika and Dinka, 2023), extreme rainfall and flooding (Kilavi et al., 2018; Mganga, 2023a; Obando et al., 2016; Okaka and Odhiambo, 2018), illegal wildlife trade (Chege, 2015; Price, 2017), and pollution (Ezzati and Kammen,

2001; Mbandi et al., 2023; Omanga et al., 2014). Kenya offers geographical diversity within the African continent, providing a unique perspective on climate finance strategies and challenges of NbS, which are inherently diverse in their intervention areas and ecosystems. Furthermore, Kenya has exhibited regional environmental leadership by actively participating in initiatives and adopting legislation addressing climate change (Wambua, 2019).<sup>29</sup> Kenya is also recognised for its relatively developed governance institutions and a policy landscape supporting NbS (Government of Kenya, 2020a). Finally, Kenya's income level classification, often categorised as a lower-middle-income country, represents an interesting balance between economic development and climate finance challenges, offering valuable insights into the interplay between socio-economic growth and climate-related investments.

Several factors guided the selection of NbS cases. First, to generate maximum insight into current practices, I selected projects that represented a diversity of primary financing instruments: venture capital (Komaza), carbon credits (Mikoko Pamoja) and blended finance via the establishment of a public-private partnership (Upper Tana Nairobi Water Fund). The literature suggests that philanthropic grants have played a leading role in private financing for NbS, but less is known about the role of for-profit finance for NbS. Therefore, all NbS cases were selected for also leveraging for-profit finance. As the study reveals in the empirical chapters, there are discrepancies between what an NbS project claims to be its primary financing instrument and deployment on the ground.

I complement the empirical NbS case studies in Kenya with insights from Costa Rica. Costa Rica is internationally recognised for its green transition, and the effectiveness of its approach towards NbS financing has been well-documented (The Earthshot Prize 2021, 2022; World Bank, 2022a). Although currently an upper-middle income OECD country, much of Costa Rica's progress began while it was still a lower-middle income country. Moreover, as the empirical findings show, Kenya provides an interesting counterexample to Costa Rica's state-centric model, which predominantly leverages public finance for NbS.

Empirical case studies offer an in-depth and comprehensive method to studying the research questions, drawing on data from multiple sources and perspectives (Zainal, 2007). Moreover, the case study approach enables the examination of contextual factors and the exploration of multifaceted and dynamic relationships among actors and networks (Feagin et al., 2016).

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<sup>29</sup> The enactment of the Kenyan Climate Change Act 2016 marked a significant milestone as the first dedicated climate change law on the African continent. It set a precedent for other countries in the region, serving as an example of the potential content and structure of a national climate change law (Wambua, 2019).

Finally, the case study approach provides insights that are of practical relevance to policymakers and the wider business community interested in NbS (Brears, 2022; Järvensivu and Törnroos, 2010).

The objective of the thesis is not to do a comprehensive country comparison as one would lose the depth and richness of data that a case study of individual NbS projects provides. Instead, the inclusion of Costa Rica offers a complementary perspective, enabling the exploration of how a private-sector led approach to climate finance for NbS contrasts with a state-driven financing model. The financing characteristics of each NbS were inherently unique to each project. To adapt to this context-specific challenge, the research focused on comparable ecosystem services rather than identical financial instruments. The concluding section (Chapter 8) integrates top-down and bottom-up perspectives, providing a comprehensive answer to the research questions. Table 3.2. below provides an overview of each chapter, indicating the level and unit of analysis of each chapter. The selection of countries from two different regions is intended to generate broader insights into NbS and climate finance.

**Figure 3.2. Overview of chapters: Level and units of analysis to examine dynamics of private climate finance for NbS**

| Chapter | Level of analysis       | Primary unit of analysis              | Secondary unit of analysis             | Actor groups           | Role                                                        |
|---------|-------------------------|---------------------------------------|----------------------------------------|------------------------|-------------------------------------------------------------|
| 4       | International, national | UNFCCC (international level)          | Kenya, Costa Rica (national level)     | Development banks      | Pledged to provide climate finance to developing countries  |
|         |                         |                                       |                                        | Development agencies   |                                                             |
| 5       | NbS implementation      | Komaza (Kenya)                        | Sustainable supply chains (Costa Rica) | NbS project proponents | Implementing organisation                                   |
|         |                         |                                       |                                        | Developing countries   | Climate finance recipients                                  |
|         |                         |                                       |                                        | Corporations           | Climate finance provider                                    |
| 6       | NbS implementation      | Mikoko Pamoja (Kenya)                 | NbS carbon projects (Costa Rica)       | NGOs                   | Climate finance provider, project implementing organisation |
| 7       | NbS implementation      | Upper Tana Nairobi Water Fund (Kenya) | NbS water projects (Costa Rica)        |                        |                                                             |

|   |                                            |               |               |               |               |
|---|--------------------------------------------|---------------|---------------|---------------|---------------|
| 8 | International, national NbS implementation | Cross-cutting | Cross-cutting | Cross-cutting | Cross-cutting |
|---|--------------------------------------------|---------------|---------------|---------------|---------------|

Source: Author

The research was conducted in several phases. The first phase began in 2020 with an international-level analysis to understand the biggest knowledge gaps on climate finance, private climate finance, and NbS in developing countries in the UNFCCC. Empirical data was collected in-person in Kenya and remotely in Costa Rica. Archival data and an extensive review of literature on NbS, finance, and private sector engagement in developing countries complemented this. Insights from the field study in Kenya informed data collection and methodology refinements. The research methods are detailed in Section 3.4.

The research phases provide an understanding of the evolution of the thesis topic, from an initial interest in the challenges of climate finance policy deployment in developing countries to a more refined question that addresses one angle of the multi-faceted challenge of mobilising finance for addressing global environmental challenges. The journey from pilot study to case study selection, data collection, and analysis was undertaken in a way that allowed me to explore the knowledge gaps in the literature. Namely i) NbS as an approach to address climate action and wider sustainable development goals in developing countries, and ii) the challenge of mobilising private sector finance for climate action in areas beyond energy markets (i.e. beyond established markets where the business case and investment returns are less clear). This narrower focus made it possible to conduct a detailed analysis of the evidence of the implementation of NbS initiatives and derive conclusions from them. For this reason, the thesis focuses on the study of empirical NbS cases. Despite the more limited scope, the study maintained an attention towards the interactions of actors at the international, national and project level rather than examining financial flows alone. This approach enabled me to consider relevant socio-technical components that make funding both effective and efficient in achieving the desired environmental outcomes.

An overview of the phases is provided below:

- **Phase 1** (2020-2021): Pilot study: Analysis of international climate finance and NbS in the UNFCCC. Pilot study interviews with climate finance experts, literature review, and document analysis.
- **Phase 2** (2021-2022): National-level analysis, scoping study and selection of NbS case studies.
- **Phase 3** (Sept-Dec 2022): Analysis of private climate finance for NbS implementation. Field study in Kenya (in-person, Sept-Dec 2022) and field study in Costa Rica (remotely; Jan-June 2023).
- **Phase 4** (June 2023-January 2025): Analysis and write-up (June 2023 – Jan. 2025). Occasional additional follow-up interviews and verification of data (Feb. 2024-Dec 2024).

### ***A note on terminology***

The terminology surrounding climate finance has evolved considerably throughout this doctoral research. When I began my doctoral programme, finance for climate-related adaptation and mitigation activities was predominantly called ‘climate finance.’ In early assessments of climate finance, NbS was noted for its dual-use or multiple-use benefits, contributing to both adaptation and mitigation efforts and SDGs, but lacked any further nuance or categorisation (Buchner et al., 2021). These reports, in other words, were broad assessments of all sources and types of climate finance. They contained significant data gaps and assessed NbS only in terms of public climate finance sources invested in the agriculture, forestry, and land-use (AFOLU) sector (Nature4Climate, 2024). Since then, additional assessments have aimed to close data gaps by providing greater detail. In 2021, UNEP-FI began publishing an annual report on the State of Finance for Nature, which tracks ‘nature finance’ across three UN conventions and provides a more comprehensive list of financial sources that contribute to NbS. It is currently estimated that NbS receives approximately 37% of the financing needed to reach the Paris Agreement climate goals (Nature4Climate, 2024).

Since then, the terminology has shifted from a broad, all-encompassing term— “climate finance”—to developing additional terms to convey specificity, such as ‘nature finance.’ This evolution reflects the growing recognition of the need for greater nuance and the interlinkages between nature and climate goals. Despite this shift, the distinction between the two remains context-dependent, underscoring the challenges of data standardisation and conceptual

clarity in this field. For consistency, this thesis uses ‘climate finance’ as an overarching term, given that its scope focuses on climate adaptation and mitigation under the UNFCCC.

Moreover, estimates of financial flows for climate adaptation climate mitigation and nature-based solutions often rely on different definitions and methodologies. As a result, figures cited in this thesis may not be directly comparable. Wherever possible, I have clarified underlying definitions or sources to help the reader interpret the figures in context.

Finally, a note on the use of finance-related terminology. I recognise that some terms have distinct analytical meanings. For instance, ‘funding’ refers to non-repayable financial support from public sources (e.g., grants, subsidies), whereas ‘capital’ often refers to private sources and ‘finance’ encompasses a broader concept of financial flows. This thesis uses these terms interchangeably unless specified otherwise.

### **3.3. Research methods**

The thesis adopts a pragmatist, problem-driven research approach. This research employed several data collection types, including interviews with experts, government officials and NbS stakeholders, and an examination of publicly available records. A field visit to Kenya supported the empirical NbS case studies. The research approach and design were reviewed and approved by the University College London Research Ethics Committee to ensure that the study meets ethical standards and high standards of research integrity.

#### **3.3.1. Document analysis**

Document analysis was used for the study on the international dynamics shaping private climate finance for NbS (Section 4.2.1), and, to a lesser degree, in the sections on national dynamics of climate finance and NbS in Kenya and Costa Rica (Section 4.3). In total, 69 documents were analysed in the study. These documents consisted of policy documents and other relevant information published (43) and negotiation outcome documents (26). Negotiation outcome documents are here referred to as documents published by the UNFCCC as outcome documents from the Conference of the Parties. ‘Policy documents and other relevant documents’ came from a variety of sources and depended on the research question addressed. For instance, policy documents from the Government of Kenya and Costa Rica and project-level information published on Verra were used to identify NbS financing for the NbS scoping exercise (Chapter 4).

The thesis used documents predominantly as sources of information to analyse contextual factors, frameworks, and policies that are important for a comprehensive international and level understanding. They also provided important context for the NbS case studies in each country. The negotiation outcome documents served as the basis for analysing the conceptual development of NbS and our understanding of the role of private climate finance under the UNFCCC.

In the first section of Chapter 4, I relied on the findings in the literature to trace the conceptual evolution of climate finance and NbS under the UNFCCC, relying in particular on a few secondary sources (Ciplet and Roberts, 2017; Dupuy, 2013; Khan et al., 2020). The analysis traces in Section 4.2.1 the changes in these concepts from the 1970s, focusing on their transformation since the establishment of modern multilateral environmental institutions in the 1990s. It also examines the policy narrative under the UNFCCC and the role of finance for climate action in developing countries. The synthesis of the analysis (available in Appendix 4A) draws from the academic literature and UNFCCC negotiation outcome documents, complemented by insights from interviews with climate finance experts.

The scoping study of NbS initiatives in Kenya and Costa Rica (section 4.3.6.) involved the review of several documents from the grey literature (Landholm et al., 2022a; Odhengo et al., 2021; T. Smith et al., 2022). The analysis was complemented with focused searches on Google Scholar using terminologies such as ‘nature-based solutions’ and ‘ecosystem-based approaches’ but also more specific terms for finance instruments and mechanisms, such as ‘payment for ecosystem services’ and ‘voluntary carbon market,’ recognising that initiatives that could qualify as ‘nature-based solutions’ are not framed as such in the research. I also consulted climate change country assessments and the grey literature to identify the NbS applicable to the contexts of Kenya and Costa Rica (e.g., ‘soil organic carbon’ in Kenya). I searched these terms in Google Scholar for relevant initiatives. Finally, various databases were used to search for nature-based solutions in Kenya and Costa Rica, including the VERRA and Gold Standard databases for the voluntary carbon market.



**Table 3.1. Breakdown of sources for document analysis**

| Document type                                | Empirical chapter |   |   |   |           |
|----------------------------------------------|-------------------|---|---|---|-----------|
|                                              | 4                 | 5 | 6 | 7 | Total     |
| <b>Policy documents and other documents*</b> | 43                | 3 | 9 | 8 | <b>63</b> |
| <b>Negotiation outcome documents</b>         | 12                |   |   |   | <b>12</b> |
| <b>Interviews</b>                            | 48                |   |   |   | <b>48</b> |

\* Other documents include official project documents referred to for the NbS scoping exercise

Source: Author

### 3.3.2. Interviews

In total, I conducted 48 interviews. The interview participants comprised climate experts, NbS project stakeholders and policy officials (see Appendix 3A). The interview sample size was limited to key stakeholders, rather than obtaining large data sets, because the design objective was to get greater depth via the case study approach. This decision is justified by the study's exploratory research design, which recognises the early stages of the field of private climate finance for NbS. The interviews aim to have a sample large enough to uncover a variety of opinions and obtain a richness of data, but also feasible to undertake in the given timeframe.

The study relied on semi-structured interviews, one of the common ways that qualitative researchers gather data (Alvesson and Deetz, 2000). The interview protocol contained open-ended questions to provide "broad parameters within which interviewees can formulate answers in their own words concerning topics specified by the interview" (Roulston, 2010, p. 12). The interview protocol was thus used as a 'guide' and questions were not always asked in the same order but rather depended on the responses from the individual; I initiated questions and posed follow-up 'probes' in response to the interviewee's descriptions and accounts (Pessoa et al., 2019; Roulston, 2010). The interview protocol sought to explore the deployment and role as barriers and enablers of private climate finance for NbS initiatives and the extent to which the private sector can act as a driver or accelerator of the Paris Agreement goals and the wider transition towards sustainability in developing countries. Although some numerical data was collected, the objective was to explore themes, patterns and underlying motivations rather than to measure variables statistically.

I employed purposeful sampling as a technique to identify interview participants (Palinkas et al., 2015). Participants were selected based on expertise, relevance to the NbS project and, later, the snowballing technique. The identification of individuals who are knowledgeable about the unit of analysis is critical in case studies seeking to obtain rich information and depth (Patton, 2002).

The interviews lasted between 30 minutes and 90 minutes. The interviews with international climate finance experts—undertaken during the pilot study in the first phase of the study—and on the Costa Rican data, were conducted using online telecommunication methods approved by UCL (i.e. Microsoft Teams). The remaining semi-structured interviews on Kenyan data were conducted in-person in Kenya. In some cases, follow-up interviews were held to fill data gaps, especially when mapping the figures and deployment of financing in each NbS project.

Time spent in Kenya was appropriately distributed between the study of NbS initiatives on the ground, interviews with government officials to understand national dynamics, and interviews with international climate finance experts to gain a thorough multidimensional understanding of the research questions. By fostering a network of collaborative partnerships, the fieldwork design was structured to guarantee that field initiatives were closely aligned with locally significant and sought-after issues. Furthermore, it ensured the presence of efficient avenues for converting research outcomes into actionable policies and practical applications.

Case study interviews were recorded on Microsoft Stream, whether held in-person or virtually unless technical difficulties made the recording impossible. I leveraged features available in Microsoft Stream to generate a first draft of interview transcriptions, followed by developing a second, edited version through the automated capabilities of PowerShell to help streamline and expedite the process. The data was securely stored in the United Kingdom through UCL's N:Drive and OneDrive, and only accessed through a secure VPN (i.e. Cisco AnyConnect or Deskop@UCL Anywhere Service) when I was not on the UCL network. Participants' data was handled in accordance with the documentation submitted and approved by the UCL Ethics Committee.

Informed consent is an integral part of ethics in research. Each participant was approached through a recruitment email, an informed consent sheet and an information participation sheet. These documents ensured that all participants were provided with the information necessary to make an informed decision on their participation in the study. Participants were given a choice between three degrees of anonymity in the consent forms. While most participants agreed to full disclosure of their identity, it was decided that it was not necessary for the research analysis and presentation to attribute quotes to specific individuals. This enhanced consistency across the thesis. An exception was made for the interview conducted with the Minister of Environment of Costa Rica, who provided his consent to quote him. His identity is disclosed because attributing his statements maintains their meaning and impact. A table of interview participants, anonymised, and their respective organisations is provided in Appendix

3B. Moreover, it is important to note that the views provided by participants with affiliations should be considered their personal views, not official positions from the organisation.

Reflexivity guided both the planning phase and the conduct of interviews, particularly how questions were framed and responses interpreted. I adopted core principles outlined in the literature, such as maintaining a positive relationship with the interviewee and being aware of potential interviewer bias during interactions, to ensure the quality of interviews (King et al., 2018; Seidman, 2006).

I took notes during and after the interviews, as well as upon completing and rereading the transcriptions. These notes were consolidated into interview memos and saved in UCL's N: Drive. I complemented the empirical data with an extensive review of published literature, policy documents, country reports, and literature on various topics touching on climate change, finance, the private sector, nature-based solutions, governance, national and international governance laws, and other documents.

### **3.3.3. Analysis of data**

I adopted two analytical approaches for data analysis, tailoring one for international and national level analysis and the other for the NbS case study analyses. The approach ensured methodological flexibility and alignment with the specific requirements of each study component.

The first analysis sought to understand the conceptual development of private climate finance for NbS under the UNFCCC and the key barriers and enablers. This analytical exercise consisted of three steps. First, I analysed UNFCCC negotiation outcomes and policy documents to track the evolution of private climate finance and NbS under the UNFCCC. I tracked key terms within these documents, such as “private” actors, “private climate finance” and “market-based mechanisms.” I also consulted secondary sources and key research to triangulate findings.

Second, I analysed the interviews with international climate finance experts to understand the barriers and enablers of climate finance in developing countries. I used NVIVO 12 to manually code the interviews according to themes, informed by the themes from the literature review through deductive coding. The list of deductive themes is organised according to the interview sections. I quickly noticed that participants gave expansive responses that were not always clearly identifiable by the themes that emerged in the literature review, so it was ultimately decided to employ an inductive coding approach. This approach enabled me to capture more

of the context and richness of interview responses. I did an initial round of qualitative data coding, assigning codes to each transcript. The first coding round was meant to be loose, tentative, and evolved as the coding proceeded. The codes employed a descriptive coding method to code excerpts according to topic and then collated together based on their commonality to each descriptive code. Some simultaneous coding was used in which a single part of the data was coded with multiple codes as it captured multiple values. To pick up on key themes, I reviewed the codes for frequency.

For the analysis of NbS case study interviews with experts from Kenya and Costa Rica, I employed an inductive approach. I took comprehensive notes during and after each interview, providing a rich and detailed dataset. I subsequently used a combination of narrative and thematic analysis of the transcripts to understand the experiences of implementing NbS initiatives and to identify recurring patterns and themes within the data, aligning them with the key concepts of the multi-level perspective framework. The study's approach enabled an in-depth understanding of the unique perspectives shared by each participant. I did not rely on qualitative data analysis software, such as NVIVO, for this phase because of the highly context-specific data from the interviews. The richness of data from each empirical case would have otherwise been lost.

### **3.4. Limitations**

Despite carefully designing the research methodology, there are several limitations must be noted. First, the investigation of an emerging policy field with significant data gaps poses significant challenges. Since the 2000s, when *climate finance* as a term first emerged, there has been considerable interest among policymakers, academics and non-state actors alike, making it a dynamic and fast-moving policy issue. This made it a necessity to maintain an exploratory research approach. The constant emergence of new NbS projects and legislation rendered it impossible to complete a comprehensive scoping study on NbS in the two selected countries. I imposed a cut-off date on new and additional data intake to ensure a manageable scope.

A second limitation of the study is its heavy reliance on qualitative interviews as the primary source of data. One of the weaknesses of qualitative interviews is that it may be difficult to get behind superficial or biased answers to understand the real drivers of behaviour and identify patterns. This was a risk when conducting interviews with NbS project stakeholders. The case study approach limited the number and types of individuals I could select to obtain relevant

data. I used methods such as probing to minimise these risks and triangulated results. I also considered the impact of sample size and strived to follow general recommendations for qualitative research in the social sciences. I was guided by the need to balance an in-depth analysis with a large enough number for a meaningful analysis.

Conducting interviews also raises questions about bias and objectivity, a common criticism of this research method. I had to rely on the interpretation of this data as there was no statistical analysis or quantitative research method employed. This limited the extent to which I could generalise conclusions to other developing countries. I attempted to mitigate these constraints by verifying data sources and reflecting on data critically.

A third limitation is related to the scope of the study. The fields of private climate finance and NbS are broad, and terminological ambiguity makes setting precise boundaries difficult. I decided to narrow the scope based on a systematic approach to data collection and analysis confined to three empirical cases in Kenya, supplemented with insight from a broader analysis of NbS in Costa Rica. I focused on key indicators and relevant qualitative characteristics across case studies. This helped me streamline data requirements and facilitate a more comprehensive understanding of dynamic systems of climate finance. I narrowed the international-level analysis to the governance framework set out by the UNFCCC.

Finally, the case study design is often critiqued for its constrained generalisability and potential for subjectivity (Sprinz and Wolinsky-Nahmias, 2004). However, the systematic application of the methodology can establish general insights and principles from a single case (Eisenhardt, 1989; Yin, 2009). To enhance the study's rigour, I completed each case study with detailed fieldwork, project visits, interviews, and document analysis.

### **3.5. Conclusion**

This chapter demonstrated the rationale, as well as the steps taken, to develop a methodology that facilitated a deep and credible analysis of the dynamics of private climate finance for NbS. I laid out the research approach, design and methods employed by the thesis.

The first empirical chapter (Chapter 4) explores the conceptual evolution of climate finance and NbS under the UNFCCC. It also conducts a preliminary test of the conjectures of practitioners to identify overlap and divergence with the literature review. The subsequent sections of the thesis—and the focus of the empirical study—examine the role, drivers, enablers and barriers of private climate finance under three empirical NbS cases in Kenya,

supplemented with findings from Costa Rica (Chapters 5-7). This combined approach, bringing together top-down and bottom-up analyses, allowed for a comprehensive analysis of relevant dynamics shaping private climate finance for NbS.

The choice to adopt the philosophy of pragmatism's problem- and action-oriented approach was driven by two overarching advantages for this research. First, it encourages practical, actionable knowledge, allowing for flexibility in data collection and accommodating diverse contexts, a key consideration for studies in developing countries with significant data gaps. Additionally, pragmatism's sensitivity to context supports the study of interactions between various dynamics, including technological innovation, societal needs, and institutional structures. My qualitative research is based on document analysis and semi-structured interviews.

## **Chapter 4. International and national dynamics shaping private climate finance for NbS**

### **4.1. Introduction**

This chapter investigates how the concept of mobilising climate finance has evolved under the UNFCCC and the emergence of NbS as a policy intervention under the UNFCCC. It examines both international and national dynamics in Kenya and Costa Rica. The existing literature analyses climate finance, the private sector, and NbS as separate domains but lacks an integrated perspective, a gap this chapter begins to fill.

The first sub-section (4.2.1) begins with an analysis of the conceptualisation of climate finance within multilateral environmental governance and the UNFCCC. How is the role of the private sector and private climate finance framed in global environmental governance, and how has it evolved since the 1970s? How is climate finance for NbS understood in the context of climate mitigation and adaptation activities, and how did the responsibility of providing climate finance for developing countries take hold? How has the discourse regarding the dichotomy between the roles of private climate finance and public finance for climate action developed over this period? Finally, how is NbS addressed under the UNFCCC process, especially in the early years before the concept was defined?

Understanding the role of *private* climate finance for NbS in a developing country context requires consideration of the broader systemic dynamics of climate finance. Sub-sections 4.2.2. and 4.2.3. draw on interviews to examine the barriers and enablers of private sector finance for climate action and the governance interventions that can facilitate the more effective allocation of international climate finance for NbS in developing countries. The analysis is organised into three sub-sections: the dynamics of (i) private climate finance (4.2.2.), (ii) international climate finance (4.2.3.), and (iii) domestic climate finance for climate action and NBS in developing countries (4.2.4.). The interviews reveal that private climate finance and NbS in developing countries are still largely treated as separate issues.

The third section (4.3.) analyses national climate finance dynamics in Kenya and Costa Rica. More specifically, how private climate finance is currently deployed for NbS in a developing country context. It includes a scoping study of private climate finance for NbS in Kenya and Costa Rica, exploring the deployment of NbS in these two countries. It also introduces the three empirical cases studied in Chapters 5, 6, and 7.

## 4.2. International dynamics shaping climate finance and NbS under the UNFCCC

### 4.2.1. Climate finance and NbS under the UNFCCC

*“I don’t think [the concept of climate finance] has evolved very much to be honest. [...] I think there is a sense of it maturing, but I also think there is this sense of being stuck.” (Participant 17)*

While the climate finance experts interviewed claimed that the term “climate finance” largely emerged around 2010, and its use accelerated after the adoption of the Paris Agreement, the literature review and documentation analysis below reveals that the concept predates this period.

The conceptualisation of climate finance under multilateral environmental governance since the 1970s, and the role of the private sector as an actor, can be delineated into five phases. Each of these is labelled by the dominant form of decision-making of that period as categorised by Ciplet and Robert (2017):<sup>30</sup>

- Phase I, 1970s-mid-1980s (consensus-based universalist decision-making);
- Phase II, mid-1980s-mid-1990s (consensus-based universalist decision-making);
- Phase III, 1997-2009 (inclusive multilateralism, top-down compliance governance);
- Phase IV, 2009-2015 (bottom-up, transparency-oriented mechanisms);
- Phase V, 2015-present (transparency-oriented mechanisms, intensified multilateralism and bilateralism).

In each phase, there was typically one key conference and an accompanying agreement that framed the role of the private sector in climate action for that period. The following analysis incorporates the development of the concept of climate finance and the emergence of NbS under the UNFCCC. A table summarizing these findings is provided in Appendix 4A.

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<sup>30</sup> These phases, with some small variations, have been identified by Ciplet and Roberts (2017). One difference is that the fifth period, which, in this view, began in 2015 with the adoption of the Paris Agreement, signalled a definitive shift towards transparency-oriented mechanisms and intensified multilateralism and bilateralism.



***Period I(a): 1970s – mid 1980s***  
***Conference: Stockholm Declaration (1972)***

The 1972 UN Conference on the Environment marked the beginning of modern multilateral environmental governance. This period was characterised by a state-centred interventionist vision of economic policy (Dupuy and Vinuales, 2013) in which governments were regarded as the primary entities responsible for addressing societal challenges. Nations undertook lengthy negotiations to reach agreements on principles with broad, global applicability. The adoption of the Stockholm Declaration in 1972 established the legal foundation for integrating human development and environmental concerns into multilateral governance. While the Stockholm Declaration did not explicitly mention NbS, it laid the groundwork by establishing principles for safeguarding natural ecosystems, with a focus on their preservation, restoration, and enhancement (Gonzalez, 2023). At the time, national constitutions largely did not include environmental rights. The Stockholm Declaration led to the gradual emergence of constitutional and broader statutory initiatives, which embedded environmental rights into domestic legal systems (Kotzé, 2015).<sup>31</sup>

The Stockholm Declaration did not specifically refer to climate finance or the financial cost of protecting global society from environmental damage. However, there was an implied understanding that developed countries had a responsibility to compensate developing countries for environmental damage (Ciplet and Roberts, 2017; Newell and Roberts, 2017). The precursor of the CBDR concept—a key element of today’s global climate regime—can thus be traced back to the 1970s (Naidoo, 2020).

Non-state actors, including the private sector, were largely absent from discussions in this period. The Stockholm Declaration refers to “man, government, countries and people,” but there is no explicit reference to the role of businesses or the private sector in discussions. A group of developed nations, referred to as the ‘Brussels Group,’<sup>32</sup> lobbied to restrict the scope of certain topics, including resisting the demands of developing nations for increased aid and prioritisation of their developmental concerns (Brighton, 2016).

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<sup>31</sup> Today, an estimated two-thirds of national constitutions have incorporated the right to a healthy environment, most of which are situated in the Global South (Boyd, 2010).

<sup>32</sup> The Brussels Group was a secret group of developed nations that conspired to limit the reach of UN’s first conference on the environment (1972). The Brussels Group included the following countries: United States, Germany, Italy, Belgium, the Netherlands and France (Brighton, 2017; Hamer, 2002).

## **Period II: Mid-1980s-1996**

**Reports/conferences: Brundtland Commission (1987); Rio Declaration, Earth Summit (1992)**

The first attempt to link finance and sustainability within the framework of multilateral environmental governance took place through the work of the Brundtland Commission in 1987. The recommendations suggested that multilateral financial institutions incorporate environmental and social risks into project design and investment appraisals (Naidoo, 2020).

Multiple climate finance-related concepts and institutions emerged with the adoption of the Rio Declaration at the Earth Summit in 1992, including the formalisation of the CBDR concept (UNFCCC, 1992). The Earth Summit officially recognised the need to provide financial assistance to vulnerable nations with ‘new and additional’ finance (i.e. *additionality*).<sup>33</sup> However, any reference to compensatory justice for developed countries was relegated to a provision on insurance for vulnerable developing nations. Any reference to climate finance focused on climate mitigation activities. There was an apprehension that any inclusion of finance for climate adaptation might lead countries to underemphasise mitigation (Ciplet et al., 2015; Khan et al., 2020).

The Rio Conventions and their financial mechanisms were also established in this period. The Global Environment Facility was tasked to channel financial resources across international environmental conventions (i.e. UNFCCC, UNCBD, UNCCD), and support both climate mitigation and adaptation activities under the UNFCCC.

While the Brundtland Report argued that business had to play an active role in reconciling economic growth and environmentalism (Brundtland, 1987; Ciplet and Roberts, 2017; Lélé, 1991; Newell and Roberts, 2017, p. 1991; Spicer and Bousuet, 2019), corporations had restricted scope at the Earth Summit (Maljean-Dubois and Richard, 2013). Business was not explicitly mentioned in the core text of the Rio Declaration; the private sector was still treated with suspicion. This may partly explain the spirit of Principle 15, which introduces the *precautionary approach*, and Principle 17, which calls for environmental impact assessments.<sup>34</sup> However, the action plan of the Earth Summit, Agenda 21, marginally

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<sup>33</sup> The concept of ‘additionality’ in climate finance refers to the extent to which financial resources provided for climate-related projects contribute to climate mitigation and/or adaptation and other co-benefits beyond what would otherwise have occurred without such financial support. In other words, it assesses whether the funds allocated for a particular project result in outcomes that are additional to the baseline scenario, representing the anticipated status quo without the intervention of climate finance. Additional information is provided in Appendix 4B.

<sup>34</sup> Principle 17 of the Rio Declaration called for “environmental impact assessment, as a national instrument, [to] be undertaken for proposed activities that are likely to have a significant adverse impact on the environment and [be] subject to a decision of a competent national authority” (United Nations, 1992a, pp. 3–4).

addressed the role of business and industry in Section III on 'strengthening the role of major groups.'<sup>35</sup>

While there was no explicit reference to the NbS term during this period, the international community adopted the Forest Principles, which provided the first voluntary, non-binding agreement for the management, conservation, and sustainable development of all types of forests in modern multilateral environmental governance. The Forest Principles also state that financial and technical support, as well as cooperation, should be provided to developing countries with significant forest areas to support their conservation, management, and sustainable forestry development efforts. Only two references to the private sector state that they should support these efforts. However, there is an absence of specificity regarding the delineation of the government and non-state actor roles.<sup>36</sup>

### ***Period III: 1997-2009***

#### ***Agreement/Conferences: Kyoto Protocol (1997), Conference of Johannesburg (2002), Conference of Rio+20 (2012)***

The adoption of the Kyoto Protocol in 1997 marked a shift under the UNFCCC's conceptual framing of climate finance toward a hybrid model that combined active government regulation with market-based mechanisms (Ciplet & Robert, 2017). The Kyoto Protocol focused on mitigating emissions of developed countries and established three market-based 'flexible mechanisms' to engage the private sector: the Clean Development Mechanism, Joint Implementation Projects and Emission Trading. The Kyoto Protocol's flexibility mechanisms became the primary international instruments available to national policymakers to mobilise and engage private corporations in climate mitigation activities, laying the foundation for carbon markets.

In this phase, there was still a lack of clarity on how to disburse international climate finance to developing countries, aside from explicitly prioritising countries deemed most vulnerable to the effects of climate change.<sup>37</sup> This period viewed climate finance mainly through the prism of development aid. The Bali Action Plan (UNFCCC, 2007) included finance as one of the four

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<sup>35</sup> Agenda 21 of the United Nations Conference on Environment and Development (United Nations, 1992b).

<sup>36</sup> See paragraphs 8(c) and 12(a) of A.CONF.151/26 (Vol.III) United Nations: Forest Principles (United Nations, 1992c).

<sup>37</sup> "[In] that whole 2009 conversation, the key problem was like 'OK, how much? How much do we need?' And they came with this USD100 billion goal. [...] 'Well, OK, we don't have evidence that tells us that there should be another number on the table, but at least we have a number,' which countries have been wanted to have since like 1992 when the [UNFCCC] Convention was created" (Participant 74).

pillars. Despite formalising the CBDR concept at the Rio Summit, its interpretation was rigidly delineated between the Global North's and Global South's responsibilities.<sup>38</sup> This period also witnessed the establishment of infrastructures and operationalisation for climate adaptation funding (e.g., the Global Adaptation Fund), marking a pivotal step towards laying the groundwork for financing climate adaptation.

The Kyoto Protocol required Annex I Parties, or developed countries, to report on changes in carbon sinks resulting from deforestation, reforestation, and afforestation. This meant that developing countries were exempt. There were also no explicit provisions for finance related to NbS in the Kyoto Protocol; the CDM allowed for part of emissions reduction credits to come from afforestation and reforestation projects (Fuchs and Noebel, 2022). Land use issues and forestry projects under the CDM were restricted to afforestation and restoration projects, and deforestation was not included. Reducing Emissions from Deforestation and Forest Degradation (REDD) became a standalone mechanism at COP13 (2007) to incentivise developing countries to reduce emissions from forest deforestation and degradation; it was an output-based payment financed by donor countries in the Global North for implementation in the Global South.

The UNFCCC climate agreements in the early 2000s (e.g., Bali, 2007; Copenhagen, 2009; Cancun, 2010; Durban, 2011) created incentives and a framework to govern foreign direct investment related to the private sector and the environment. Rio+20 largely continued the logic that began in the 1990s while increasing the emphasis on the green economy and its relevance to socio-economic development. The end of this period took place at the UNFCCC COP15 in Copenhagen (2009) where the first mention of an objective to scale up international climate finance is made. The target of mobilising USD 100 billion per year in climate finance by 2020 is adopted at COP16 in Cancun (2010a).<sup>39</sup> Moreover, COP15 committed the developed nations to deliver USD 30 billion in 'fast start' finance to developing countries, explicitly referencing REDD. REDD evolved into REDD+,<sup>40</sup> reflected an enlarged scope beyond avoided deforestation and degradation, and linking it to broader climate action and sustainability goals. It included sustainable management of forests and carbon sequestration. Towards the end of this period, a paradigm shift emerged as the role of the private sector came to the forefront, and governments gradually focused on creating incentives and market-based mechanisms for climate action.

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<sup>38</sup> i.e. Annex I and non-Annex I countries.

<sup>39</sup> In new and additional finance. See footnote 4.

<sup>40</sup> Reducing Emissions from Deforestation and Forest Degradation, plus Conservation, Sustainable Management of Forests, and Enhancement of Forest Carbon Stocks (REDD+).

The first explicit reference to NbS under the UNFCCC was made in a position paper presented by IUCN at COP15 in Copenhagen (IUCN, 2009).<sup>41</sup> While IUCN did not present a definition, it used the term implicitly to address the co-benefits between nature conservation, sustainable land management, and climate (Warren, 2020). Moreover, IUCN linked climate adaptation benefits and REDD+ activities; the latter focused solely on mitigation benefits (Warren, 2020). This laid the foundation for today's understanding of the concept of NbS that emphasises the co-benefits of protecting nature and sustainable land management for climate mitigation *and* adaptation, biodiversity preservation and contribution to human well-being. Other policy-making bodies have since advocated for and/or adopted NbS as a policy intervention area.<sup>42</sup>

#### ***Period IV: 2010-2015***

#### ***Conferences/agreements: Paris Agreement (2015); Addis Ababa Action Agenda on Financing for Development***

The fourth phase commenced following the adoption of the 2009 Copenhagen Accord (COP15), marking a shift away from the top-down approach of the Kyoto Protocol. It was generally accepted that, because developed countries had emitted the majority of historical greenhouse gas emissions, they also had a responsibility to provide financial support to developing countries.<sup>43</sup> Concepts of country ownership and southern-led climate action emerged during this period, recognizing that individual nations should have primary responsibility and control over implementing climate policies, and that the Global South's perspectives, needs, and priorities should be central to the international decision-making process.

The adoption of the Paris Agreement marked a shift toward a bottom-up approach, in which both developed and developing countries were required to make national commitments through their Nationally Determined Contributions (NDCs). All countries must act on climate change, regardless of their level of economic development, while respecting their varying national capabilities. It signalled to developing countries that they could not rely solely on

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<sup>41</sup> However, the first ever use of the term 'NbS' was attributed the World Bank, which used it in a report submitted to the IUCN's World Conservation Conference in 2008 (Kabisch et al., 2016; Warren, 2020; World Bank, 2008).

<sup>42</sup> See, for instance, initiatives by the European Commission (Davies et al., 2021), the Group of 7 (G7), and the Group of 20 (G20) agenda (Warren, 2020).

<sup>43</sup> *"I think for me there is an after and before of the Paris agreement, because before [Paris Agreement] ... this conversation [was] very much divided about the role of developed and developing countries related to climate financing--or it was all about the developed countries being responsible to provide [financial] resources. But I think that conversation was starting to change. [...] The Paris Agreement called for "a different type of engagement between developed and developing countries on climate change— [one in which] everyone accepts responsibility as painful as that is" (Participant 17).*

foreign aid to reach their climate goals; funding was subject to national-level commitments and progress towards achieving their NDCs.

This period saw a focus on the development of quantitative metrics for climate finance. Consensus emerged that ‘additionality’ should be a key characteristic of climate finance (Copenhagen Accord, 2009). The UNFCCC established a Standing Committee on Finance to enhance knowledge and close some of the data gaps. The first studies indicated that climate finance was disproportionately flowing into climate mitigation. This imbalance was acknowledged by the Paris Agreement, which set an objective of achieving parity between climate finance directed to mitigation and adaptation.<sup>44</sup>

At the time, policymakers did not differentiate between the quantitative and qualitative aspects of finance (Naidoo, 2020). Conversations on climate finance were consumed with questions around ensuring the adequate, consistent, and predictable flow of finance from the global North to the global South. In contrast, the ‘quality’ of finance refers to structuring climate finance in such a way that it has a lasting impact and contributes to systemic change. This eventually led to the adoption of Paris Agreement Article 2.1.c., which refers to “making finance flows consistent with a pathway towards low greenhouse gas emissions and climate-resilient development” (UNFCCC, 2015a, p. 2), reflecting a need to shift the entire financial system. Despite these advancements, there was an absence of legally binding commitments on climate finance under the UNFCCC.

This period also saw increasing attention towards the private sector and the government’s critical role in creating an ‘enabling environment’ for the private sector to take climate action. Some argue that the growing adoption of neoliberalism in climate policy de-emphasised the responsibility of the public sector in favour of focusing on markets and the private sector to solve collective problems (Gabor, 2020). The continued marketisation can be seen in the new policy announcements that aim to create incentives for markets and investors to transition finance, or ‘shifting the trillions’ and market-based measures (Ciplet and Roberts, 2017).

In terms of its relevance for NbS, the signing of the Paris Agreement marked a critical period for REDD+ as it recognised the role of forests for climate mitigation and gave new impetus to international efforts to halt deforestation and degradation, and support forest restoration (Fuchs and Noebel, 2022, p. 4).

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<sup>44</sup> See Paris Agreement (2015).

**Period V: 2015 – present (Post-Paris Agreement)**  
**Conferences/agreements: TBD**

From the Paris Agreement onwards, discussions focused on accelerating an ‘economy-wide transformation’ and framed climate finance as a key tool or ‘enabler’ for transitioning to a net-zero economy. The COVID-19 pandemic further accelerated the adoption of this narrative, reasoning that environmental objectives must be aligned with broader development challenges of the Global South (e.g. food security, health, economic resilience).<sup>45</sup>

By this time, the transparency-oriented framework for environmental governance, in which countries made pledges through their NDCs and review their progress, had fully taken hold. This period marked the establishment of new multilateral institutions and the proliferation of bilateral arrangements between nations to promote technology transfer (Dupuy and Vinuales, 2013). It also saw an increase in private climate finance going to clean energy projects in the Global South, reflecting a general change in global FDI flows (Dupuy and Vinuales, 2013).

This period is marked by the international community’s failure to reach the USD100 billion annual target for climate action by 2020 (Timperley, 2021). Despite the setback, new financial commitments for climate and nature were made, culminating in the latest commitment of tripling climate finance to USD 300 billion per year by 2035 (UNFCCC, 2024b).<sup>46</sup> The OECD has since stated that it has fulfilled its climate finance pledge in 2022, albeit two years later than the target year. An increasing number of private climate funds have been established to address climate change and other private climate finance initiatives for nature (e.g., *Bezos Earth Fund*).<sup>47</sup> Climate finance initiatives also often took a more blended approach, attempting to combine public and private climate finance actors, such as the LEAF Partnership for Tropical Forest Conservation.

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<sup>45</sup> “*This last year [2020], to me opens up the real story of that. To me, it’s not about climate finance. It’s about what are the dynamics of financing climate change that all of this opens up. It’s to flip it around. Instead of getting a label about what is climate finance doing, it’s how are the trends for financing climate change actually emerging and what does this mean? And then seeing climate finance as a tool within a broader spectrum of financing options that exist for us to achieve the Paris [Agreement] Goals*” (Participant 17).

<sup>46</sup> The international community committed to increase the USUSD 100 billion per year climate finance target by 2025 through a ‘new collective quantified goal’ (UNFCCC Decision 1/CP21, paragraph 53). In 2024, at COP29, countries agreed to increase that goal to USD 300 billion annually by 2035 (UNFCCC, 2024b). The international community also agreed to mobilise, by 2030, at least USUSD 200 billion per year in finance for biodiversity at the CBD COP15 (2022).

<sup>47</sup> See, for instance, *Bezos Earth Fund*, as well as nature-focused venture capital funds *Superorganism* and *One Ventures* (Ma, 2023; Szkutak, 2023).

NbS as a climate mitigation and adaptation tool has gained increased attention during this period, as demonstrated by recent UNFCCC COPs. For instance, at COP26 in Glasgow, NbS was included in the decision text for the first time, and the NbS definition was formally adopted at UNEA (UNEP, 2022). The host of COP28, the Government of the United Arab Emirates, also aimed to increase global support for NbS. Despite growing attention to NbS under the UNFCCC, interviews with experts confirmed that the current amount of finance flowing into NbS remains a fraction of the global needs.<sup>48</sup>

A review of NbS across periods, however, highlights that—despite NbS applying to all ecosystems on land and in the sea—its inclusion under the UNFCCC process has, until recently, predominantly been attributed to actions on the conservation and restoration of forest ecosystems. While this increased ambition and commitment to NbS can largely be regarded as progress, there is a risk that limiting NbS to forests could be harmful as it overemphasises the importance of tree planting as a solution to climate change. A holistic approach to assessing the ecosystem services that NbS provides is critical.

The analysis reveals that REDD+ inadvertently became one of the primary mechanisms for channelling finance for NbS under the UNFCCC. Moreover, the analysis of the evolution of climate finance for NbS across periods demonstrates a gradual shift towards results-based payments. This is evident in the language of the GCF and the Warsaw Framework on REDD+, which stipulates that developing countries should apply to the GCF for results-based finance.

#### **4.2.2. Private climate finance and NbS in developing countries**

*“How do you get funding where you know no one else will come in?”*  
(Participant 17)

The expert interviews confirmed the findings of the literature, which suggest that over the last decade, the climate finance discourse has increasingly focused on leveraging financial resources from the private sector. However, global figures indicate that NbS in developing

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<sup>48</sup> “There are different types of studies [...] that say that NbS, or the role that nature can play in mitigating emissions, is in the range of one-third of the emissions reductions needed. At the moment, the share of funding being made available [for NbS] is in the range of 3% to 8%, so the amount of money being made available doesn’t do justice compared to the magnitude of the solution or the potential solution” (Participant 23).



countries is primarily funded through international and domestic *public* sources or grants.<sup>49</sup> In this context, this section draws on expert interviews to analyse the dynamics of private climate finance in developing countries, as framed under the UNFCCC. A summary of these findings is presented in Appendix 4C.

What drives the shift in policy attention to the private sector for raising climate finance? The experts were mainly of the view that raising sufficient climate finance to achieve the transition to a net-zero economy would not be possible without a significant contribution from the private sector.<sup>50</sup> Participants highlighted the ambiguity in the Paris Agreement regarding how to achieve the annual USD 100 billion target and which climate finance sources are included in it.<sup>51</sup> Some participants reasoned that governments wanted to leverage private climate finance to relieve the pressure on public budgets to achieve the USD 100 billion goal.<sup>52</sup> One participant questioned the achievability of the USD 100 billion target through public funds, wondering how the international community had agreed to this target. They noted that, when the goal was negotiated, developed countries were aware that it could only be reached with a significant contribution from the private sector.

The views expressed by participants focused on “courting” the private sector by incentivising them with compelling business opportunities in which to invest. However, one participant noted that merely trying to incentivise the private sector would be insufficient to enable transformational change. Instead, laws and regulations are needed to mobilise finance at the scale needed to transition to a net-zero economy.<sup>53</sup> This theme will be further discussed in the section below on domestic climate finance dynamics in developing countries.

The interviews also indicated the private sector’s growing appetite to participate in or finance NbS,<sup>54</sup> However, views varied on the motivation driving this change. Some participants reasoned that the involvement of the private sector was out of necessity (i.e. to fill the climate finance gap and because the transition towards sustainability requires the involvement of the private sector). An increasing number of private actors have adopted net-zero targets and,

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<sup>49</sup> “A relative share of climate funding being made available to tackle sustainable land use [and] nature-based solutions in developing countries is very small. Most of it comes from grant funding, which is insufficient, and the amount being made available in concessional finance is too small and takes too long to mobilise to get to the scale that we need” (Participant 23).

<sup>50</sup> See 1.a. in Appendix 4C.

<sup>51</sup> See 1.b. *Ibid.*

<sup>52</sup> See 1.b. *Ibid.*

<sup>53</sup> See. 1.f. *Ibid.*

<sup>54</sup> See 1.c. *Ibid.*

more recently, nature-positive targets.<sup>55</sup> Others argued that the private sector saw it as an ‘opportunity’ to tap into more financial sources.

Some attributed it to a growing awareness of the role of nature in the climate system and our dependence on its resources for socio-economic development.<sup>56</sup> The private sector contributes to greenhouse gas emissions and environmental degradation. Therefore, it should also bear some responsibility for nature’s preservation.<sup>57</sup> This is evident in the growing adoption of corporate net-zero targets and, more recently, nature-positive targets.

Another theme emerging from the interviews involved the challenges associated with investing in NbS. There is a misalignment in the risk-return expectations of investors and private sector actors, especially about the financing of NbS. Private actors are seeking high returns on their investments, similar to those captured in renewable energy projects, which, however, are likely to be unattainable via NbS initiatives in which nature is mainly as a public good.<sup>58</sup> Moreover, to attract private climate finance for NbS, lenders and investors will require demonstrable scalable projects, a significant challenge due to the relatively new nature of the NbS concept—a challenge further amplified by the limited large-scale demonstration projects in the global South.<sup>59</sup> The limited but growing track record of NbS and longer expected repayment periods still often require risk mitigation measures, such as guarantees, to launch an NbS initiative. This may also partly explain the low levels of private climate finance flowing into adaptation projects in the Global South.

#### **4.2.3. International climate finance in developing countries**

*“Many small countries are not accessing the GCF, because it’s too tough—it’s too difficult.” (Participant 61)*

*“To understand development finance is also to understand the good, the bad and the ugly of development finance.” (Participant 17)*

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<sup>55</sup> 929 companies from the Forbes 2000 list have set net zero targets; up from 417 in December 2020, and 702 in June 2022 (Net Zero Tracker, 2023). More than 500 companies have adopted the TNFD (TNFD, 2024)

<sup>56</sup> See i.c. and 1.i.e. *Ibid.*

<sup>57</sup> See i.d. *Ibid.*

<sup>58</sup> See 1.g. *Ibid.*

<sup>59</sup> See 1.h. *Ibid.*

Most climate finance in developing countries comes from international sources, primarily public ones. This section analyses the dynamics of international climate finance in developing countries. Appendix 4D summarises the interview findings.

The interviews shed light on advances in international climate finance in recent years and the downsides and recurring challenges that developing countries face in accessing international aid to support climate mitigation and adaptation. A lack of national capacity is a significant bottleneck for developing countries when submitting projects through an often-cumbersome process with demanding requirements. Even though institutions such as the GCF have implemented attempts to facilitate access, the requirements for having specific systems to monitor and review projects can be a barrier to funding for small developing countries.

The GCF was established on principles that would address some of the longstanding issues in development aid and development financing institutions. Large environmental funds, such as the GEF, have been criticised for their limited ability to scale finance for projects in developing countries. In contrast, recipient developing countries have criticised international funds for their access modalities (Bruun, 2017). Despite the well-intentioned principles, however, multiple challenges remain, and new ones were created with the establishment of the world's largest environmental fund.

Operational and institutional challenges affect accessing and using disbursed international financial resources. Access and disbursement of international climate finance can take years, and intermediaries are often relied upon to fill the capabilities gap (e.g. international consultants and implementing agencies). This 'outsourcing' of project development and execution is a loss of local knowledge capture. Moreover, international and domestic climate flows are often treated separately and are rarely well incorporated into national planning and development comprehensively. Together, these factors compound the challenge of achieving the net-zero transition to the green economy and the broader sustainable development goals.

Meeting the requirements of the GCF is a daunting task, particularly for least-developed countries with limited institutional capacities. Thus, the question that follows is how to develop that national capacity. This is a fundamental question of breaking the international aid dependency cycle. The GCF does not execute projects but instead operates as an intermediary, channelling the funding on behalf of donor countries. Moreover, because it is not an implementing agency, it must ask itself other questions, such as: how does the institution receiving the funds ensure that the funded projects are genuinely transformational? How does it ensure that the investment objectives and criteria of the GCF are met? In other words, the

intermediaries submitting projects to the GCF must be able to submit projects that genuinely respond to country needs—the right projects and at the right time.

One of the challenges is associated with having nationally accredited entities as intermediaries in the international climate finance system. Sometimes, these entities are driven by alternative interests and separate agendas, and their objectives are not necessarily strongly aligned with those of the country. In response, the GCF has reportedly lowered its requirements and criteria for developing countries to make it easier to access international climate finance. In turn, the GCF has turned its focus to more robust monitoring systems to ensure the effective management of financial disbursements. Additional information can be found in Appendix 4D.

### **4.3. National dynamics of climate finance and NbS**

*“How is this shaping funding on the ground, and what's the process through which funding is getting [to] the ground?” (Participant 34)*

*“Enabling environment—it's a very large bucket term” (Participant 17)*

The following section examines the national dynamics of climate finance for NbS in developing countries, focusing on Kenya and Costa Rica. A full study of indicators of each country, based on political, legal, environmental, socio-economic, and other parameters, can be found in Appendix 4G.

#### **4.3.1. Overview of national dynamics influencing private climate finance in developing countries**

Understanding the role of *private* climate finance requires understanding the dynamics of the current primary source of NbS finance—public sources. What dynamics shape the role of government policy in mobilising climate finance in developing countries? These findings are presented in greater detail in Appendix 4E.

The interviews emphasised the importance of an integrated approach to domestic public climate finance. Governments of developing countries that have taken a ‘proactive approach,’ such as establishing national climate funds, are more likely to leverage multiple climate finance sources. Lower-middle-income or least-developed countries, with weaker institutions and national capacities, have found it more challenging to access international climate finance.

The interviews also highlighted the relatively slow public sector adoption of NbS in developing countries, contradicting the discourse under the UNFCCC, which has increasingly moved towards recognising the importance of channelling climate finance into NbS.

The interviews also revealed the limitations of government intervention. Referring to the shortcomings of the REDD+ programs in developing countries, one expert noted that launching domestic initiatives for NbS can be cumbersome and difficult to manage effectively. Achieving sufficient project scale, while also ensuring that it addresses concerns of additionality, leakage, and permanence, is particularly challenging.

Governments have shown increasing interest in finding approaches to attract climate finance. Government policy can go a long way in recognising the intrinsic value of nature to spur action. International organisations can also play a role in utilising financing instruments (e.g., guarantees, loans) to reduce project risk and cost, thereby incentivising private actors to invest in NbS projects that they would otherwise not. One expert noted that the concept of governments compensating the private sector for their environmental action can be traced back to the Brundtland Report (1987).

One interviewee highlighted the diversity among developing country governments in terms of their openness to working with the private sector. Some governments are more open to working with the private sector, while others are not, and the latter group expresses scepticism towards working with non-public sector stakeholders.

The interviews with climate finance experts provided an opportunity to gain insight into what policy-makers and the grey literature have increasingly referred to as the establishment of 'enabling environments' for mobilising climate finance in developing countries (Ichord, 2023; World Bank, 2023a). The interviews highlighted that the term 'enabling environment' encompasses several key components, which policymakers often refer to interchangeably. Some participants focused on policy and institutional aspects, while others referred to the 'enabling environment' as creating the right conditions for the private sector to take action.<sup>60</sup> Despite these differences, the term 'enabling environment' can be summarised as encompassing the following four elements: (i) setting up the appropriate institutional arrangements to mainstream environmental issues across governmental entities; (ii) adopting policies and policy instruments in which environmental concerns; (iii) aligning national budgets to achieve environmental objectives; (iv) capacity development of long-term government

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<sup>60</sup> Source: Participant 52.

personnel; (v) creating the legislative, regulatory and market conditions to enable the private sector to invest in the transition to a low-carbon economy. See Appendix 4F.

One participant made more critical reflections, arguing that ‘enabling environment’ is a ‘throwaway word’ or ‘buzzword’ used to convey technical assistance or capacity development, but there is a lack of understanding around specifics.

*“It’s also a question of power—an enabling environment for whom? Is it for the ultimate people on the ground that enables them? Or is it an enabling environment for finance to invest in something that meets their risk and return profiles? So sure, you are creating an enabling environment for somebody, but for whom? By your actions, whom are you creating this enabling environment?” (Participant 17)*

This raises questions of power dynamics in international climate finance and whether the private sector’s motivations are indeed aligned with the needs of those being served by NbS. Appendix 4F provides additional detail on an ‘enabling environment’ for climate finance, as understood through the expert interviews.

#### **4.3.2. Nature-based solutions in Kenya**

The following section examines the extent to which NbS is relevant to Kenya and relevant government actions and policy-making that could influence NbS implementation in the country.

In Kenya, the potential of NbS for climate actions is particularly relevant in the following key sectors: food and agriculture, forestry, and tourism. Agriculture makes up a significant portion of the economy (approximately 25%), represents 50% of the total land area, and employs the majority of the rural population (70%) (FAO, 2023).<sup>61</sup> The agricultural sector is also responsible for over 60% of the country’s total emissions (WRI, 2017). Tourism also contributes to a sizable portion of the economy (11%) and represents a growing market. Tourism is important for understanding NbS in Kenya because it is dominated by activities related to its unique biodiversity.

At the time of independence in 1963, Kenya had approximately 10% of natural forest cover. However, increasing deforestation rates since the 1970s has led to significant declines in the

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<sup>61</sup> The agricultural sector in Kenya is dominated by the production of tea, coffee, horticulture, and crops such as maize and wheat (D’Alessandro et al., 2015).

country's natural forest coverage, leading it to lose almost half of its tree cover in fifty years—now standing at about 6% (GRW, 2025). Deforestation in Kenya has been driven by agricultural expansion, a growing population putting pressures on natural resources, urbanisation, unregulated logging, and a high dependence on wood as a fuel source (Rotich and Ojwang, 2021).

Kenya is also highly vulnerable to the effects of climate change. Drought and floods are the main climate hazards the Government of Kenya identified. Estimates suggest that climate-change-related events (e.g. floods and droughts) are currently costing the Kenyan economy an estimated 2-3% of its GDP yearly (Government of Kenya, 2021b), but the cost is expected to increase.

Kenya's economic dependence on its natural resources has driven rapid land-use changes in recent decades, leaving Kenyan soils severely degraded (Mganga, 2023b). This degradation is increasingly reflected in the declining agricultural productivity, principally caused by unsustainable land practices, changes in rainfall, pests, and diseases (Mulinge et al., 2016).

The government has identified NbS as a core component of its NDC and national policies. Its updated NDC states a commitment to reducing emissions by 30% (Government of Kenya, 2020a). A significant majority of activities will be achieved through NbS implementation. The forestry sector accounts for nearly half of the abatement measures in Kenya's NDC. More broadly, to achieve these mitigation targets, the Kenyan Government has included the following NbS-related activities and/or objectives: achieve tree cover of at least 10%, make efforts to achieve land degradation neutrality, enhance NbS and REDD+ activities, implement climate-smart agriculture and harness mitigation benefits from the blue economy, including through payments for ecosystem services.<sup>62</sup>

NbS for climate adaptation and resilience is also addressed in Kenya's NDC, especially in the agricultural and environmental sectors. The Kenyan Government intends to build resilience through more sustainable land use. It plans to rehabilitate and conserve degraded forests, enhance agroforestry in farmlands, establish private forest plantations, increase nature-based enterprises, and promote mangrove ecotourism. Kenya's NDC explicitly references NbS to achieve its climate mitigation and adaptation objectives six times.<sup>63</sup>

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<sup>62</sup> See Appendix 4G for a full list of relevant policies and legislation.

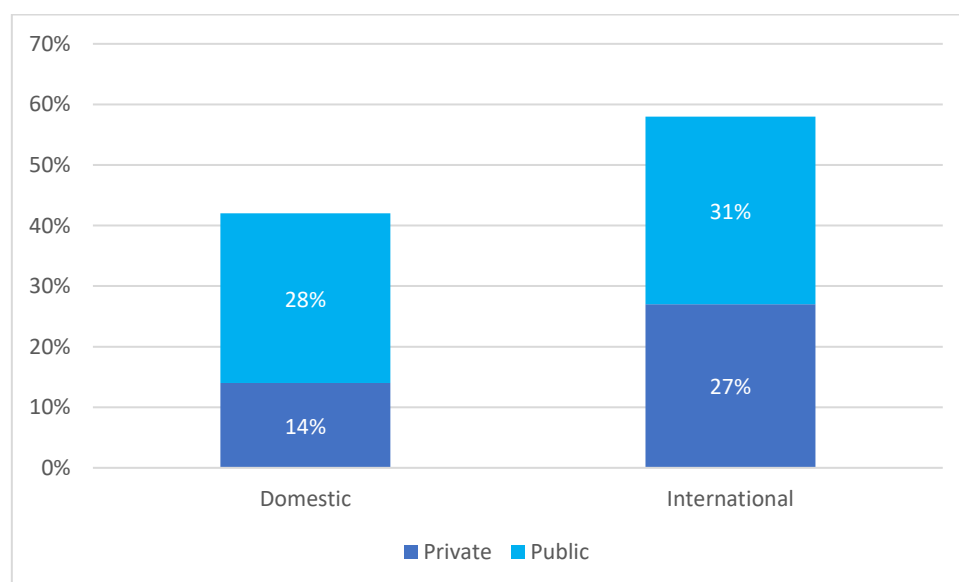
<sup>63</sup> See Appendix 4G.

### 4.3.3. Climate finance in Kenya, including for nature-based solutions

Kenya is one of the first countries in the Global South to undertake a national assessment to track its climate finance flows. The following section draws on data from a scoping exercise undertaken by the Government of Kenya (Mazza et al., 2021) based on data from 2017/18. It also considers the country's updated NDC submission in 2020. The Government's estimates focus on investments in climate adaptation and mitigation and leave out any analysis of dual-purpose finance for climate and nature. Despite these data gaps, the study provides an overview of the current climate finance flows and the breakdown by public, private, domestic, and international finance sources.

Climate finance in Kenya represents USD 2 billion in annual flows,<sup>64</sup> with the majority derived from international flows (USD 1.2 billion) but still a significant portion representing domestic flows (USD 843 million). Moreover, public finance flows represent 59%, with private climate finance flows representing 41%.

**Figure 4.1. Overview of climate finance in Kenya: Distribution of domestic, public, private and international finance**



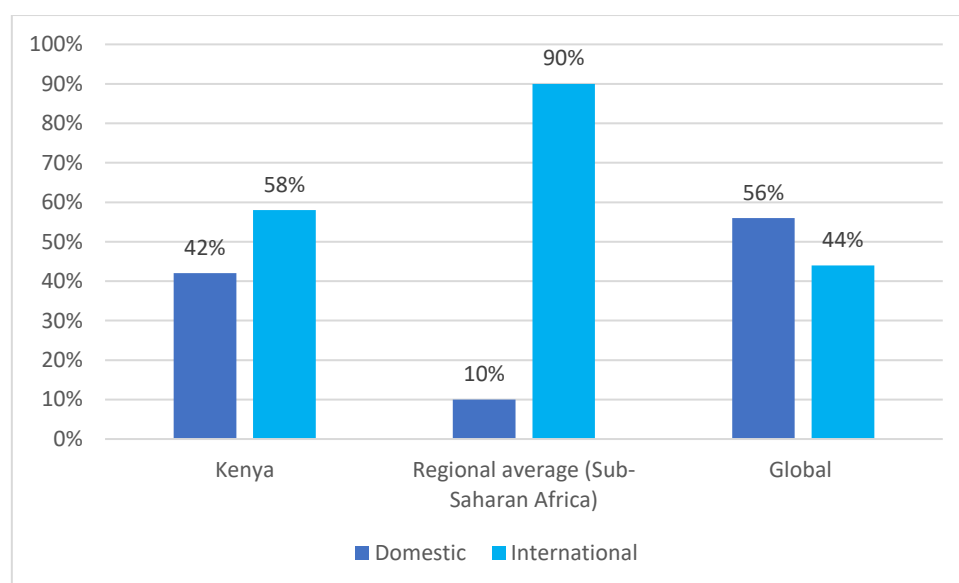
Source: Mazza et al. (2021)

<sup>64</sup> This estimate encompasses public and private sources, both domestic and international. It tracks project-level investments in Kenya directed toward climate mitigation (e.g. renewable energy), climate adaptation and other climate-related activities (see figure 4.3). However, the coverage is incomplete, with notable data limitations, especially for domestic private finance.



Another distinction from global climate finance flows is that climate finance flows in Kenya are derived from international sources (58%) rather than domestic finance sources (42%), albeit representing a much more balanced proportion than the wider continent.<sup>65</sup> It is worth noting that the current share of domestic—compared to international—climate finance flows in Kenya is much higher than the regional average for Sub-Saharan Africa.

**Figure 4.2. Kenya's climate finance figures compared to global and regional estimates**



Source (Kenya figures): Mazza et al. (2021)

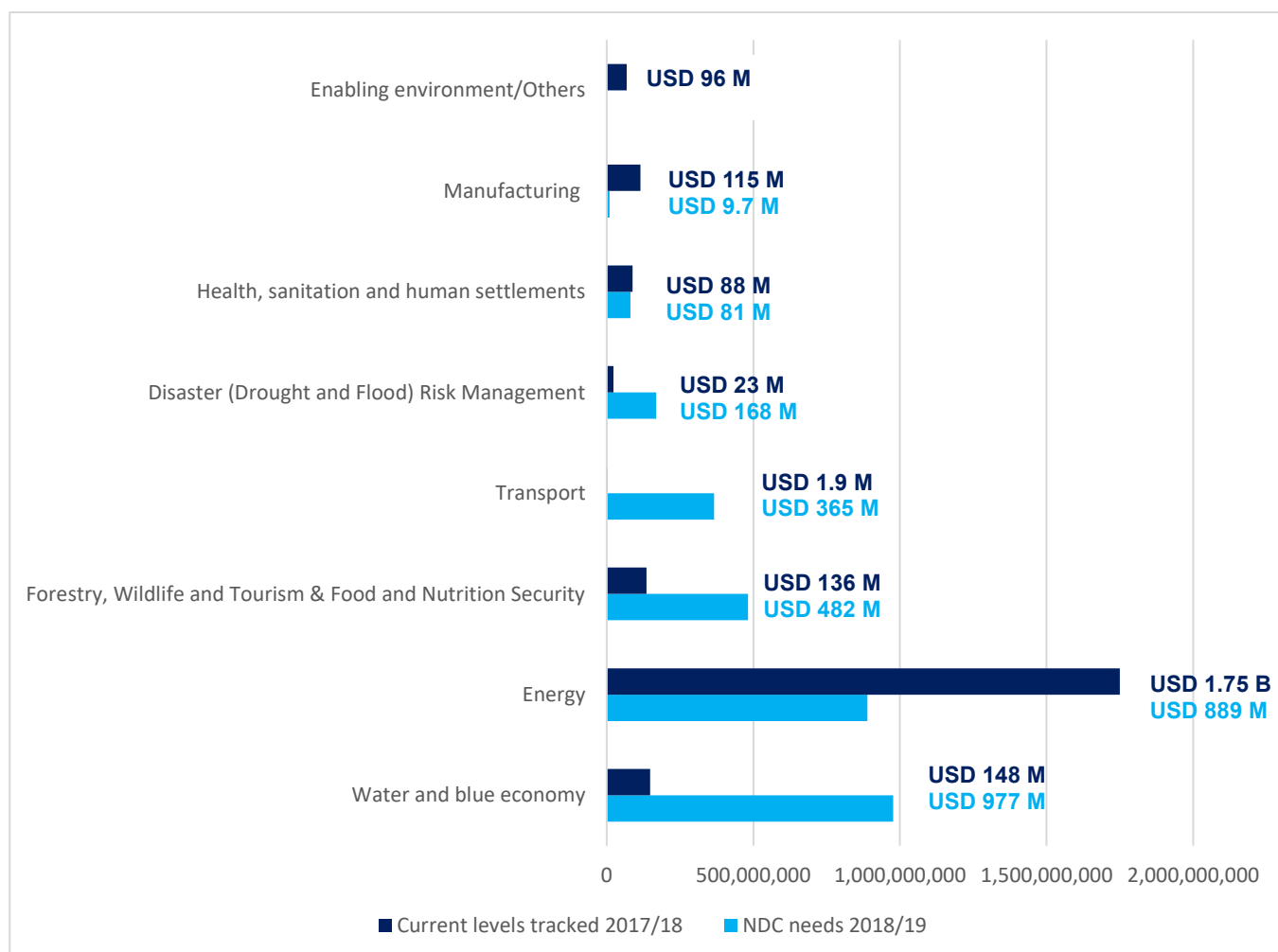
Source (Global and regional figures): Buchner et al. (2021)

The breakdown of current climate finance flows tracked in Kenya reveals several insights. First, the energy sector receives the largest portion of climate finance (USD 1.7B) and is double the estimated needs for the country to reach its NDC. Several additional sectors (e.g. manufacturing, health and sanitation) currently receive more climate finance than the anticipated financial needs in the NDC. Second, the figure below highlights the substantial data gaps in relation to nature-based solutions and AFOLU-related activities. For instance, the

<sup>65</sup> A substantial portion of tracked global climate finance flows is raised and spent domestically. Global figures from 2021 point to domestic climate finance as representing 56%. However, this number has been raised to 84% according to a more recent global landscape study conducted by CPI (Buchner et al., 2023). These domestic climate finance flows are dominated by Western Europe, North America and China.

finance data on forestry, wildlife, tourism, food and nutrition security is all lumped together, so it is unclear which of these activities supports NbS.

**Figure 4.3. Breakdown of estimated climate finance flows in Kenya (2017/18) in USD**



Source: Mazza et al. (2021).

Adjusted from KES to USD according to the 2017 exchange rate.

Table 4.1. below provides an overview of the climate finance committed by the Kenyan Government in their NDC. The current climate finance flows are insufficient to meet the country's climate goals. The Kenyan Government estimates that USD 62.6 billion is needed to achieve its NDC from 2020-2030, with the majority of funding needed in climate adaptation ad USD 43.9 billion. It is worth noting that the latest global figures on climate finance suggest that adaptation finance is almost entirely derived form international sources in Sub-Saharan Africa (Buchner et al., 2023). Mazza et al. (2021) conclude that "the private sector has a key

role closing Kenya's investment gap," (p. 10) especially in areas where the gaps are large (i.e. forestry, water and land-use).

**Table 4.1. Share of climate finance needs in mitigation and adaptation activities in order to achieve Kenya's Updated Nationally Determined Contribution (NDC) 2020-2030: Domestic vs. International finance (in USD)**

|                       | Climate Mitigation | Climate Adaptation | Total finance     |
|-----------------------|--------------------|--------------------|-------------------|
| Domestic finance      | USD 3.7 B          | USD 4.4 B          | USD 8.1B          |
| International finance | USD 14 B           | USD 39.5 B         | USD 53.5 B        |
| <b>Total</b>          | <b>USD 17.7 B</b>  | <b>USD 43.9 B</b>  | <b>USD 61.6 B</b> |

Source: Kenya's Updated NDC 2020-2030, Government of Kenya (2020)

Note: Numbers may not sum up exactly due to rounding

The disparity between Kenya's expected NDC contributions and current climate finance flows is represented in evidence in the two tables below. Kenya's updated NDC increased the government's commitment to cover part of the costs (i.e., domestic climate finance) from 0% to 13%, compared to the first NDC. However, the government still expects climate finance to come from international sources (87%). It is worth noting that according to recent estimates, 42% of climate finance in Kenya comes from domestic sources, a figure much higher than the government anticipates will be needed for the implementation of the NDC (13%). It is worth noting that no desired target for private sector finance is explicitly mentioned in the updated NDC.

**Table 4.2. Share of domestic and international climate finance needs as provided in Kenya's Updated NDC for the period 2020-2030 (figures rounded in USD): Climate mitigation vs. climate adaptation**

|                       | Climate Mitigation | Climate Adaptation | Total climate finance needs |
|-----------------------|--------------------|--------------------|-----------------------------|
| Domestic finance      | 21%<br>(~USD 4B)   | 10%<br>(~USD4B)    | 13%<br>(~USD8B)             |
| International finance | 79%<br>(~USD14B)   | 90%<br>(~USD39.5B) | 87%<br>(~USD54B)            |

Source: Kenya's Updated NDC 2020-2030, Government of Kenya (2020)

Note: Numbers may not sum up exactly due to rounding

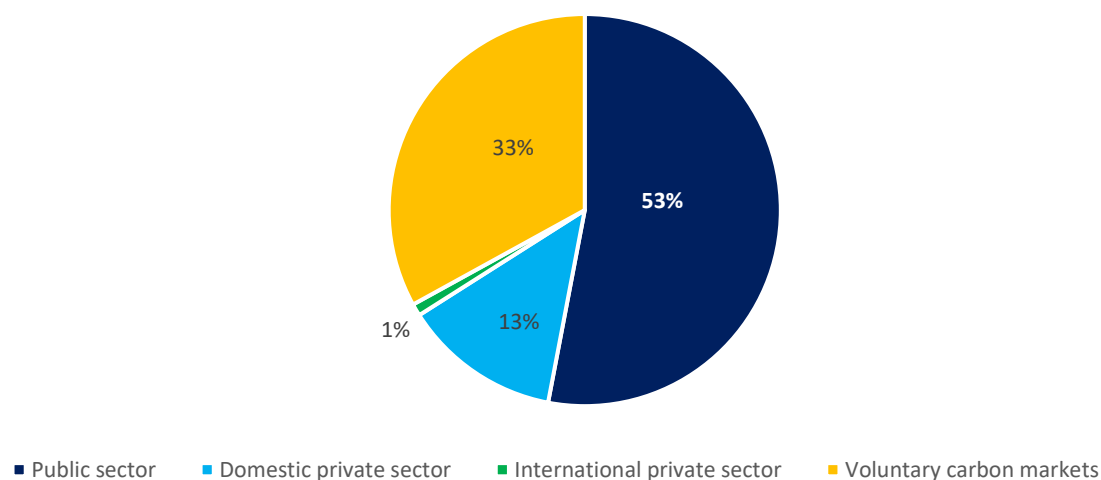
**Table 4.3. Share of estimated domestic and international climate finance flows compared to the desired share as established by the Kenyan Government in its NDC (2020-2030)**

| Area                                                            | Kenya: Current total estimated climate finance flows (2018 figures) (% of total flows) | Kenya: Desired share of climate finance sources as outlined in its updated NDC |
|-----------------------------------------------------------------|----------------------------------------------------------------------------------------|--------------------------------------------------------------------------------|
| Domestic climate flows (mitigation and adaptation)              | 42%                                                                                    | 13%                                                                            |
| International climate finance flows (mitigation and adaptation) | 58%                                                                                    | 87%                                                                            |

Source (Kenya figures): Mazza et al. (2021)

The only figures available on finance flows into NbS in Kenya were published by Smith et al. (2022). The study tracked USD 90 million per year in finance flows, representing 6% of the country's overall climate finance flows. In the absence of adequate tracking mechanisms, this figure is likely to be an underestimate. The study suggests that voluntary carbon markets are one of the primary instruments used by NbS. The scoping study on private climate finance for NbS in Kenya (section 4.3.4) presents similar findings; many projects relied on the sale of voluntary carbon credits. Interestingly, the study by Smith et al. (2022) also did not track much international private-sector finance, while the scoping study collected more information on international private-sector finance than domestic private-sector finance. Due to a lack of transparency on the methodology used and data sources from the study by Smith et al. (2022), it was impossible to identify the breakdown of finance and include these NbS initiatives in the scoping study (section 4.3.6.). The study by Smith et al. (2022) estimates that USD 1.2 billion per year by 2050 would be needed to implement NbS in Kenya (Smith et al., 2022), of which 40% should be derived from private sector sources.

**Figure 4.4. Breakdown of climate finance flows into NbS in Kenya**



Source: Smith et al. (2022) from data taken from Government of Kenya (2018, 2021)

#### **4.3.4. Nature-based solutions in Costa Rica**

The Costa Rican economy has transformed dramatically since the 1980s, moving from a lower-middle-income country to an upper-middle-income country in a relatively short period of time (The World Bank, 2024). It is now considered among the wealthiest countries in the region (World Population Review, 2025) having successfully diversified into a service-based economy from an agriculture-based economy.

Costa Rica is recognised as a leader for its measures to protect and conserve the environment (BTI Transformation Index, 2022). The right to a healthy environment was established in the constitution.<sup>66</sup> The right to clean water was added in a 2020 reform.<sup>67</sup>

Costa Rica remains vulnerable to climate change. Records indicate an increase in extreme weather events, such as storms, hurricanes, and rising temperatures, affecting the country (World Bank, 2021). One figure estimates property-related losses due to an increase in extreme weather events, between 2005 and 2017, to be at USD 2.21 billion (MINAE, 2018).

Costa Rica's NDC incorporates NbS in its climate mitigation and adaptation goals. A screening of its NDC finds a total of 56 references to NbS (Government of Costa Rica, 2020). It features

<sup>66</sup> See Article 50 of the Constitution of Costa Rica 1949 and amendments (Constitute, 2021).

<sup>67</sup> *Ibid.*

prominently in the sections on agriculture and livestock, forests and biodiversity, as well as oceans and freshwater. The NDC also considers NbS in the country's land management strategy, infrastructure and construction sector, commerce and services, waste management, agriculture and livestock. See Appendix 4G for greater detail on NbS references in Costa Rica's NDC.

An entire section of Costa Rica's NDC mitigation segment is dedicated to forests and biodiversity.<sup>68</sup> Goal 8 commits to sustaining and increasing forest coverage through its payments for the ecosystem services programme. The NDC aims to expand its *Environmental Services Payment Programme* to a broader *Ecosystem Services Payment Programme*.<sup>69</sup> Goal 8.1. specifically refers to NbS as a key pillar of its climate action. Only one goal (9.1) in the NDC specifically refers to leveraging the private sector for NbS: "Costa Rica will explore the potential of public-private investments to support the protection and restoration of mangroves" (Government of Costa Rica, 2020; UNDP, 2022a).

There are several cross-cutting goals that also refer to NbS: goal 10 (actions for climate empowerment), goal 11 (transparency and continuous improvement), goal 12 (finance), and goal 13 (climate policies, strategies and plans). Section 12 specifically refers to how the Costa Rican Government will leverage the financial sector in climate mitigation and adaptation actions (See Appendix 4G for specifics). Interestingly, only two sub-goals in this section refer to NbS: sub-goal 12.7 (sustainable infrastructure and the creation of green jobs) and 12.9 (Costa Rican Compensation Mechanism).

While Costa Rica's NDC section on adaptation only marginally refers to NbS twice, the more recent National Adaptation Plan 2022-2026, launched in 2022, incorporates NbS throughout its roadmap for strengthening the country's resilience.

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<sup>68</sup> See updated NDC, Goal 8 (2020, pp. 37).

<sup>69</sup> *Ibid.*

#### **4.3.5. Climate finance in Costa Rica, including nature-based solutions**

There is very little climate finance data on Costa Rica. There are no known analyses of climate finance flows in Costa Rica, nor is there a needs assessment for implementing Costa Rica's NDC.

I reviewed both national and international documents. The UNFCCC Standing Committee of Finance, in its latest biennial assessment, confirms that it is currently unknown whether climate finance is regularly reported at the national level in Costa Rica.<sup>70</sup> This was also confirmed by interview participants.

In an interview, the Costa Rican Minister of the Environment estimated that about 80% of climate finance in the country comes from domestic sources, compared to 20% from international sources. Other experts interviewed indicated that while the Costa Rican Government had undertaken a domestic climate finance assessment, it had not been made publicly available.

The following national documents were reviewed in this analysis: National Climate Change Adaptation Plan 2022-2026 (Government of Costa Rica, 2021), Revised National Determined Contributions 2020 (Government of Costa Rica, 2020).<sup>71</sup> The analysis also included the report on "Monitoring of Climate Finance in Financial Entities Supervised by SUGEF in Costa Rica" (Mejia and Rodriguez, 2019), which provides guidelines for how the financial entities should report climate finance data. However, no subsequent reports have been published as of the writing of this thesis. In sum, very little climate finance data on Costa Rica has been made publicly available.

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<sup>70</sup> See table 1.1. Regular reporting of climate finance at national level (UNFCCC Standing Committee on Finance, Fifth Biennial Assessment 2022).

<sup>71</sup> Contribucion Nacionalmente Determinada 2020.

#### **4.3.6. Scoping study of private climate finance for NbS in Kenya and Costa Rica**

While some grey literature exists on NbS projects,<sup>72</sup> there is a lack of in-depth research on *private* climate finance for NbS in Kenya and Costa Rica. Moreover, existing scoping studies on NbS tend to focus on specific solutions, such as flood resilience (Boer et al., 2023), NbS in urban areas (Ershad Sarabi et al., 2019) or NbS for disaster risk reduction (Popovicki, 2023). Most of these studies are not peer-reviewed. One report by Smith et al., (2022) assesses potential strategies for scaling up finance for NbS in Kenya. However, it lacks a rich, contextual data, providing a short description of only two NbS cases. Another bibliometric analysis of NbS in Africa (Nyika and Dinka, 2022) noted that, except for South Africa, there is currently limited research on the state of NbS on the African continent.

The scoping study (available in Appendices 4H, 4I, 4J) aimed to fill this gap by providing an analysis of initiatives that qualify as NbS in Kenya and Costa Rica. It sheds light on the domestic and international dynamics of NbS in each country, with a focus on identifying NbS initiatives that source private climate finance.

There are several insights that can be drawn from the scoping study (Appendices 4H, 4I, 4J). First, the scoping study reveals that NbS initiatives rely on diverse financing sources, intermediaries, and instruments, which is difficult to capture using the current climate finance framework (Buchner et al., 2013). NbS initiatives often combine finance from multiple public and private sources through various finance mechanisms. For instance, NbS initiatives rely heavily on grants from philanthropic sources and non-profit organisations, especially in the early phases of project development and piloting, and then, as they develop, rely on more complex financing structures from a diversity of sources (e.g. USAID GEF, investment funds). This multiplicity contributes to the complex and non-linear nature of financing illustrated by the financial flows diagram of climate finance (Buchner et al., 2013). Consequently, mapping the landscape of finance for NbS is complex, making it difficult to apply the Buchner et al. (2013) framework for climate finance.

A lack of publicly available information on financing NbS interventions limited the comprehensiveness of the scoping study. Information on NbS is published inconsistently across projects, and documentation on the financing mechanisms is even more difficult to obtain. A centralised database on NbS does not exist, neither at the national nor international

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<sup>72</sup> See, for instance, an international scoping studies of NbS by CCICED (2021), a national scoping study of NbS in Serbia (Popovicki, 2022), Bosnia-Herzegovina (Kapovic Solomun, 2022), Asia-Pacific region (Kerin and Cox, 2021).



level. Multilateral organisations tend to disclose more information on NbS, but because initiatives leverage multiple sources of climate finance, the private climate finance dynamics of each project are obscured. Moreover, the reliance on diverse financing instruments renders direct comparability difficult. For instance, some NbS are structured as funds, while others are implemented as standalone projects, and some operate as a for-profit business. These attributes collectively underscore the complexities in obtaining a comprehensive picture of the climate finance landscape of NbS at a country level.

Despite these challenges, the scoping study reveals several findings. Financial flows for NbS exhibit a distinct direction from North to South. The scoping study was only able to identify projects that relied to some extent—if not entirely—on *international* finance sources; no initiatives sourced finance exclusively from domestic sources or Global South institutions. Even the government-led PSA programme in Costa Rica leverages international financial sources. Moreover, it appears that none of the NbS initiatives identified in the scoping study relied exclusively on private climate finance.

Moreover, the scoping study on Kenya's reveals the popularity of voluntary carbon markets to finance NbS. Data gaps make it impossible to quantify the total amount of revenue generated for the specific NbS cases, but if projects are counted as individual units, the sale of carbon credits appears to be among most common form of financing for NbS. Projects that could qualify as NBS are registered as AFOLU initiatives or ARR. Among the NbS-related projects published in the Verra Verified Carbon Standard database for Kenya, four projects are registered under two standards-- the Verified Carbon Standard *and* the Climate, Community and Biodiversity Standard.<sup>73</sup> All NbS-related projects under the Verified Carbon Standards are categorised as Agriculture, Forestry and Other Land Use projects.<sup>74</sup> Among the NbS-related

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<sup>73</sup> These projects are: Chyulu Hills REDD+ Project, Komaza Smallholder Farmer Forestry Kenya, Papariko - Restoration of Degraded Mangrove Areas in Kenya, TIST Programme in Kenya (multiple projects). Note that the TIST programme is registered as multiple projects in the Verra Registry but, for analysis purposes, is counted here as a single project here.

<sup>74</sup> These projects are the following: Boomitra Carbon Farming in East Africa through Soil Enrichment; Boomitra Grassland Restoration in East Africa Through Soil Enrichment; Chyulu Hills REDD+ Project; Conservation of Miombos in Taru Kenya REDD+; Hongera Reforestation Project (Mt Kenya and Aberdares); Kenya Agricultural Carbon Project; Komaza Smallholder Farmer Forestry Kenya; Livelihoods Mount Elgon Project; Makueni Agroforestry Carbon Project

Northern Kenya Grassland Carbon Project; One Mara Carbon Project; Papariko - Restoration of Degraded Mangrove Areas in Kenya; Restore Africa: Restoring trees and livelihoods in Kenya; The Kasigau Corridor REDD Project – Phase I Rukinga Sanctuary; The Kasigau Corridor REDD Project - Phase II The Community Ranches; TIST Programme in Kenya, (VCS 001, VCS 002, 003, 004, 005, 006, 009, VCS-CCB 010); Western Kenya Soil Carbon Project. Note that the TIST programme is registered as multiple projects in the Verra Registry but, for analysis purposes, is counted as a single project here.

projects published in the Verra Climate, Community and Biodiversity Standard database for Kenya, the majority of projects involve ARR (6 projects)<sup>75</sup> with the remaining projects involving REDD (2 projects)<sup>76</sup> and ALM (1 project).<sup>77</sup>

The NbS projects that leverage private climate finance, in Kenya, appear to be led by non-state actors that are capable of attracting philanthropic finance and public climate finance through blended financing mechanisms. While return-seeking capital such as private equity and commercial loans appear as financial instruments for some NbS in Kenya to extent to which they are supported by public finance sources to mitigate risk is unclear.

In Kenya, NbS projects utilising voluntary carbon credits as a financing instrument were concentrated on Agriculture, Forestry, and Other Land Use (AFOLU) areas. According to the Verified Carbon Standard (VERRA) registry, Kenya has a total of 24 AFOLU projects.<sup>78</sup> In contrast, Costa Rica, has a limited presence of NbS registered under the Verra and Gold Standard platforms. The one biodiversity project registered under Verra, titled "Avoided Deforestation Through the Payment of Environmental Services in Rainforests Located on Private Lands in the Conservation Area of the Central Volcanic Mountain Range of Costa Rica," is no longer active, and pertinent documents are unavailable.

The variance in the focus of financing mechanisms between Kenya and Costa Rica suggests two distinctly opposing experiences in leveraging climate finance for NbS. While Kenya is increasingly leveraging carbon credit revenue for the financing of NbS projects, Costa Rica's approach has largely been driven by government-driven programmes. It is only in recent years that the Costa Rican Government has begun considering strategies for leveraging private climate finance. This may be in part driven by the decreasing revenue from the fuel tax, the main source of finance for the PSA programme. For example, the Costa Rican BIOFIN

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<sup>75</sup> These projects are: Aberdare Range/Mt. Kenya Small Scale Reforestation Initiative; Forest Again Kakamega Forest

Komaza Smallholder Farmer Forestry Kenya; Papariko - Restoration of Degraded Mangrove Areas in Kenya; Sustainable Agriculture in a Changing Climate; TIST Programme in Kenya (VCS 001, VCS 002, 003, 004, 005, 006, 009, VCS-CCB 010). Note that the TIST programme is registered as multiple projects in the Verra Registry but, for analysis purposes, is counted as a single project here.

<sup>76</sup> These projects are: Chyulu Hills REDD+ Project; The Kasigau Corridor REDD Project, Phase I (Rukinga Sanctuary) and Phase II (The Community Ranches). Note that the Kasigau Corridor REDD Project is published as separate projects (one for each phase) under the Verra Registry, but, for analysis purposes, is counted as a single project here.

<sup>77</sup> This project is: the Northern Kenya Grassland Carbon Project.

<sup>78</sup> It is essential to acknowledge the intricate nature of project counting, with 10 CCB projects identified despite excluding programmes issuing separate IDs under Verra but representing the same overarching project. For instance, the Kenya Agricultural Carbon Project (ID 1225) implements agroforestry activities under VERRA's Carbon programme. However, it could also potentially yield biodiversity benefits even though not formally enlisted under the biodiversity programme.

programme committed USD84.9M in 2018 for six new programs that, in some capacity, seek to leverage private climate finance for NbS.<sup>79</sup>

Unlike climate energy projects, NbS initiatives do not exhibit a technology-centric focus. The extent to which technological innovation supports NbS is unclear. It appears that it may play a supporting role rather than being at the forefront of investment and project implementation, like energy projects, where the majority of climate finance flows both in Kenya and internationally.

#### 4.4. Conclusion

What does this analysis of the conceptual evolution of climate finance and NbS under the UNFCCC say in terms of the role of *private* climate finance? First, it confirms the links between multilateral governance frameworks and domestic policymaking. Tracing the concepts related to climate finance since the 1970s reveals a gradual shift towards engaging the private sector in global finance flows. Moreover, early conceptualisations of NbS under the UNFCCC adopted a narrow definition, which may explain why initial implementations have largely been concentrated on terrestrial forests.

Both Kenya and Costa Rica incorporated references to private sources and NbS, in their updated NDCs, to achieve their climate goals, albeit to varying degrees. However, both countries seem to treat the two as separate issue areas at the domestic policy level.

Costa Rica, well known for its advancements in forestry recovery, has very little information available on climate finance flows domestically, not least for NbS, contrary to Kenya. However, an initial assessment suggests that the government's effective public financing of NbS implementation may have met financing needs, which may explain the limited private sector's contributions to NbS to date.

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<sup>79</sup> These NbS initiatives are the Biobusiness Platform, Payment for Ecosystem Services Programme, Thematic Bond for Protected Areas, Huella del Futuro, Seed Capital and Entrepreneurship for Sustainable Tourism (see scoping study tables).

## **Chapter 5. A case study on private climate finance leveraged by Komaza Inc. for sustainable timber supply chains**

### **5.1. Introduction**

In Africa, up to 65% of productive land is degraded (FAO, 2021). Desertification affects 45% of the continent's land area (Mansourian, 2021). Restoring forests and landscapes to combat land degradation is one approach to enhance food and water security, sequester greenhouse gas emissions, preserve biodiversity, and enhance the resilience of communities facing the effects of climate change (Cowie et al., 2011; Hermans and McLeman, 2021; Wolff et al., 2018). Studies suggest that the benefits of restoration are up to ten times higher than their costs (IPBES, 2018).

This chapter presents a case study on Komaza Inc. (Komaza), a social impact forestry company whose objective was to address the continent's USD 30 billion wood deficit while restoring degraded land in Kenya. Launched in 2006, the NGO-turned-for-profit company set out on a mission to become Africa's largest forestry business by working with smallholder farmers to provide sustainable, scalable local wood supply (Komaza, n.d.). Their goal was to lift subsistence farmers out of poverty by building a profitable forestry business that connects small-scale farmers to high-value wood markets. Leveraging technology and global capital markets to finance its growth, Komaza was heralded as the "Uber of Forestry," revolutionising timber production in Africa (Cavano, 2020). Its forestry business model relied on partnerships with landowners to grow trees on private properties (known as the 'out-grower' forestry model). This approach sought to reduce the cost of operations and appeal to return-seeking investors. Despite raising over USD ~57 million in finance over nearly 16 years of operation, growing its workforce to over 600 employees, subscribing 25,000 farmers to its programme, and having planted 8 million trees, the company defaulted on its loan in 2023, triggering insolvency proceedings.

Komaza is considered an NbS enterprise because its business model was centred around achieving simultaneous socio-economic, climate, and wider biodiversity objectives (Komaza, n.d.; Atisa, 2021). Coastal Kenya is characterised by some of the highest poverty rates in the country, with over 62% of the population living below the poverty line (World Bank Group, 2016).

Komaza's rise and successes—but ultimate failure to grow into a mature social impact forestry business—offers insights into the dynamics of private climate finance for a for-profit NbS enterprise in a developing country. Specifically, the case study reveals some of the challenges of mobilising private climate finance for for-profit companies that aim to achieve large-scale impact, such as transforming the forestry supply chain.

This case study examines the following questions. How was climate finance deployed for the NbS enterprise? What were the barriers to mobilising private climate finance for Komaza, and what enablers facilitated its deployment? To what extent was Komaza able to act as a driver or accelerator of the transition towards sustainability in Kenya? The chapter begins with a brief review of the relevant literature. The second section explains how Komaza deployed finance for the NbS enterprise. While an initial assessment of Komaza's climate finance data suggests heavy reliance on global capital markets via private equity funds, a closer examination reveals that, except for grant funding, the provision of climate finance from international capital markets is backed mainly by Development Finance Institutions (DFI) or finance considered “public.” Section three analyses the barriers and enablers that Komaza faced leveraging private climate finance in building more sustainable forestry and timber supply chains. The fourth section examines the business model's ability to address socio-economic and environmental considerations and trade-offs between these objectives in operating a for-profit entity operating as an NbS enterprise.

### **5.1.1. The forestry sector in Kenya**

It is estimated that by 2030, the wood supply deficit in sub-Saharan Africa will reach USD 30 billion (Collins, 2020). In Kenya, the current deficit is estimated at one-third of the required supply (Koech, 2020) and is estimated to double in the next decade (Gatsby Charitable Foundation, 2020). The significant demand for wood stems from its use as a source of fuelwood (see Appendix 5A).<sup>80</sup> In Kenya, it accounts for approximately 70% of the country's primary energy (Githiomi and Oduor, 2013; Government of Kenya, 2013). Over 90% of rural households in Kenya use firewood for cooking and heating, while 80% of urban households in the country depend on charcoal for cooking (Hamid and Blanchard, 2018; Hamlin, 2012; Ndegwa et al., 2011).

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<sup>80</sup> See Appendix 5A.

Several factors contribute to the wood supply deficit in Kenya. The country has a relatively underdeveloped forestry and timber industry with an inefficient supply chain and outdated sawmills, leading to insufficient quantities of high-quality industrial timber being produced (UNEP, 2017). Moreover, wood is often poorly treated and irregular in size, leading to comparatively high consumer prices (UNEP, 2017). Actors at the top of the value chain, often located in rural areas, lack investment capital for more efficient conversion technologies (Ndegwa et al., 2011). Repeated government bans on logging within government plantations (i.e. 1999-2011 and 2018-2023),<sup>81</sup> aimed at regenerating forests, have further increased uncertainties and inefficiencies in the value chain (Brittall et al., 2013). Bans are thought to have increased illegal logging within Kenya and imports from illegal sites from neighbouring countries (Pilgram et al., 2022).

The Kenyan Government has recognised the impacts of the timber industry as a contributor to the country's emissions levels, as well as forest deforestation and degradation (UNEP, 2012a, 2012b). Other drivers of land degradation in Kenya are land use change for agriculture, poor governance, and institutional failures in the forestry sector (Government of Kenya, 2013).<sup>82</sup> The Kenyan Government has adopted several supply and demand-side policies and legislations to modernise its bioenergy sector and transform the timber supply and processing industry (GoK, 2010). Enhancing energy and resource efficiency is one policy intervention to reduce pressures on forests.

Private actors can contribute to a more sustainable timber supply chain by increasing woodlot developments on farmlands and adopting technology to enhance efficiency (Githiomi and Oduor, 2012). Forests are managed under three tenure systems in Kenya: public, community and private.<sup>83</sup> Data on forest ownership is only available for two categories: public (27%) and combined private/community-owned forests (73%).<sup>84</sup>

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<sup>81</sup>The government has imposed several logging bans since the 1980s, each with different durations and scopes, with the most recent one imposed in 2018 and being lifted in 2023. See Appendix 5A.

<sup>82</sup> A list of direct and indirect drivers can be found in Appendix 5A.

<sup>83</sup> Public forests in Kenya are under the joint management of national government agencies, predominantly the Kenya Forest Service and Kenya Wildlife Service, along with County Governments. Community forests are either owned by communities themselves or held in trust by county governments. Forest management rights and responsibilities are transferred from the government to local communities through long-term leases or management agreements in these areas. Meanwhile, the third group, private forests, are owned and/or managed by individual landowners, institutions or private entities (Government of Kenya, 2017a, p. 75).

<sup>84</sup> Breakdown of forest ownership data by community-owned and private ownership is not available.

In 2010, the Kenyan Government committed to increasing its country's tree cover to 10% by 2030 from a baseline of 5.7% (GFW, n.d.), later increasing the target to 30% by the year 2050 (UNDP, 2022b).<sup>85</sup>

The forestry sector is important in the context of NbS. Trees play a critical role in carbon sequestration, biodiversity conservation, and the provision of ecosystem services such as water purification and soil stabilisation. They provide habitats for plant and animal species and can enhance habitat connectivity. The sector is also an essential source of livelihood for many Kenyans (Matiku, 2005; MEWNR, 2016). Unsustainable land use practices in Kenya have resulted in gradual land degradation, decreased land productivity, which has in turn lead to encroachment on public land for food production and resource extraction (Matiku, 2005).

The types of benefits generated from commercial tree plantations are dependent on the specific management practices and the ecosystems in which the interventions take place in (Cawsey and Freudenberger, 2008; Lindenmayer et al., 2003). When optimising for environmental metrics, studies show that plantations are a favourable land use option over agriculture (Brockhoff et al., 2008). However, nuance is necessary here. Afforestation of agricultural land may have positive benefits for climate mitigation and biomass energy production, but will have trade-offs on other metrics, such as food production (Kreidenweis et al., 2016). A systematic study of 350 journal articles showed that trees in agricultural areas can enhance the provision of ecosystem services in Sub-Saharan Africa (Kuyah et al., 2016). Moreover, the afforestation of mono-crop trees in water-scarce croplands or the afforestation of natural non-forest land will have detrimental environmental impacts. On the other hand, afforestation of unused or degraded lands will have beneficial ecological impacts because these activities can assist in the provision of habitat, buffering edge effects, and increasing connectivity for biodiversity conservation (Brockhoff et al., 2008; Yao and Li, 2010). This is important to remember as Komaza does not operate a traditional forestry model of large-scale plantations but instead utilises a small percentage of each landowner's land to grow trees in degraded and underutilised agricultural lands.

The type of reforestation and land restoration activities, where and how they are implemented, determines carbon-storage potential. Fast-growing plantations (e.g. Eucalyptus) will absorb greater quantities of carbon than natural forests, but due to their harvest cycle absorb less carbon in the long term (Lewis et al., 2019; Yang and Harrison, 2019). Moreover, the carbon

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<sup>85</sup> In May 2022, Kenya's President Uhuru Kenyatta announced Kenya's attainment of the Constitutional 10% tree cover target (UNDP, n.d.).

sequestration potential of timber plantations is greater if they are used in construction or furniture products, rather than fuel wood.

Navigating the advantages and disadvantages of each land use activity is a significant challenge that requires adaptive management and strategic decision-making. Improving the productivity of the timber supply chain can have the unintended consequence of increasing pressure on forest ecosystems. Higher incomes from greater efficiency in the supply chain encourage individuals to encroach on forested areas (UNEP, 2017). Therefore, financial incentives for promoting efficiency must be aligned with private stakeholders adhering to relevant social and environmental criteria. It should also be noted that there is a lack of evidence on whether increased efficiency will alleviate pressures on natural forests (UNEP, 2017).

Unlike the traditional forestry model, which typically involves a significant upfront cost of purchasing large plots of land for commercial plantations, Komaza adopted the 'out-grower model'. In this model, landowners (or 'out-growers') are contracted by the forestry enterprise to grow trees on unused parts of their land (Rode et al., 2014). By entering into a partnership, the forestry company committed to providing inputs (e.g. seedlings), training, and technical assistance, while the farmers committed to undertaking interventions on their land (e.g. planting, nurturing, and managing the trees until they reach maturity). This approach aimed to "connect the dots from smallholder farmers to the [...] booming wood markets of Africa, which the farmers would otherwise have access to" (Baragona, 2018).

The out-grower forestry model reportedly enabled Komaza to reduce operating costs to approximately USD1,000-1,500 per hectare, compared to the estimated average of USD 5,000 per hectare in Sub-Saharan Africa. The advantages of the out-grower model include much lower initial capital costs, as there is no need to purchase land or pay salaries to landowners (Rode et al., 2014).

### **5.1.2. Private climate finance for sustainable timber supply chains**

The estimated global finance needs for transforming the forestry and timber sectors toward long-term sustainability are estimated at USD 70-160 billion per year (Castren et al., 2014). Data on forest financing from private sources is scarce and incomplete. Kenya lacks comprehensive data on its timber industry. Research suggests that the majority of land restoration activities, at the global level, are funded through public budgets, while private actors often finance efforts to enhance supply chain sustainability (UNEP, 2023a).



Despite growing interest in how finance can contribute to more sustainable supply chains, the literature in this area has only emerged in the last decade and remains sparse (Jia et al., 2020). A few authors have examined the role of finance in sustainable supply chains, but have tended to focus on economic performance, while attention to environmental and social performance has been limited (Santos et al., 2019; Tseng et al., 2018; Xu et al., 2018). The motivations, objectives and constraints faced by private investors vary in their objectives and constraints, depending in large part on their dependence on the land to be restored (Gitz et al., 2020). Löfqvist et al. (2023) examine the barriers and enablers to private climate finance for forest and landscape restoration, showing that a corporation's motivation to engage in these activities is driven by compliance with environmental regulations, net-zero commitments, corporate social responsibility, and the impact on branding and marketing objectives. The degree to which private investments in forestry and timber are considered high- or low-risk investments varies, however. The grey literature suggests timber is a low-risk investment with low volatility and high returns in the long run (FAO and the Global Mechanisms of the UNCCD, 2015), but others found the opposite to be true. Löfqvist et al. (2023), found that asset managers face bigger barriers to investing in land restoration because they are deemed to be “high-risk, unknown investment[s] with low profitability.” This finding is supported by Rode et al. (2019), who conclude that the risk-return profile of investors in the sustainable land use sector rarely meets the demand of private investors.

Attracting private climate finance for sustainable forestry is challenging in part because returns often take up to ten years to materialize—a timeframe that return-seeking investors are unwilling to accommodate (Cavano, 2020). Moreover, investors are discouraged by assets that are not easily converted into cash. The convergence of these factors, alongside political and security risks inherent in the African context, has resulted in minimal commercial investment in the sector (Cavano, 2020). A summary of barriers to private climate finance in the sustainable forestry and timber sectors in developing countries can be found in Appendix 5A.

While there has been some research on finance and sustainable land use in the forestry sector in developing countries, it has largely focused on Latin America, leaving a significant knowledge gap on dynamics in Sub-Saharan Africa. Similarly, research on sustainable supply chains more broadly has predominantly focused on Europe and the United States; highlighting a gap in developing countries (Fahimnia et al., 2015; Khalid et al., 2015; Santos et al., 2019). Considerably less attention has been paid to the financing of land restoration in the commercial forestry sector. Some studies have examined private climate finance for forest and landscape restoration at global scales, but don't examine commercial forestry models at

local levels (Löfqvist et al., 2023; Löfqvist and Ghazoul, 2019). Moreover, analyses on the economics and financing of Komaza's out-grower scheme have focused on Brazil (de Moraes Gonçalves et al., 2020; Rode et al., 2014) and a few other developing country regions (Kamara, 2011; Phimmavong et al., 2019). A few studies have been conducted on the model's potential in East Africa and Kenya (Cheboiwo and Langat, 2009; Cheboiwo et al., 2018), but have fallen short of analysing the impact of this model on climate resilient development and the role of private climate finance for these initiatives.

Enhancing efficiency is one approach to advancing more sustainable supply chains within the forestry and timber sectors.<sup>86</sup> The investment opportunities to improve efficiency in the forest sector can be grouped into four categories (UNEP, 2017): (i) forestry operations (i.e. commercial logging), (ii) timber conversion (i.e. sawmills), (iii) charcoal production, (iv) use of charcoal and firewood in cooking stove technology.<sup>87</sup> Financing more sustainable supply chains will lead to trade-offs that must be accounted for, and include “(1) economic, environmental, and social outcomes, (2) the extent of those outcomes on different spatial and temporal scales, (3) the extent to which those outcomes are felt by different actor groups, and (4) the relative emphasis on effectiveness, efficiency and equitability” (Newton et al., 2013, p. 10).

In Kenya, the grey literature points to several investment barriers in the forestry and timber sector. A study by UNEP (2017) highlights that small-scale forestry actors in Kenya face significant financial challenges, placing them at a disadvantage to larger organisations. The largest difficulty remains accessing credit, high interest rates, and high equipment purchase costs due to taxation on imported equipment. Ototo and Vlosky (2018) also note that limited access to extension services for establishing, managing, and harvesting forest plantations remains a challenge. Other challenges include the absence of quality seedlings, information asymmetries on end markets, and administrative burdens related to licensing and transportation (Ototo and Vlosky, 2018).

Kenya's National Forest Programme (2016-2030) sparingly examines private-sector investment opportunities, primarily focusing on government-enabled programs that support the establishment of payments for ecosystem services in forestry and REDD+ forest finance (Government of Kenya, 2016a). The analysis of the forestry's potential indicates that the

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<sup>86</sup> See Appendix 5A: “Areas for optimising efficiency in the forest and timber sectors in Kenya.”

<sup>87</sup> See Appendix 5A. Komaza focuses on enhancing efficiency in forestry operations (i.e. commercial logging) and timber conversion (i.e. sawmills).

largest wood supply potential lies in trees planted on farmland (70%), followed by communal and private forests (20%) and public forests (9%) (Government of Kenya, 2016).<sup>88</sup> It also recognises that smallholder plantations have significant potential for forestry, indicating promising results for the out-grower forestry model (Appendix 5B). Another study on gross margins for one hectare of selected crops in south-western Kenya showed that growing certain types of trees (specifically Eucalyptus) has one of the highest profit margins compared to cash and food crops in Kenya (Ndegwa et al., 2011). However, the study was conducted in Kisii County, which is characterised as a non-ASAL (Arid and Semi-Arid Lands) region. Its findings may not be representative of the broader context of Kenya, where approximately 80% of the territory comprises an ASAL area (Appendix 5A).

## **5.2. Komaza: The deployment of private climate finance for sustainable timber supply chains**

### **5.2.1. Private climate finance deployment**

The following section provides an overview of Komaza's deployment of private capital. Contrary to the findings in the literature, which suggest that NbS, and specifically land restoration, are primarily funded by public sector funding, the case of Komaza provides an example of significant amounts of private climate finance leveraged from global capital markets for the implementation of a private NbS business model. However, the company's failure to reach maturity, breakeven and pay back its loan, ultimately leading to its insolvency, raises questions on the long-term viability of the NbS business model that relies heavily on private venture capital for its growth.

Interviews with Komaza employees, corroborated by secondary sources, indicate that approximately USD 57 million in climate finance was mobilised over a nearly 20-year period (2006-2023). Table 5.1. below summarises these figures and underscores the diversity of climate finance sources leveraged by the NbS enterprise. During Komaza's initial years of operation as a not-for-profit (2006-2015), non-reimbursable grants from philanthropic organisations and high-net-worth individuals were the primary funding sources at approximately USD 9 million, with each grant averaging between USD 250,000 and USD 500,000.<sup>89</sup> The Mulago Foundation was an example of a grant provider in the early years,

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<sup>88</sup> See Appendix 5A. "Estimates (%) of wood supply potential from different sources in Kenya."

<sup>89</sup> Participant 110.

while Apple Inc., in partnership with Conservation International, provided a grant in later years to support the development of Komaza's voluntary carbon credits.<sup>90</sup>

From 2015 onwards, as a for-profit enterprise, Komaza turned to western-based venture capital to finance its growth. A seed round raised an undisclosed amount in 2015. The objective of the seed funds was to prove that there was sufficient demand from farmers to engage in Komaza's business model and that the market was large enough. These concerns were attributed to the high capital requirements anticipated to implement the business model. In 2017 and 2020, Komaza secured USD 10 million and USD 28 million in Series A and B funding rounds, respectively. Each round sought to prove a different objective to investors. The first (Series A) round aimed to demonstrate that the company could plant trees at scale. The second (Series B) round sought to show that the company could process timber at scale, the next stage in the value chain. The Series B round also aimed to prove to return-seeking investors that the company could attract sufficient capital to fund operations, at least initially.

The financing sources of Komaza's Series A and Series B funding rounds suggest that financing was leveraged from independent venture funds within global capital markets. However, a closer examination highlights the role played by DFIs and public finance. For instance, FMO Private Equity, is a Dutch development bank funded from domestic public sources. NOVASTAR Ventures, the lead investor in Komaza's fundraising rounds, also significantly relied on DFI finance, according to Komaza's Director of Finance. Meanwhile, the LDN Fund, which provided a concessional loan to Komaza, is an impact investment fund that blends public, private, and philanthropic resources.<sup>91</sup> This raises questions about the extent to which private climate finance is in fact available to NbS enterprises without DFI funding available to de-risking return-seeking investments in emerging markets.

In 2022, Komaza received a concessional loan of approximately USD 9.6 million, at an interest rate of 7-8%, from the Mirova Capital LDN Fund. The loan was meant to cover the company's sawmill's capital expenditure and infrastructure development and help integrate the value chain further by entering the timber processing sector. It is also worth noting the financial instruments that Komaza failed to leverage successfully, namely guarantees and voluntary carbon markets. A closer examination of the reasons for the failure will be provided in the sections below.

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<sup>90</sup> Participant 110.

<sup>91</sup> Sources: Participant 110; UNCCD (2024).

**Table 5.1. Overview of climate finance mobilised by Komaza (2006-2023)**

| <b>Project finance characteristics</b>              | <b>Amount (USD)</b> | <b>Description</b>                                                                                                                                                                                                                                 |
|-----------------------------------------------------|---------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Total finance tracked:                              | ~\$56-58M           | Finance raised from all sources                                                                                                                                                                                                                    |
| <b>Grants</b>                                       | \$8-10M             | Grants (2006-2015)<br>Various, including Mulago Foundation, Apple Inc, Conservation International                                                                                                                                                  |
| <b>Venture capital</b>                              | Unknown             | Seed round (2015): Undisclosed amount (Novastar Ventures)                                                                                                                                                                                          |
|                                                     | \$10M               | Series A (2017): led by Novastar Ventures with Impact Asset, Rabo Foundation, Mitsui & Co, Sobrato Philanthropies <sup>92</sup>                                                                                                                    |
|                                                     | \$28M               | Series B (2020): co-led by Novastar Ventures and AXA Investment Managers, FMO Bank <sup>93</sup>                                                                                                                                                   |
| <b>Debt</b>                                         | \$9.6M              | Concessional loan (2022): US (Land Degradation Neutrality Fund, Conservation International)                                                                                                                                                        |
| <b>Voluntary carbon credit revenue (2023-)</b>      | \$500K              | Revenue: USD 0 (2023)<br>Grants: USD 500,000 grant for technical assistance (Apple Inc. and Conservation International)                                                                                                                            |
|                                                     |                     |                                                                                                                                                                                                                                                    |
| <b>Cost of entering the voluntary carbon market</b> | ~ \$750K            | 3+ year process.                                                                                                                                                                                                                                   |
| <b>Finance recipient entities:</b>                  | NA                  | Komaza Group Inc. (KGI)<br>Komaza Forestry Limited (KFL)<br>Komaza Smallholder Forestry Vehicle (SPV)                                                                                                                                              |
| <b>Finance intermediaries:</b>                      | NA                  | FMO Bank                                                                                                                                                                                                                                           |
| <b>Finance channels:</b>                            | NA                  | Venture capital firms (e.g. Novastar Ventures, Axa Investment Managers)<br>Various philanthropic grant donors (e.g. Mulago Foundation)<br>Philanthropic donors (e.g. Conservation International)<br>Others (e.g. Land Degradation Neutrality Fund) |
| <b>Land investment allocations:</b>                 | \$1-1.5K /ha        | This is per hectare of farmland (compare with the average in sub-Saharan Africa, which is ~\$5,000/forestry)                                                                                                                                       |
| <b>Commercial returns expected:</b>                 | 20% IRR             | Expected returns 20% IRR compared to 15% IRR in traditional forestry.                                                                                                                                                                              |
| <b>Financial instruments:</b>                       | NA                  | Primarily equity (venture capital), but also grants and concessional loans.                                                                                                                                                                        |

<sup>92</sup> Komaza (n.d.).

<sup>93</sup> Source: Participant 110; CPI (CPI, n.d.).

## 5.3. Komaza: Role and drivers of private climate finance

### 5.3.1. The role and drivers of private capital for Komaza

As the section above highlighted, Komaza leveraged diverse sources of finance to achieve specific corporate objectives. This section addresses around the sources of capital, their distinct roles in Komaza's business development, and the interests of the private capital providers involved. The analysis in the table below highlights that equity investors are motivated by high-risk and high returns, engaging early with Komaza before the business model had proven its long-term viability. Meanwhile, grants, as non-return-seeking capital providers, are driven by Komaza's social and environmental impact objectives and contributed early on when Komaza was still a not-for-profit. An analysis of the motivations of each stakeholder group in engaging with Komaza is provided in Appendix 5B.

The interest of return-seeking investors is driven by the market opportunity to fill the timber supply deficit (estimated in Africa at USD30 billion by 2030) and the “out-grower” business model that claims to enable Komaza to operate at 80 % less cost than large forest plantations. Due to these cost reductions, Komaza's financial modelling suggested that the commercial internal rate of returns would average 20%, compared to the 15% typically seen in traditional forestry models. The expectation was that the revenue from carbon credits would represent over 50% of revenue for ten to 15 years from 2022 onwards and until a steady state of trees was reached.<sup>94</sup>

One interviewee, however, expressed scepticism towards the viability of a business model relying on tree assets being grown on degraded land. Pointing to the capital-intensive needs of operating a business in the forestry and timber sector: he stated *“growing trees is harder than people think. Some trees take twice as long to grow. [For example], in some semi-arid areas in Kenya, the carbon credit validator cut down the carbon stock by 25%, and that was just a semi-arid area. [Komaza] operated in an arid region, so you could [probably] cut 50% of that [for Komaza].”*<sup>95</sup>

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<sup>94</sup> Participant 110.

<sup>95</sup> Participant 103.

**Table 5.2. Finance leveraged by Komaza: Capital roles and provider interests**

| <b>Financial instrument</b>                               | <b>Capital provider</b>                                                                                      | <b>Role of capital for Komaza</b>                                                                                                                                                           | <b>Capital provider interest</b>                                                  | <b>Amount<sup>96</sup> (USD)</b> |
|-----------------------------------------------------------|--------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|----------------------------------|
| Non-reimbursable grants                                   | Mulago Foundation, DRK Foundation, Apple Inc. / Conservation International LDH Technical assistance facility | Technical assistance, business model iteration                                                                                                                                              | Social and environmental impact                                                   | ~\$10M                           |
| Equity                                                    | NOVASTAR, Impact Asset, Rabo Foundation, AXA Investment Managers, FMO Bank                                   | Commercial investment into the proof of concept                                                                                                                                             | High-risk, high-return expectations of 10-100x of initial capital                 | ~\$38.5M+                        |
| Guarantee                                                 | Green Climate Fund                                                                                           | De-risk commercial debt investors and reduce overall interest rate to prove business model. Provision of grants, concessional loans, equity investments and guarantees to climate projects. | Social and environmental impact with potential for moderate returns on investment | NA <sup>97</sup>                 |
| Concessional debt, repayable grants and first loss equity | Mirova's Land Degradation Neutrality Fund                                                                    | Demonstration effect to validate business model. Commercial return of 20% IRR expected (compared to 15% in traditional forestry)                                                            | Social and environmental impact with potential for moderate returns on investment | ~\$9.6M                          |
| Carbon markets revenue                                    | Buyers of carbon credits                                                                                     | De-risk pathway to revenue by supporting cash flow earlier in the lifecycle of tree assets. Expected carbon to represent 50% of income stream                                               | Fulfilling corporate ESG goals and offset carbon emissions                        | NA                               |

<sup>96</sup> Figures are approximate.

<sup>97</sup> Komaza failed to leverage multilateral finance from the Green Climate Fund.

|  |  |                                                                                 |  |  |
|--|--|---------------------------------------------------------------------------------|--|--|
|  |  | from 2022 for approximately 10-15 years until steady state of trees is reached. |  |  |
|--|--|---------------------------------------------------------------------------------|--|--|

Source: Author's own adaptation from Climate Finance Lab (2018)<sup>98</sup> and complemented with information from interviews.

### 5.3.2. Komaza's approach to mitigating risk for private capital: The Special Forestry Vehicle

To address capital requirements, mitigate the risk of stakeholders, and align with the extended timeframe of tree growth, Komaza planned to launch a Special Forestry Vehicle (SFV). The SPV, touted as an "innovative financing mechanism" for investors to provide capital via a closed-end vehicle with a planned duration of 12 years, was to be financed by debt and equity investors. The objective was to securitise tree harvest contracts by "package[ing] tree production partnership contracts with thousands of smallholder farmers and sell[ing] them to investors, providing farmers and forestry companies with access to low-cost, long-term finance while enabling institutional investors to access sustainable forestry investments" (Cavano, 2020, p. 14). In return, investors would receive a market-rate return from their investment in forestry and social impact for smallholder farmers.

However, the SFV never launched, and the failure to close a Series C investment round in 2022 triggered the insolvency process. As one of the interviewees highlighted, "*Why would I only invest in trees? Everyone was actually interested in projects that can be financially sustainable and can be removed from the current organisation as a plug-in [standalone business]*".<sup>99</sup>

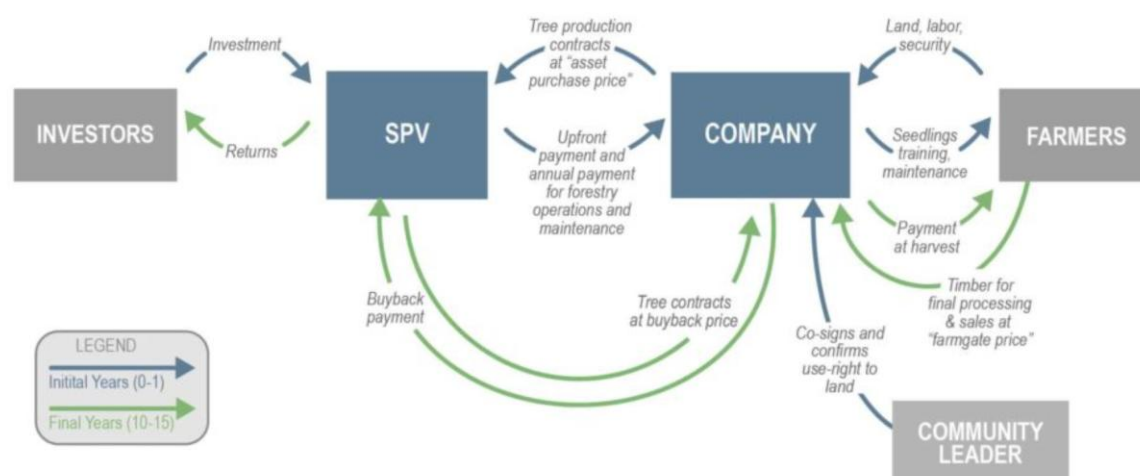
Appendix 5B summarises the interests of each of stakeholder group, as well as the associated risks, of engaging with Komaza.

<sup>98</sup> See Climate Finance Lab (n.d.).

<sup>99</sup> Source: Participant 110.



**Figure 5.1. Komaza’s Smallholder Forestry Vehicle as an innovative investment mechanism to enable private investments that support smallholder farmers**



Source: Climate Finance Lab (2018)

## 5.4. Komaza: Barriers and enablers of private climate finance for sustainable supply chains in the forestry sector

### 5.4.1. Overcoming capital hurdles: Grants vs. capital markets and the role of technology in raising private climate finance

*“Financing is critical because forestry is very capital-heavy—you need a lot of money. Although we are running a different model to secure the land, the inputs are not cheap. You are not getting money within the operational term period. You are literally looking at cycles of about 10 to 15 years. [...] Therefore, you need a very good plan on how you are raising your money and sustaining operations.” (Participant 109)*

The following analysis of Komaza underscores a contrast with the NbS literature review's findings, which conclude that NbS have low capital requirements with the exception of costs at the initial stages of implementation (Table 5.1.). The research also suggests that, because of these lower capital requirements, NbS is often funded by grants or public funds (UNEP, 2023a). However, the Komaza case study reveals that NbS that seeks to transform supply chains may indeed necessitate significant capital investments, contingent upon the sector and

operational framework. A list of barriers and enablers to private climate finance, as highlighted by Komaza, can be found in Appendix 5.

Second, the company had to invest in extensive capacity-building, awareness raising and trust-building to obtain the willingness of local stakeholders (i.e. farmers) to enter into a formal partnership with Komaza. For instance, at first, landowners opposed planting one of the two seed varieties, Eucalyptus—a controversial non-native tree variety originally from Australia, understood to require a lot of water in an area that was already degraded and experienced water shortages. The company organised a workshop, alongside the Kenyan Government, aimed at convincing landowners of the acceptability of planting Eucalyptus in specific sites and under specific conditions. The species was deemed suitable due to its rapid growth and its fast-growing nature, and high species-site index in certain sites.<sup>100</sup> Another example is around local concerns that Komaza was not sharing benefits equitably with landowners. Komaza had to mitigate these risks by engaging a third party to undertake a study to show how they ranked favourably compared with local timber prices.

Third, the company invested in research and development to find the optimal seed variety for the region. In the early years of operation (2008-2012), when the team was still identifying the best tree varieties to plant in Coastal Kenya, half of the company's expenses were allocated to nurseries. Coastal Kenya's limited history in forestry is attributed to the region's arid and semi-arid geography, rendering soil quality and water levels challenging for commercial tree cultivation. Komaza settled on two varieties: *Melia Vokensii* and a hybridised Eucalyptus variety. However, even within the operating region (coastal Kenya), there was a wide range of which seeds would work best in a given area—referred to as the site-species optimal metric. The company had to develop advanced site selection procedures, including a platform optimising site-species metrics through georeferencing. This is just one example of the capital-intensive nature of operations and how technology can help optimise operations.

The climate finance requirements were initially met by philanthropic donors who aligned with Komaza's impact-driven mission to reduce poverty and enhance economic opportunities for smallholder farmers. After a decade of not-for-profit operation, Komaza's leadership team concluded that relying on donor funding, primarily sourced from philanthropic organisations and high-net-worth individuals, was insufficient and too inconsistent for scaling its operations.

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<sup>100</sup> The guidelines by the Kenya Forest Service, which are aligned with Forest Stewardship Council guidelines (FSC) state that planting Eucalyptus is not recommended in water scarce areas, riparian areas, wetlands, and marshy areas (KFS, 2009).

Transitioning to a for-profit enterprise, Komaza was able to raise private equity from global capital markets. “You [can] have fantastic philanthropic and other donors that are willing to write cheques, but that does not sustain 15 years of operation. So the next jump is how do you get 15 years of capital?”

The transition to leverage return-seeking investments, however, introduced new requirements on the company. Investors imposed much more stringent reporting requirements, which can be an onerous task for an early-stage NbS enterprise with limited capacities and resources. It took Komaza an adjustment period, as well as additional resources, to set up the monitoring frameworks and develop systems to implement these changes. The case of Komaza has shown that these requirements broadly have positive impacts in that they ensure that the respective business, socio-economic and/or environmental objectives of the company are tracked and held accountable to achieve progress towards them.

*“[Investors] want to know how much value we are creating. And that’s why the departure from the NGO [lead to implementation of] the correct command [structures]. When you are raising Series A, [there were] a lot of metrics that we needed—there were ESG issues, there was gender-based violence issues to measure, and there’s a lot of things that we needed to be compliant with. But that drove us to do a baseline study.” (Participant 109)*

Additionally, Series A and Series B investors had more demanding expectations than grant providers for continuous, robust forecasts on tree growth and revenue from trees. These stricter reporting requirements pushed the company to leverage technology, adopting innovative monitoring approaches. Describing themselves as a “technology-first company,” Komaza built in-house platforms to monitor three core business departments: nursery operations, harvest operations and field operations. This enabled the company to obtain a higher level of accuracy on tree survival rates, tree growth, farmer activities, responding to investor requests and, later, the Verra standard for voluntary carbon credit issuance.

At the same time, other return-seeking investors, such as the GCF, imposed stringent reporting requirements that would not have been achievable by an early-stage NbS enterprise like Komaza.<sup>101</sup> Komaza had initiated an application for concessional finance from the GCF’s Private Sector Facility, which was ultimately not approved because the company failed to secure a Letter of No Objection from the Government of Kenya.<sup>102</sup> The GCF had extensive

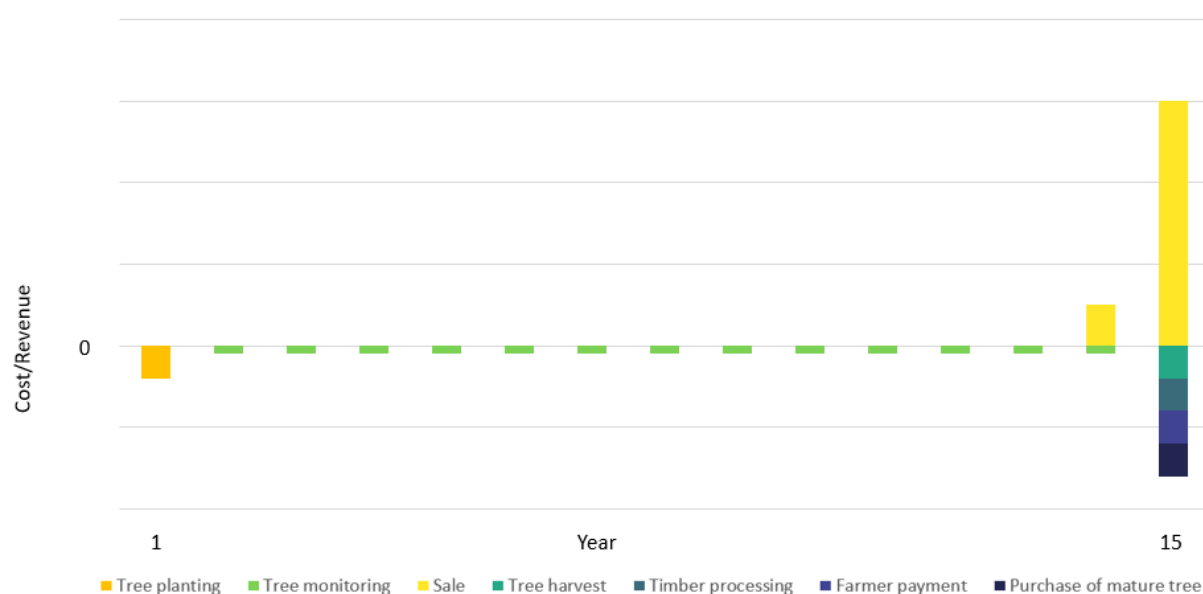
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<sup>101</sup> Source: 110.

<sup>102</sup> “All funding proposals submitted to the GCF must be accompanied by a no-objection letter (NOL) from the National Designated Authority (NDA)/focal point following the no objection procedure adopted by the B.08.10. NOL is one of the key tools of the GCF to ensure country ownership. These letters

requirements, including forecasting models and monitoring of tree growth, biomass accumulation, and ESG practices, which one Komaza employee regarded as much more stringent than other processes, such as Verra.<sup>103</sup> The GCF required advanced financial forecasting models to determine “how the underlying [tree] asset would develop, mature and be converted into income to service their investment.”<sup>104</sup> While Series B investors highlighted this need, they did not impose requirements as stringently. Two primary reasons made these reporting requirements difficult for Komaza to meet. First, a lack of data on the speed of growth of trees in the regions Komaza was operating in. And, second, the plantations were managed very differently in the out-grower model than in the traditional commercial plantation model.

**Figure 5.2. Overview of cost and revenue developed by Komaza (per ha)**



Source: Author’s own representation from interviews.

*\*Note the above graph is a depiction of a single hectare. In a realistic scenario, multiple hectares are developed, allowing for an overlay of costs and revenues.*

ensure that the proposed project is consistent with country-driven approaches and national climate strategies and plans, and signal their support for funding proposals” (GCF, 2022a).

<sup>103</sup> Participant 110

<sup>104</sup> Participant 110.

#### 5.4.2. Navigating the temporal dimension of NbS business models: Investor expectations and corporate governance structures

*The private sector is used to 'microwave results'—I put in money today, I get my money back tomorrow. [...] Nature doesn't get rushed. The process of growing a tree is the process of growing a tree—take it or leave it. But nature is very punitive if you don't want to be patient.” (Participant 115)*

A defining characteristic of Komaza as an NbS enterprise was its long commercial cycles. It takes time for trees to grow. Komaza's trees took anywhere from five to 15 years between initial planting and harvesting.<sup>105</sup> This uncertainty rendered any modelling and financial forecasting very difficult.<sup>106</sup> Moreover, attempts to adopt a new 'out-grower' model in a region that lacked an existing forestry industry added additional complexity. The long-time horizon for piloting a business model, implementing it, analysing initial results, and reaching the break-even point is because you are working with nature, and thus, by definition, it takes time to see the results.

The Komaza case suggests two aspects of leveraging private climate finance for an NbS enterprise in the forestry sector. First, patient investment is required to accommodate the extended lifecycle of NbS business models. Secondly, NbS enterprises require greater sophistication in their governance and financial structuring models to leverage investment opportunities, as well as to manage growth.

The early years of Komaza's operation were defined by trial and error—"there were many mistakes."<sup>107</sup> A lack of information and knowledge meant that trees were often planted in suboptimal species-site matching and trees didn't mature at consistent rates.<sup>108</sup> Independent venture capital funding was able to take on this high risk by investing in the overarching holding company. Despite attempts to adjust the business model by entering the timber processing sector in established markets (e.g., Central Kenya), they were not able to break even by the time insolvency was triggered.

Multiple interviewees emphasised the importance of patient capital for the NbS 'incubation period,' a period characterised by high uncertainty and long timeframes. For instance, the

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<sup>105</sup> 'Tree planting,' as defined here, refers specifically to the moment when trees are transplanted onto the land, excluding the period spent in nurseries during seed propagation to produce viable, commercial trees for planting.

<sup>106</sup> Participant 110.

<sup>107</sup> Participant 109.

<sup>108</sup> "The tree species were not well understood [in this environment] and physically dispersed, [under] disparate management, so the conditions that each plantation faced varied greatly" (Participant 110).

Director of Operations said the first years of operation were focused on R&D and building out the nurseries, but even there, he didn't know if the model would be profitable.<sup>109</sup> In Komaza's case, the not-for-profit model enabled the organisation to test and iterate using donor funding, to gain time before solidifying the business model. This *incubation period* is critical because a lot of NbS business models are considered too small to receive finance from private capital sources (e.g. USD 250,000).

One of the biggest factors impeding patient private capital was driven by the timeline that return-seeking investors operate in, which may be inconsistent with the timeline for NbS enterprises to develop their nature-based assets and start generating revenue. The typical lifespan of an independent venture capital fund is ten years (Rossi et al., 2020). However, Komaza, which had been operating for almost 20 years, still hadn't generated sufficient revenue to break even by 2023.<sup>110</sup>

*"We don't understand how long it takes for trees to grow. [...] All of our funds are term limited—we have to exit, so the structure of these funds are wrong. We take a pretty long term—we can go up to 12 years, but that is still not long enough for these kinds of investments to mature and that is the problem."*  
(Participant 134)

Moreover, high-risk return-seeking investors that invested in Komaza are expecting returns that are not realistic in an NbS African context: "This is not a place for huge returns. Nature-based solutions in Africa are definitely not the place to get Silicon Valley returns. That's why you need social investors."<sup>111</sup>

In Kenya, private climate finance is challenging to leverage for entrepreneurs establishing an NbS enterprise due to the limited green lending opportunities available from commercial banks.<sup>112</sup> While commercial banks may provide asset financing, they are not adapted to NbS models, such as the financing of trees as an asset class.<sup>113</sup> Moreover, even if a loan is approved, the grace period before the loan repayment on the interest begins is usually six months, a timeframe not adapted to the timescale of working on NbS. As one former Komaza employee said: "if you plant a tree [today], you barely have a canopy [in that timeframe]. So you cannot monetise anything in six months."<sup>114</sup>

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<sup>109</sup> Participant 109.

<sup>110</sup> In Komaza's case, the organisation functioned as a for-profit company for eight years before initiating the insolvency process. However, it had been in existence for nearly 20 years, initially established as a not-for-profit entity in 2006.

<sup>111</sup> Participant 134.

<sup>112</sup> Participant 115.

<sup>113</sup> Participant 115.

<sup>114</sup> Participant 115.

A second key area is related to corporate governance and the structuring of finance for a NbS enterprise as a means to more easily attract the volume of capital needed and mitigate risks of each return-seeking investor. Conversations with Komaza employees highlighted that, as the company grew, and received new sources of financing, management didn't adopt more sophisticated governance and financial structures, and strategic management decisions.

*“The issue—and it goes back to the management team—I think they expanded too quickly. I would manage the company way differently. Starting a company is easy, expansion is very, very tough.” (Participant 134)*

Traditional forestry models face many challenges in Kenya. For instance, there is a limited availability of large tracts of land with single ownership at a cost that allows a business model and its unit economics to be viable. As a result, Komaza needed to innovate in its approach to developing dispersed commercial forest plantations on smallholder farmlands. This approach may have required lower initial capital investment but entailed both risk and long-run expenses to ensure the viability of the business model, necessitating patient capital aligned with the venture business's objective. The cost of land, however, is expected to continue to increase and may pose barriers for future NbS enterprises (Vogelsang et al., 2023).

The left side of Figure 5.3. below shows the loan from the LDN Fund, which was mobilised to finance the sawmill for timber processing in Central Kenya. This marked the first time the company received project financing through a loan to help the company break even faster. However, it took several years to obtain the loan from Mirova Capital, which managed the LDN Fund, and, by the time the loan was approved, the sawmill had already been built. Failure to establish a ringfencing mechanism to ensure that the funds would retroactively cover the cost of the sawmill meant that the loan ended up being used for the general operations of Komaza Forestry Limited. In short, the LDN loan failed to accelerate the company's timber processing capacity, falling short in contributing substantially to revenue generation needed to initiate the loan repayment.

Komaza would have benefited from more concessional terms, but Mirova Capital considered the LDN loan a low-risk investment. Tying the loan to the successful closure of a venture capital Series C round further increased reliance on external factors and increased the risk of defaulting. When Komaza's previous lead investor, Novastar Ventures, was unable due to an administrative constraint (the closure of its fund).

Without a new lead investor, Komaza resorted to taking on debt. In hindsight, the appropriateness of debt financing for a cash-negative company can be questioned. Despite backing from DFIs, the fund's time horizon was misaligned with the long-term nature of building an NbS enterprise. This situation highlights the need for alternative capital structures, such as permanent capital models, where investors can maintain their investments for longer periods of time (i.e. decades).

A separation of the venture capital driven business (e.g. ecosystems) and the asset base (forestry assets) for nature-focused enterprises would have been one approach to reduce the risk of capital providers. A more refined governance structure that separates tree assets into 'ecosystems' (managing nurseries, planting trees, monitoring, etc.) and 'wood' (timber processing) could have perhaps mitigated risk and ensured that the right funding sources were raised for each part of the business. This would have been justified for two primary reasons. First, the two have different revenue timeframes, risk profiles, and capital requirements. For instance, the 'ecosystems' part of the business has long, often uncertain, timeframes and high capital requirements. But it can also be characterised as innovative, involving the implementation of novel approaches, technologies and business models (e.g. the out-grower model). In other words, the 'ecosystems' part of the business should be financed by high-risk, high-reward-seeking capital. On the other hand, wood processing is an established industry that only has an initially high capex (e.g. sawmill) but can bring the company to faster revenue.

The right side of the figure below (Figure 5.3) presents an alternative financing approach that ringfences the LDN loan to ensure that it remained separate and protected from other corporate operational expenses. Another difference between the actual financing structure and the alternative finance structure is where the carbon revenue flows. As the figure shows, carbon revenue went to the holding company based in the US. Perhaps an improved model would "invest at a level where the associated cash flows are aligned."<sup>115</sup> Structuring carbon revenue to flow into the Kenyan subsidiary would have facilitated funding on-the-ground operations and, and more likely to reach the breakeven point.<sup>116</sup>

The case study of Komaza also raises additional insight into the development of more sophisticated governance structures to support viable NbS business enterprises in a developing country context. One of the weaknesses of the SPV model was that it was not adapted to the local context of an underdeveloped forestry and timber sector. Rather, the SPV

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<sup>115</sup> Participant 110.

<sup>116</sup> *Ibid.*



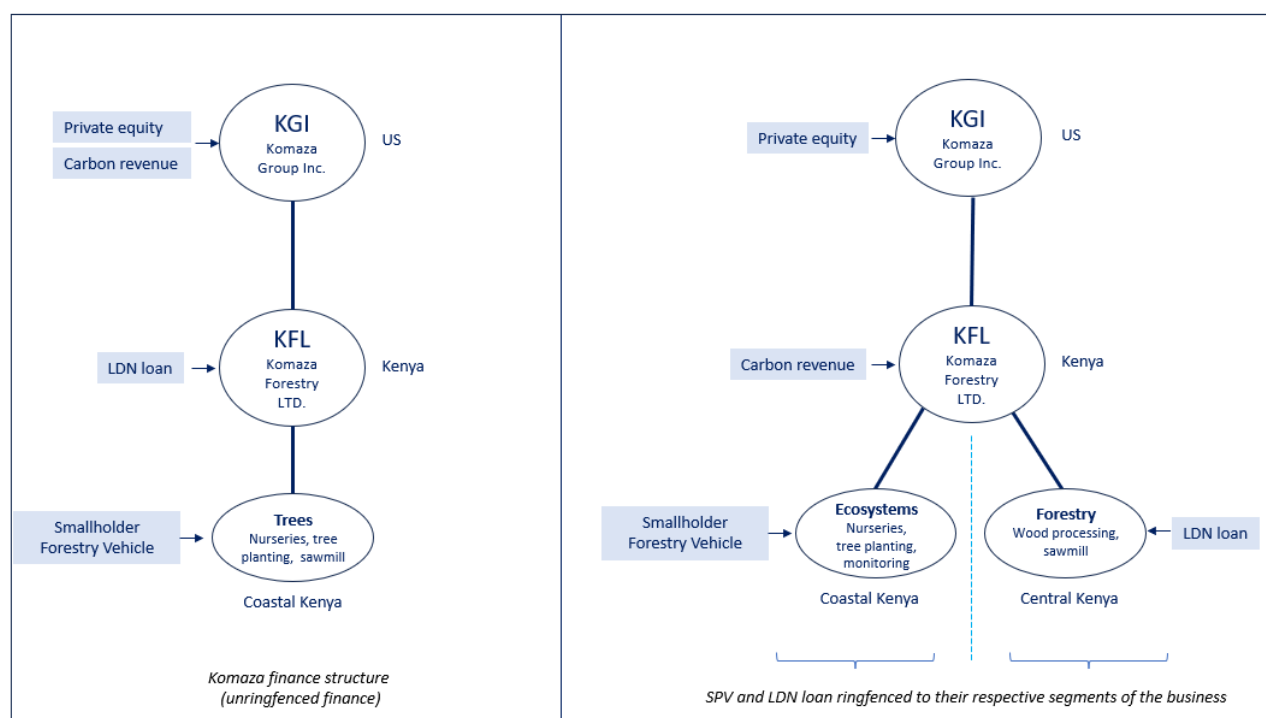
was designed to enable investors to invest in the tree assets broadly. In a forestry operation applied in a Western context where the forestry and timber value chain are highly developed, it is common for an operating company to rely on third-party services for the planting, monitoring, harvesting, and processing. However, because of Komaza's vertical integration, only one party could manage the assets (i.e. Komaza), placing the entire risk on the company and its investors. In this model, the investors care deeply that KGI and KFL continue to operate because, in the event of failure, the three assets cannot be transferred or sold. Investors noticed this and were reluctant to invest further in the Series C round.

*"We never launched the SFV – why would [an investor] only invest in trees? Everyone was interested in investing in projects that can be financially sustainable and removed from the current organisation and plug-in[to the wider value chain]." (Participant 110)*

Komaza sought vertical integration of its value chain to address gaps arising from the underdevelopment of the timber sector in the region. However, introducing more refined governance structures that partition the value chain into manageable segments could have presented distinct investment opportunities for each component while mitigating exposures to other risks. For instance, if the LDN-financed entity operated as a standalone business, in the event of failure, Mirova and the LDN fund could take over the forestry operations of the business while Komaza retains the tree-growing operations.

Finally, the case reveals the importance of governance for NbS enterprises. The transition into a for-profit enterprise hampered Komaza's ability to continue receiving philanthropic finance. A more refined governance structure would have enabled part of the company to retain its status as a not-for-profit. For instance, one model would have had a not-for-profit manage the tree planting operations while a separate for-profit entity harvests and processes the timber. In this model, any shortfalls could continue to be funded by donors. Despite significant challenges associated with getting the required levels of donations at scale, this approach may have still enabled the company to leverage philanthropic donations.

**Figure 5.3. Comparison of Komaza’s actual financing structure (left) and an alternative structure in which ringfencing occurs (right)**



Source: Author

### 5.4.3. Additional revenue sources: Voluntary carbon markets and multilateral finance

As a company enters the growth stage, financial requirements tend to increase, and the company’s ability to attract different types of funding becomes critical (Čalopa et al., 2014; Marmer et al., 2011; Singh and Mungila Hillemane, 2021). The previous sections highlighted that Komaza relied primarily on grant funding in its initial years of operation, later turning to equity investments to scale its growth. The debt investment from the LDN fund was the first step towards attracting different types of finance through a structure that became closer to a project finance structure.

An analysis of Komaza's financing sources necessitates an exploration of the counterfactual. What alternative financing options could the company have utilised? The voluntary carbon markets and multilateral finance were two additional sources of finance that Komaza attempted, but ultimately failed, to leverage. An examination of the challenges Komaza faces sheds light on the barriers and enabling conditions that support the growth of NbS enterprises.

One of Komaza's key strategies to reach the break-even point was to leverage revenue from the voluntary carbon markets to "realise value from the [tree] assets earlier in their life cycle."<sup>117</sup> However, Komaza faced several challenges in the process, which delayed the carbon credits application process and failed to sell credits before the insolvency process was triggered in 2023. The first challenge faced by Komaza was the long timeframe for obtaining carbon credit validation from the third-party entity, Verra. Komaza's application for the Verra "Climate, Community and Biodiversity" (CCB) took more than three years from the start of the process.<sup>118</sup> The delays were attributed to a combination of delays on the third-party validators side and a lack of internal capacity. Increasing demand from project developers and public scrutiny<sup>119</sup> has likely further increasing delays.

This observation underscores several aspects of the voluntary carbon market in Kenya and the broader region at the time of study. First, there is an absence of carbon credit verification bodies across Africa, posing a significant barrier to securing finance for NbS initiatives in the region.<sup>120</sup> Addressing this institutional deficiency and enhancing the verification gap would elevate the region's enabling environment for the voluntary carbon market. Second, there is a considerable cost to enter the voluntary carbon market, which Komaza quoted at approximately USD 750,000 in terms of application resources, contractors and staff time. This underscores the necessity for NbS initiatives to consider diverse models for leveraging finance, encompassing both public and private, to support the development of voluntary carbon markets. Various pre-financing models and offtake agreements could help defray some associated costs. However, Komaza's experience with Apple's Restore Fund, points to the risk of aggressive off-take agreements. Apple provided a USD500,000 grant, channelled through an NGO, Conservation International, attached to the Restore Fund, to provide technical assistance in establishing the carbon project with a view to investing in the carbon credits generated. The Restore Fund, however, proposed highly stringent terms, including a market-rate debt investment and acquisition of all carbon credits at no cost for a specified period of 5-10 years.<sup>121</sup> These terms were considered impractical for Komaza, leading the company to decline the offer.

A second source of finance that Komaza failed to leverage was public finance from the GCF's Private Sector Facility. Komaza had initiated an application for finance from the GCF's Private

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<sup>117</sup> Participant 110.

<sup>118</sup> Participant 110.

<sup>119</sup> See, for instance, the following Guardian article: Greenfield (2023).

<sup>120</sup> Participant 115.

<sup>121</sup> Participant 110.

Sector Facility, which ultimately was not approved due to the company's failure to secure a Letter of No Objection (LNO) from the Government of Kenya.<sup>122</sup> The company's explanation for the failure was attributed to government bureaucracy—allegations of corruption later surfaced against the responsible team. While failure to obtain the LNO blocked Komaza from securing GCF finance, the section above highlighted that even with the LNO, the financial reporting and forecasting models expected by the GCF would have been unachievable by the company. In fact, Komaza's Director of Finance stated that the GCF reporting requirements were more extensive than the requirements by Verra to get their voluntary carbon project approved. The findings also suggest that the GCF's financing terms are more conservative.

## **5.5. Komaza: Private climate finance for NbS in the context of the Paris Agreement Goals and the transition towards sustainability**

The following section presents an analysis of the impact of Komaza's interventions on the transition towards sustainability. The analysis brings forth two overarching findings. First, despite attempts to drive holistic transformation within Kenya's timber supply chain, significant limitations arise from a business model that aims to generate profits and shareholder value while concurrently advancing wider sustainable development goals. Additionally, the interviews underscore the significance of addressing socio-economic needs of local communities for the adoption of NbS.

### **5.5.1. Impacts and limitations of Komaza's NbS activities**

*"I think one of the one of the biggest challenges that we have faced is what are called the 'politics of farmer payments.' You see, this is a business, as much as we want to do environmental impact, we are also supposed to return some money to our investors." (Participant 110)*

The analysis of Komaza's activities' impacts on achieving joint environmental and socio-economic objectives is based on the information provided by interview participants and secondary sources, particularly the documentation provided by the company through the Verra registry (Verra, 2023). Komaza's financial forecast model estimated that approximately 50% of the company's revenue over 10-15 years would be derived from the sale of credits in the

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<sup>122</sup> All funding proposals submitted to the GCF must be accompanied by a no-objection letter (NOL) from the National Designated Authority (NDA). The NOL is one of the key tools of the GCF to ensure country ownership. These letters ensure that the proposed project is consistent with country-driven approaches and national climate strategies and plans, and signal their support for funding proposals (GCF, 2022).

voluntary carbon credits market, underscoring the importance of the program's activities for the company.

Appendix 5B summarises the company's intended contributions towards climate mitigation, adaptation, biodiversity, and improving socio-economic livelihoods of communities via Verra's Climate, Community and Biodiversity Standards (CCB) Standard. The NbS intended to contribute to a host of Sustainable Development Goals: SDG 1 (No Poverty); SDG 2: (Zero Hunger); SDG 4 (Quality Education); SDG 5 (Gender Equality); SDG 8 (Decent Work and Economic Growth); SDG 10 (Reduced Inequalities); SDG 12 (Responsible Consumption and Production); SDG 13 (Climate Action).<sup>123</sup> However, the analysis highlights concerns and risks that these objectives may not be met, be overinflated, or simply that the company cannot realistically achieve impacts in all of these areas while simultaneously seeking a profitable business model.

Regarding contribution to climate mitigation, Komaza expected an increased carbon stock (or steady stock of trees), sequestering 286,630 tCO<sub>2</sub> of carbon annually over a 30-year crediting period. While this is a standard component of a carbon credit programme, there are concerns around permanence especially given that Komaza does not own any of the plantation lands and relies on the continued efforts of smallholder farmers to maintain the trees. This increases the risk of tree theft, pre-mature land sales, forest fires or diseases. Moreover, one interview participant noted that the degraded soils of semi-arid and arid regions in which Komaza operated may have significant impacts on the actual carbon stock, cutting it by as much as 50 % of standard models.<sup>124</sup> Another concern is the definition of additionality applied by Komaza, which justifies the carbon project as a risk mitigation strategy to achieving breakeven. However, publicly available information suggests that the company always intended to plant trees as a core component of its business model. Perhaps the carbon credit project encouraged the company to have a more substantial standing stock of trees. Concerns around leakage in this project are of lower concern because farmers are utilising unused land for tree plantations and therefore are unlikely to shift their activities outside of the project area.

The company's carbon credits documentation purported its contributions to strengthening the resilience to the effects of climate change. Coastal Kenya has been severely affected by climate change; erratic rains and an increased frequency and length of droughts are major

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<sup>123</sup> It is worth noting that the CCB project document does not list SDG 15 ("Life on Land," i.e. biodiversity). Verra (2023).

<sup>124</sup> Participant 103 sharing insight from other carbon project validation processes in semi-arid and arid regions in Kenya.

concerns in the region. Komaza's CCB project is situated in proximity to some of the largest remaining fragments of the Coastal Forests of Eastern Africa, a global biodiversity hotspot experiencing mounting pressures from local economic development.<sup>125</sup> Despite the company's reported benefits of its commercial tree planting activities on strengthening climate resilience, citing soil health improvements and erosion protection to protect the productivity of lands, it is largely unclear how these impacts are being measured and monitored. It is also unclear what intervention activities are included apart from the already planned tree-planting activities. The CCB project document cites adaptation as an 'optional benefit,' and notably lacks specific indicators in its monitoring plan. This indicates a potential deficiency in Verra's methodology of the project's contribution to adaptation.

The third area of interest for evaluating the impacts of Komaza's activities pertains to biodiversity and the broader natural environment. According to Komaza's project documents, its activities will lead to increased forest cover and wildlife habitat and reduce pressures on high conservation value areas. However, the definition of forest cover applied here is questionable, seeing that the business' out-grower model applied by Komaza relies on the plantation of trees on portions of unused smallholder lands dispersed over a big region, thus unlikely to create a forest habitat for wildlife. The project documentation implies that the afforestation activities will lead to future "ecological niches for biodiversity" but lacks rigour in evaluating its impacts on nature.<sup>126</sup> The company asserts that "the project will increase the quantity of sustainably produced alternatives to meet growing wood demand in Kenya and East Africa, [...] reduc[ing] the pressure on forest resources from natural forests, in particular, mangrove forests" (page 40-41 of Verra, 2023). However, how this is being monitored through the CCB and VCS projects remains unclear. Indeed, assessments of nearby natural forests are absent from the monitoring plan. In sum, the monitoring plan lacks indicators for measuring biodiversity comprehensively.<sup>127</sup>

It is also worth noting that Komaza's selection of a non-native tree species, representing 54 % of trees planted, may impact biodiversity. The project document states that over half of the species planted by Komaza are non-indigenous eucalyptus species.<sup>128</sup> Planting eucalyptus

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<sup>125</sup> Verra Registry (2023) "Komaza Smallholder Farmery Forestry Kenya." Accessed 2024-01-23.

<sup>126</sup> See page 70 of Verra Registry (2023) "Komaza Smallholder Farmery Forestry Kenya." Accessed 2024-01-23.

<sup>127</sup> Biodiversity assessments should include multiple indicators covering species diversity, abundance, habitat quality, and other ecosystem services (IPBES, 2025).

<sup>128</sup> The CCB and VCs project description states that 55 percent of trees planted are *Eucalyptus grandis* x *camaldulensis* and 45 percent are *Meliavolkensisii* (see page 15-16 of Verra, 2023). The survival rates of each is not disclosed in the project description documentation.

trees in Kenya, a species originally from Australia, has been controversial due to its impacts on nutrient levels and water tables (Ndegwa et al., 2011). The project document acknowledges the potential adverse effects of introducing a non-indigenous species (*Eucalyptus grandis* x *camaldulensis*) on water availability and introducing pests and diseases and identifies safeguards to mitigate these potential negative impacts. However, the continued evaluation of these effects is notably absent from the monitoring plan and its list of indicators.

The fourth area of impact, socio-economic impacts, is another key area identified by Komaza. Komaza emphasises the benefits of its activities on vulnerable rural communities by enabling smallholder farmers to access wood markets that they would otherwise not have access to. However, the CCB & VCS project documentation submitted to Verra provides no baseline data on total farmer payments and the share of farmers, claiming it was “too early,” despite being in operation for over 15 years prior at the time of project submission.<sup>129</sup> Importantly, there is a lack of clarity regarding distributing benefits from the carbon credits to the farmers and landowners. One Komaza employee shared that the Verra methodology provides up to two years, after validation, to determine an approach forward on sharing benefits.

Finally, the analysis of the limitations in addressing joint SDG goals as a for-profit enterprise raises questions around the viability of a for-profit NbS business model. The case of Komaza underscores inherent tensions in balancing investor interests and socio-economic benefits to local communities. Several decisions reflect these tensions. For example, Komaza was founded on the mission to help alleviate poverty, ultimately settling to build a business model in the forestry sector. The unit economics, however, made commercial tree planting in arid and semi-arid regions challenging. Additionally, the company decided to continue planting trees *and* processing timber, even though the unit economics favoured the latter from a revenue-generating perspective. The company also adopted a strict definition of which farmers they would enrol, turning down any farmers not considered smallholder subsistence landowners.<sup>130</sup>

Some company decisions can be interpreted as driven by revenue-seeking objectives. For instance, the decision to introduce a non-indigenous tree species in the region was motivated by optimising fast-growth trees despite potential negative ecological impacts.<sup>131</sup> Furthermore, the registration of the project as a CCB project under the Verra Standard, despite its impact

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<sup>129</sup> Participant 110.

<sup>130</sup> “What we need to do is to empower the people who [do not have] the capacity to get the resources they need. Those are the people we want to work with. Probably in the future we will work with big companies, but for now that is not our mandate” (Participant 109).

<sup>131</sup> Participant 109.

primarily focused on carbon sequestration with limited adaptation benefits to the community and biodiversity, underlined the corporate strategy of generating voluntary carbon credits as a means to increase revenue sources. These examples highlight the complexity of balancing profit generation and sustainable impact for NbS enterprises.

### **5.5.2. Dimensions of climate-resilient development in Komaza's operations**

*“Because at the end of the day, if you go to the root cause of all these problems, it is people trying to just survive. [...] And therefore anybody who is focused on figuring out how to get people to put food on their table, stands a good chance, in my opinion, of solving most these world problems, especially those related to the environment.” (Participant 110)*

One participant referred to Maslow's 'hierarchy of needs' as playing a role for financing NbS implementation in a developing country. Maslow (1962, 1954, 1943) argued that human needs are arranged in a hierarchy in which basic needs (i.e. physiological and safety needs) must be more or less met prior to addressing higher needs (e.g. self-actualisation). In other words, an individual is first concerned about meeting their basic physiological needs, such as securing water, food, and shelter, as well as covering safety needs, such as employment and health, before being able to consider longer-term objectives.. This to the climate-resilient development framework which emphasises the importance of incorporating the socio-economic needs of project stakeholders.

In the case of Komaza, employees pointed out that the demand by farmers to enrol in the programme became so popular that they had to turn down farmers. Komaza's approach sheds light on how the company addressed the socio-economic needs as a key precondition for NbS implementation. They addressed the factors of food security and income generation first. Komaza made a deliberate decision only to enrol farmers with sufficient land available for subsistence farming to ensure that they would continue to meet their basic needs. Additionally, when farmers began undertaking unplanned activities, such as intercropping activities near the trees, rather than discouraging it, the company equipped them with inputs and shared techniques to support them in optimising yields. Moreover, they saw farmers' willingness to engage in new agricultural activities as an opportunity, in the long run, to link them with more prominent third-party buyers (e.g. sorghum).

Applying the climate-resilient development framework requires understanding the local context and flexibility to respond to socio-economic development challenges. For instance, poverty is a significant factor shaping the short-term outlook of smallholder farmers. Komaza's contracts with landowners required that individuals grow and maintain trees for at least seven



years before harvesting. However, they were sometimes driven to sell the timber on the market after only a few years to meet their immediate revenue needs.<sup>132</sup> The company sought to address this by providing incremental payments during the growing period, compensating farmers for the proper maintenance of the assets.

Innovative approaches may also be necessary to address the socio-economic needs of the local population. For instance, the land tenure system in Coastal Kenya is often informal with limited issuance of ownership documents. Much of the land in the region is held under communal tenure arrangements<sup>133</sup> This is a barrier for individuals wishing to access capital from financial institutions. Komaza had to develop an authentication methodology with the government to cross-check land ownership claims with the local community political hierarchy (i.e. village elder, assistant chiefs, district county commissioners). In essence, the company designed a business model that allowed landowners to invest in their land to enter a new market sector without borrowing capital from commercial banks.

## **5.6. Perspectives from Costa Rica's forest recovery and sustainable supply chains**

*“Costa Rica realised early on that its greatest wealth [lay in ] its natural resources, and [we] decided to protect these natural resources since the 1950s and created policies around that.” (Participant 206)*

The dramatic reversal of Costa Rica's forest area highlights the critical role of government policy and economic incentives in mobilising finance for land use change. Despite occupying only 0.03% of the Earth's surface (51,100 sq km), Costa Rica is important for biodiversity as it harbours approximately half a million species and represents about 5% of the estimated global species diversity (Johnston, 2022). Once experiencing some of the highest deforestation rates in the world in the 1960s and 70s, Costa Rica saw its rainforest cover decline from 75% of the total land area in the 1940s to as low as 30-40.8% by the 1990s (Nygren, 1995; Sader and Joyce, 1988; Sanchez-Azofeifa, 2017).<sup>134</sup> Deforestation was primarily driven by the rapid expansion of the road system, cheap credit for livestock activities

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<sup>132</sup> “KES 5,000 is better than KES 100,000 three years from now. And for them it is [a question of] the[ir] hierarchy of needs—I need food on the table, and I’m not sure whether I will be alive three years from now” (Participant 109).

<sup>133</sup> Participant 109.

<sup>134</sup> The exact forest cover rate by the 1980s is contested with some arguing that the figure went down to 30% (Nygren, 1995; Sader and Joyce, 1988) and others arguing that it never dropped below 40% (Sanchez-Azofeifa, 2017). Proponents of the 2017 study by Sanchez-Azofeifa state that while it is true that the country made significant advances in forest recovery, it was not by 25 percentage points between 1980 and 2020.

and laws that promoted deforestation (Blignaut and Andersen, 2002). In short, one-third and half of the country's forest cover was lost in just half a century.

Forest degradation is a significant threat to sustainable land use. Over half of tropical forests have been destroyed since the 1960s (IUCN, 2021). In developing countries, where rural communities depend on natural resources for their livelihoods, conservation is perceived as a cost that reduces the potential for profits. Costa Rica's widely praised conservation policies, introduced in the 1990s, have changed this perception and allowed landowners to benefit financially from the ecosystem services provided by their land, opting out of traditional extractive land use practices (e.g. timber, agriculture, livestock) where the economic and financial return usually is higher (Blignaut and Andersen, 2002). The country saw a reversal of forest cover close to 60% of the country, making the country a model of environmental preservation (World Bank, 2022a). Today, approximately 20% of Costa Rica's territory is protected by protected areas and national parks (Costa Rica Bureau, n.d.). More critically, the Costa Rican Government introduced policies that successfully incentivised the protection of environmental values of *private* land by compensating individual landowners for sustainable management practices (Kishor and Constantino, 1993).

The scoping study on NbS revealed an absence of private climate finance projects to transform the forestry sector in Costa Rica. Instead, it revealed that Costa Rica's PSA programme drove the dominant NbS in the country, addressing both sustainable forestry and supply chains.

Costa Rica's PSA programme became the country's primary policy instrument to achieve forest recovery is well-documented (Le Coq et al., 2015), including its impact on the environment and poverty alleviation (Barton et al., 2009; Daniels et al., 2010; Locatelli et al., 2008; Miranda et al., 2003; Pfaff and Robalino, 2012; Robalino and Pfaff, 2013; Sanchez-Azofeifa, 2017; Zbinden and Lee, 2005). The Government of Costa Rica has recently aimed to expand its NbS by launching a national initiative to respond to global requirements for deforestation-free sustainable supply chains.

This analysis focuses on financing Costa Rica's reforestation efforts, providing insights into the limited role of private climate finance in the country's forest recovery. Instead, it highlights the role of public finance and policy in incentivising land-use change in the country.

### 5.6.1. Government policies supporting reforestation and conservation in Costa Rica

Several policy decisions in the 1990s have played a role in reversing Costa Rica's forest loss. First, in 1996, the government banned most forest clearing activities. Studies showed that the ban notably impacted decreasing forest cover loss (Fagan et al., 2013). However, the successful *reforestation* has mainly been attributed to the government-administered PSA programme (Robalino and Pfaff, 2013). *Forest Law No. 7575*, enacted in 1996, acknowledged four ecosystem services provided by forests and compensated landowners for them: greenhouse gas emissions mitigation, hydrological services (e.g. supplying drinking water, hydropower), biodiversity conservation, and scenic beauty for recreation and ecotourism (Pagiola, 2008). The law established a regulatory framework for contracting landowners to provide environmental services from their lands and created the National Fund for Forest Financing (*Fondo Nacional de Financiamiento Forestal, FONAFIFO*) (Pagiola, 2008).

*“National parks assume you have the money to purchase private land and turn it into national parks. But in the 1950s, the country didn't have the money to purchase land. The institutionalisation of the policies [...] [was part of a bigger goal], which is to create a green economy.” (Participant 206)*

Developing incentive schemes for more sustainable practices on private land required understanding the economics of land use conversions and their associated opportunity costs. As is common in the region, forests in Costa Rica are often privately owned. Kishor and Constantino (1993) provided an early study of land use options for Costa Rican landowners ranging from managed natural forestry, plantation forestry and cattle-ranching (See Appendix 9). They concluded that sustainable forest management was not more prevalent before the PSA programme because alternative land use options were simply more profitable from a private landowner perspective.<sup>135</sup> Conflicting government policies that incentivised agriculture and cattle ranching activities via trade protection and credits were at the root of deforestation and land degradation from the 1970s to the 1990s. This was further accelerated by land title policies favouring forest cover removal because landowners who lacked land titles felt driven to undertake activities that proved possession. Moreover, the inability to use land ownership as collateral to access capital from financial institutions in the country meant that landowners

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<sup>135</sup> “For large farmers or corporate owners facing low discount rates and operating in marginal agricultural lands it is better to convert a primary forest to artificial plantations of fast-growing species. For subsistence farmers facing high discount rates, or in a situation of high discount rates due to macroeconomic risks, it is better to liquidate the forest and convert natural capital to other uses” (Kishor and Constantino, 1993).

preferred converting land to raising capital for collateral or obtaining capital by logging the forest.

The National Forestry Financing Fund (FONAFIFO) was established in 1996 under the Ministry of Environment (MINAE) as the government body responsible for administering the PSA programme. It financially compensates landowners for their sustainable forest management and forest conservation.<sup>136</sup> The programme has since evolved over the years and grew to include additional activities such as agroforestry and natural regeneration (introduced in 2004), as well as paying users for watershed conservation (Pagiola, 2008). FONAFIFO is a semi-autonomous agency with independent legal status. Its board has representatives from the three government sectors and two from the private forest sector (Pagiola, 2008) (Appendix 9).<sup>137</sup>

However, the PSA programme was not launched in a vacuum. In the 1970s, following a significant decline in timber supplies, the Costa Rican Government introduced various tax credits to incentivise timber plantations, reversing decades of forest loss (Pagiola, 2008). Subsequent versions of tax rebates were implemented, the most notable being the *Forest Protection Certificate* (Certificado para la Protección del Bosque, CPB) in 1995. The *Forest Protection Certificates*, launched a year before Forest Law No. 7575, marked a shift in focus from economic incentives promoting timber production to forest conservation (Pagiola, 2008).

The drivers that led to the PSA policy formulation in Costa Rica can be attributed to several internal and external factors (Le Coq et al., 2015). First, deforestation was widely acknowledged as a national issue and forestry organisations and forestry incentive instruments already existed and were well established in Costa Rica (Le Coq et al., 2015). Growing international momentum on environmental issues in the 1990s (e.g. ratification of the Rio Conventions) provided an opportunity for domestic institutions leading the forestry sector, including FUNDECOR, to receive financial support for the forestry sector, especially the carbon sequestration services (Le Coq et al., 2015). In addition, the introduction of subsidy bans in the framework of international agreements on trade<sup>138</sup> jeopardised existing incentives and increased pressure to develop and implement a new Forestry Law. The Ministry of

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<sup>136</sup> The establishment of FONAFIFO was also complemented by the establishment of the Costa Rican Office for Joint Implementation (OCIC) which had the authority to formulate policy for joint implementation (JI) and activities implemented jointly programmes (AIJ) (Blignaut and Anderson, 2002).

<sup>137</sup> Three representatives from the public sector (the Ministry of Environment and Energy, the Ministry of Agriculture, and the National Banking System) and two representatives from the private forest sector (appointed by the board of directors of the National Forestry Office) (Pagiola, 2008, p. 713).

<sup>138</sup> A “ban on subsidies to productive sectors following an agreement between the Ministry of Finance, the President of Costa Rica, and the International Monetary Fund in the framework of World Trade Organisation negotiation (De Carmino et al., 2000; Brockett and Gottfried, 2002” (Le Coq et al., 2015, p. 8).

Environment capitalised on the concept of environmental services and payments as a new way to justify support to the forestry sector, shifting from public incentives to a market-based approach (Le Coq et al., 2015). Appendix 9 provides a detailed overview of the internal and external factors shaping the PSA programme in Costa Rica.

The country's dependency on tourism also factors into Costa Rica's PSA programme. Of the approximately 3 million tourists per year, more than half indicate their primary reason for visiting Costa Rica is the scenic beauty of its environment. Tourism generates about USD 4 billion in revenue annually, accounting for nearly 10% of the country's GDP and employing 200,000 each year.

In summary, Costa Rica's PSA Programme has, to date, been the dominant NbS intervention for forest recovery in the country. It provides evidence of a policy framework that has successfully internalised conservation benefits, incentivising its landowners to restore and conserve forests through payments sourced predominantly from public domestic climate finance sources. International public climate finance only began playing a role in funding the programme recently. This multilateral finance provided to the PSA programme represents "the international community [paying] for the externalities which accrue to the global community" through Costa Rica's forestry recovery (Kishor and Constantino, 1993, p. 24).

#### **5.6.2. Financing Costa Rica's national PSA Programme to halt and reverse deforestation**

*"If you look at the [public programmes], the REDD+ programme, in Costa Rica, all of this finance, they are subsidies—they are not payments. There is no such thing as a market in Costa Rica. Costa Rica has advanced this agenda on taxes and funding from aid agencies, because the World Bank is an aid agency. There is nothing wrong with that, but don't expect private actors to join your programme if you pay them peanuts to conserve the ecosystems." (Participant 218)*

Despite the extensive literature on Costa Rica's PSA programme and its role in reversing forest cover loss in the country (Castro et al., 2000; Chomitz et al., 1999a), its financing mechanisms are sometimes inconsistently reported. Several points warrant consideration.

First, the amount disbursed to landowners has varied over the years and is determined by multiple variables, including land use activity. According to FONAFIFO's annual report (FONAFIFO, 2021), the annual payments per hectare depend on the land use activity but can be estimated as follows: forest protection (USD 70/ha), water resource (USD 87/ha), natural regeneration (USD 45/ha), forest management (USD 54/ha); and forest management pilot

project (USD94). Payments, irrespective of activity type, are made through a contractual commitment ranging from 5 years (e.g. natural regeneration and forest management) to ten years (e.g. forest protection, water resource and pilot project forest management). These payments begin in the first year of programme enrolment and continue annually for the duration of the contract (either 5 or 10 years). This approach contrasts with Komaza, which primarily planned to compensate landowners only after the trees had fully matured.

Second, the majority of finance supporting Costa Rica's green transition and forest cover recovery came from domestic public sources, citing the taxes on fossil fuels as the biggest contributor to the PSA programme: *"If you ask me, I think 15% max has been international and 85% has been national in the PSA"*.<sup>139</sup> Reports on the exact proportion of domestic compared to international finance vary, however. The PSA programme has reportedly paid out more than USD500 million to landowners since it was established in 1996, contributing to a fifth of the country's total area in hectares of forests reforested (FONAFIFO, 2018).

As the PSA programme evolved and grew in international recognition, its revenue sources diversified to include international sources, such as a loan from the World Bank and grants from the GEF (GEF, n.d.). It became clear that the fossil fuel tax is becoming a less reliable source of funding due to the transition to electrification.

*"In recent years, we started getting international funding. First, the country provides funding to protect the forest. The international community is only providing funding for separate issues—right now we are only getting funding for emissions reductions, but not biodiversity or education. We are trying to bring international funding to the country so that we can switch the sources of funding and invest in other areas of action and to prevent the shortage of funding. And because PSA is sourced by consumption of fossil fuels and the country is experiencing a switch to electrification means we have less taxes. So we need to find more international sources of funding."* (Participant 214)

The PSA programme also received bilateral international public finance in the form of a grant from various governments, including Germany (for forest protection) and Norway (for carbon sequestration) (GEF, n.d.). The table below provides an overview of the revenue sources of Costa Rica's Payment for Ecosystem Services, showing early signs of the ability to "layer" revenue sources for ecosystem services provided by the same area of land. Additional details can be found in Appendix 4I.

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<sup>139</sup> Source: Participant 206. This was also repeated in other sources (Cameron, 2015). The exact amount that FONAFIFO receives from fossil fuel sales taxes has varied over the years. Initially, it received about a third of the revenues generated from fuel taxes, but this changed in 2001 when the Ministry of Finance lowered the amount to 3.5% but guaranteed it (Pagiola, 2008).

**Table 5.3. Overview of revenue sources for Costa Rica's PSA Programme aimed at Carbon Sequestration and Storage ecosystem services**

| <b>National/<br/>International</b> | <b>Intermediaries</b>                                | <b>Instruments and finance tracked</b>                                                                                                               |
|------------------------------------|------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------|
| National                           | Fondo Nacional de Financiamiento Forestal (FONAFIFO) | Domestic public budgets (fossil fuels tax, water tax, forestry tax, carbon credits and public-private agreements) (\$200M, 1986-2011) <sup>140</sup> |
|                                    | FONAFIFO                                             | International and domestic private sector (Certificates for Environmental Services) (amount unclear) <sup>141</sup>                                  |
|                                    | Costa Rican Tourism Institute                        | International private climate finance (tourism offset calculator) <sup>142</sup> (2020-) (amount unclear)                                            |
| International (bilateral)          | German KfW Development Bank                          | Bilateral public grant (\$12 million, 2003) <sup>143</sup>                                                                                           |
|                                    | Norway                                               | Bilateral public finance for carbon credits (\$10M 2020)                                                                                             |
| International (multilateral)       | World Bank Forest Carbon Partnership Facility        | International public finance, results-based payment (\$60M from World Bank in 2020) <sup>144</sup>                                                   |
|                                    | Global Environment Facility                          | Public multilateral grant and loan package (\$40-50M) <sup>145</sup>                                                                                 |
|                                    |                                                      | Public multilateral grant (\$8.3M) <sup>146</sup>                                                                                                    |
|                                    | Green Climate Fund                                   | Public multilateral finance, results-based payment (\$54M from GCF in 2020) <sup>147</sup>                                                           |

<sup>140</sup> Obando (2022).

<sup>141</sup> The Certificates for Environmental Services (CSA) is a mechanism designed by FONAFIFO to facilitate the private sector's participation in the Payments for Environmental Services (PSA) programme. Each certificate represents one hectare of forest conserved. Buyers of the certificates range from local industries, private individuals, and foreign investment companies (Porras, 2008). The biggest contributors to the programme are the hydropower sector, followed by tourism, airlines, food and agriculture, and construction industries (Russo and Candela, 2010). The amount raised via this mechanism are unclear.

<sup>142</sup> Costa Rica's Tourism Institute signed an agreement with FONAFIFO to encourage tourists to offset their carbon footprint from air and land travel. The revenue generated from the offsets contributes to the funding of the national PSA programme. The amount of finance raised is unclear. Source: Turner (2020).

<sup>143</sup> Pagiola (2008).

<sup>144</sup> In August 2023, the World Bank Forest Carbon Partnership Facility made a results-based payment to Costa Rica for its efforts in effectively reducing carbon emissions from deforestation and forest degradation. Costa Rica was the first Latin American country and second country, globally, to receive such a payment from the WBG, also known as REDD+ (World Bank Group, 2022).

<sup>145</sup> Figures vary according to source (Cameron, 2015; Centre for Public Impact, 2016).

<sup>146</sup> Cameron (2015)

<sup>147</sup> USD 54.1 million to be granted to Costa Rica by the Green Climate Fund for emissions avoided in 2014 and 2015 (United Nations, 2020). "That money is primarily intended to strengthen and improve the PSA Programme in private lands and indigenous territories" (United Nations, 2022, p. 5).

| National/<br>International        | Intermediaries                 | Instruments and finance tracked                                       |
|-----------------------------------|--------------------------------|-----------------------------------------------------------------------|
| International<br>(not-for profit) | Earthshot Prize <sup>148</sup> | Grants (\$1.3M from EarthShot Prize)                                  |
| International<br>(private)        | LEAF Coalition                 | International private climate finance (\$10-14M, 2023) <sup>149</sup> |

Source: Author

Interviews with Costa Rican officials, however, pointed out that the success of the electrification of the transportation system in Costa Rica has resulted in a decline in revenue generated from the fossil fuel taxes, providing a less reliable funding source for the PSA programme. This explains in part the Government strategy to complement domestic finance with international sources.

*“The biggest chunk of PSA is funded via taxes on fossil fuels (3.5% tax). If we accept that we are successful in the transition to net zero, the money for environmental programs will decrease, [...] which brings in the role of the private sector.”* (Participant 218)

There is a lack of available information regarding *private* climate finance leveraged for Costa Rica's reforestation efforts. The primary mechanisms for raising private sector funds for the nation-wide PSA program—and, by extension, for reforestation and land conservation—are the sale of carbon credits through the Costa Rican Office of Joint Implementation and the LEAF Coalition. However, details on other private venture capital contributions remain scarce. The sale of carbon credits as a financial instrument will be explored further in the case study on carbon credits, particularly in reference to Mikoko Pamoja.

The PSA programme, initially designed to generate revenue through carbon credit sales under the CDM, has seen limited success in generating this source of finance. Of the few carbon credit projects registered on the Verra platform, three out of five were launched by a private entity, BaumInvest Inc. While there are reports of private for-profit ventures benefiting from the restoration of forest cover—especially in the tourism sector and, to a lesser extent, in sustainable supply chains like timber and wood products—the extent to which the PSA programme is responsible for these developments remains unclear. Other underlying socio-economic factors, such as declining beef prices, shifting population trends, and the growth of eco-tourism driven by the scenic beauty of restored and preserved landscapes, may also play a role in forest recovery (Brownson et al., 2020; Calvo-Alvarado et al., 2009).

<sup>148</sup> Earthshot Prize Winner 2021 (BBC News, 2021).

<sup>149</sup> Janauid (2023).



### 5.6.3. Scaling private climate finance for forests by establishing a national framework for sustainable agriculture and deforestation-free supply chains

*Our goal is to have our transportation 100% renewable, so what remains is to electrify our transportation—which is the decarbonisation route. And we are interested in the sustainable landscape initiatives, [...] because we are more interested in climate adaptation, biodiversity and water per se, than the carbon which is already kind of a done deal. So the so-called co-benefits, we think are the benefits.”* Franz Tattenbach, Minister of Environment, Costa Rica

The Costa Rican PSA programme showcased that a national framework provides several advantages in achieving scale in enhancing sustainability in land use practices. It enabled the government to negotiate compensation for the ecosystem services provided . Costa Rica effectively argued to the international community, for financial compensation to address the environmental market failure, highlighting the value of its conservation and restoration efforts in terms of carbon sequestration, biodiversity and tourism benefits. The table below presents the distribution of benefits based on each ecosystem service delivered from the reforestation and conservation of land in Costa Rica (Castro et al., 2000). While both the country and landowners, when grouped, benefit to at least some degree from all ecosystem services, Costa Rica effectively managed to mobilise international finance for ecosystem services that benefit the global community (i.e. scenic beauty, carbon sequestration and biodiversity).

**Table 5.4. Costa Rica’s PSA Programme: NbS ecosystem benefits to stakeholders**

| Types of benefits               | Benefit internalised by: |         |       |
|---------------------------------|--------------------------|---------|-------|
|                                 | Landowner                | Country | World |
| Sustainable wood production     | x                        |         |       |
| Hydropower production potential | x                        | x       |       |
| Water supply                    |                          | x       |       |
| Watershed protection            |                          | x       |       |
| Scenic beauty/ecotourism        | x                        | x       | x     |
| Carbon sequestration            | x                        | x       | x     |
| Biodiversity                    | x                        | x       | x     |

Source: Adapted from Castro et al. (2000, p. 77)

However, Costa Rica's PSA programme also encountered limitations. Perhaps the biggest limitation is that the government cannot currently meet demand for enrolment in the PSA programme.

*"But the real story is, yes we did create Protected Areas and yes we did have Payment for Ecosystem Services, but once you zoom in and look at PSA, we are only addressing 10% of demand for payment of ecosystem services because that's all we can collect from the 3.5% of tax on fossil fuels and you end up getting USD 60 per hectare per year. So if you compare with the opportunity cost, the economic argument is not there.*

*What it really was is the following: in the same legislation that we created in the PSA [...] we banned land use change and nobody says that because PSA sounds much more progressive – the ban sounds Stalinist, like big government. No one is allowed to change land if you have more than 2 acres of land – you are not allowed to chop it down. And that is why we have forest coverage in the country – but nobody wants to hear that." (Participant 203)*

The expansion of the PSA programme is a significant challenge. Interview participants working with the governing party at the time of the writing of this dissertation have mentioned that the programme will be expanded to include other ecosystem services, such as biodiversity, increasing the rise of PSA up to potentially USD 100 per hectare per year. But others have noted that a very small portion of people, perhaps 10-20% of eligible landowners would be able to attain the highest level of payment. The interview participants also could not elaborate on where the extra funding will come from.

Several interview participants also noted that the reforestation programme in Costa Rica cannot only be attributed to the PSA payments. The biggest factor in reversing the forest cover reversal is attributed to the forest ban, but there were also other broader factors, including trade competitiveness which disincentivised certain economic activities (e.g. corn production).

*"Subsidising biodiversity does not affect supply chains. For example, we don't plant corn anymore because it doesn't make sense to compete with American corn." (Participant 218)*

Studies have found that the PSA programme's impacts on individual landowner wealth have been inconsistent. Some have argued that their participation in the programme was motivated by a desire to secure their land tenure rights and to contribute to national forest conservation (Arriagada et al., 2015; Chapman et al., 2021). There is also unequal access to payments for ecosystem services which seem to favour larger landowners largely as a result of historical patterns of agrarian settlements and the state's inability to recognise certain forms of property claims for PSA by smaller landowners (Lansing, 2014). Studies have also revealed that Costa Rica's PSA programme has had an impact on the perception that nature stewardship provides

additional benefits beyond financial. The results from a study of cattle farmers in the Guanacaste region further substantiate this; whereas the country's leadership framed the PSA programme as payments for a specific service, farmers in fact, viewed it more as a form of non-transactional support that recognises land stewardship while also providing rural development assistance (Chapman et al., 2020, p. 1). The authors conclude that "the support for stewards framing of PSA [...] points to a potential leverage point in designing PSA programs that enhance (rather than undermine) connections to nature" (Chapman et al., 2021).

Following significant recovery, the Costa Rican Government is now turning to a new sustainability initiative for land use beyond forestry cover. The interviews revealed that the current Costa Rican Government considers sustainable agriculture and deforestation-free supply chains in agriculture as a key area for future intervention to enhance land use and meet its international climate change and biodiversity commitments. This recognises that addressing the economic needs of landowners and providing them with viable economic activities is fundamental to enhancing sustainable land use. Agriculture, which occupies 35% of Costa Rican territory, is a critical sector for these efforts, with significant cash crops including coffee, bananas, sugar, and cocoa.

*"Because Costa Rica is not emitting and not deforesting, you can argue in the international markets, that [European countries] should exempt Costa Rica from an import tax that they charge on bananas." (Participant 206)*

*"And that is what I'm fighting against very much—the very basic traditional definition of nature-based solutions, because I think we are missing the boat in some regards. I think there is a lot we can do with biodiversity, but it's with mainstream agriculture, not fighting against mainstream agriculture." Franz Tattenbach, Minister of Environment of Costa Rica*

Interviews with the current Costa Rican Government revealed intentions to expand its NbS policies into the agricultural sector. A new initiative aims to incentivize agricultural landowners to adopt more sustainable land use practices by reframing the narrative of the agricultural industry as one of the culprits of environmental damage to one contributing to its restoration and sustainable use. A second component of the strategy is a desire to link agricultural trade with climate change and biodiversity commitments. By negotiating directly with other nations, the government hopes to reduce the transaction cost that individual landowners (i.e. certification) face in exporting their products. This is of particular importance in less affluent, rural areas, where landowners lack the financial resources to comply with emerging EU regulations, such as the deforestation-free supply chain regulation.

*“Due to our past efforts we can say that and—we want to harvest those fruits of our national policies to be equally shared with tourism and agriculture. [...] we are big believers in tying trade to responsible climate change and biodiversity policy, but at the country-wide level not at the certification level—this is the big difference. We are very adamant not to go with the individual level—its too expensive, too complicated, too confusing.”* Franz Tattenbach, Minister of Environment of Costa Rica

The financing mechanisms to achieve this will rely on a combination of established domestic governance structures (e.g. credits and incentives managed by FONAFIFO) and other public incentives available for conservation and ecosystem services, forestry, and REDD+ through the National Fund for Forestry Financing, and multilateral finance (i.e. GEF, UNDP, FAO).

## **5.7. Conclusion**

Contrary to what the literature has heretofore suggested, the study on Komaza reveals an example of a for-profit NbS enterprise, operating in a developing country, that mobilised significant sums of private climate finance. Nevertheless, the company faced challenges in aligning investor expectations with the long-term horizons required by a NbS forestry business model, ultimately leading to the closure of business operations. The case highlights that NbS initiatives may rely on multiple sources of climate finance, with philanthropic finance playing a particularly important role in increasing the financial runway—a necessity when operating with the long-time horizons of NbS. The case also demonstrates the complexities associated to achieving joint SDGs within a for-profit business model. Although Komaza attracted substantial private climate finance, its failure to mature into a viable enterprise reveals the tensions between profit-driven objectives and broader socio-economic and environmental goals.

The case of Komaza illustrates how NbS in Kenya are shaped by the country’s distinct political economy, historical trajectory, and development status. Although Kenya is comparatively advanced within its regional context, it remains a lower-middle-income country with persistent socio-economic needs. Unlike Costa Rica, Kenya does not have a long-standing practice of embedding environmental protection into state-led development priorities, despite both countries’ dependence on tourism linked to the scenic beauty of their natural landscapes. Kenya lacks a robust institutional and governance system dedicated to channelling finance for nature but is attempting to change this policies, including the emergence of a tax on the sale of carbon credits. In this context, Komaza emerges as a relatively standalone initiative, navigating domestic and international systems to mobilize capital for its business model. Its early successes can be attributed not only to the company’s operational capacities but also to

Kenya's strong international networks, bolstered by an international founding team and expertise, which enhanced investor confidence.

Access to voluntary carbon markets was a priority for Komaza, anticipating it to be an important revenue stream in a system characterized by limited state funding and barriers to accessing multilateral climate finance, such as the GCF. The Kenyan Government's recent exploration of taxation mechanisms for carbon revenues underscores the country's evolving approach to regulating and capturing value from NbS finance. These factors highlight a decentralized, private sector-driven emergence of NbS projects, with the state seeking to secure broader national benefits. Kenya's relatively stable political environment, its legacy of working with philanthropic organizations, and its middle-income status create conditions that allow for independent, high-risk, for-profit models such as Komaza. Yet, these models face significant challenges in sustaining operations at scale under fragmented financing structures.

Costa Rica's experience offers a contrasting example. Its PSA programme is rooted in a distinct political-economic and historical context, where state-led development has consistently placed environmental conservation at the center of policy. Costa Rica's institutional framework, developed through decades of prioritising environmental conservation, has enabled the government to manage NbS programmes in a systematic and coordinated manner. The PSA, funded through a mandatory taxation system on fossil fuels, ensures a stable revenue stream for conservation activities.

Costa Rica's carefully crafted legal and governance frameworks enabled it to access both domestic and international *public* finance to fund its reforestation activities. It pioneered the concept that forests provide valuable ecosystem services both to its own population and to the world. Costa Rica provides an example that sustainable practices in forestry, coupled with rewards for environmental services, is both viable and feasible via a public finance model. Costa Rica's approach reflects not only its small size and centralized governance structure but also its history of negotiating international finance arrangements in ways that incorporated environmental concerns. This includes its early experimentation with debt-for-nature swaps, decades before such instruments gained traction in global climate finance discourse.

While Costa Rica's approach provides institutional certainty and scale, the PSA programme demonstrated limited flexibility in incorporating land areas outside the designated private lands that could also benefit from reforestation. Significant challenges remain in implementing such programmes, particularly in establishing governance structures that can mobilise new financing, specifically private climate finance as we will see in the next chapters, creating equitable payment mechanisms, developing institutions to monitor land use changes, and

ensuring transparency and fairness in payment systems. These challenges make the PSA programme potentially less applicable in lower income countries with weaker institutions.

## **Chapter 6. A case study on private climate finance leveraged by Mikoko Pamoja for mangrove conservation and restoration**

### **6.1. Introduction**

Mangroves are among the world's most carbon-rich and productive forests (Donato et al., 2011; Jennerjahn and Ittekkot, 2002). They provide billions of dollars' worth of ecosystem services (Global Mangrove Alliance, 2023) despite covering less than 1% of forests globally (see Appendix 6A) (FAO, 2007). The conservation and restoration of mangroves are recognised as a NbS because they provide both environmental and socio-economic benefits to communities. Mangroves store up to five times more carbon than tropical forests (Donato et al., 2011), representing one of the highest carbon stocks per hectare (Donato et al., 2022).

They also enhance community resilience to the effects of climate change through their ability to reduce wave strength and wind velocity during storm surges, estimated at USD 65 billion in annual coastal protection (Menéndez et al., 2020b). Finally, mangroves play a disproportionately important role in the fisheries supply chain (Sandilyan and Kathiresan, 2012a), serving as critical habitats and nurseries for billions of fish and other species worldwide, vital for the local and global fisheries industry (Leal and Spalding, 2022). Despite the vital role mangrove forests play for local livelihoods, climate, and nature, mangrove ecosystems have been declining globally at rates twice that estimated for terrestrial rainforests (Thomas et al., 2017).

This chapter presents a case study on Mikoko Pamoja, commonly referred to as the world's first blue carbon project. Launched in 2012, the project—whose name means 'mangroves together' in Swahili—uses the sale of voluntary carbon credits to finance the restoration and conservation of mangroves across 117 hectares in the Gazi Bay of Kenya. The project involves the participation of two villages, Gazi and Makongeni, home to about 5,400 inhabitants, primarily composed of subsistence fishers. Mikoko Pamoja is considered an NbS because its objective is to restore and conserve mangrove areas with a view to addressing climate mitigation, climate adaptation, socio-economic development, and biodiversity enhancement.

The initiative has won multiple international awards and is often noted as a prime example of NbS in its ability to offer 'triple wins' by mitigating and adapting to climate, providing community benefits, and enhancing biodiversity. In Kenya, mangroves cover a small total area of

approximately 45,590 hectares<sup>150</sup> in the Lamu and Tanu River districts (Kirui et al., 2013; Sigi Lang'at and Kairo, 2013), representing less than 3% of the natural forest cover or less than 1% of the national land area (Government of Kenya, 2017b). The majority of Kenya's coastal population lives in rural areas, engaging in fisheries and agriculture for their livelihoods.

The case study examines the deployment of climate finance for Mikoko Pamoja as an NbS relying on the sale of carbon credits in the voluntary carbon markets as the primary financing instrument. The chapter examines the barriers and enablers of mobilising private climate finance for Mikoko Pamoja. To what extent did Mikoko Pamoja act as a driver or accelerator of NbS adoption in Kenya? The chapter begins with an overview of the blue economy in Kenya and the challenges associated to financing the conservation and restoration of mangroves. The second section explains how finance was deployed for the NbS implementation. An assessment of finance flows suggests that USD 744,255 was leveraged in climate finance. The final section examines the financing instrument's ability to address socio-economic and environmental considerations and its limitations in achieving joint objectives and scaling up projects.

### **6.1.1. The blue economy in Kenya**

The importance of coastal areas to humans is unequivocal. Despite comprising only about 4% of the Earth's total land area, they are home to over 30% of the world's population (Barbier et al., 2008). Coastal areas are more densely populated than inland areas, and their populations are increasing rapidly. However, the long-term viability of these regions hinges on their capacity to continue to provide critical ecosystem services, including protection from extreme weather events, food supply and water provision (Barbier et al., 2008).

In Kenya, counties on the coast experience some of the highest rates of poverty, estimated at above 70% (Government of Kenya, 2017b). In order of significance, the primary economic activities are tourism, ports and shipping, agricultural industries, fisheries, farming, forestry and mining. A valuation of the products and services derived from mangrove ecosystem services in Kenya points to approximately USD 2,000 generated per hectare per year (Government of Kenya, 2017b).

Mangroves are complex ecosystems that play crucial roles ecologically, physically, economically and socially in these coastal areas (Jennerjahn and Ittekkot, 2002). Mangroves

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<sup>150</sup> The estimated total area of mangroves in Kenya varies according to source. The Kenyan Government estimates an area of 61,271 hectares (Government of Kenya, 2017b).



are exceptionally efficient at capturing atmospheric carbon and storing it in biomass and soil due to their high productivity and extensive root systems. They are different from tropical trees in that they store significant amounts of carbon below ground. This feature allows them to sequester up to five times more carbon than terrestrial forests, both above and below ground (Alongi, 2002; Donato et al., 2011; Inoue, 2019; Mayaux et al., 2005; Ray et al., 2011). Mangroves also provide critical climate adaptation benefits by acting as a first line of defence against flooding and tsunamis (Alongi, 2008), soil erosion (Cochard et al., 2008; Thampanya et al., 2006), and extreme weather events by reducing waves and storm surges (Menéndez et al., 2020b). Due to a unique combination of characteristics, including tree density along shorelines, tree shape, aerial roots, trunk and canopy structures, mangroves can reduce wave energy by 66% within the first 100 metres of forest width (Mclvor et al., 2012). Kenya has previously been identified as a country where mangroves have high average carbon stock densities, measured in tonnes per hectare (Jakovac et al., 2020a).

The benefits of mangroves, however, extend far beyond climate mitigation and adaptation. Mangroves provide many ecosystem services: nutrient cycling (Alongi, 2002); water purification (De Lacerda and Abrao, 1984; Tam and Wong, 1999); nursery habitats for fish and biodiversity more broadly (Primavera, 1998; Robertson and Duke, 1987; Sheridan and Hays, 2003); habitats for endemic species (Field et al., 1998); medicinal uses (Bandaranayake, 1998); and a durable timber product resistant to rotting (Dahdouh-Guebas et al., 2005). Mangrove forests provide critical habitats for species on the coastline extending from Somalia through Kenya and Mozambique, referred to as the 'Swahili Centre for Endemism' (Burgess and Clarke, 2000; Fungomeli et al., 2020). Crucially, for coastal communities in Kenya, mangroves provide critical ecosystem goods—fuel wood, medicine, food and construction materials (Kairo et al., 2001; Rönnbäck et al., 2007).

Despite their importance, mangroves, and marine ecosystems more broadly, have experienced some of the highest degradation rates globally. Current rates of coastal area conversion indicate an annual global decline of mangroves ranging between 0.163% globally (Hamilton and Casey, 2016; Pendleton et al., 2012), 1-2% for tidal marshes (Pendleton et al., 2012), and 0.4-2.6% for seagrasses (Pendleton et al., 2012). Globally, mangrove ecosystems have experienced a decline of 35-50% over the last half-century (Bosire et al., 2014). If current degradation rates continue, these ecosystems could face near-total loss within the next 100 years (Duke et al., 2007). Onshore aquaculture for fish and shellfish production is one of the leading causes of mangrove deforestation, followed by deforestation to produce agricultural products and land cover conversion for infrastructure and urban development (Friess et al., 2019).

In Kenya, it is estimated that approximately 18% of mangrove coverage has been lost between 1985 and 2010 (Kirui et al., 2013), driven by human pressure,<sup>151</sup> soil erosion, drought and sea-level changes (Maina et al., 2021). Moreover, mangrove timber is highly sought after for its extended burning duration when used as firewood and for its favourable structural properties in construction. Kenya is among the top countries contributing to 90% of the greenhouse gas emissions resulting from mangrove deforestation (see Appendix 6A) (Jakovac et al., 2020a).

More than 90% of the world's mangroves are located in the Global South (López-Angarita et al., 2016). Of the total remaining mangrove forest area, 40% are formally protected but often lack sufficient financial resources and need more interventions to promote restoration (Leal and Spalding, 2022). The Kenyan Government has implemented various policies and measures to support mangrove protection. Kenya's NDC specifically mentions mangroves as an intervention area to attain climate change goals and strengthen resilience against climate change and also includes mangroves in the National Biodiversity Strategy and Action plans (2000-2005, updated draft 2019-2030). The National Mangrove Ecosystem Management Plan (2017-2027) assesses the status of mangroves on biophysical, socio-economic and legal indicators. This plan also evaluates ecosystem services and threats, providing a detailed situation analysis for each county in Kenya (Government of Kenya, 2017b). Moreover, the Gazi Bay area, where the Mikoko Pamoja NbS initiative is implemented, stands out as an extensively studied mangrove ecosystem in Africa (Bosire et al., 2008; Huxham et al., 2015; Kairo et al., 2009, 2008). Furthermore, the area is recognised for its community engagement in mangrove research and restoration efforts (Kairo, 1996) and is host to a field station operated by Kenya's Marine and Fisheries Research Institute (Plan Vivo, 2020).

Mangroves were declared official government reserve forests in 1932 in Kenya. Considering the growing realisation of deforestation rates of mangroves, a presidential ban was placed on foreign exports of mangrove poles in 1982, followed by a national ban on mangroves in 1997. The management of mangroves is bestowed on the Kenya Forest Service, and in some areas, in partnership with the Kenya Wildlife Service when they occur in Marine Protected areas (Government of Kenya, 2017b). Despite these efforts, the government has acknowledged that deforestation along the coast, including in marine protected areas, continues to be a challenge in the country.

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<sup>151</sup> E.g. urbanisation, resource overexploitation.

Studies have demonstrated the value of protecting mangroves as an NbS for climate action (Macreadie et al., 2021). Conserving the remaining mangroves globally would avoid releasing up to 15.51 PgCO<sub>2</sub> in the atmosphere, while restoring degraded mangrove areas could sequester up to 0.32 PgCO<sub>2</sub> globally (Jakovac et al., 2020a). Because of the vast amount of carbon that mangroves store, their conversion into alternative land uses, such as cattle pasture, could lead to the release of three times more carbon dioxide per hectare than the conversion of forests in the Amazon region (Kauffman et al., 2016). A number of studies have been devoted to assessing the effectiveness of mangrove conservation or restoration initiatives across countries with mangroves, but the African region continues to be understudied (Amin et al., 2021; Ellison et al., 2020; Kodikara et al., 2017; Miteva et al., 2015).

‘Blue carbon’ is used here to refer to NbS involving the carbon captured and stored by coastal marine, and wetland ecosystems, including mangroves, seagrass meadows, and tidal marshes (Macreadie et al., 2021). While the emphasis on carbon sequestration is significant, it often overlooks the numerous other co-benefits associated with mangrove protection and restoration and the interlinkages with wider economic challenges. The ‘blue economy’ has emerged as a concept to conserve the world’s oceans and inherent resources while adopting a lens that incorporates both socio-economic benefits and ecological conservation. Studies of the application of the blue economy concept in the African context highlight that successful initiatives balance ecological, economic sociocultural aspects while emphasising the involvement of local communities (Okafor-Yarwood et al., 2020; Wenhai et al., 2019).

The Government of Kenya has recognised the potential of a blue economy to support poverty alleviation, food and nutrition security, employment creation, environmental sustainability and economic development (Rasowo et al., 2020; Wairimu and Khainga, 2017). The government aims to grow the blue economy beyond the current 4% of GDP. If fully developed, it is estimated that the blue economy could contribute USD 4.8 billion to Kenya’s economy between 2020-2030 (IOM, 2022).

### **6.1.2. Private climate finance for mangrove conservation and restoration in Kenya**

Global financial requirements for mangrove conservation and restoration are estimated to reach USD 4 billion by 2030, with approximately one-third (USD 1.2 billion) expected to come from the private sector (Ring et al., 2023). Various climate finance instruments and mechanisms, including voluntary carbon markets, are increasingly recognised as potential approaches to support the conservation and restoration of forests and mangroves.

The grey literature has examined some of the challenges in financing mangrove conservation and restoration, but research on private climate finance remains sparse. A significant issue is the market's failure to value the ecosystem services provided by mangroves adequately. A limited supply of projects considered 'high-quality,' combined with a perceived high-risk of engaging in projects, increases the cost of private capital (Ring et al., 2023). For these reasons, public and philanthropic funding is considered essential for mangrove conservation and restoration. However, the role of private return-seeking capital is less clear.

The grey literature predominantly explores various financial mechanisms aimed at catalysing private climate finance for mangrove conservation and restoration. These mechanisms include partnerships for mangroves, blended finance (e.g., via the Global Fund for Mangroves), debt for mangrove-positive small and medium-sized enterprises (via commercial banks and development finance institutions), microfinance for mangrove-positive enterprises, and mangrove-linked insurance (Ring et al., 2023).

The academic literature on financial mechanisms supporting mangrove conservation and restoration is limited and primarily focused on Southeast Asia, such as a study in Vietnam (Pham et al., 2022). One study in Tanzania emphasised the importance of governance systems in resource management and decision-making processes for mangrove conservation (Ntibona et al., 2022). There have been some studies on how PES can support mangrove forests (Locatelli et al., 2016). Public sector-led financing mechanisms, such as blue bonds and debt-for-nature swaps, are also emerging to catalyse mangroves' finance. However, how the private sector will contribute capital at scale remains unclear. Moreover, to date, mangroves are largely absent from public sector-led REDD+ schemes (King, 2012).

The sale of carbon credits in voluntary carbon markets stands out as the leading instrument for mobilising private climate finance for mangroves (Ring et al., 2023). The global voluntary market for NbS is expected to grow significantly and reach between USD 24.9 billion and USD 40 billion by 2030 (Deutz et al., 2020). However, blue carbon credits currently represent less

than 1% of nature-based credits (Ring et al., 2023). While there is a growing reliance on voluntary carbon markets for financing forestry projects, schemes are prioritising larger terrestrial forests over mangroves. A significant limitation for both PES and REDD+ schemes is the uncertainty in quantifying the provision of environmental services, particularly for mangroves (Alongi, 2011). Furthermore, voluntary carbon markets face scrutiny and criticism regarding transparency, project integrity, governance structures, lack of participation of local communities and indigenous peoples, biodiversity impacts, permanence, leakage, and additionality. There are concerns that the sale of carbon credits to businesses may be used for greenwashing purposes without leading to meaningful change (In and Schumacher, 2021), and that nature-based projects can dispossess or marginalise local communities in practices referred to as “green grabbing” (Cormier-Salem and Panfili, 2016). This being said research indicates that if carbon prices are held between USD 4.5 and USD 18 per tCO<sub>2</sub>, it could significantly support the restoration of the supermajority of deforested mangroves (90%) (Jakovac et al., 2020a). The average current price of carbon credits in the voluntary carbon markets is USD 6.97 per ton (Ecosystem Marketplace, 2021).

The valuation of ecosystem services provided by Kenya’s mangroves, particularly shoreline protection, surpasses that of other ecosystem services, including carbon sequestration, by at least two orders of magnitude (Kairo et al., 2009). Monetising these *non-carbon* ecosystem services of mangroves remains a challenge (Barbier et al., 2008). Coastal communities often encounter difficulties accessing non-traditional financial sources, such as microfinance initiatives focusing on mangroves. The Northern Rangelands Trust provides an exception through its microfinance scheme on the coast of Kenya to support small enterprises (NRT, 2023).

While Mikoko Pamoja is one of the better known blue carbon projects, there is a lack of understanding regarding the deployment of private climate finance for mangrove conservation and restoration. Knowledge on climate finance for mangrove remains in its early stages and would benefit from a more in-depth analysis of the challenges to large-scale implementation (Friess et al., 2019).

## **6.2. Mikoko Pamoja: The deployment of private climate finance for mangrove conservation and restoration**

### **6.2.1. Private climate finance deployment**

The following section provides an overview of the deployment of private capital for Mikoko Pamoja. Contrary to the two other empirical cases, which relied on the sale of carbon credits as an *additional* revenue source, Mikoko Pamoja turned to the sale of carbon credits as the primary financial instrument from the onset. Interviews with former and current Mikoko Pamoja staff, corroborated with secondary sources, point to a total approximate value of USD 744,255 mobilised in finance by Mikoko Pamoja from 2013 to the time of writing (2024), of which USD 234,255 was raised from the voluntary carbon markets, according to Mikoko Pamoja's 2023 annual report. Table 6.1. below summarises these figures and provides an overview of the breakdown of finance sources.

In the project's early years, during the pre-project phase, in-kind support was also provided by institutions such as the Edinburgh Napier University and the UK Government. After the launch of the project as a carbon project, Mikoko Pamoja also received donations from institutions seeking to support specific community projects. Moreover, additional smaller side economic initiatives have been launched to generate additional revenue for the community, such as beekeeping and eco-tourism activities.

From the first year of sale, 2013-14, onwards, as a blue carbon project, Mikoko Pamoja predominantly relied on the sale of carbon credits in the voluntary market to finance the conservation and restoration of mangroves. However, an analysis of total climate finance mobilised indicates that carbon revenue still represents less than half (~45%). An assessment of the list of buyers of carbon credits suggests that all buyers—except one organisation—have been from international, non-Kenyan and non-African organisations, consisting primarily of resellers or carbon intermediaries or sustainability consultants that work with the private sector to lower or offset their carbon footprint (representing over 50% of the carbon credits sold by Mikoko Pamoja). This is followed by small or medium-sized businesses (approximately 10%), charities (30%), universities (10%) and conferences, and individuals (less than ~1%).

Analysing the breakdown of carbon credit purchases and buyers reveals several noteworthy findings (see Appendix 6B). First, the price of each carbon credit evolved and varied according to the buyer, ranging from USD 6 to USD 25 between 2013, the first year of sale, and 2023, the last reported year available as of this writing. All traceable carbon credit buyers were from the private sector, with no government funds identified for carbon credit purchases.

In terms of the value of carbon credits purchased, the largest share came from consultancies and other organisations acting as ‘carbon brokers,’ representing approximately 42%. This was followed by non-governmental organisations, not-for-profits, and philanthropic organisations (around 20%); private businesses (e.g., retail and tourism sectors) (about 21%); academic institutions (roughly 12%); individuals and family offices (about 1%); and unknown entities (around 4%). The project proponents have since applied to the Kenyan Government to expand the project area. This has yet to be approved and has been delayed due to the formulation of the country’s national carbon policy. It is worth noting that all but one of the carbon buyers are international. Local companies, including one mining and one sugar company that have visibly degraded neighbouring ecosystems, have not purchased any credits.

In addition, donations from philanthropic trusts and NGOs generally financed one-off additional projects in addition to the project’s core activities. For instance, in 2023, they had a “project to provide local youths with training on forest monitoring, the use of excel presentations and employment skills related to the forest” (Participant 132). The amount of donations relative to carbon credit finance is difficult to estimate as it varies yearly. One estimate for an annual carbon credit sale revenue of USD40,000 may be around USD20,000 in additional income from donations and/or grants.

The predominant source of climate finance for Mikoko Pamoja remains grants. Despite consistent sales of carbon credits since 2013, the total revenue generated from the voluntary carbon market has not yet offset the initial project initiation expenses, even after over a decade of operation. This did not pose an issue for Mikoko Pamoja, whose pre-project phase was primarily funded with non-reimbursable grants, but would likely pose limitations on other climate finance instruments, such as return-seeking capital. It may also be indicative of the challenges of raising private climate finance to cover initiation costs through carbon credit sales alone.

Before ending this section, it is also worth noting the types of finance that were not leveraged. For instance, despite the project winning several prestigious awards—such as *Equator Prize*<sup>152</sup> and the *UN Person of the Year in Kenya 2023*<sup>153</sup>—there remains an absence of

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<sup>152</sup> “The Equator Prize, organised by the Equator Initiative within the United Nations Development Programme, is awarded biennially to recognise outstanding community efforts to reduce poverty through the conservation and sustainable use of biodiversity” (UNDP, 2024, para. 1)

<sup>153</sup> The UN in Kenya Person of the Year recognises a person or individual that has made a considerable contribution to the UN Sustainable Development Goals (United Nations, 2024).

leveraged multilateral finance. The only public finance came from the UK government's Ecosystem Service for Poverty Alleviation Programme. Moreover, a negligible amount was provided by local corporations, two local companies operating in the area to support workshops in the form of in-kind support, estimated at less than USD500.



**Table 6.1. Overview of finance mobilised by Mikoko Pamoja**

| Project characteristics                                 | Amount (USD)             | Description                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
|---------------------------------------------------------|--------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Total finance tracked:</b>                           | <b>\$744,255</b>         | Finance from all sources (grants, carbon revenue, donations).                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
| <b>Pre-project phase (2012-2013)</b> <sup>154</sup>     | \$390,000                | <p><b>Philanthropic (international)</b><br/>Earthwatch International</p> <p><b>Public (international)</b><br/>Ecosystem service for poverty alleviation programme (Research Council of the United Kingdom)</p> <p><b>Research institutions (international, public)</b><br/>Edinburgh Napier University (UK)<br/>Bangor University (UK)</p> <p><b>Research institutions (national, public)</b><br/>Kenya Marine Fisheries Research Institute (KMFRI)</p>                                                                                                        |
| <b>Carbon credits revenue (2013-2022)</b>               | \$234,255                | <p>Price per tCO<sub>2</sub>: ~\$6 - \$25<br/>2,043 tons of carbon sequestered per year</p> <p><b>Breakdown of revenue distribution:</b><br/>ACES: 6%<br/>Community salaries: 21%<br/>Office expenses: 5%<br/>Community development projects: 32%<br/>Restoration and conservation activities: 36%</p> <p><b>Breakdown of buyers</b><br/>Resellers/brokers (42%)<br/>Businesses (SMEs) (21% of which only one is Kenyan)<br/>Charities (10%)<br/>Academic institutions (~12%)<br/>Individuals and family offices (less than 1%)<br/>Unknown entities (~4%)</p> |
| <b>Donations/grants (2013-2022)</b>                     | \$120,000                | <p>Estimate based on the assumption that \$10,000-20,000 in additional funds are received annually via donations from philanthropic and non-governmental organisations.<sup>155</sup></p> <p>Types of donors are not disclosed.</p>                                                                                                                                                                                                                                                                                                                            |
| <b>Other support</b>                                    | <500                     | In-kind support from two corporations operating in the area                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
|                                                         | NA                       | 8 Undergraduate students performing 600 hours of research each for their honours project                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
| <b>Feasibility study and business case study cost**</b> | \$390,000 <sup>156</sup> | Grants from Edinburgh Napier University (UK), Bangor University (UK), Kenya Marine Fisheries Research Institute (KMFRI)                                                                                                                                                                                                                                                                                                                                                                                                                                        |
| <b>Finance recipient entity:</b>                        | NA                       | ACES                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |

<sup>154</sup> Grants received in the preparatory phase (2012-2014); distribution unclear. Half of grants in the preparatory phase was delivered in the form of in-kind support.

<sup>155</sup> Participant 133.

<sup>156</sup> Based on information from interview participants indicating a total cost of GBP 250,000. Converted to USD based on average exchange rate for 2013.

|                                     |    |                                                                                                               |
|-------------------------------------|----|---------------------------------------------------------------------------------------------------------------|
| <b>Finance intermediaries:</b>      | NA | NA                                                                                                            |
| <b>Finance channels:</b>            | NA | Mikoko Pamoja                                                                                                 |
| <b>Financial structure:</b>         | NA | ACES receives finance                                                                                         |
| <b>Land investment allocations:</b> | NA | 36% of carbon revenue is distributed to restoration and conservation activities, totalling USD 11,558 in 2023 |
| <b>Return on investment:</b>        | NA | NA                                                                                                            |
| <b>Financial instruments:</b>       | NA | Carbon credit revenue, grants and donations                                                                   |

### **6.3. Mikoko Pamoja: Role and drivers of private climate finance for NbS**

#### **6.3.1. Role and drivers of private climate finance**

The section above revealed that Mikoko Pamoja relied on only a few financial instruments. Aside from the project initiation costs, raised in the form of non-reimbursable grants, estimated at USD390,000, Mikoko Pamoja utilised the sale of carbon credits and one-off donations to fund additional project activities. This section examines the sources of capital and their role, revealing the role of capital and the respective interests of stakeholders.

The providers of non-reimbursable grants consisted of government entities, philanthropic organisations, academic institutions, and research institutions. These organisations were motivated by the joint ecological and social benefits from the conservation and restoration of mangroves.

Private buyers of Mikoko Pamoja's carbon credits were motivated by multiple interests. Buyers showed a direct link between their organisation's activities and the blue economy, and a commitment towards achieving net-zero emissions. For instance, one buyer's principal business activity is the organisation of marine conservation biology conferences. Other buyers included businesses in the marine or tourism sector, such as an ocean race organisation and a sustainable tourism company operating in Kenya. The profile of buyers suggests a local dimension to private climate finance for nature-based carbon credits. Academic institutions and conference organisers primarily sought to offset the environmental impact of specific courses or events. Finally, carbon credit brokers or resellers, mainly comprising consultancies, sold credits to companies aiming to offset their carbon footprints. The analysis did not suggest speculations in carbon prices as a factor driving the sale of Mikoko Pamoja's carbon credits.

**Table 6.2. Finance leveraged by Mikoko Pamoja: Capital roles and provider interests**

| <b>Financial instrument</b>    | <b>Capital provider</b>                                                               | <b>Role of capital for Mikoko Pamoja</b>                                                                             | <b>Capital provider interest</b>                                                                              | <b>Amount (USD) (2013-2022)</b>                                              | <b>In-kind (USD)</b> |
|--------------------------------|---------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------|----------------------|
| <b>Non-reimbursable grants</b> | <b>International public actors</b> (government)                                       | Project initiation, baseline study, carbon credit application, Plan Vivo standard                                    | Blue economy conservation and restoration, as well as research                                                | ~\$ 390,000 (Distribution between in-kind contributions and capital unknown) |                      |
|                                | <b>International private</b> (philanthropic and not-for profit organisations)         |                                                                                                                      |                                                                                                               |                                                                              |                      |
|                                | <b>International academic institutions</b>                                            |                                                                                                                      |                                                                                                               |                                                                              |                      |
|                                | <b>National public actors</b> (research institutions)                                 |                                                                                                                      |                                                                                                               |                                                                              |                      |
| <b>Donations</b>               | <b>Unknown</b>                                                                        | Continued support to the community by financing specific project activities                                          | Mangrove conservation and restoration, as well as financing community benefits                                | \$120,000                                                                    | NA                   |
| <b>Carbon markets revenue</b>  | <b>International private actors</b> (3 consultancies carbon credit brokers/resellers) | Finance the continued conservation and restoration of mangroves while providing the local community with co-benefits | Assist and advise companies in reaching their climate goals, including through the purchase of carbon offsets | \$97,873                                                                     | NA                   |
|                                | <b>International private actors</b> (6 philanthropic or NGOs)                         |                                                                                                                      | Contribution to conservation, offsetting, offsetting courses or events                                        | \$47,590                                                                     | NA                   |
|                                | <b>International private actors</b> (8 public and private corporations)               |                                                                                                                      | Offsetting, contribution to conservation in relevant business sector (marine, tourism or retail)              | \$43,683                                                                     | NA                   |
|                                | <b>International academic institutions</b> (7 private and public universities)        |                                                                                                                      | Offsetting courses or conferences                                                                             | \$29,294                                                                     | NA                   |

|  |                                                             |  |                                                                                                  |         |    |
|--|-------------------------------------------------------------|--|--------------------------------------------------------------------------------------------------|---------|----|
|  | <b>Domestic private actors</b> (business)                   |  | Offsetting, contribution to conservation in relevant business sector (tourism)                   | \$3,000 | NA |
|  | <b>International actors</b> (13 individuals/family offices) |  | Offsetting individual footprints and contributing to projects with environmental and co-benefits | \$2,908 | NA |
|  | <b>Unknown</b> (4 entities)                                 |  | Unknown                                                                                          | \$9,877 | NA |

Source: Author

### 6.3.2. Approaches to mitigating risk for private climate finance

Appendix 6B outlines the interests of each stakeholder group and the associated risks of engaging with Mikoko Pamoja. The project successfully mitigated risks for private capital, as evidenced by the consistent oversubscription and sell-out of its carbon credits. The primary risks for capital providers can be categorised into two stakeholder groups: grant providers and carbon credit buyers.

Grant providers, who supply non-reimbursable grants, primarily played a role in the project initiation phase. Their main risk was injecting capital into the feasibility and other pre-project activities of a blue carbon project, which was relatively new and unexplored at the time. Specific risks included the possibility that the project would not launch due to various factors, such as a lack of market demand for blue carbon credits in a voluntary market. There were also concerns about compromises on project integrity, and uncertainty regarding whether stakeholders would be interested in purchasing credits generated through a novel payment for ecosystems, particularly marine ecosystems like mangroves. Additionally, there was a heightened risk of capital misuse, corruption, and financial diversion inherent to a project implemented in a developing country.

Several risks were identified for carbon credit buyers. The primary risk is purchasing credits that do not represent emissions reductions or environmental benefits if the project fails to have the intended impact on the ground. Leakage and permanence were concerns, given the local communities' informal reliance on timber for personal use, such as building homes.

Several measures sought to mitigate risk. The first was to establish a governance structure to oversee the implementation to reduce risks associated to the misuse of funds. Specifically, operating ACES as a non-profit UK-based charity was positively received by buyers for two reasons. First, the perception that the intermediary, as a charity, was not profiting from the project, and second, ACES, based in the United Kingdom, administers the funds on behalf of the project, provided the transparency and accounting principles buyers required.

*“It was important to have basically a UK charity bank account that provides that transparency that buyers needed, especially so back then—perhaps carbon financing is becoming more mainstream now—but back then it was it was relatively new. And just that transparency of where the funds are coming from, where they’re going, that oversight and publication of our accounts was really important so.” (Participant 133)*

Investing in capacity building for local communities and stakeholders addressed leakage and permanence issues. For instance, project proponents planted a woodlot of fast-growing trees to provide community members with an alternative wood source.

*“What we have done is that we have started an alternative whereby we have established wood lots, the planting of terrestrial trees. I think you have heard about Casuarina tree—we have a farm at Makongeni Primary School, just next to Gazi village, [where] we have planted 2,000 seedlings so that the people who rely on the mangroves at least they can go for the alternative and then when can cover the leakage.” (Participant 107)*

A third strategy for attracting carbon credit buyers centred on marketing the project's co-benefits beyond carbon sequestration, placing biodiversity and community benefits at the heart of the project. In the early years of the voluntary carbon market, this approach was unique, as NbS carbon credits tended to focus solely on carbon sequestration. These co-benefits were of interest to buyers because they allow them to meet multiple ESG metrics and reduce project risk. Even if some carbon sequestration benefits do not materialise, the project can still contribute to community and livelihood improvements.

The decision to launch the first blue carbon project in a legal context that prohibited mangrove deforestation proved advantageous for project implementation. The ban supported the project by providing stakeholders with backing to enforce the law at a community level. Because it takes place on public land, the project necessitates the establishment of a Community Forest Association and a Participatory Forest Management Plan to receive government approval to

undertake activities in the mangrove forests.<sup>157</sup> The ‘Barrazas,’ or community meetings, provided locals with decision-making authority on how to spend the funds generated through Mikoko Pamoja.

Finally, the involvement of a non-Kenyan, international charity organisation administering the finances of the blue carbon project was crucial for building confidence among international buyers.

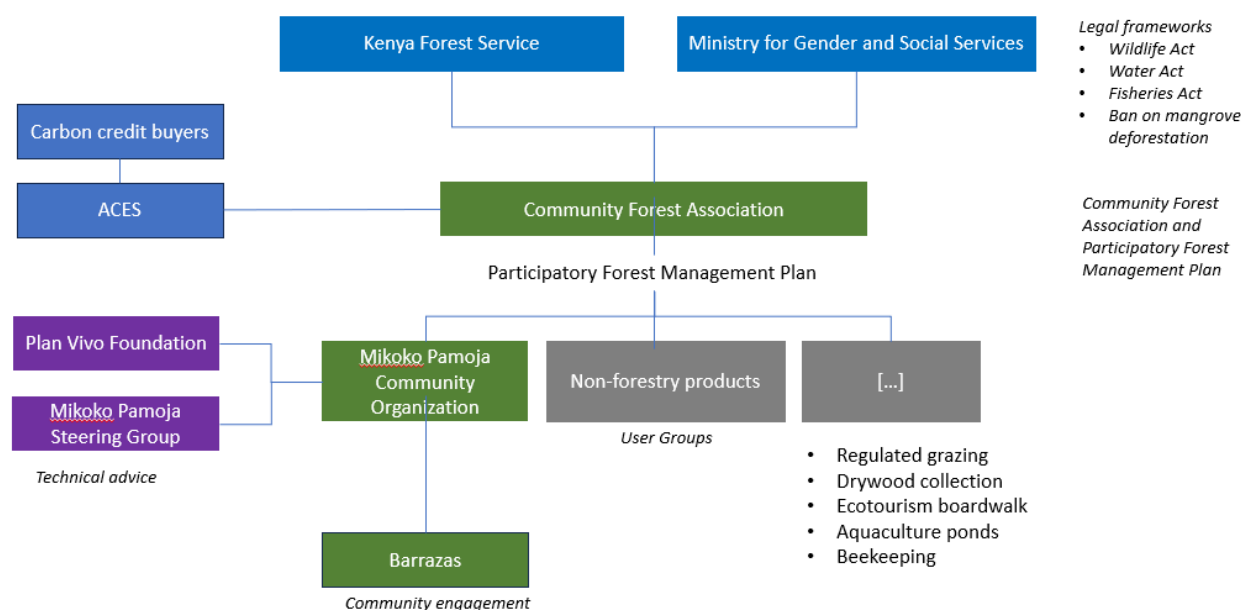
*“It was important to have [...] a UK charity bank account that provides [the] transparency that buyers needed, especially back then [...] it was relatively new. Just that transparency of where the funds are coming from, where they’re going—that oversight and publication of our accounts—was really important.”* (Participant 133)

It is worth noting that establishing a CFA, especially in mangrove areas, which are on public government land in Kenya, is complex because it requires a degree of capacity and knowledge. While Mikoko Pamoja was not the first CFA in Kenya, it was the first that covered a mangrove forest. Other CFAs were established on more “wealthy land with good connections to NGOs and other forms of capacity [...] present, because mangrove forests are government owned---[...] they tend not to be any resources in them.

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<sup>157</sup> Other user groups on the land also needed government approval for activities, such as grazing, dry wood collection, managing an ecotourism boardwalk, administering aquaculture ponds, and beekeeping.

**Figure 6.1. Overview of the regulatory environment and contractual frameworks governing stakeholders of the Mikoko Pamoja and Gazi Bay area**



Source: Author

## 6.4. Mikoko Pamoja: Barriers and enablers for private climate finance in the voluntary carbon market

### 6.4.1. Overcoming project initiation costs: Leveraging donor and grant funding

The primary obstacle to mobilising private climate finance for Mikoko Pamoja was covering the initiation costs before the project generated revenue from carbon credits. The challenge of generating finance between the pre-project phase and the generation of credits has been commonly identified in the literature. These initiation costs encompassed several dimensions: including scientific baseline studies, the establishment of governance structures and frameworks, and engagement with the community to obtain their willingness to participate in the project.

The pre-project cost was estimated at USD 390,000, a substantial sum for a small coastal community. Recognising that finance was a barrier to project implementation, the decision was made early on to keep the project small, focusing instead on marketing itself as the 'world's first blue carbon project.' The high upfront project cost was primarily due to the need to

undertake scientific monitoring activities, such as establishing baseline information, a requirement for third-party carbon credit standards. However, the project site benefited from being located in a studied mangrove site. Mikoko Pamoja thus benefited from existing scientific data and international partnerships, which decreased costs.

Furthermore, the project benefited from substantial in-kind support. UK-based ACES relied on volunteer scientists, including three PhD students, to conduct baseline studies. Personal relationships and international partnerships between the Gazi Bay community and foreign universities, such as Edinburgh Napier University, played an important role in getting the project off the ground. Edinburgh Napier University also supported the local community to put in place the governance frameworks required by the government, such as the Community Forest Association and the Participatory Forest Management Plan. It is estimated that about 50% of the initial project setup cost was delivered through in-kind contributions.

*“The project was developed through long-term research on carbon sequestration by mangroves, and this research started way back in the 1990s. Because you know Gazi Bay is one of the most studied mangrove sites in Africa—and even in the world. There has been a long time period of study on [these] mangroves.”* (Participant 101)

Another aspect that worked in Mikoko Pamoja’s favour was the low supply of blue carbon credits available globally. The scarcity in supply is attributed to several reasons. First, blue carbon ecosystems tend to be smaller in scale and more fragmented geographically, lacking defined areas, which complicate project management. Moreover, communities living in mangrove ecosystems often rely heavily on forests as a primary resource, making NbS conservation or restoration activities difficult. Moreover, land tenure in coastal areas is often classified as public land, making it even more challenging to secure project rights. One participant estimated that only 5-10 blue carbon projects are available to buyers in the global voluntary carbon market.<sup>158</sup>

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<sup>158</sup> Participant 132.



#### **6.4.2. Ensuring the long-term viability of carbon credits as a financing mechanism through trust and integrity**

*“If our sector does deals with big polluters, it may harm the entire NbS sector.”*  
(Participant 132)

One of the primary challenges in mobilising private climate finance for NbS carbon credit projects is the temporal aspect—specifically, the time required to establish the project and begin selling carbon credits, particularly for reforestation and afforestation components. This requires patient and risk-tolerant capital providers who understand the NbS characteristics.

*“You need a patient buyer. A person who understands that systems might change. Like this year, we do not have seeds, not because there are people who are not ready to plant, but because the climate was so bad, there were no rains.”* (Participant 108)

Mikoko Pamoja offered several advantages to attract suitable buyers and mitigate their project risks. As a small-scale project involving only 117 hectares and a limited supply of credits annually, it was easier to be selective of buyers and screen for values alignment. Carbon credit buyers were required to sign a 'Values Statement,' which committed them (i) not to make any offset claims based on their purchase and (ii) to take additional actions to reduce their emissions. Furthermore, ACES refused to sell to controversial, heavily polluting industries, such as the oil and gas sector, given their known tendency to claim offsets while undertaking minimal action to reduce their environmental impact.

*“The task that we [ACES] do have is checking those buyers for ethical criteria that we have as a seller. So being very conscious of the criticisms of carbon credits, especially the criticism that it is a permit to pollute, and people are just offsetting instead of reducing their carbon footprint.”* (Participant 132)

While this approach excluded some buyers, it did not prevent carbon credit resellers, who comprised a significant percentage of Mikoko Pamoja buyers, from reselling to companies potentially misaligned with ACES's values. ACES had no control or information over the resellers' subsequent transactions.

This discussion underscores the role of trust and credibility for Mikoko Pamoja in ensuring long-term demand from carbon credit buyers. Interview participants noted that operating in the voluntary carbon market, especially in its early stages when blue carbon projects were uncommon, required extensive marketing efforts to 'convince buyers.' There was a risk of 'high-quality' buyers being associated with less desirable, high-polluting buyers, so ACES

dedicated significant efforts to 'vetting buyers' motivations and interests, often 'interviewing' them to ensure they were the right match for Mikoko Pamoja.<sup>159</sup>

*"In the voluntary carbon market, it's a gentleman to gentleman [transaction]—you need somebody who [you can] trust, who keeps his word. But because of that, it can be a very big effort to establish new links because there is a lot of mistrust in humanity. And what I find in Mikoko Pamoja [...], we are very much internationally connected. So if I write to any of the buyers, potential buyers, they are ready to come on board and purchase, those who have heard about our credibility [...]. So to develop that space of trust is very important, and it is also very risky in the voluntary carbon market in general."*  
(Participant 108)

Transparency facilitates trust, which attracts new buyers unfamiliar with blue carbon credit projects. Mikoko Pamoja benefitted from having a team of scientists at ACES, which spearheaded the project, with strong ties to Europe and the UK, the primary buyers of the carbon credits. Moreover, ACES's status as a charity reassured buyers that their values aligned with the project's goals, ensuring they were not merely profit-driven. It is unclear how the outcome would have differed if the project founders didn't have any international ties to Western voluntary carbon credit buyers.

A final component of trust relates to the local community. In Kenya, mangrove ecosystems are largely considered government land and any project in the area necessitates communal resource management. Mikoko Pamoja had to establish a communal resource management plan and benefit-sharing mechanism to obtain government approval and demonstrate equitable distribution of benefits to reassure buyers.

This analysis suggests that the concept of 'high-integrity' in the voluntary carbon market extends to both the project developer and buyers. The project developer must demonstrate that core principles such as permanence, leakage, and additionality are sufficiently addressed, in order to assure buyers of the project's overall quality. Mikoko Pamoja relied on the Plan Vivo Standard, known for its flexibility and consideration of biodiversity and community co-benefits. While "carbon benefits are the hook that buyers purchase on, the co-benefits were a significant attractive factor for buyers."<sup>160</sup>

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<sup>159</sup> Participants 132, 133.

<sup>160</sup> Participant 132.

#### **6.4.3. Alternative revenue sources: Challenges and opportunities for voluntary carbon credit projects**

Mikoko Pamoja's stakeholders considered several non-carbon credit revenue alternatives. They explored the potential for ecotourism revenue to finance mangrove restoration and conservation. However, relying on these activities for revenue generation created both operational risks and ethical dilemmas. During the pre-project phase (pre-2013), political instability in Kenya underscored the tourism sector's vulnerability to external shocks. At the same time, concerns were raised about the elevated carbon emissions generated by international tourists traveling to Kenya under the banner of supporting climate action. These considerations ultimately led to the founding team ruling out tourism as a principal revenue source.

Another challenge identified by participants is that the primary ecosystem service benefiting local communities, coastal protection, is not currently monetizable. Despite scientific evidence showing that mangroves mitigate climate change effects on land (e.g., salinisation, loss of agricultural land, loss of life, and enhancement of fisheries), these services have no compensation. Thus, the sale of carbon credits in the voluntary market becomes an almost insufficient financial instrument, providing more co-benefits than its potential to mitigate climate change.

The project also considered increasing revenue by incorporating additional carbon sequestration metrics within the same project area, thereby increasing credit issuance. For instance, seagrass restoration and conservation, adopted by a nearby sister project, *Vanga Blue Forest*, is a valuable source of carbon sequestration but is threatened by fishing activities that damage the plants and release carbon back into the environment. Generating carbon credits from seagrass conservation indirectly acknowledges other environmental co-benefits, such as enhancing fish stocks, biodiversity, carbon sequestration, and coastal protection. However, it also directly conflicts with the livelihoods of local communities in Makoni and Gazi Bay, who rely on fishing. One participant noted that launching such a project in a wealthier neighbourhood where the community does not depend on seagrass or mangrove services would enable faster project scaling due to lower stakes for the community: "the stakes are not that high." (Participant 132).

The question of alternative revenue sources and potential untapped climate finance also raises the issue of the price per ton of carbon credit sold. An analysis of buyers and price per ton shows that prices have fluctuated since the first sale in 2013. While one ACES employee remarked that prices have increased substantially over the years, with some buyers paying

up to USD25/ton, he acknowledged that determining a fair market price is challenging, with greater emphasis on the type of buyer than the price of the credit.

*“[It’s] difficult to know what the market price is if you like—what a fair market price is because the quality of these credits is so variable between projects. I think we could probably command a much higher price than we than we have in the past. We could be much more ruthless in our sales, but we’re not, we’re trying you know we don’t sell to the highest bidder. That’s not how we work. We’ve got some buyers who’ve been with us for a long time and we want to support them.” (Participant 132)*

The statement reveals that NbS projects sold in voluntary carbon markets are likely to command higher prices if they offer measurable co-benefits. In the case of Mikoko Pamoja, the use of the Plan Vivo Standard to attribute community and biodiversity co-benefits may explain the relatively high prices it has been able to obtain for carbon credits sold in the voluntary market.

While Mikoko Pamoja has raised sufficient annual revenue to operate as a charity, limiting project expenses to staff salaries, community needs are considered ‘almost infinite,’ prompting interest in potential project expansion. However, despite repeated efforts, the project has not been able to increase its land area due to the requirement for government approval, which has not been granted. Nevertheless, the project demonstrates positive spillover effects on adjacent areas. For example local inhabitants have altered their behaviour toward resource extraction, in part because of the uncertainty over which areas are formally protected by Mikoko Pamoja.

*“People talk a lot about leakage in a negative sense, but in in our project there’s been positive leakage. It’s pretty unclear to most people exactly where our protected area is. It’s simply a part of the forest and we’ve talked over the years about whether we need to delineate this area much more strictly, but in fact we haven’t, partly for resource reasons [...] but in fact it’s quite useful from our perspective. [...] What seems to have happened is that people have shifted [their behaviour] and [...] everybody understands that the forest is protected and we’re seeing regeneration across the forest, which is great—although it’s slightly galling because I think we should be able to claim for all that carbon benefit, it would help our bottom line, but looking back, you know we were a bit naive to have such a small area.” (Participant 132)*

A final potential revenue stream involves business spin-offs that benefit from the improved ecosystem services, such as beekeeping. Although there have been discussions about installing beekeeping and other activities, these have not gained traction for various reasons, including the need for additional capital and the need for NbS carbon credit projects to connect local communities with markets willing to buy the products. The ecotourism boardwalk is one

small source of additional revenue, but it remains insufficient to meet the scale of funds needed.

## **6.5. Mikoko Pamoja: Private climate finance for NbS in the context of the transition towards sustainability**

### **6.5.1. Impacts and limitations of Mikoko Pamoja's NbS activities**

The following section analyses the extent to which private climate finance impacts NbS implementation via Mikoko Pamoja's NbS activities. As a blue carbon project, Mikoko Pamoja contributes to various climate mitigation and adaptation efforts, as well as to biodiversity and socio-economic goals. This analysis yields two main findings. First, while the project's co-benefits play a role in marketing and sales, the actual monitoring and impact evaluation of these broader UN SDG categories appears weak. Second, despite the considerable advantages of increasing funding for the conservation and restoration of ecosystems such as mangroves, their global impact on carbon sequestration remains limited due to the small-scale nature of the project. Placing greater emphasis on a holistic assessment of the ecosystem services provided by mangroves would more effectively demonstrate the value of the NbS interventions beyond carbon sequestration.

The analysis draws from interviews with participants and documentation provided by Mikoko Pamoja stakeholders, including the Project Design Document and Annual Reports. Since the sale of carbon credits in voluntary markets is the primary revenue source of the project, publicly available carbon documentation remains the primary information source.

Appendix 6A summarises Mikoko Pamoja's intended contributions toward climate change, biodiversity, and livelihoods under the Plan Vivo Standard. Uncommon for voluntary carbon projects ten years ago, Mikoko Pamoja's objectives explicitly identify non-carbon benefits among the core project objectives: (i) community development; (ii) restoration of degraded and denuded mangrove ecosystems; (iii) carbon sequestration of 2,482 tCO<sub>2</sub> per year; (iv) alternative sustainable mangrove-generating activities, such as beekeeping and ecotourism; and (v) serving as a demonstration project for community-led mangrove conservation and carbon credit funding. Collectively, the project's activities contribute to several Sustainable Development Goals (SDGs): climate change (climate action) and SDG 14 (life below water), SDG 1 (no poverty), SDG 2 (zero hunger), SDG 4 (quality education), SDG 6 (clean water and sanitation), and SDG 8 (decent work and economic growth).

Despite recognising the multiple benefits of the project, a closer examination of the project documentation reveals less scrutiny and rigour in the metrics used for non-carbon-related benefits or impacts. Socio-economic and biodiversity-related impacts lack quantification and are primarily monitored descriptively. For instance, while livelihood benefits such as land and tenure security and natural resource access are listed in the project documentation, the evaluations lack comprehensive metrics. The impacts on socio-economic conditions have not been quantified, except for the number of jobs created in the community, which remain in the single digits. Even then, there is a lack of detail in the methodology, as my study revealed a small number of full-time project staff and some seasonal work (a few days per year) for mangrove monitoring. More granular data and consistent monitoring, especially linking the impact of community enterprises, would significantly enhance the project's marketability.

The socio-economic impact of the project is monitored through “the number and vitality of mangrove-related local businesses” and the “impacts of individually funded projects supported by community funds” (Plan Vivo, 2020). For the first area of impact, the target is to increase the ‘number and vitality of businesses.’ However, the only accurate measurement of activity tracking appears to be the number of visitors to the mangrove boardwalk. This does not systematically track or analyse the number and vitality of spin-off businesses, representing a lost opportunity. The second area of impact, individually funded projects, is reported on as a whole but lacks detail and measurable outcomes.

The third area of interest for evaluating the impacts of Mikoko Pamoja’s activities on broader environmental and biodiversity impacts is also vague and lacks detailed measurements. For instance, the measurement for sea meadows involves a survey of macrofauna, but only states that the objective is “no significant decline in diversity or biomass.” This lacks rigorous measurement.

This lack of specificity in non-carbon, biodiversity, and socio-economic indicators is likely attributable to the voluntary carbon standard utilised, which prioritises sequestration as the principal metric. This may indicate that co-benefits hold less significance for buyers than is assumed, or alternatively, there remains considerable scope to enhance projects through the integration of advanced monitoring technologies. Such improvements could lead to increased payments for ecosystem services through alternative credit stacking, such as biodiversity credits. Additional revenue streams that financially reward the safeguarding of non-carbon ecosystem services would create more pressure for establishing metrics and indicators.

The interviews also revealed the limitations of the NbS project. While it provides a means to sequester carbon and conserve important carbon stocks, mangrove forests, which constitute a small fraction of global forests, have limited scalability potential because of the limited surface area they cover globally. Nevertheless, adequate financial flows to these ecosystems are essential due to their broader benefits for climate adaptation and economic livelihoods.

*“It is important not to exaggerate the benefits of NbS. Mangroves are really the most carbon dense, so it’s a no-brainer because you will lose carbon, but they are also a very small ecosystem. Even if you conserve all mangroves and restore all areas that are open to mangrove ecosystem, you may trap up 800,000 tons of carbon per year, but that is only 3% of global emissions. It’s important to keep that in mind. Some of the tensions I have found when we are marketing the product is that there is a temptation to hype [the impact], which doesn’t fit well for an objective science-based approach.” (Participant 132)*

This also raises the question of the long-term viability of a project that only relies on voluntary carbon markets. For instance, one participant raised the question of financing once corporate net-zero targets are reached: “What is the viability of carbon credit project if companies no longer have an incentive to purchase credits to offset their emissions in the future?”

There are also broader questions about the methodological shortcomings of the voluntary carbon markets and the kinds of restoration and conservation activities promoted via the sale of voluntary carbon credits. One interviewee, for instance, highlighted that the voluntary carbon markets incentivise growing trees in easy landscapes to fulfil additionality requirements, but that what is really needed is, in fact, difficult areas where vegetation is unlikely to grow.

*“That’s one of the paradoxes of carbon projects. If the incentive is to plant in easy places where the trees will survive and grow because you get carbon benefits, but usually in most of those places, if they are easy, the trees will grow there anyway.” (Participant 132)*

### **6.5.2. Scaling private climate finance for NbS and the potential role for technology**

The sections above highlighted that there are multiple benefits to keeping a blue carbon small-scale, at least initially. First, it enabled the project developers to be selective about the project site, choosing a region (Gazi Bay) that already had comprehensive research and benefited

from strong academic and scientific communities internationally to reduce the transaction cost associated with preparing extensive documentation needed to set up a carbon project. Second, it facilitated community and carbon credit buyer stakeholder management. For example, the two villages were small enough demographically that the project proponents could identify the two individuals who depended on the timber for their livelihoods and provide them with an alternative.

*“Well, if you have no alternative, then what do you think people are going to do? They’re going to continue stealing.” (Participant 106)*

Moreover, the small project area limited the number of carbon credits for sale in an ecosystem already in short supply globally, enabling the stakeholders to be selective about who their buyers are. This enabled them to reduce project risk by screening for buyers that aligned with their values. The time-consuming and costly nature of screening potential buyers and accepting small-scale purchases has implications for scale.

However, the small scale of the carbon project also came with its drawbacks. Locating the mangrove project in Kenya meant it was situated on public land, where communities lack formal tenure rights and, consequently, the government had the authority to make key decisions such as expanding the project site. This constraint became evident when efforts to expand the project were blocked due to an absence of government approval.

There are also advantages of expanding a project to scale, not least to increase revenue distribution to the community. Mikoko Pamoja had submitted a request to increase the project size but is waiting for a response, years later, pointing to the dependency on government approval as a bottleneck to NbS financing and implementation. Because of the rugged terrain of mangroves, there appears to have been ‘positive leakage,’ but which the community has not been able to generate additional revenue from.

*“We did apply some years ago [to expand the project area], but basically, they’ve put a moratorium on new projects and on expansions of existing ones. So although we wrote that letter more than two years ago now, we have not had a response. And it is a little bit delicate for us because if you like—that positive leakage, the longer we wait, the less positive benefit we’ll get on new areas.” (Participant 132)*

One of the biggest challenges to increasing scale remains local capacity and knowledge. After seeing the revenue generated from Mikoko Pamoja, surrounding communities were eager to implement a similar project but lacked the contractual agreements needed in Kenya. Many rural communities in the area have limited knowledge and capacity to develop NbS projects



that leverage voluntary carbon markets. This points to the fact that projects are more likely to be developed in areas that have existing structures.

## **6.6. Perspectives from Costa Rica's initiatives to finance mangrove conservation and restoration**

*"People want to invest in Costa Rica, but we are already at 53-56% of forest coverage, do we need more forest coverage just like that? Or do we need to fine tune more into biodiversity? It's no longer the brut force of carbon; we need to paint with a finer brush." (Franz Tattenbach, Minister of Environment of Costa Rica)*

While Costa Rica's PSA Programme initially leveraged domestic public finance by allocating a portion of revenues from the national fossil fuel sales tax, the long-term government objective was to develop a market-based mechanism for valuing ecosystem services in the economy. According to the former environment minister, "the 'ultimate goal is to create institutional, policy, economic and social conditions for the direct transactions between a provider and a user' of ecosystem services (Rodriguez, Feb. 2012)" (Matulis and Fletcher, 2020, p. 136). However, as several studies have shown, Costa Rica has yet to fully develop a "true market for the sale of ecosystem services" (Fletcher and Breitling, 2012). Instead, as this section reveals, the country continues to rely primarily on public finance, albeit with a growing emphasis on *international* sources.

This section draws on insights from Costa Rica's application of carbon credit financing mechanisms, which have supported ecosystem conservation and restoration, primarily focused on terrestrial forests but also encompassing mangrove ecosystems. While the study identifies a limited number of mangrove-specific or blue carbon initiatives in Costa Rica, the analysis of carbon credit-like financial instruments underscores the government's pivotal role in developing diverse revenue streams to support the conservation and restoration of extensive forest areas, including mangroves.

### **6.6.1. Government policies for mangrove restoration and conservation through the sale of carbon credit mechanisms**

*“How is it possible that Costa Rica with its green theme and commitment to carbon neutrality, has been losing back of the envelope 14,000 hectares [of mangroves] in the last 20 years (about a third of the country’s emissions and about 1/5 of original mangroves areas)?” (Participant 217)*

Costa Rica’s mangrove surface area is estimated to cover 52,802 hectares (SINAC et al., 2023). In a recent study, the government calculated that 14,336 hectares have been lost over the last century and could potentially be restored and ultimately conserved (Participant 214) (SINAC et al., 2023). Almost all of the country’s mangroves (approximately 99.85%) are located on the western coast of the country, facing the Pacific Ocean, where the “richest and most complex forests are found” (FAO, 2007), with the remaining mangroves located on the east coast (Nicoya Peninsula, n.d.; SINAC et al., 2023).

Costa Rica’s mangroves have been threatened by various activities over the last one hundred years. In the 1940s, the rapid rise of the population in coastal areas led to the conversion of mangrove forests for agricultural and aquaculture purposes, as well as timber (López-Angarita et al., 2016). In later years, following the decline of Costa Rica’s banana industry in the 1980s, local communities turned to timber, including from mangroves, as a source of income, as well as using them for tannins and charcoal production (Lacerda et al., 1993). These activities collectively resulted in the loss of more than 25,000 hectares of mangroves, approximately 40% of the country’s total mangrove area) (Whitworth, 2020). The conversion of mangrove areas to other land use areas in Costa Rica has since been banned (FAO, 2007).

Costa Rica is one of only a few countries in the region that has included mangroves in its NDC (Global Mangrove Alliance, 2023). Its strong tourism sector, high proportion of protected areas, and national laws have all been said to act in favour of its ecosystem conservation (Global Mangrove Alliance, 2023). The legal protection of Costa Rica’s mangroves began with the first Water Law No. 11, passed in 1884, established that all coastal land up to one mile inland belonged to the state (SINAC et al., 2023). The first law regulating the direct use of mangroves was passed in the 1940s, which established a fee based on weight of the wood extracted (SINAC et al., 2023). More recently, Forestry Law No. 7575, passed in 1996, completely prohibits the extraction of wood and the exploitation of mangroves (SINAC et al., 2023).

In its revised NDC to the Paris Agreement, Costa Rica committed to protecting all of its coastal wetlands, including approximately 22,000 hectares of mangroves by 2025 (NDC Partnership and Pew, 2023). Costa Rica has also included mangrove conservation and restoration in its

national decarbonisation plan, RAMSAR Strategic Action Plan and Sustainable Development Goals plan (*Science and Conservation*, 2022). Costa Rica launched its National Blue Carbon Strategy in 2023—marking “the first of such policy instrument in the world” (Global Mangrove Alliance, 2023, p. 23). The aim of the strategy is “to establish a framework that integrates actions related to the management, conservation, restoration and rehabilitation of blue carbon ecosystems and wetlands with carbon sequestration potential to promote a model that benefits communities who depend directly on the ecosystem services they provide” (Global Mangrove Alliance, 2023, p. 35).

Costa Rica’s Blue Carbon Strategy aims to implement an economic valuation process to support the development of a financial mechanism for blue carbon, utilising both non-market and non-traditional blue carbon finance mechanisms. The strategy’s action plan is expected to be finalised by December 2024, suggesting that the country is still in the early stages of implementing blue carbon activities. The national NDC commits to exploring the potential of public-private investments to support the protection and restoration of mangroves (Government of Costa Rica, 2020).

According to the study’s participants, the Government of Costa Rica intends to expand its PSA programme to include mangroves as part of a broader Payments for Marine Ecosystem Services (PMES) programme. One challenge of expanding into mangrove ecosystems, however, is the legal framework and financial structure that would apply given that mangroves are considered “natural state heritages” and are, as such, considered public land (Global Mangrove Alliance, 2023). The PSA programme is designed to target private landowners, not state-owned or communal land, though some exceptions may apply.

*“Everything [in Costa Rica] is negotiated at the country level. It is assumed that the carbon stocks are owned by the Government in particular for blue carbon—it is part of the natural heritage, and therefore a public good, meaning seagrasses, sea marches, mangroves are part of the national patrimony. The government has the custody and responsibility to protect and restore mangroves.”*

This underscores a fundamental obstacle to integrating mangroves into the PSA (Payments for Environmental Services) program: as public land, mangroves are ineligible for inclusion in a national programme that compensates individual landowners for the conservation and restoration of ecosystems on private property. This barrier to mobilising financial resources for mangrove conservation will be explored further in the subsequent sections.

### **6.6.2. Financing Costa Rica's Payment for Ecosystem Service Programme: The absence of private climate finance for mangrove-specific emissions reduction credits**

*"Costa Rica has no market approach for mangroves that we can speak of [...]. There is no blue carbon market." (Participant 217)*

The previous chapter revealed that the primary financing sources for Costa Rica's PSA programme is the national fuel tax, set at 3.5%, and contractual agreements signed with private buyers for the purchase of ecosystem services. These contracts included the sale of hydrological services to hydropower producers (Pagiola, 2008). However, the financing of Costa Rica's PSA programme evolved from charging domestic users for the environmental services that forests provided in Costa Rica to diversifying revenue with international public finance (Chomitz et al., 1999b). To sustain and expand the programme, Costa Rica sought supplementary funding from non-domestic sources, international grants and loans, particularly from international development banks like the World Bank and the Norwegian and German Governments.

Costa Rica also leveraged emissions reduction credit programmes as a financing source for its PSA programme. One such financial instrument was the issuance of certified emission reduction (CER) credits or carbon certificates administered under the Kyoto Protocol's Clean Development Fund (CDM), which aimed to facilitate international finance to developing country governments under the UNFCCC.<sup>161</sup>

While the majority of projects under the CDM in Costa Rica were energy and transportation-related projects, there was some finance that was channelled through FONAFIFO for reforestation activities (Participant 217). In 1996, Costa Rica made a historic transaction by selling 200,000 tons of carbon emission reduction credits, or carbon offsets, to the Government of Norway at USD10 per ton of carbon (Erickson, 2014). The revenue from this sale helped finance the Private Forestry Project, an initiative within the PSA programme that paid thousands of private landowners to reforest and protect their land (Russo and Candela, 2006; Subak, 2000). These credits were registered as an Activity Implemented Jointly under the CDM. Despite this success, a subsequent attempt by the Costa Rican Government in late

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<sup>161</sup> Saleable certified emissions reduction credits, each equivalent to one tonne of CO<sub>2</sub> could be counted towards meeting a part of the an Annex I country's quantified emission limitation and reduction commitments if it satisfied three requirements: "(i) voluntary participation by the parties involved; (ii) real and measurable mitigation of emissions; and (iii) reductions that are additional to any that would have occurred in the absence of the project" (Bhullar, 2013a, p. 1).

1997 to auction an additional 1,000,000 tons of carbon credits at a floor price of USD20 per ton failed to attract any buyers.

The Kyoto Protocol of 1997 introduced three flexibility mechanisms that allowed "polluter countries," officially referred to as 'Annex I parties,' to meet their emissions reduction targets: (i) International Emissions Trading (IET) (Article 17), (ii) Joint Implementation (JI) (Article 6), and (iii) the Clean Development Mechanism (CDM) (Article 12) (UNFCCC, 1997). These mechanisms enabled developed countries to offset their commitments by financing projects in developing nations, provided that these projects could demonstrate "additionality"—meaning the emissions reductions achieved were above and beyond what would have occurred under a business-as-usual scenario. In the case of Costa Rica, the primary buyers of the early carbon credits were industrialised governments, reflecting a reliance on public finance for these transactions.

Another emissions reduction credits programme that supported Costa Rica's forest conservation was financing from the REDD+ programme under the UNFCCC. Adopted under the UNFCCC in 2013 and recognised under the Paris Agreement, REDD+ provides outcome-based financing or 'results-based financing' to national governments to reduce human pressure on forests that result in greenhouse gas emissions (UNFCCC, 2024c). REDD+ represents a significant portion of projects under the voluntary carbon market credits (Haya et al., 2023). Costa Rica's participation in the global REDD+ programme leveraged international finance in the form of carbon credits from various organisations.

In 2022, Costa Rica became the first country in Latin America and the Caribbean to receive payments under the REDD+ programme from the World Bank's Forest Carbon Partnership Facility (World Bank, 2022b). Costa Rica leveraged FONAFIFO's experience in distributing payments for ecosystem services through its national PSA programme to distribute the revenue generated from the REDD+ initiative (Zúñiga et al., 2015). The REDD+ programme marked a departure from the CDM in that it encompassed more than just afforestation and reforestation activities. It expanded to include the conservation of forest carbon stocks and the sustainable management and enhancement of forests (Bhuller, 2013). The broader definition to include conservation was more aligned with Costa Rica's environmental and developmental context, in which significant forest cover increase had already occurred by the mid-2010s.

In addition to the fossil fuel and water taxes, the government introduced domestic financing programmes to further support its PSA programme, some of which took the form of credits aimed at mobilising additional funds. These domestic non-fossil fuel, non-water tax

programmes, however, did not represent a substantial source of finance for the PSA programme. For instance, in 2013, BanCO2 was launched as the “Costa Rican Voluntary Domestic Carbon Market” (Banco Nacional, 2023). Acting as the Government of Costa Rica’s broker of carbon credits in the voluntary market, BanCO2 sought to attract private buyers, primarily domestic, with the opportunity to reach their emissions reduction targets. Though the success of BanCO2 remains unclear it is understood to represent a fraction of overall funding revenue. Another tool used by the Costa Rican Government involved a partnership with the national bank (Banco Nacional) providing customers with an optional “eco” labelled debit card, which transfers a portion of transaction fees to the national PSA programme (Fletcher and Breitling, 2012). Another initiative enables car owners to opt into a programme that allows them to offset their total emissions via their annual registration fees. The GEF committed to providing matching grant funding for the latter two programmes (named the Ecomercadores II program).<sup>162</sup>

Two key insights emerge from the examination of Costa Rica’s emissions reduction credits programme. First, there is an absence of mangrove-specific emissions reduction credit programmes in the country. Costa Rica’s national programme does not yet differentiate between terrestrial and mangrove forests, instead categorising all credits under the broader terrestrial forests umbrella. Interview participants highlighted that this represents a missed opportunity to leverage additional financing, given the significantly higher carbon storage and sequestration capacity of blue carbon ecosystems like mangroves. Despite an impressive forest recovery track record, the funding sources for forestry conservation and restoration, including mangroves, in Costa Rica are primarily from public budgets (national and international), and failed to harness market mechanisms, which was originally envisioned for its Payment for Ecosystem Services Programme.

Second, the private sector has played only a minor role in mangrove restoration and conservation efforts in Costa Rica. The limited private climate finance that has been mobilised primarily comes from philanthropic budgets and is channelled through the government agency, SINAC. While some international corporations have provided in-kind support, there has been little direct financial investment, with contributions remaining confined to philanthropic sources.<sup>163</sup>

*“There is currently no structured process or mechanism to incorporate the private sector into blue carbon in Costa Rica. There is an opportunity,*

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<sup>162</sup> Source: Participant 220.

<sup>163</sup> Source: Participant 214.

*however, because the government has limited resources and capacity.”*  
(Participant 216)

Private sector investments in nature in Costa Rica remains limited and, of the limited financing provided, is primarily driven by corporate social responsibility objectives. As one participant noted: “Unless there’s a CSR goal, there isn’t much interest from the private sector in getting involved—unless a crediting process is in place. But without standardised frameworks, the pathway for engagement remains unclear” (Participant 214). There are only a few identifiable projects that include mangrove conservation and restoration.

*“Costa Rica is very much still in baby shoes when it comes to private sector finance—it’s in the pre-development stage.”* (Participant 202)

*Asociación Costa Rica por Siempre* references blue economy projects on its website, but specific initiatives could not be identified from publicly available information, making it unclear to what extent these projects include mangroves. The organisation also administered the debt-for-nature swap between the U.S. and Costa Rica (add to table), leveraging government and philanthropic funding, though it has yet to mobilise private sector finance. Additionally, a certified organic shrimp producer from Germany operating in Costa Rica has reportedly purchased conservation credits to restore mangroves through the Global Conservation Standard (Schloenvoigt, 2023).

### **6.6.3. Scaling private climate finance for mangroves: Jurisdictional REDD+, the LEAF Coalition and other crediting schemes**

*“We are prisoners of our own success. We were able to reverse deforestation [...] and we built a lot of activities out of this such as ecotourism. But this comes from a long history of a socially-oriented state that delivers good to the people, and people get used to this and they don’t become amenable to taking care of nature themselves. We have reached a point where the state cannot fully deliver on our nature preservation. [...] We might be victims of our own structured approach.”* (Participant 215)

Scaling private climate finance for mangrove restoration and conservation in Costa Rica necessitates first understanding the barriers that have impeded private climate finance thus far. A key challenge to mobilising both public and private climate finance for blue carbon ecosystems lies in the country’s land tenure system.<sup>164</sup> In Costa Rica, multiple laws designate

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<sup>164</sup> See, for instance, Forestry Law No. 7575 (Government of Costa Rica, 1996), Wildlife Conservation Law No. 7317 (Government of Costa Rica, 1992) and Maritime Terrestrial Zone Law No. 6043 (Government of Costa Rica, 1977).

mangroves as state-owned *public* land, placing them outside the jurisdiction of FONAFIFO, which is mandated to provide ecosystem service payments on *privately* owned land.

*“Because of our regulation, money cannot be disbursed to people unless they can legally demonstrate that they own the land where they live and farm. And because they can’t demonstrate this [for mangroves], they wouldn’t be able to get payments.” (Participant 215)*

Complicating efforts to achieve the national mangrove restoration goals is the encroachment by local communities on blue carbon ecosystems, despite their legal status as protected *public* land. Over the years, various economic activities, such as cattle ranching and sugar cane plantations, have taken place in these mangrove ecosystem areas. As a result, any government-led mangrove restoration initiatives will require legal processes to reestablish state ownership and reclaim these lands for protection, ensuring that restoration occurs on territory that is legally designated as public.

Costa Rica’s legal framework, which mandates the protection of mangroves as public land, contrasts sharply with the on-the-ground reality of mangrove encroachment and degradation. This disconnect has hindered the development of mechanisms to direct targeted finance toward mangrove conservation. For example, current REDD+ calculations overlook the significant carbon storage and sequestration potential of mangroves, resulting in public funding through SINAC that fails to specifically recognise or value the ecosystem services provided by these vital blue carbon ecosystems.

*“The REDD+ concept in Costa Rica does not take into account for soil carbon and the key for mangroves is to account for that soil carbon. So the next step under the REDD strategy is to take mangroves out of the whole reference level and do a second calculation just for mangroves and only consider soil carbon and hopefully tie that to the financial mechanism. This also has snowballing effects, because as Costa Rica assesses all the GHG emissions, you cannot report to the UNFCCC for above and below ground carbon if you don’t do it for all sectors, so eventually we will have to do this exercise all the way back to the 1990.” (Participant 217)*

Another barrier to mobilising private climate finance in Costa Rica is related to domestic institutional dynamics. An historical institutional tension between FONAFIFO and SINAC over the allocation of potential revenue from international voluntary carbon markets complicates an expansion of the programme. FONAFIFO is tasked with sourcing funds for restoration and conservation on private lands, while SINAC manages conservation efforts on public and state-owned lands. Interview participants have noted competition between the two institutions,



reflecting a broader issue: a centralised, state-led approach to ecosystem conservation and restoration lacks the flexibility to adapt to emerging financing mechanisms, such as carbon and biodiversity credits.

*“[FONAFIFO] had to take control of REDD for it to happen. But because of this centralised approach, when a new thing like carbon markets comes up, we don’t know how to deal with it and then there is this turf war of people that want access to the mandate which supposedly could give millions of dollars. It’s FONAFIFO’s turf but they don’t have the mandate to work outside of private lands, so they can’t work on mangroves. I would love them to but there are reasons why FONAFIFO is not being allowed to expand its legal mandate to mangroves. But at the same time they have the maps, the experience, they have it all—so why not give them the mangroves?” (Participant 217)*

Geographic and cultural factors can also introduce barrier to private climate finance. As a small country, there are inherent limitations to the scalability of NbS projects compared to larger jurisdictions, which may affect the feasibility of nature-based carbon projects. Moreover, a general dependency on public funding for conservation and restoration efforts appears to discourage private actors from providing financial resources to NbS.

A final challenge is associated with the complexity around the rights to carbon emissions reduction credits. Both the government, supplying the carbon credits, and private actors, purchasing the credits, want to make emissions reduction claims in an effort to meet carbon neutrality targets, but this would lead to double-counting. Competition between actors complicates the allocation of credits.

*“There are no credits [for mangroves] in Costa Rica currently. There are efforts that are supposed to recognise them, but its not formally accounted. We have some initiatives, supported by the German Government, for mangrove restoration and they are under the impression that those credits would be theirs but there is no transparency or understanding of how these will be presented – if they are going to be included in what the country uses through its NDC or otherwise.” (Participant 216)*

In an effort to scale financing for conservation, in 2023, the Government of Costa Rica, along with Ghana, became one of the first governments to finalise Emissions Reductions Purchase Agreements (ERPAs) with Emergent to supply jurisdictional REDD+ emissions reductions and removals credits to LEAF Coalition buyers (Emergent, 2023). The press release announced deals totalling USD14 million at USD10 per tonne for ART TREES credits from the 2017 crediting year, citing at least ten major corporate buyers as part of the coalition and purchase

guarantees from the governments of Norway, the United Kingdom, and the United States (Emergent, 2023).<sup>165</sup>

Interview participants highlighted several advantages of the jurisdictional approach to carbon credit sales compared to a voluntary market, including reduced leakage risks and scale. The LEAF Coalition emphasises high-integrity credits and reliable supply from countries engaged in forest protection, reducing supply risk by working with a wide pool of sellers. It also mandates the involvement of IPLCs through benefit-sharing plans, though the specifics of their compensation remain unclear. The LEAF Coalition reduces transaction cost by allowing private actors to purchase carbon credits from multiple governments through a single transaction. It favours forward purchase agreements to manage price volatility and secure large-scale commitments from buyers.

Mikoko Pamoja's project and those administered by the LEAF Coalition share several characteristics. First, both require specific screening criteria for their buyers, including their corporate commitments to emissions reductions and reporting. In Kenya, there are many different project-level initiatives, and a nested approach thus becomes more relevant to avoid double-counting of emissions reductions. On the other hand, Costa Rica's national PSA programme has comparatively fewer project-level initiatives.

Additional information on the partnership between the LEAF Coalition and the Costa Rican Government is not available, more than a year since its announcement, suggesting a long timeframe for implementation. Interview respondents have indicated that the purchase agreement remains under negotiation and is confidential.

According to interview participants, the main challenge in the carbon credits transaction negotiations is aligning the expectations of supply countries with the demands of buyers. The difficulty lies in "linking the supply countries' willingness to transact [based on one of the four pathways] with what the buyers want." Emergent offers four distinct pathways, highlighting areas for disagreement between the seller and the buyer : (i) sovereign contribution (results-based payment) through government funders such as Norway or the United States; (ii) corporate contributions without title transfer, where credits count towards the supplying country's NDC (e.g., Costa Rica); (iii) corporate contributions with title transfer, allowing for joint claims; and (iv) corresponding adjustments to credit issuance, where the title transfers to

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<sup>165</sup> Corporate buyers listed as part of the coalition include Bayer, Capgemini, McKinsey, PwC and Walmart Foundations.

count toward the supplying country's NDC. Interview participants emphasised that these pathways have not yet been fully aligned with the Costa Rican Government's interests, a significant bottleneck given the current Costa Rican Government's strong determination to include credits as part of their NDC and buyers' desire to make emissions reduction claims.

Interview respondents expressed mixed opinions on the potential benefits and limitations of the emerging emissions reduction credit programs under Costa Rica's jurisdictional REDD+ and the LEAF Coalition as catalysts for private climate finance. While the jurisdictional approach to carbon credits is slower to implement, its perceived advantage is a reduced risk of double-counting, thanks to a more transparent and legally structured framework. However, jurisdictional REDD+ has faced limitations, particularly in its ability to incorporate mangrove ecosystems.

A key challenge remains aligning buyers sellers regarding the rights to make carbon claims, which has constrained private sector engagement. Additionally, current evidence suggests that mangroves and blue carbon are not consistently incorporated as distinct components within REDD+ projects.

*“Mangroves get messy for the REDD+ secretariat terrestrial forests, so they rather not do too much with it, and the LEAF Coalition primarily works with the REDD Secretariat.” (Participant 215)*

In 2019, Costa Rica, in collaboration with FUNDECOR, launched a project named BIOTA NEXUS. Designed as a biodiversity credit mechanism to complement revenue from carbon credits, this initiative aims to address several challenges. Given that Costa Rica already has significant forest cover which makes it difficult to demonstrate additionality in the voluntary carbon market, BIOTA NEXUS focuses on biodiversity and conservation. It offers a mechanism to finance efforts that enhance the value of land, seeking to provide additional compensation to landowners for the ecosystems, disincentivising alternative, less sustainable land-use practices.

*“[This project] implies a total change in the mindset of the people who have the forest. A plain subsidy is a subsidy, but a forest is able to generate value of even half of what it offers, it becomes a true asset. The only way to maintain these areas, is if they are assets and are able to compete with other economic activities, such as cattle, pineapple or conservation activities. If you don't keep the return on the land for forest conservation closer to the agricultural uses, you are going to lose the lands. I see this everywhere: Brazil, Bolivia, certain*

*areas of Colombia. The reality on the ground is that the situation on the ground is even worse than here.” (Participant 218)*

Charging USD 1,600 per hectare per year, with a minimum five-year commitment, translates to an estimated cost of USD 20 per ton of carbon, assuming each hectare sequesters an average of 400 metric tons of carbon. The interview participant revealed that the private sector is not only interested in carbon sequestration but is also keen on biodiversity data, which the Costa Rican Government’s PSA programme fails to provide. There appears to also be also growing interest in applying these mechanisms to mangrove ecosystems.

This highlights an important distinction between the concepts of subsidies and payments. Several interview participants pointed out that the Costa Rican Government, through its PSA (Payment for Environmental Services) programme, has essentially created a subsidy, not a true payment system.

Finally, some have proposed expanding the PSA programme to include mangrove conservation and restoration by introducing new compliance and voluntary funding schemes through a blue fund (Hernandez-Blanco, 2019). This initiative could leverage the "polluter pays" principle by implementing a tax on plastic waste, high-carbon-intensity activities, and aquaculture, thus providing a sustainable financing source for new mangrove conservation efforts.

## **6.7. Conclusion**

The study of Mikoko Pamoja reveals how a small-scale blue carbon initiative on the Kenyan coast leveraged private climate finance through grants and the sale of voluntary carbon credits. The case illustrates the significance of international collaboration and scientific research in reducing project transaction costs, given the substantial scientific knowledge and capacity required to initiate carbon credit projects.

The political, historical, and institutional contexts shaped the approaches for mobilizing climate finance for ecosystem restoration and conservation through carbon credits. In both Kenya and Costa Rica, mangrove ecosystems fall under government or public land, requiring government involvement in any NbS project development. In Costa Rica, the jurisdictional approach to the sale of carbon credits was facilitated by substantial institutional capacity, rooted in the country’s long-standing tradition of state-led development and prior experience selling emissions reductions under the Kyoto Protocol. This capacity has allowed Costa Rica to

aggregate project areas at scale and to ensure that emission reductions are accounted toward its NDC.

Government policy shaped carbon credits revenue in both countries. In Kenya, a longtime ban on mangrove deforestation in most areas of the countries facilitated project enforcement but simultaneously raises concerns regarding additionality under carbon crediting standards. This reveals that some carbon credit buyers may prioritise compelling narratives over evaluation criteria. While small-scale buyers may be more susceptible to this tendency, it is possible that larger transactions would subject credits to greater scrutiny.

In Kenya, the expertise and administration required for carbon credit projects presents a barrier for remote communities to participate in these projects. The community is also largely dependent on the government to receive project approval given that it is public land. The project's inability to expand, despite buyer demand, due to the absence of government approval underscores the challenges of developing NbS projects on public land where state capacity is limited. Bureaucratic procedures and reliance on government approval may therefore constitute an additional barrier to achieving scale.

The empirical case also reveals an inherent tension in the allocation of rights to carbon emissions reduction claims. While Costa Rica prioritises the use of such reductions for national targets, private actors remain interested in securing ownership of claims. The findings suggest that less developed countries, despite possessing potential for nature-based carbon projects, may lack the institutional capacity to safeguard claims for their own NDCs, and instead cede them in exchange for much-needed revenue.

In Kenya, the absence of a national-level programme for mangrove conservation and restoration inadvertently encouraged the emergence of small-scale, community-driven projects that rely on private climate finance. In contrast, Costa Rica's centralised governance approach has enabled large-scale terrestrial forest reforestation and conservation, but has lacked a targeted strategy for mangrove ecosystems. Additionally, the effectiveness of Costa Rica's existing system has, to date, not required the engagement of private actors or the mobilisation of finance for mangrove conservation and restoration.

In Costa Rica, jurisdictional REDD+ projects account for the majority of the country's carbon credits in global markets. Emissions reduction credits for the conservation and restoration of natural ecosystems have primarily been facilitated through the government-run programme, leveraging domestic revenue from the fossil fuel tax alongside recent multilateral financing

from the World Bank and bilateral agreements. However, the study revealed that the PSA programme doesn't differentiate between terrestrial forests and mangrove forests. Though the interviews suggested that the adoption of policies such as the national Blue Carbon Strategy seeks to change this.

Both carbon credit projects quantify carbon emissions, but their metrics beyond carbon are limited. While Mikoko Pamoja incorporates biodiversity measurements, the credits are solely issued based on carbon emissions and sequestration indicators. In Costa Rica, BIOTA NEXUS has emerged as an early project developer focused on wetlands, addressing some of these gaps and highlighting that private initiatives may have stronger incentive to report on metrics beyond carbon.

## **Chapter 7. A study of private climate finance leveraged by the Upper-Tana Nairobi Water Fund for water services**

### **7.1. Introduction**

Water is vital for human well-being and development (Ait-Kadi, 2016; Alcamo, 2019; Bhaduri et al., 2016). It is also an essential component of nature that ensures the continued functioning of ecosystems and the climate system (Hall and Manabe, 1999; Ostroumov, 2002; Taylor et al., 2019). When humans lack access to clean and safe water, it has significant economic, health, and social impacts (WHO, n.d.).<sup>166</sup> As the global population grows, demand for fresh water is expected to increase, exceeding supply by approximately 40% by 2030 (WEF, 2023). Access to drinking water has long been a challenge on the African continent, where the WHO estimates that approximately 33% of the population is affected by water scarcity (WHO, n.d.). Access to clean water supports wider development (Ait-Kadi, 2016; Barbier and Burgess, 2017; Fuso Nerini et al., 2019).

The protection and restoration of watersheds have emerged as an alternative to engineered approaches for securing clean water (Vogl et al., 2017b). Studies show that green infrastructure for water can enhance urban water management (Jones et al., 2022; Strbac et al., 2022), resilience during extreme weather events (Senes, et al., 2021), improve water security (Cooper, 2020), biodiversity levels (Korthals et al., 2001), and agricultural productivity (Keesstra et al., 2018). While some research has been conducted on environmental water funds to address water security challenges, it has not examined the specific role of private climate finance.

This chapter presents a case study of the Upper Tana Nairobi Water Fund, an environmental fund established in 2015 to support watershed services in Kenya. Its core mission is to facilitate the implementation of sustainable land use practices for the long-term conservation, protection, and management of the region's watershed. The UTNWF serves as an example of an NbS due to its joint intended benefits for mitigation (i.e. adoption of more sustainable land use practices), climate adaptation (i.e. water security), benefits for communities (i.e. new revenue generation) and biodiversity (e.g. via agroforestry).

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<sup>166</sup> Inadequate, absent or inappropriately managed water and sanitation services reduces overall productivity of a country and is linked to higher disease rates of diseases, such as cholera. People who need to spend time and effort finding and collecting water are often exposed to physical risk and comes at an opportunity cost (WHO, 2024). Inadequate, absent or inappropriately managed water and sanitation services is linked to higher rates of diseases, such as cholera (WHO, n.d.).

The UTNWF brought together four major stakeholder groups in a public-private partnership: (i) farmers in the sub-watersheds who had to undertake new land use practices; (ii) the public sector who provided funding and in-kind support (e.g. county governments, water utility companies), (iii) private downstream users who provided finance (e.g. corporations); and other stakeholders providing financial support for an NbS initiative (e.g., development organisations and donors) ((TNC), 2015). For a breakdown of each of the actors and stakeholder groups, see Appendix 7B.

The Upper Tana River basin spans approximately 17,000 km<sup>2</sup> and has a population of 5.3 million inhabitants, primarily smallholder farmers, who largely rely on agricultural activities for their livelihoods (The Nature Conservancy (TNC), 2015). The Upper Tana Basin plays an important role for Kenya. It is a significant source of water supply for its capital city, Nairobi, and surrounding areas, supplying more than 90% of water for the city's four million residents (Droogers et al., 2011). The basin sustains one of Kenya's largest agricultural regions (TNC, 2015). It also generates approximately 80% of Kenya's hydropower (Hoff et al., 2007). Hydropower generates about 60% of the country's electricity (TNC, 2015). The country's overreliance on hydroelectric power has subjected the country to regular power outages (Takase et al., 2021), which are estimated to cost businesses 7.1% reduction in annual sales.

The UTNWF leveraged USD 24.8 M million in total climate finance. As of 2024, the fund has raised sufficient finance to operate as a self-sustaining endowment fund, no longer requiring additional revenue sources or donations to implement its activities. Moreover, since the UTNWF's establishment in Kenya, the model has been replicated in ten African countries,<sup>167</sup> establishing 17 collective action water funds in Africa.<sup>168</sup> The establishment of an endowment fund to finance future activities offers insights into instruments that enable successful long-term financing of NbS. Specifically, the case sheds light on the enabling factors and challenges associated with mobilising private climate finance for payment for ecosystem services in the water sector, as well as broader NbS.

The case study examines the following questions. How was climate finance deployed for the UTNWF? What were the drivers and roles of private climate finance for the UNTFW? What were the barriers to mobilising private climate finance for the UTNWF, and what conditions facilitated its deployment? This chapter begins with an overview of the water sector in Kenya,

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<sup>167</sup> These countries are Ethiopia, Ghana, Kenya, Malawi, Morocco, Nigeria, Senegal, Sierra Leone, South Africa, Tanzania.

<sup>168</sup> Participant 103.



highlighting current financing challenges in the water sector in Kenya. The second section (section 7.2.) explains how climate finance for a payment for ecosystem service in the water sector was deployed, leveraging various financing sources. Section three (section 7.3) analyses the barriers and key enablers the UTNWF encountered in leveraging private climate finance to pay for ecosystem services. The fourth section (section 7.4.) examines the extent to which the UTNWF's model addresses broader socio-economic and environmental considerations and the extent to which private sector involvement in payments for ecosystem services can act as a driver or accelerator for the transition towards sustainability in developing countries. The final section (section 7.5.) draws on lessons from Costa Rica's investments in watershed services, drawing on insights from the Agua Tica Water Fund as one policy and finance mechanism, noting that Latin America is the region with the largest number of water funds established.

### **7.1.1. The water sector in Kenya**

Access to fresh and safe water is particularly challenging in arid and semi-arid lands (ASAL), which cover nearly half of the African continent (43%) and the majority of Kenya (89%) (UNDP, 2018). The IPCC projects that mean annual temperatures in East Africa will increase by 2-3°C above preindustrial levels by 2100 (IPCC, 2022), likely further exacerbating pressures on freshwater supply countries.

In Kenya, the gap between water supply and demand is large and increasing, driven by population pressures, accelerated urbanisation, and changes in the hydrological cycle due to climate change (Chepyegon and Kamiya, 2018; Hamlet et al., 2020). Water needs for agricultural and industrial activities are also expanding to meet growing population demands. The city of Nairobi is experiencing among the fastest growth rates globally (World Population Review, 2024). Meanwhile, pollution and inefficient water management practices have contributed to a lack of freshwater availability. Kenya has experienced high variability in rainfall in recent years, leading to an increase in the frequency and duration of droughts, as well as floods, which—together—have exacerbated the challenges of water scarcity in the country (World Bank Group (WBG), 2021).

Water scarcity impacts both urban and rural areas in Kenya. The gap between the demand for water and the availability of water is acute in rural areas where almost half of Kenya's population lives without access to water services (Bukachi et al., 2021). However, informal settlements in urban areas are also severely affected (Kamau and Njiru, 2018). Unofficial

figures estimate that 60% of Nairobi's population lives in informal and low-income settlements with inadequate access to safe drinking water due to a lack of affordability (Gerlach, 2008) and an inconsistent water supply (Chakava et al., 2014).

Kenya has five major rainwater catchment areas, known as 'Kenya's water towers:' Mount Kenya, Aberdare Range, Cherangani Hills, Mt. Elgon and Mau Forest Complex (Mulwa, 2021). The catchments are unevenly distributed in the country, primarily located in the southwestern part of the country and contribute over 7% of the country's surface water resources (Mulwa et al., 2021b). The culmination of a variety of land use practices, such as unsustainable farming practices and deforestation, has led to the degradation of these catchment areas (Mulwa et al., 2021b, p. 10).

Fresh water is needed for our basic livelihoods, food production, economic activities and protection of the environment and its ecosystems. Water security also spills into human security (e.g. conflict over water resources but also physical water-related disasters), human health (e.g. water-borne diseases), environment (e.g. biodiversity), and other security issues such as conflicts arising from governance challenges arising over shared resources (Bakker and Morinville, 2013; Link et al., 2016; Pachauri et al., 2009). The linkages between soil erosion, water management practices and socio-economic development have been documented (Pani, 2020). Similarly, enhanced rainwater levels and quality contribute to food security (Ngigi, 1999). Water security is also a critical component of effective climate change adaptation (Biswas and Tortajada, 2016; Babel et al., 2020). Finally, water resources are important to consider in the context of climate mitigation, because consumption patterns affect long-term availability of freshwater. The energy and agricultural sectors are the leading consumers of global water supply (UNESCO, 2018).

Different approaches and technologies can address water insecurity. Traditional engineered approaches, or 'grey infrastructure,' are often deployed to improve the supply and quality of water, as well as enhance the efficiency of water usage. For instance, more efficient water treatment plants can facilitate water treatment and reuse, especially in urban areas. Large dams have become less popular due to their impacts on ecosystems, the dislocation of human populations and impacts on culture, among other reasons (Gleick, 2000; Naik, 2017).

Interest in watershed protection and ecosystem restoration has grown substantially (Caparrós-Martínez et al., 2020; Vogl et al., 2017b). These NbS interventions enhance resilience and yield societal benefits, presenting compelling alternatives to the maintenance, repair and replacement of grey infrastructure (Luedke, 2019). Moreover, NbS interventions in the water

sector may respond more effectively to the technical and institutional capacity constraints in emerging markets (Wehn de Montalvo and Alaerts, 2013; HLPW, 2018; Vörösmarty et al., 2021). Globally, the literature shows that the protection of watersheds and aquatic ecosystems has significant impacts on water supply (Postel and Thompson, 2005), water quality (Boyd, 2020), water treatment costs (McDonald et al., 2016). Studies have also recognised the potential of NbS to improve water security in Kenya (Mulwa, 2021). For example, optimising rainwater catchment systems contributes to food security and can have multiple environmental co-benefits while being technically simple to implement and relatively low-cost (Ngigi, 1999). The role of watershed protection schemes in strengthening climate resilience and contributing to climate mitigation is increasingly recognised (UNESCO, 2023).

### **7.1.2. Private climate finance for watershed services**

It is estimated that USD 50 billion in annual investments is needed to achieve water security in Africa by 2030. Current investments are estimated at USD 10-19 billion per year, indicating a large financial gap. Moreover, financial resources in the water sector are primarily leveraged from domestic sources (see Appendix 7A), which contrasts starkly to current climate finance flows in Sub-Saharan Africa, including Kenya, where the predominant source of finance is from *international* sources.<sup>169</sup> In Kenya's NDC, the sector with the largest climate finance gap is in water and the blue economy, where the finance needs are estimated at six times higher than current levels of investment (Frederico Mazza et al., 2021). However, national-level data on investments in Kenya's water sector are sparse.

The role of climate finance in relation to water security has been examined by the academic community and practitioners alike (OECD, 2022b; Savage et al., 2015). Various authors (Gerlach, 2008; Kimani, 2015) have pointed to Kenya's historically insufficient investments into water facilities across Kenya. Current initiatives to finance water security tend to be government-financed. Private actors are more reluctant to consider investments in the water sector due to uncertainties in revenue and potential political risk in developing countries.

Initiatives that leverage private climate finance for water services in Kenya are limited and tend to focus on implementing *grey* infrastructure projects. International finance, which is used to mobilise private climate finance, has played a noticeable role here. For example, the World

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<sup>169</sup> See Chapter 2. Literature review for more information.

Bank Group, together with various multi-donor trust funds and partners,<sup>170</sup> launched an initiative to facilitate commercial financing for water utilities in 2007, as well as providing “USD 21 million in results-based grants to help water service providers obtain commercial funds for delivering water services to low-income areas” (Pories et al., 2019, p. 12) between 2013 and 2019 (WBG, 2018).<sup>171</sup> However, grey infrastructure investments are focused on enhancing water, sanitation and hygiene (WASH), but do not contain a specific climate finance focus.<sup>172</sup> Green infrastructure initiatives for water services in Kenya have relied on public and/or philanthropic finance.<sup>173</sup>

Payments for ecosystem services have received considerable attention in both the academic and policy literature as a financial mechanism that can facilitate the adoption of more sustainable land management practices via both public and private climate finance (Martin-Ortega et al., 2013; Pagiola et al., 2005; Salzman et al., 2018a; Wunder, 2015). The literature identifies numerous definitions of PES and analyses of the terminologies (e.g. Kaiser et al., 2021; Wunder, 2015).<sup>174</sup> This thesis applies a broad definition of PES: “the exchange of value for land management practices intended to provide or ensure ecosystem services” (Salzman et al., 2018b, p. 205).

A relatively obscure concept in the 1990s, with only a handful of articles—highlighting the first case in Costa Rica—PES has grown to an estimated USD36-42 billion in annual transactions, covering more than 550 active programs globally (Le et al., 2024). The growing attention towards PES as a financial mechanism is partly driven by its downstream benefits for various stakeholders, including water companies and urban inhabitants. Additionally, hydroelectricity generation stands as another significant beneficiary, which is adversely affected by the rapid accumulation of silt in reservoirs (Kauffman et al., 2014).

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<sup>170</sup> The multi-donor trust funds that contributed to these initiatives in Kenya included the Public Private Infrastructure Advisory Facility (PPIAF), the Global Partnership for Results-based Approaches (GPRBA), and the Water and Sanitation Programme.

<sup>171</sup> Other examples include the Kenya Innovative Finance Facility for Water (KIFFWA), which is managed by the Netherlands Water Partnership.

<sup>172</sup> See, for instance, Water.org’s WaterCredit Initiative, which provides micro-financing through loans to help impoverished communities in Kenya access safe water and sanitation (Water.org, n.d.).

<sup>173</sup> For example, the Njururi Fund, established in 2023, is primarily funded by international donors such as the Dutch Government (Berghuis, 2024).

<sup>174</sup> The thesis does not distinguish between ‘Payment for Ecosystem Services’ and ‘Payments for Environmental Services.’ (Bulte et al., 2008). Bulte et al. (2008) state that the former may be used to emphasise the enhancement of ‘nature’s services,’ whereas the latter includes amenities provided by the built environment. However, others have found that the two terms are widely used as synonyms, and therefore, a distinction between them is not an important conceptual dimension of PES. (Shelley, 2011; Wunder, 2015).

The literature on PES for water services delineates between *user-financed*, *government-financed*, and *compliance-based* (Salzman et al. 2015). Moreover, within those categories, there are hybrid approaches, combining, for instance, user-financed and government-financed schemes. The table of financing types in Appendix 7A provides greater detail.

The beneficiaries of water services are revealing of stakeholder interests. Contributions towards PES for water services are driven by the expectation of three main outcomes: increased quantity or total water yield, enhanced consistency or evenness of water flow and improved quality of water (Porrás, 2008). It contributes to our understanding of which actors contribute financial resources, and which actors benefit from actions, but also ensures the practical implementation by stakeholders. For instance, one study on introducing sustainable agriculture in the Netherlands noted that the project involved complex, time-consuming activities with stakeholders to ensure their buy-in (Bouma et al., 2011). An overview of water services by end-users is provided in Appendix 7A. Scarcity or the perceived scarcity of the ecosystem service (i.e. water supply) is the primary driver motivating private actors to engage (Salzman et al., 2018a). This is particularly relevant when examining the role of private climate finance for PES in addressing joint water security and climate goals. One study examined the costs of collective action watershed investment programmes but only included one case in Africa, the Greater Cape Town Water Fund.

The literature highlighting several dimensions of PES design and implementation, including their impacts on human well-being (Pattanayak et al., 2010), deforestation (Daniels et al., 2010; Jayachandran et al., 2017; Kaczan and Swallow, 2013), biodiversity (Hein et al., 2013; Ingram et al., 2014; Wunder and Wertz-Kanounnikoff, 2009), carbon sequestration (Alix-Garcia and Wolff, 2014; Antle and Stoorvogel, 2009; Leah L Bremer et al., 2016; Zhai et al., 2021). Others have conducted systematic reviews of multiple case studies, such as Brouwer et al. (2011) or Martin-Ortega (2013), which adopts a regional approach to establish general patterns.

The literature on financing for green water infrastructure, however, has focused on urban areas in developed countries (Appel et al., 2017; Cousins, 2021; Merk et al., 2012) and Latin America and China in emerging markets (Salzman et al., 2018a). There are some studies conducted on the financing of green infrastructure in the African region, such as in Ethiopia (Herslund et al., 2018), but the topic remains largely understudied.

Some limited research has examined finance in the context of collective action watersheds (Kang et al., 2023). However, these studies are part of the grey literature and are published

by project developers (i.e. TNC on UTNWF).<sup>175</sup> The TNC (2016), for instance, examines the potential of securing finance through water funds and other investments in ecological infrastructure. The focus of these studies is on the overall benefits and lacks an examination of the role of private climate finance in developing NbS for climate action. Some articles conduct economic analyses on watersheds, such as (Kang et al., 2023), which survey the costs of municipal-scale collective-action watershed investment programs. Another example, Vogel et al. (2017b) propose a modelling framework to analyse the economic returns of watershed investments. Kauffman et al. (Kauffman et al., 2014) explore the potential of green water credits for ecosystem services in the Upper Tana River basin; the study, however, is based on a hypothetical model for a business case. Despite the growing attention on PES, there is an absence of research on the role of *private climate finance* for PES in the water sector, especially on cases for climate action in the sub-Saharan African region.

An examination into the enablers and barriers of private sector payments for water ecosystem services as they relate to climate action through the case study on the UTNWF is compelling for several additional reasons. First, payments for water services represent one of the largest biggest domains in terms of transaction value and geographical distribution of PES globally (Locatelli and Vignola, 2009). This is likely attributable to the demonstrable link between sustainable land management practices in the watershed and its impact on water quality and supply for downstream users. Costa Rica has the highest number of existing PWS schemes and, therefore, serves as a good unit of analysis (Martin-Ortega et al., 2013), while sub-Saharan Africa faces the highest capital expenditure needs to achieve global water goals (UNICEF, 2020). Finally, the implementation of green infrastructure (i.e. protecting the sources of water) provides a clear example of NbS contributing cross-cutting benefits for climate mitigation and adaptation, biodiversity, and human wellbeing.

## **7.2. Upper Tana Nairobi Water Fund: The deployment of private climate finance for NbS water services**

### **7.2.1. Private climate finance deployment**

This section presents an analysis of the deployment of climate finance for the initial set-up and implementation of the UTNWF . While the primary source of funding came from public entities—in line with the literature review findings, the share of public-private climate finance does not reflect the current global levels of finance for nature, where 80-90% of financial flows

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<sup>175</sup> See, for instance, reports by TNC (2015, 2016, 2020).

are estimated to be from public sources. Rather, as the analysis finds, the distribution of public-private climate finance was much more equal.

The interviews point to a total of USD 24.8 million levered for the UTNWF since 2012. The first phase began with a feasibility study and a business case study undertaken by the TNC for USD 522,000. The cost was born by private actors, one of which was a corporation (Pentair) and the other a philanthropy (Sall Family Foundation), with an overall proportion of approximately two-thirds leveraged from the former. It is worth noting that despite financing the initial studies for setting up the UTNWF, Pentair did not continue to provide finance once the UTNWF was founded in 2015.

The UTNWF relies on a payment for ecosystem service financing mechanism to enable “downstream water users to pool financial resources to compensate upstream land managers for conservation efforts” (p. 6, TNC, 2020). The financing mechanism was based on two types of funds—a revolving fund, replenished periodically through donor contributions—followed by a self-sustaining endowment fund in which the capital is invested to generate annual revenue, while the principal is either maintained or increased (TNC, 2020). Both funds leveraged public *and* private climate finance.

The UTNWF set up a hybrid fund consisting of an endowment fund and a revolving fund, as well as leveraging in-kind contributions. The revolving fund leveraged USD 11.9 million and was designed to periodically disburse capital while continuing to be replenished through donor contributions. The public-private share here was almost proportional at USD 5.5 million and USD 6.3 million. The endowment fund closed in March 2024 at approximately USD 1.6 million, generates approximately 11% in annual return through invested interest guaranteed over five years, and is used to finance continued intervention costs without having to rely on new finance.

The in-kind contributions to the UTNWF were significant, totalling USD 10.3 million, with the significant majority representing public finance, at USD 9.3 million, sourced from multilateral funders (UNDP GEF Small Grants Programme). The carbon revenue to date has generated another half million USD, contributing to a total of USD 10 million in carbon credits inventory.

An assessment of the overall proportion of private to public finance suggests that public to private climate finance is approximately 2:1, with public finance at USD 16.6 million and private climate finance at USD 7.1 million. The supermajority of the public finance leveraged represents public multilateral finance from the GEF. A project is typically only eligible to receive

multilateral finance with national government support as country-level organisations (e.g. Ministries) are the official counterparts of multilateral financial entities. It is also important to nuance the private climate finance as part of it is derived from philanthropic donors and other, larger multinational corporations. Among corporate donors, a significant portion is, in fact, leveraged from their philanthropic arms (e.g. Coca-Cola Foundation, Caterpillar Foundation, UPS Foundation), suggesting that companies still consider NbS investments part of their ESG portfolio rather than contributing to their business operations and bottom line.

**Table 7.1. Overview of climate finance mobilised by the Upper-Tana Nairobi Water Fund**

| Project characteristics          | Amount (USD) | Description (USD)                                                                                                                                                                                                                                                                                |
|----------------------------------|--------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Total finance tracked:           | \$ 24.8 M    | Finance raised for both funds, in-kind contributions and carbon revenue.                                                                                                                                                                                                                         |
| Endowment fund                   | \$ 1.59M     | <b>Private finance (\$ 600K)</b><br>Coca-Cola Foundation<br>FrigoKen                                                                                                                                                                                                                             |
|                                  |              | <b>Public finance (\$ 990K)</b><br>GEF through IFAD                                                                                                                                                                                                                                              |
| Revolving fund                   | \$ 11.9M     | <b>Private finance (\$ 5.5M)</b><br>Coca-Cola Foundation<br>FrigoKen<br>East African Breweries Ltd.<br>The Sall Family Foundation<br>Caterpillar Foundation<br>UPS Foundation<br>Nairobi City Water and Sewage Company<br>MAC-P<br>2022 Jen led Campaign, New TCCF, TNC Support<br>Local Farmers |
|                                  |              | <b>Public finance (\$ 6.3M)</b><br>GEF (via IFAD)<br>SIDA (Government of Sweden)                                                                                                                                                                                                                 |
| In-kind contributions*           | \$ 10.3M     | <b>Private (\$ 1M)</b><br>Two local NGOs (undisclosed)<br>Local Farmers                                                                                                                                                                                                                          |
|                                  |              | <b>Public (\$ 9.3M)</b><br>UNDP (GEF Small Grants Programme)<br>County governments (local county governments in the Upper Tana)                                                                                                                                                                  |
| *including labour and staff time |              |                                                                                                                                                                                                                                                                                                  |



|                                                                           |         |                                                                                                                         |
|---------------------------------------------------------------------------|---------|-------------------------------------------------------------------------------------------------------------------------|
| <b>Carbon revenue (2023-2024)</b>                                         | \$ 0.5M | Carbon revenue to date but just started. Current inventory available for sale is \$10M.                                 |
| <b>Feasibility study and business case study cost (economic analysis)</b> | \$ 522k | Grants to TNC. Earmarked for feasibility studies. (Pentair and Sall Family Foundation)<br>In addition to above finance. |
| <b>Cost of entering voluntary carbon market</b>                           | Unknown | Unclear                                                                                                                 |
| <b>Finance recipient entity:</b>                                          | NA      | Upper Tana Nairobi Water Fund (UTNWF)                                                                                   |
| <b>Finance intermediaries:</b>                                            | NA      | Multilateral (GEF)                                                                                                      |
| <b>Finance channels:</b>                                                  | NA      | Upper Tana Nairobi Water Fund                                                                                           |
| <b>Financial structure:</b>                                               | NA      | Hybrid fund consisting of (i) an endowment fund <sup>176</sup> and (ii) a revolving fund <sup>177</sup>                 |
| <b>Land investment allocations:</b>                                       | NA      | USD 500/farm over three years <sup>178</sup> (average farm size 0.65) <sup>179</sup>                                    |
| <b>Return on investment:</b>                                              | NA      | Endowment fund generates 11.05% interest, guaranteed for five years, held in Co-operative Bank of Kenya.                |
| <b>Financial instruments:</b>                                             | NA      | Primarily: Grants and donations for payment for ecosystem service (water) via collective action water fund              |

Source: TNC (2016) and interviews

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<sup>176</sup> An endowment fund is defined here as “a fund whose capital is invested to generate a steady annual stream of income. Only the investment interest and earnings are spent, while the principal is either maintained or increased” (TNC, 2015, p. 26).

<sup>177</sup> A revolving fund is defined as one that periodically (i.e. annually) is replenished through fees collected and/or through donor contributions (TNC, 2015).

<sup>178</sup> Participant 118

<sup>179</sup> Participant 103.

## **7.3. Upper Tana Nairobi Water Fund: Role and drivers of private climate finance**

### **7.3.1. The role and drivers of private climate finance**

The section above highlighted that the UTNWF sourced finance from multiple stakeholders. During its first decade, the UTNWF relied on grants, combining funds from public and private sectors through blended finance, to later establish a self-sustaining environmental fund. The reliance on non-reimbursable grants rendered the UTNWF highly vulnerable to donor financing fluctuations. The following section identifies the roles and drivers of climate finance for UTNWF.

The table below reveals that, despite actors contributing to the same entity, the roles and motivations behind the finance providers vary significantly. International philanthropic finance played a critical role in providing the necessary initial capital to undertake the necessary studies to obtain buy-in from stakeholders and get the UTNWF off the ground. Only after the feasibility and baseline studies were undertaken and public sources were leveraged did the private sector consider making financial contributions. Public finance from the GEF and the Kenyan Government expressed willingness to support the initiative from the start, but obtaining approval and disbursement of funds took longer.

The social and environmental impact drove international and domestic public actors. While *international* public actors were motivated to support the achievement of national environmental goals (e.g. Paris Agreement or Biodiversity-related targets), *domestic* public actors were concerned about the results of the interventions for local stakeholders and communities. None of the domestic or regional level actors referenced the expected benefits of the NbS interventions for achieving global environmental targets or sustainable development agendas. However, the TNC, the primary philanthropic actor and a well-known international NGO, relied heavily on domestic government support for the NbS initiative to be eligible to receive financial contribution from the GEF. Domestic public finance represented a larger portion of than international sources. This finding differs from suggestions in the global climate finance landscape, suggesting international funding as the primary source. It also diverges from Kenya's climate finance strategy, presented in the NDC, which aims to leverage finance primarily from international sources. Finally, it is unclear to what extent the finance leveraged from the GEF was new and additional or part of the country's allocation as part of the GEF fund cycle.

On the other hand, interviewees, representing the private sector, emphasised that companies were primarily concerned with corporate social responsibility and ensuring their continued business operations. Large corporations expressed concern about local communities' perception, fearing accusations of disproportionately utilising water resources, thus potentially impacting their long-term operating license. Subsequent sections will examine these interests and their impacts on barriers and enablers of mobilising private climate finance. The drivers behind private action are further discussed in the following section in 7.3.1.

**Table 7.2. Finance leveraged by UTNWF: Capital roles and provider interests**

| <b>Financial instrument</b>                      | <b>Capital provider<sup>180</sup></b>                                                                  | <b>Role of capital for UTNWF</b>                                                                                                                                                                 | <b>Capital provider interest</b>                                                                                                                                                 | <b>Amount<sup>181</sup> (USD)</b> | <b>In-kind<sup>182</sup> (USD)</b> |
|--------------------------------------------------|--------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------|------------------------------------|
| <b>Non-reimbursable grants (blended finance)</b> | <b>International public organisations</b> (governments)<br>GEF, SIDA, UNDP                             | Country support for national-level activities that have environmental co-benefits for climate and nature                                                                                         | Social and environmental impact; achievement of global environmental agreements                                                                                                  | \$7.3M                            | \$ 300K                            |
|                                                  | <b>International private</b> (public and private corporations)<br>Coca Cola, Pentair, Caterpillar, UPS | Enable co-finance requirement to receive GCF finance; fund UTNWF activities                                                                                                                      | Continued business operations, corporate social responsibility                                                                                                                   | \$ 3.1M                           | NA                                 |
|                                                  | <b>International private actors</b> (philanthropies or NGOs)<br>TNC, ICTA, MAC-P, TSFF                 | Technical assistance and support in designing the governance structure of UTNWF, especially the pre-project phase and launch; administrative support; feasibility study and business case study. | Social and environmental impact; corporate license to operate                                                                                                                    | \$ 1.4M                           | NA                                 |
|                                                  | <b>Domestic public organisations</b> (governments)<br>County governments                               | Contribution of staff time to support intervention activities and UTNWF administration                                                                                                           | Social and environmental impact; Enhanced water supply for residents; Income generation for constituents; Increased hydropower generation; Enhanced water security for citizens. | NA                                | \$9M                               |
|                                                  | <b>Domestic or regional private actors</b> (business)                                                  | Enable co-finance requirement to receive GCF finance                                                                                                                                             | Continued business operations, social and                                                                                                                                        | \$1.3M                            | NA                                 |

<sup>180</sup> See table on project stakeholders for a detailed list of organisations in each capital provider category in Appendix 7B.

<sup>181</sup> Figures are approximate.

<sup>182</sup> Estimated value of in-kind contributions.

|                               |                                                                                     |                                                                                                    |                                                                                  |         |         |
|-------------------------------|-------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------|---------|---------|
|                               | Frigoken, EABL, NWSC                                                                |                                                                                                    | environmental impact                                                             |         |         |
|                               | <b>Domestic or regional private actors</b><br>(philanthropic or NGOs)<br>Local NGOs | Feasibility study, business case; feasibility study and business case study; fund UTNWF activities | Social and environmental impact                                                  | NA      | \$ 250K |
|                               | <b>Domestic actor</b><br>(individual farmers)                                       | Provide co-financing for high-cost inputs subsidised by UTNWF                                      | Generate new revenue streams; Enhanced water supply for farming and family needs | \$ 250k | \$ 750k |
| <b>Carbon markets revenue</b> | <b>Buyers of carbon credits</b>                                                     | Generate an additional revenue source for UTNWF's Endowment Fund.                                  | Fulfilling corporate ESG goals and offset carbon emissions                       | \$ 0.5M | NA      |

Source: Author

### 7.3.2. Approaches to mitigating risk for private climate finance: Collective action environmental fund

Appendix 7B outlines the interests of each stakeholder group and the associated risks of engaging with the UTNWF. The biggest risk facing stakeholders, among both public and private, was the potential for a mismanagement of funds. This risk was heightened given the significant scale that the UTNWF sought to achieve and the amount of capital to be leveraged relative to previous NbS initiatives. Another significant risk for private capital providers was associated with the potential for project failure and its potential to worsen community relations and public perception. As a new pilot, the untested water fund model in Sub-Saharan Africa, the long horizon for realizing NbS benefits, and the difficulties of monitoring remote areas of the Upper Tana region collectively increased the risk of project failure.

*“You are giving to an endowment fund that is investing the money and you never really know if the money will be given for the purposes that were agreed upon.”*  
(Participant 130)

To mitigate the risk for private actors engaging in the UTNWF, an independent special-purpose entity was established: the “Upper-Tana Nairobi Water Fund, a charitable trust registered under Kenyan law and governed by a board of trustees” (The Nature Conservancy (TNC), 2015, p. 26). Its mission was to govern funds allocated through the public-private partnership. Figure 7.1. below provides an overview of the collective action water fund, as

presented by the TNC, while more information on the governance structure is provided in Appendix 7B. In practice, only five corporations constituted 'paying users,' despite other corporations and individual users benefiting from the expected increase in water supply and quality.

The UTNWF functioned as an environmental action fund, utilising financial instruments that included both an endowment and a revolving fund. This model provided several advantages to the UTNWF stakeholders in risk management. First, it lowered the overall project cost to private actors because the collective action fund was able to leverage a significant share of public finance. Secondly, the involvement of the TNC, an organisation with technical expertise and prior experience implementing the same model in other geographic regions, lowered the risk of project failure. Substantial in-kind support from various stakeholders helped mitigate the risk of fund mismanagement and enabled participation actors, such as governments, that were restricted from providing direct capital to a private-led initiative, even if it in a public-private framework.

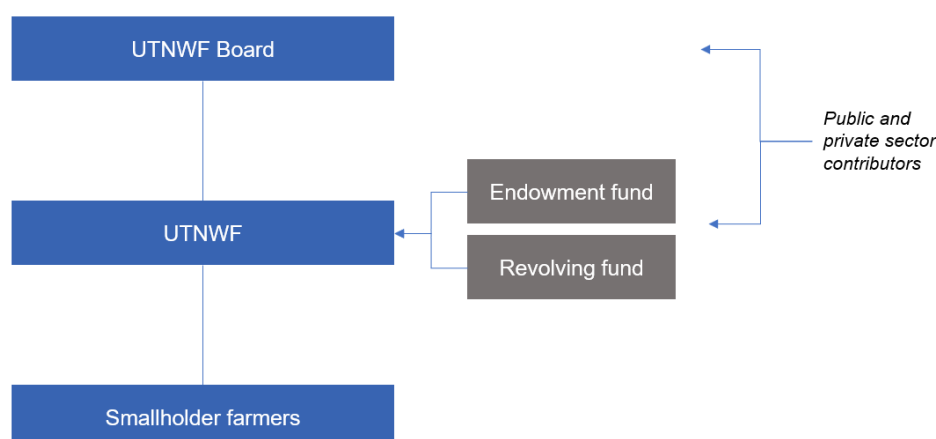
Another risk management approach involved granting private actors the authority to oversee UTNWF operations by serving on the steering committee. This mitigated the potential hegemony of international organisations, such as the TNC, to dominate the implementation of the collective water fund model.<sup>183</sup> The UTNWF steering committee was tasked with overseeing the management of financial resources, thereby strengthening trust between stakeholders. Appendix 7B lists the steering committee members. While most organisations represented on the steering committee provided either financial or in-kind contributions, it is worth noting that four out of the 11 organisations did not make any known contributions to the UTNWF.<sup>184</sup> KenGen stands out as the only commercial entity that did not contribute to the UTNWF, despite the economic analysis in the preparatory phase pointing to a significant contribution of the NbS interventions on hydropower generation. Finally, the private sector provided financing in the form of donations and grants, rather than through mechanisms with return-seeking expectations.

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<sup>183</sup> Participant 103.

<sup>184</sup> The International Centre for Tropical Agriculture, the Tana and Athi Rivers Development Authority, the Water Resources Management Authority, and the Kenya Electricity Generating Company.

**Figure 7.1. The governance model of the Upper Tana Nairobi Water Fund**



Source: TNC (2020)

## **7.4. Upper Tana Nairobi Water Fund: Barriers and enablers of private climate finance for payment for ecosystem services in the water sector**

### **7.4.1. Overcoming capital hurdles: The role of project preparation for leveraging blended finance**

An initial barrier to mobilising private climate finance for the UTNWF was assembling a group of partners large enough that could cover the finance and scale necessary across stakeholder groups. A defining characteristic of NbS for climate action, especially in the water sector, is that for interventions to lead to a quantifiable enhancement of an ecosystem service—in this case, hydrological services—project scale is needed. In other words, tens of thousands of smallholder farmers in the Upper Tana region needed to agree to change their land use practices upstream for the NbS intervention to impact downstream water users. In Kenya, the average farm size of smallholder farmers is approximately 0.53 hectares (Koomen et al., 2018), rendering it an added challenge to aggregate land to achieve scale for NbS.

The cost for undertaking these NbS interventions would not only be high for a single entity to undertake, especially a private actor, but the ecosystem service benefits that would accrue would be non-exclusionary. Water as an ecosystem service in economic terms is characterised as rivalrous, given the dependence of corporations on water as a common good. The interviews with corporations highlighted that their interest in contributing to the UTNWF was driven by the recognition that, as individual entities, they would be unlikely to reach the level of scale needed for any NbS interventions to impact the water supply and water quality.

Cooperation among private actors on an NbS initiative brought additional benefits. Corporations encountered challenges in engaging directly with communities, as scepticism and negative perceptions regarding their intentions often constituted significant barriers.

*“When you are doing water projects on your own, it involves engaging with the community, and if you don’t have an organised, willing community with clear-minded leaders, you might do a project that might not survive. The project needs to continue; there are various maintenance issues.”* (Participant 130)

While some project intervention inputs, such as avocado seedlings and grass strips, were provided by the UTNWF to farmers at no cost, other, more expensive inputs required a cost-sharing arrangement between the farmer and the UTNWF. For example, drip irrigation systems and rainwater harvesting pans cost approximately USD 450 and USD 200, respectively. Farmers typically had to pay 50% unless a woman-led household or the farmer was older than 65, in which case the cost-share was lower, at 25%.

Aside from the above, farmers did not contribute substantial capital to the UTNWF, but their voluntary participation was essential for its implementation. Respondents noted that convincing farmers to adopt new, more sustainable land practices faced some initial challenges, especially for more labour-intensive interventions or where benefits were not accrued immediately. In other words, farmers are reluctant to adopt new approaches unless they clearly understand short-term benefits.

In response to these challenges, a recurring theme emphasised by respondents was the crucial role of the economic analysis during the pre-project preparation phase, known as the 'business case' of the NbS initiative. Additionally, the potential benefits of NbS interventions for all stakeholder groups were underscored. The analysis demonstrated the risk of the business-as-usual scenario for corporations and was the principal driver for private actors to contribute climate finance (see Appendix 7B). The assessment concluded that an initial investment of USD 10 million into NbS interventions over ten years in the three watershed areas identified above would lead to USD 21.5 million in economic benefits over a thirty-year timeframe (TNC, 2016). First, agriculture, as the region is home to a significant agricultural area in the country. The second is in the energy sector, since the region provides over half of the country’s hydropower generation. Finally, the NbS interventions would affect water security and the livelihoods of downstream users, as the river supplies 95% of the capital city’s water.



Studies suggest that 90% of the water used in its operations in Kenya was sourced from the Upper Tana River, so Coca-Cola was particularly motivated to contribute.<sup>185</sup> The analysis suggested that if water trends continued under the BAU scenario, Coca-Cola would have to move its production facilities entirely within ten years.<sup>186</sup> Frigoken, one of the region's major vegetable producers, also highly depended on the country for its agricultural supply chain, with approximately 80% of its operations being based in Kenya and relying on 70,000 smallholder farmers. An overview of the risks under a business-as-usual scenario is provided in Appendix 7B.

*"I think one of the key strategies was the development of the business case that was sent out to the various partners. The business case basically looked at the benefits to the various partners, because [...] the private sector understood that, without the resource protected upstream, the future of their business is not assured [...]." (Participant 112)*

The UTNWF case underscores the importance of the project preparatory (or 'design') phase in leveraging catalytic funding from public and private sources for an NbS initiative. This stage, funded through grants from the TNC and Pentair, contributed two strategic elements for leveraging broader private climate finance for the NbS initiative. First, the economic analysis pointed to the cost of inaction on private actors' business operations. It also highlighted that a certain level of geographic scale was needed to achieve impact, which would benefit from collective action as it was too large for any single private actor to undertake without others benefiting through free riding.

Second, the pre-project phase involved extensive stakeholder engagement to identify respective interests and address risks of a business-as-usual scenario. From a corporate perspective, the primary motivation for participation was the desire to mitigate risks in their business operations stemming from ongoing declines in water supply. Some of these companies would be directly impacted by a decrease in water supply (e.g. Coca-Cola Company, Frigoken), but others would be indirectly impacted (e.g. Pentair). Pentair PLC, a global engineering firm, was concerned that it would lose clients or business with the continued decline of water supply or increased community tensions. Respondents emphasised that the co-benefits of NbS interventions for the livelihoods of local communities and smallholder farmers were significant advantages and points of consideration in allocating capital. This suggests that environmental projects alone may not have been sufficiently compelling for private actors. It is also worth noting that respondents did not refer to the co-benefits of the

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<sup>185</sup> Participant 103.

<sup>186</sup> Participant 103.

NbS initiative on environmental objectives beyond climate mitigation and climate adaptation, such as conserving or restoring biodiversity or nature.

Another stakeholder group included in the economic analysis was the individual landowners. The study strategically focused on the financial benefits that would ensue from NbS interventions adapted to individual landowners' needs. The UTNWF adopted a so-called 'demand-driven model' in which individual farmers were engaged directly to identify NbS interventions that would generate short-term *and* long-term benefits for them. Farmers were supported with the provision of inputs. The introduction of enhanced irrigation systems through the provisioning of water pans is one example of short-term benefits. On the other hand, the revenue generated from the sale of fruits and avocado trees would take longer, usually at least three years, and provided farmers with long-term benefits. The UTNWF did not use financial resources to compensate farmers directly for their land use practices. Instead, it provided them with in-kind support for interventions or subsidising the cost of more expensive equipment, such as water pans. Despite some initial reluctance of farmers to join the program, once a few early adopter farmers joined, word of mouth was critical in convincing other, more sceptical farmers to join the initiative. In sum, addressing the socio-economic needs of farmers was crucial in convincing farmers to adopt more sustainable practices.

*“These are just regular family households—they have small farms, as small as less than one-quarter of an acre, and their job is not to do conservation. That’s not really what they think about or they even know labour or even care about. They just want to feed their family.” (Participant 111)*

The pre-project preparation phase of the UTNWF lasted two years (2012-2014) and cost just over USD 1 million. Initial discussions of developing a potential collective action water fund began in 2011, and the fund, as a project, was not officially launched until 2015/16. However, it proved crucial in laying the groundwork for both public and private stakeholders to understand how the NbS initiative responds sufficiently to the interests of each stakeholder group. This understanding led actors to commit capital, which was strengthened with blended finance.

#### **7.4.2. Navigating the long-time horizon of NbS: Public-private partnerships that build trust and legitimacy in deploying blended finance**

One obstacle to securing blended finance for the UTNWF stemmed from distrust between public and private stakeholders. The complexity of stakeholder relationships further amplified this, as did the degree of reliance on water as an ecosystem service and their broader interests and time horizons for expectations of benefits resulting from the NbS initiative (see Appendix

7B). The lack of trust between stakeholders existed on multiple levels. Kenyan Government employees viewed initiatives spearheaded by the private sector with a degree of suspicion, primarily due to policies disincentivizing government participation in such initiatives.

A lack of prior experience and domestic policies favouring public-private partnerships in Kenya initially discouraged public-private collaboration. The interviewees pointed to public-private partnerships generally being spearheaded by the Government in Kenya. Initiatives initiated by the private sector in Kenya are received with a general sentiment of scepticism and distrust.

*“Traditionally, and this is for my country—and I think it's not unique to my government, governments look more to the private sector to fund public projects that the government itself has initiated. For instance, you may talk of PPP for the building of an institution like a hospital or even a school. But now when it comes to the instance where the private sector is initiating the PPP, and it's requesting the government to join it, [it] becomes a bit tricky [...].”* (Participant 112)

Second, corporations tended to be sceptical of the benefits of the NbS interventions. Larger corporations were reluctant to shoulder the project's financial burden alone, while smaller enterprises believed that responsibility should fall on large multinational corporations which have larger budgets. Despite a strong economic analysis pointing to direct benefits for individual companies, obtaining approval from corporations was challenging because employees were often driven by short-term interests, aligned with their annual performance cycles, which were much shorter than the duration of an NbS initiative which can take 5-10 years before results are seen.

*“Institutionally, people may see the big picture and the value, but everybody's concerned about their own personal interest. People don't last in roles for more than three years often. So why would you want to commit to something [where] the results will come after you are gone? You care about your career. You care about the next promotion. You care about your bonus. And so that's really something that folks on the NGO side do not understand.”* (Participant 111)

Considerable distrust existed not only between public and private actors but also among local farmers. Landowners were often reluctant to engage with corporations participating in community initiatives. The UTNWF aimed to transform this scepticism into an opportunity by enabling private actors to cultivate trust and enhance their reputational standing with local communities. The challenge was further compounded by the extended time horizon required to realise measurable benefits in water provisioning services.

*“When you're talking [about] restoring green infrastructure, it's not something that can be done in a few years. The vision for Nairobi Water fund is the future—2030, 2050 and beyond. It also requires a lot of money and that is*

*how the idea was able to get to the various stakeholders. The pioneers joined up and the Upper Tana Water Fund was started. Of course, at the beginning there was little funding. [...] We should not expect to work a miracle in five or seven years [...].” (Participant 112)*

In response to these challenges, the TNC adopted a strategy to "get the right people in the room" (Participant 103). This involved ensuring representation from organisations at the appropriate level. Within corporates, it required obtaining senior leadership consent; within governments, it required obtaining ministerial-level support. Specifically, leveraging GEF funding, the UTNWF had to be designated a national priority area.<sup>187</sup> At the landowner level, the UTNWF staff realised that they needed early adopters, such as community leaders, to become programme advocates to encourage large scale adoption. Furthermore, upon securing the support of a global corporate entity such as the Coca-Cola Company, the TNC effectively utilised corporate communication channels to generate momentum in leveraging additional financial support from other stakeholders.

The TNC, as a third-party non-governmental organisation, also played a critical intermediary role in raising public and private climate finance. First, the TNC's previous experience spearheading the water fund model provided a degree of credibility and expertise that contributed to trust between public and private stakeholders. This technical expertise significantly reduced transaction costs for implementing a collective action water fund. Despite a general absence of scientific research on the application of the water fund model in the African region, the TNC was able to draw on lessons and experiences from its applications in other emerging markets.

The TNC also strategically identified companies highly dependent on water resources with large enough operating budgets to contribute towards the NbS initiative. For example, the Coca-Cola Company had already identified water stewardship as a priority in their 2030 Water Security Strategy "because it is essential to life, our beverages and the communities we serve."<sup>188</sup> Their 2030 Water Security Strategy aims to improve the health of 60 watersheds identified as critical for the company's operations and agricultural supply chains by 2030. Similarly, East Africa Breweries Ltd. had key performance indicators related to water usage.

*“Our KPI is water replenishment. When it comes to community impacts, we have targets. This year our target is 208,000 cubic meters of water replenished. So my role is [to identify] which projects are related to each of*

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<sup>187</sup> Source participant 103.

<sup>188</sup> See Coca-Cola Company 2030 Water Security Strategy (The Coca-Cola Company, n.d.).

*our breweries. I guide the UTNWF so that they know the KPIs that companies are using--they want sustainability measures.” (Participant 130)*

However, the to which smaller companies, with potentially less developed ESG strategies or a limited understanding of their dependency on water as an ecosystem service, would engage with such initiatives remains uncertain. Hence, by targeting global corporate actors already familiar with the water fund model, the UTNWF successfully leveraged private sector participation.

#### **7.4.3. Additional revenue sources: Broadening blended finance to engage more actors**

The UTNWF’s ability to leverage blended finance necessitates an exploration of the counterfactual scenario. What alternative financing options could the UTNWF have relied upon? Would the NbS interventions still have been implemented if they had failed to leverage private or public finance?

The GEF relies on financial contributions from its member states (i.e. public climate finance from governments) and doesn’t normally involve private climate finance. An entirely privately financed NbS initiative, spearheaded by corporations rather than NGOs, would have been unlikely to have been able to secure funding from GEF multilateral sources. Furthermore, as the financial mechanism of the United Nations Convention on Biological Diversity, the GEF tends to prioritise projects that integrate nature components with climate co-benefits. In contrast, the GCF primarily focuses on financing projects strictly related to climate issues, as evidenced by the literature review findings indicating a scarcity of funding for NbS projects with additional co-benefits.

One the UTNWF’s key financing strategies was to leverage blended finance, (i.e. co-financed by both the private and public sectors), thereby reducing the overall cost to each individual stakeholder while providing them with the same benefits. This was an important component in a context where the status quo among policymakers had been a preference towards financing large-scale grey infrastructure projects, such as building a dam and relying on the national debt to finance it. This phenomenon can be attributed to Kenya’s extensive history and experience in financing large-scale grey infrastructure projects, which are now integrated into their national debt portfolios.<sup>189</sup>

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<sup>189</sup> Participant 103

Voluntary carbon markets revenue served as an additional source of funding to the UTNWF's endowment fund. Obtaining certification from Plan Vivo, a third-party verifier, increased credibility of the carbon credits in the marketplace. Within a span of less than 1.5 years, the UTNWF navigated through the project submission phase, provided requisite documentation, obtained approval, and successfully sold credits to initial buyers. The methodology, however, focused solely on carbon sequestration as an ecosystem service, overlooking the inclusion of other ecosystem service benefits. This omission suggests a missed opportunity for layering credits, such as those for biodiversity services.

For instance, a study by Hunink et al. (2013) examined the potential for "green water credit" schemes to compensate farmers for adopting more sustainable land use practices in the Upper Tana region. This example underscores the potential for integrating various crediting types to address the broad spectrum of ecosystem services that NbS provide. The green water credit project ultimately remained unrealised primarily because of deficiencies in stakeholder engagement, resulting in inadequate financial and political support (Leah L Bremer et al., 2016; Kauffman et al., 2014; Vogl et al., 2017a).

Another important question relates to the financial contributions of private corporate actors to the UTNWF. Notably absent among the financial contributors is Kenya Electricity Generating Company (KenGen), despite hydropower generation being recognised as one of the principal water consumers in the Upper Tana River basin (refer to Appendix 7B for further details). Moreover, among the contributing companies, funding allocations predominantly originated from the philanthropic arms of corporations, indicating a prevailing perception that dependencies on nature and its ecosystems are not yet fully integrated into the balance sheet but rather regarded as elements of their CSR strategy. Philanthropic arms of corporations represent volatile funding sources, as the funds are often contingent on a percentage of the company's profits from the preceding year. For instance, the East Africa Breweries Foundation allocates 1% of the company's profits from the prior year (Participant 130).

Finally, one may ask what potential alternative methods there are to mobilise climate finance at scale for NbS. In partnership with the World Water Council, the TNC has attempted to push multilateral financing institutions like the AfDB and the World Bank to earmark a share of project finance (~3%).

## **7.5. Upper Tana Nairobi Water Fund: Private climate finance for NbS in the context of the transition towards sustainability**

### **7.5.1. Impacts and limitations of the UTNWF's NbS activities on the transition towards sustainability**

The analysis of the impacts of the UTNWF's activities on the achievement of joint environmental and socio-economic objectives is based on the information provided by interview participants and secondary sources, in particular project documentation provided in the Plan Vivo Foundation Registry, the carbon standard issued by the UTNWF credits. As of April 2024, the UTNWF generated USD 0.5 million in revenue from the sale of carbon credits.

The analysis brings forth two overarching findings in the context of the transition towards sustainability. First, despite attempts to encourage more sustainable land use practices in the Upper Tana region, there was a narrow focus on how results were measured, focusing primarily on carbon sequestration and revenue generation for smallholder farmers. Measurements associated with impacts on climate resilience and biodiversity received considerably less emphasis, potentially due to methodological challenges and less stringent metrics within voluntary carbon market standards for assessing these dimensions. Additionally, the compensation mechanism in carbon markets often fails to reward or scrutinise biodiversity or climate adaptation improvements. Despite these limitations, a significant achievement is the successful establishment of an endowment fund, which sustains itself by leveraging both public and private financing, thus reducing dependence on inconsistent funding sources and may also empower the governance board to place greater emphasis on broader environmental metrics. Finally, the section highlights that, despite the generation of multiple co-benefits from NbS interventions, these benefits are neither rigorously monitored nor compensated.

Appendix 7B summarises the UTNWF's intended contributions towards four impact areas: climate mitigation, adaptation, biodiversity, and improving socio-economic livelihoods identified in the Plan Vivo Standard but also wider project documentation from the UTNWF. Some of the initial impacts of interventions have been reported on by the TNC (2024), the leading implementing partner of the UTNWF, but there is a general lack of transparency on the monitoring and evaluation of impacts on all four impact areas. Although the reports highlight benefits across all four impact areas, they primarily emphasise two key aspects: carbon sequestration and the socio-economic impact for smallholder farmers. According to reports, smallholder farmers gained up to USD 3 million in additional revenue annually due to

increased agricultural yields and new agricultural activities. Enhanced water quality is said to have benefited over 500,000 individuals, but the scientific monitoring of these results is unclear.

The UTNWF's documentation on impact focuses on carbon sequestration. The agroforestry systems and tree planting activities are expected to sequester just over 1 million tCO<sub>2</sub> over the 20-year crediting period. Additional NbS interventions, and their carbon sequestration benefits, will be submitted as new carbon credit projects for validation. It is worth noting that sequestration from enhanced soil management and agricultural practices is not included despite the benefits from the NbS interventions focused on agroforestry systems. This limitation may be attributable to the carbon standard, Plan Vivo, which to date lacks measurements for soil organic carbon a feature present in other methodologies and MRV organisations.<sup>190</sup> Effectively measuring soil carbon can be leveraged to generate additional revenue through the sale of voluntary carbon credits.

Another aspect is the extent to which the NbS interventions enhance water supply in the basin. The findings to date are inconsistent. A study by the TNC (2024) indicates that KenGen has increased annual revenue by USD 600,000 due to heightened power generation and the mitigation of shutdowns and spillages, but there is a lack of detail on monitoring and evaluation methods. The Nairobi City Water and Sewerage Company (NCWSC) has claimed annual savings nearing USD 250,000, stemming from a confluence of factors such as avoidance of filtration costs, reduced energy consumption, minimised sludge disposal expenses, by the water treatment plant shows a slight downward trend from 2013 to 2022, indicating a positive impact. Respondents, however, suggest that the outcomes are still inconclusive.

The UTNWF's monitoring of non-carbon impacts remains weak. Appendix 7B enumerates the types of interventions and their anticipated co-benefits on a wide range of areas, including climate resilience and biodiversity.<sup>191</sup> It contains a lack of metrics beyond assessing agroforestry's contributions to carbon sequestration, likely attributable to the narrow ecological focus of voluntary carbon credit certifications. The Plan Vivo methodology evaluates carbon sequestration from agroforestry endeavours. Consequently, any NbS interventions beyond agroforestry, which in fact represent a core component of the UTNWF interventions, are

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<sup>190</sup> A growing academic literature has focused on the measurement, reporting, and verification of soil carbon sequestration for climate change mitigation (Andries et al., 2021; Conant et al., 2011; Ellert et al., 2007; Olson et al., 2001). Various private entities have emerged in recent years to support carbon crediting schemes that measure soil carbon. See, for instance, Boomitra, Yard Stick, Transitory, Indigo Ag, Heirloom, Nori, Agreea, EarthOptics.

<sup>191</sup> For example, agroforestry, improved land management practices, ecosystem restoration.



precluded from eligibility for carbon credit issuance. This underscores a constraint within carbon credit methodologies as a financing instrument that holistically represents the benefits provided by NbS.

Present UTNWF monitoring documentation also lacks comprehensive data on outcomes related to water supply, of particular interest to the private actors with operations in the area, such as East Africa Breweries and the Coca-Cola Company. One respondent emphasised that monitoring and attributing effects on water supply and quantity to NbS interventions have proven challenging.

*“Yes, it's true what you said, especially the water quality shows some improvement, but this improvement, there is some debate on whether it is directly because of [land use] improvement or because of lower rainfall, because there is a direct correlation or relationship between high rainfall and water quality, especially when the intensity is high.” (Participant 112)*

Despite these challenges, UTNWF respondents have indicated a general sentiment suggesting that they believe there have been positive impacts on the water supply. There has been one study on the relationship between water system provisioning service benefits in the Upper Tana River basin, specifically on the hydrological power generation aspect (Hurford et al., 2020). However, significant uncertainties around the accuracy of relationships remain “due to imperfect understanding of the interaction of ecological functions with socio-economic processes and the paucity of data available (Hurford et al., 2020).

The ambiguity surrounding the impacts of corporate activities also reflects the early stage at which companies develop key performance indicators for NbS, and, consequently, the relatively rudimentary targets they set for water-related ecosystem services. For example, an EABL representative mentioned that their current KPI is to have one water replenishment project, but a measurable metric for water replenishment is still being defined. This may also help explain why UTNWF private actors principally leveraged financing from their philanthropic arms (e.g. EABL Foundation and Coca-Cola Foundation) rather than the business operations budget.

Coca-Cola's 2023 Global Water Report delineated investments across seven watersheds, highlighting the UTNWF as a case study. The impact on biodiversity emerged as the most significant outcome from NbS initiatives, estimated at nearly USD 6 million annually--approximately double that of carbon sequestration, which was valued at around USD 3 million). However, only three projects reported biodiversity benefits, with Kenya absent from

this subset. This observation underscores a discernible incongruity in assessing benefits across the watershed projects.

A defining attribute of NbS in the water sector is its capacity to quantify water supply and quality to a notably more advanced degree than other ecosystem services, such as pollination. In the case of pollination, human capability to quantify benefits and monitor outcomes remains relatively constrained, often relying on proxies like the potential economic impact resulting from a decline in pollination.

These findings are supported by existing literature, which underscores the importance of clearly communicating potential financial benefits as a fundamental aspect of engaging funders and private sector stakeholders, thereby ensuring the long-term sustainability of such schemes (Leah L Bremer et al., 2016; Kauffman et al., 2014; Vogl et al., 2017a). However, the literature also suggests that linking quantifiable improvements in watershed performance with specific downstream beneficiaries is equally crucial for securing finance, a linkage not demonstrated by the UTNWF.

### **7.5.2. Partnerships to scale NbS for the transition towards sustainability**

The impact of the UTNWF on the transition towards sustainability hinges on its capacity to extend its reach to other watersheds within the Upper Tana basin and across the broader African region, thus contributing to systemic change. At the time of writing this thesis, water funds, akin to the UTNWF model, have been implemented, or are under discussion, in 17 African watersheds.

The rapid scaling of climate finance for source water protection through the implementation of water funds across Africa can be attributed to several factors. First, the existence of the UTNWF as a pilot project and the successful implementation of its model in the Upper Tana River basin demonstrated that utility-led catchment conservation could effectively enhance water security through NbS initiatives. This made garnering support for new water funds easier. Indeed, one respondent noted that the TNC had facilitated knowledge-sharing by flying ministerial officials and UTNWF representatives to other water fund sites, such as Cape Town, to share insights with new stakeholders. The UTNWF served as a proof of concept for the wider region. Moreover, a study led by the TNC showcased that the UTNWF model was replicable and cost-effective for other cities in Africa (Apse and Karres, 2016).

Second, the TNC, as the lead implementing organisation of the water fund model, set an objective to scale watershed conservation to 20 basins by enhancing 1 million hectares of ecosystems by 2025 (TNC, 2019b). Its Africa Business Business Plan (2019-2025) targets three primary goals: “protect land and water, provide food and water sustainably and build healthy cities in a world of rapid urbanisation” (TNC, 2019b, p. 1), but also references the co-benefits to climate mitigation and adaptation.

The TNC wanted to avoid independently establishing water funds and, rather, sought to collaborate with partners. This partnership strategy enhanced the TNC’s organisational capacity and ability to replicate the model across geographies.

*“The water fund has such an amazing structure—there is a lot of accountability. For example, there is a Board of Management and a Board of Trustees with very serious leaders in this country, CEOs and well-known individuals, [and] staff [to support the initiative].”* (Participant 130)

Finally, the TNC partnered with Pegasus Consulting to outsource the feasibility study and economic analysis for scaling the model across other African countries. The decision to outsource the studies to an independent third party strengthened the credibility of the report for private sector actors interested in contributing financial resources.

Designing a PPP that balanced stakeholder interests, while mitigating risks, also played an important role. The feasibility study and economic analysis conducted during the pre-project phase helped inform public and private actors of the potential benefits of the NbS intervention. For-profit corporations, in particular, require data to generate quantitative justification to support internal decision-making on any climate finance contributions. The NbS interventions were also carefully adapted to the smallholder farmers' short- and long-term needs. The resulting behaviour changes from farmers reveal the importance of accounting for the socio-economic needs of the given NbS implementation area.

*“If you only tell them, ‘don’t farm near the riparian area, near the river,’ they will do it anyway, because it’s the closest to the river and it takes a lot of effort to extract water from the river to water their agriculture. But if you tell them that ‘we will raise money to help you buy a water pan so that then you can harvest the runoff from there, so that you can then do your farming closer to your house or you can do your farming through irrigation,’ then they say, ‘ok, that makes sense. I don’t have to go to the river.’”* (Participant 111)

## **7.6. Perspectives from Costa Rica's national payments for water services and the Agua Tica Water Fund**

The Greater Metropolitan Area in Costa Rica has the highest demographic concentration and industrial activity, placing substantial pressure on the country's freshwater resources. The preceding chapters introduced Costa Rica's PSA programme. This chapter expands on the analysis by examining its application to water services, as documented (Pagiola et al., 2005). A less frequently studied topic is the role of water funds—specifically the Agua Tica Water Fund—as a mechanism for mobilising finance for water services. There remains a limited understanding of the role and efficacy of private climate finance in supporting water funds and payments for water services in the country.

### **7.6.1. Government policies establishing a national programme on payments for water services in Costa Rica**

Costa Rica's 1996 Forestry Law (#7575) laid the foundation for diversifying payments for ecosystem services by recognising that forest ecosystems provide multiple environmental benefits, including a differentiation between hydrological services (i.e. water provision) and other ecosystem services. Although the law did not mandate that beneficiaries pay for these hydrological services, FONAFIFO, with support from FUNDECOR, successfully persuaded water users and hydropower operators to contribute financially to the water-related services they benefit from.

FONAFIFO, with the assistance of FUNDECOR, entered into one-on-one agreements with hydropower producers, beginning with Energia Global (1997), followed by Platanar S.A. (1999) and Compania Nacional de Fuerza y Luz (2000) (Pagiola, 2008). This established a new precedent for a voluntary mechanism through which private actors can contribute financially to the country's PSA programme, specifically for water provisioning ecosystem services. These early agreements relied on voluntary payments from hydropower producers to participating landowners in the upper watershed areas. Starting in 2001, the type of payment provider gradually expanded beyond hydropower producers to include bottlers, municipal water supply companies, agribusinesses and tourism, among others (Pagiola 2007). To reduce the transaction cost of setting up these agreements, FONAFIFO introduced *Environmental services certificates* (CSA) to standardise the mechanism for private actors, or water users, to pay for conserving a designated area.

In 1998, Costa Rica passed the Biodiversity Law (#7788), which authorised SINAC to charge a rate or tariff on water usage under the framework of environmental services received. In

1999, the first utility company (Empresa de Servicios Públicos de Heredia S.A.) received approval from the regulatory agency ARESEP to apply a water fee which included a portion to protect watersheds and recover degraded river basins (Cordero n.d.). When the tariff was first introduced, the price was set at CRC 1.90/m<sup>2</sup> (USD 0.00542/m<sup>3</sup>),<sup>192</sup> reflecting approximately 2% of the total water bill (Cordero, n.d.). The price has since increased to CRC 14.3/m<sup>3</sup> (USD 0.0264121/m<sup>3</sup>).<sup>193</sup> Today, drinking water rates in Costa Rica vary annually and depend on the total usage amount (i.e. residential, commercial, industrial). The latest figures suggest rates ranging from approximately USD 0.63 to 0.91 per cubic meter (R. S. Obando, 2022). However, the exact portion of the water usage fee allocated to the PSA programme remains unclear, with interview participants unable to provide a definitive answer.

The Costa Rican Government relied on two primary financing instruments to leverage finance from water users in its PSA program: (i) water payments via the Certificados de Servicios Ambientales (CSA), which were launched in 1998, and (ii) a water tariff charging a fee for water usage, as well as a conservation fee earmarked for watershed conservation (Pagiola, 2007). The former represents a voluntary mechanism for the private sector to contribute, while the latter is a mandatory mechanism in the form of a tariff. The third mechanism, Agua Tica, was not initiated by the Costa Rican Government but rather a public-private partnership established by private actors.

Studies on the PSA programme indicate limited involvement of private climate finance for water services, partly because it was designed to derive its revenue from public sources, relying only partially on voluntary contributions from private, corporate users. Another mechanism that leveraged private climate finance for water services was the Agua Tica Water Fund. Despite being a private-public partnership, the initiative did not leverage *additional* public finance.<sup>194</sup> As revealed in Table 7.3 in the next section, the only public contribution was to provide the technical secretariat for the initiative (i.e., in-kind staff time) and payment for ecosystem services for approximately 1,000 hectares in relevant watershed areas.

The Costa Rican Government also signed an agreement with a private hydroelectric company, committing the latter to conservation efforts in the watershed areas that it was operating in. According to reports, the private hydroelectric company paid USD 120 per hectare per year

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<sup>192</sup> 2002 exchange rate used by Cordero (n.d.).

<sup>193</sup> Exchange rate from 2023. Source: Participant 222.

<sup>194</sup> Participant 222.

with a commitment of five years to support forest plantation interventions and USD 225 per hectare per year for forest protection (Cordero, n.d.).

### **7.6.2. Financing Costa Rica's public-private partnership: The Agua Tica Water Fund**

Table 7.3 below provides the first attempt at comprehensively documenting the financial resources the Agua Tica Water Fund mobilised, categorised by funding source and their respective contributions. Several key insights emerge from this analysis. Appendix 9A lists the stakeholders engaged in the Agua Tica Water Fund.

Notably, the Agua Tica Water Fund did not rely on a singular revenue stream to support its activities. It leveraged multiple funding sources, including philanthropic and for-profit corporate finance, a membership fee directed to its endowment fund, commissions generated from a debit card issued to individual consumers, in-kind contributions, and a water fee managed by the Government of Costa Rica. This diversity underscores the inherent complexity of establishing an entity that leverages public and private climate finance. The operationalisation of such a fund required navigating a complex financial structure that integrates contributions from various stakeholders, each with its own priorities and mechanisms of support.

More specifically, the Agua Tica Water Fund mobilised only a small portion of its total financial resources from trust fund donations (USD 220,000) compared to the total tracked funding of USD 5.23 million. During the pre-project phase (2012–2018), philanthropic capital was critical in funding the technical analyses and establishing the governance structures necessary to launch the initiative. This highlights the importance of philanthropic funding in the early stages of NbS. Although the exact financial breakdown for this phase remains unclear, the analysis suggests that the sole contributor was the Costa Rica–United States of America Foundation for Cooperation (CRUSA Foundation), a nonprofit organisation. This finding underscores the significance of targeted philanthropic investment in enabling the foundational work required for successful NbS implementation.

In accordance with the broader climate finance framework, an essential dimension is the assessment of the relative contributions of public and private climate finance mobilised for the Agua Tica Water Fund. The only source of public funding originated indirectly through the Costa Rican Government's Payment for Environmental Services (PSA) programme, which totalled USD 2.64 million (excluding in-kind contributions). Administered by FONAFIFO, these funds did not flow directly to the Agua Tica Water Fund. Still, they were allocated to

conservation interventions across 1,000 hectares of land with high hydrological service value. Payments were made directly to landowners to incentivise conservation practices and avoid land-use changes at an average rate of USD110 per hectare per year. This rate significantly exceeded the national average of USD64 per hectare per year, reflecting the additional hydrological benefits provided by these lands. Since the programme's inception in 2000, the PSA initiative has disbursed approximately USD2.64 million for these interventions over nearly 25 years. While substantial, this amount accounts for less than half of the total financial resources mobilised when analysing the contributions of public and private funding.<sup>195</sup> This proportion is further diminished when considering the timeline. PSA payments began in the year 2000, while private capital to support intervention areas was first leveraged in 2014. This temporal and quantitative disparity underscores private-sector engagement's pivotal but historically uneven role in financing nature-based solutions.

The interventions managed by the Agua Tica Water Fund within the watershed area were entirely financed through private capital earmarked for specific projects. These initiatives spanned 1,200 hectares and were funded by three corporate entities: Coca-Cola, FIFCO (which holds distribution rights for Pepsi), and Intel Corporation. Landowner payments were set at the same base rate as FONAFIFO's PSA program—USD 64 per hectare per year. This approach was deliberately designed to avoid competing with the government programme. Still, it resulted in lower payments than the PSA program's higher rate of approximately USD 100–120 per hectare per year within the watershed area.

Earmarking corporate capital to specific projects provided two key advantages to the capital provider. First, it enabled corporations to influence pilot project design and interventions significantly. Second, it allowed them to claim specific hectares as part of their contributions to corporate water sustainability goals. Interviews revealed why these companies opted not to contribute directly to FONAFIFO's established PSA program: one primary advantage was the more detailed monitoring and reporting offered by Agua Tica. As noted by one participant,

*“We are going a little bit further by doing all the monitoring activities during the implementation phase—the status of the forests, their integrity, water quality, soil samples, hydro-meteorological data” (Participant 122)*

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<sup>195</sup> This calculation does not take into account in-kind contributions, due to the major data gaps, and because the majority of in-kind support went to other organisations and indirectly contributed to the Agua Tica water Fund capacity.

In contrast, FONAFIFO provided more generalised reports, which lacked the granularity required by companies to demonstrate progress on corporate water footprint goals. This enhanced monitoring capacity was a decisive factor in the preference for project-specific financing.

A total of just over USD 2 million in *private* capital was mobilised for the Agua Tica Water Fund using three primary instruments. First, donations earmarked for specific project interventions accounted for most private contributions, totalling USD 1.63 million. Second, philanthropic donations and membership fees to the trust fund amounted to USD 360,000, primarily allocated for administrative services. Third, a commission from purchases made with Costa Rica's Banco Nacional "Agua Tica" debit card generated an estimated USD 20,000. Additionally, a corporate law firm provided in-kind legal support, though the exact value remains unclear. Corporate contributions came from their philanthropic arms and were directed toward project-specific activities rather than the fund itself. Administrative costs covered by the trust fund were managed as a separate budget line item, ensuring a clear distinction between project-specific financing and administrative expenses.

In-kind contributions were significant, exceeding USD 580,000, but were excluded from detailed analysis due to data limitations and the indirect nature of these contributions. For instance, the International Energy Agency's project—representing the only source of multilateral financing—supported capacity development for Agua Tica staff by funding a training programme. These contributions, while impactful, were directed at broader institutional strengthening rather than specific project activities.

One particularly innovative financing mechanism was the issuance of the Banco Nacional "BN Agua Tica Debit Card" in 2023. While initial concerns about low uptake were raised, the first 1,000 cards sold out within three days, demonstrating strong consumer interest in contributing directly to water conservation. A portion of the merchant fees retained by Banco Nacional from purchases made with the card is allocated to protecting water sources in the Tárcoles and Virilla River sub-basins. Although the exact percentage of these contributions remains unclear, the funds will be transferred annually to the Agua Tica Trust Fund, with the first disbursement yet to occur. This debit card represents a novel mechanism for engaging individual consumers in financing nature-based solutions, making it the first in Costa Rica.



**Table 7.3. Overview of finance mobilised by the Agua Tica Water Fund in Costa**

| <b>Project characteristics</b>                                                                                                                                  | <b>Amount (USD)</b>      | <b>Description</b>                                                                                                                                                                                                                                                                   |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Total finance tracked</b>                                                                                                                                    | \$ 5.23 M                | Finance raised from all sources                                                                                                                                                                                                                                                      |
| <b>Pre-project phase</b><br>(technical analysis and governance structure)<br>(2012-2018)                                                                        | \$140,000                | <b>Private finance (philanthropic)</b><br>Crusa Foundation (\$140,000)                                                                                                                                                                                                               |
| <b>Implementation phase</b>                                                                                                                                     |                          | <b>Total project area (1,200 hectares)</b>                                                                                                                                                                                                                                           |
| <b>Pilot projects (2014 2021; 2021-2026)</b><br><b>FUNDECOR (as technical secretariat)</b><br>*Not under trust fund because trust fund had not been established | ~\$800,000               | <b>Coca-Cola / FEMSA Foundation</b> (2014-2026) – a Replenishment project. “Water Replenishment to Nature” covering 687 hectares                                                                                                                                                     |
|                                                                                                                                                                 | ~\$150,000               | <b>FIFCO</b> (2023-2027) – “Water positive project” covering 150 hectares                                                                                                                                                                                                            |
|                                                                                                                                                                 | ~\$680,000               | <b>Intel Corporation</b> (2021-2031) – “Water Restoration project” 368 hectares                                                                                                                                                                                                      |
| <b>Trust Fund</b><br>(Dec 2018 -present)                                                                                                                        | \$220,000                | <b>Private finance (philanthropic)</b><br>CRUSA Foundation (\$60,000)<br>The Nature Conservancy (\$33,000)<br><br><b>Private finance (corporate and corporate philanthropic)</b><br>Florida Bebidas/Pepsi/FIFCO (\$ 53,000)<br>FEMSA Foundation (\$54,000)<br>Dos Pinos (\$20,000)   |
| <b>Banco Nacional “Agua Tica Debit Card”</b> (May 2023-present)                                                                                                 | ~\$20,000 <sup>196</sup> | <b>Private finance (corporate)</b><br>A portion of the commission generated from purchases made with the issued debit card is allocated to protecting water sources in the sub-basins of the Tárcoles and Virilla Rivers (part of the project area). The commission rate is unclear. |
| <b>In-kind contributions</b><br>(includes staff time)                                                                                                           | ~\$580,000+              | <b>Private (corporate)</b><br>BLP Law Firm provides legal advice (amount unknown)                                                                                                                                                                                                    |
|                                                                                                                                                                 |                          | Pilot project: Elevating the Impact of Water Funds (FEMSA, ALO Advisors). (amount unknown)                                                                                                                                                                                           |
|                                                                                                                                                                 |                          | <b>Private (not for profit)</b><br>Pilot project: Landscale-Costa Rica (IUCN, FUNDECOR) – IUCN project (in-kind: \$400,000)                                                                                                                                                          |
|                                                                                                                                                                 |                          | <b>Public (multilateral)</b><br>International Atomic Energy Agency (in partnership with Costa Rica National University Stable Isotopes Laboratory, ESPH, FUNDECOR): Pilot project “Water Sustainability and Security.” Capacity                                                      |

<sup>196</sup> Participant 222.

|                                                                          |                                        |                                                                                                                                                                                                                                                                                                                                                                                                                                       |
|--------------------------------------------------------------------------|----------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                                                                          |                                        | development of staff (paid by IAE; in-kind: \$180,000)                                                                                                                                                                                                                                                                                                                                                                                |
| <b>Government of Costa Rica PSA programme (Water fee)</b> <sup>197</sup> | ~\$ 2.64M <sup>198</sup><br>(1,000 ha) | <p><b>Public (domestic) - subregional</b><br/>FONAFIFO / Empresa de Servicios Públicos de Heredia (ESPH) collects a water fee for the Heredia canton, enrolling 1,000 hectares annually in the PSA programme at an average of \$110 per hectare.<sup>199</sup></p> <p><b>Public (domestic) - national</b><br/>An additional nation-wide water fee has been introduced in 2022, administered and collected by AYA (amount unknown)</p> |
| <b>Finance recipient entity:</b>                                         | Depends on activity                    | Agua Tica Water Fund can only receive donations; FONAFIFO/ESPH (PSA payments)                                                                                                                                                                                                                                                                                                                                                         |
| <b>Finance intermediaries:</b>                                           | NA                                     | NA                                                                                                                                                                                                                                                                                                                                                                                                                                    |
| <b>Finance channels:</b>                                                 | NA                                     | FUNDECOR (specific ear-marked finance for project implementation) \$1.63M                                                                                                                                                                                                                                                                                                                                                             |
| <b>The financial structure of the trust fund:</b>                        | NA                                     | Endowment fund                                                                                                                                                                                                                                                                                                                                                                                                                        |
| <b>Land investment allocation:</b>                                       | \$64-\$120/ha/yr                       | <p>(1) Agua Tica pilot projects disburse USD 64/ha/yr.</p> <p>(2) The PSA programme (ESPH) disburses between \$100-120/ha/year.<sup>200</sup></p>                                                                                                                                                                                                                                                                                     |
| <b>Endowment fund allocation:</b>                                        | \$50,000/year                          | The trust fund's annual allocation primarily supports action areas such as administrative activities and workshops. Payments to sites and landowners are distributed through the pilot projects outlined in the implementation phase above.                                                                                                                                                                                           |
| <b>Return on investment:</b>                                             | Unknown                                | The endowment fund generates approximately 3-4% interest but depends on markets. <sup>201</sup>                                                                                                                                                                                                                                                                                                                                       |
| <b>Financial instruments:</b>                                            | NA                                     | Grants and donations for payment for ecosystem service (water) via collective action                                                                                                                                                                                                                                                                                                                                                  |

<sup>197</sup> Funds are managed by ESPH and do not go through Agua Tica water fund.

<sup>198</sup> Assuming 1,000 hectares are enrolled annually under the Payment for Ecosystem Services (PSA) programme at an average payment rate of \$110 per hectare, the programme requires \$110,000 in funding each year. Since the programme began in 2000 and has run continuously through 2023, this funding has accumulated over 24 years. By multiplying the annual funding requirement by the number of years, the total amount reaches USD 2.64 million. This calculation assumes consistent annual enrolment, a steady payment rate, and no adjustments for inflation or programmatic changes (Participant 222).

<sup>199</sup> Calculation based on the Costa Rican Government's PSA programme in the watershed area covering 1,000 hectares at an average price of USD 110/hectare disbursed via the water fee. Source: Participant 222.

<sup>200</sup> The average disbursement under the government's PSA programme is estimated at \$110 per hectare per year. This includes a base payment of USD 64 per hectare annually, supplemented by an additional USD 40–60 per hectare per year for areas recognised as having heightened importance due to their water provisioning services.

<sup>201</sup> Participant 222.

|  |  |                                                                          |
|--|--|--------------------------------------------------------------------------|
|  |  | water fund via endowment fund; Ear-marked funding for project financing; |
|--|--|--------------------------------------------------------------------------|

Source: Compiled by the author

### **7.7. Scaling private climate finance to protect upstream watershed and hydrological ecosystem services through the establishment of the Agua Tica Water Fund: The role of governance structures**

The analysis reveals that governance mechanisms are central for effectively mobilising climate finance for watershed protection and hydrological ecosystem services. For instance, due to the legal terms of the Agua Tica Water Fund's incorporation, it could only accept donations, which is not the preferred channel for companies like Intel Corporation, FEMSA, and FIFCO. These companies prefer to allocate capital to specific projects for various tax purposes. They prefer receiving invoices that they can include in their accounting as investments: "It is more difficult for them to account for a donation than a project" (Participant 222). They also receive fiscal benefits from non-donation-specific allocations.

The Agua Tica Water Fund has responded by designing specific projects that meet the individual needs of corporate capital providers, with FUNDECOR, an NGO, managing project implementation (see pilot projects listed in the figure above). However, Agua Tica does not serve as the technical implementation arm, which raises questions about the rationale and potential opportunities for structural changes.

According to interviews, a distinguishing feature of the Agua Tica Water Fund is its ability to monitor and report on impact to stakeholders, which exceeds the generic reporting provided by Costa Rica's government-led PSA scheme. The Agua Tica Water Fund provides data on forest integrity, water quality, soil composition, drone imagery, and hydro-meteorological observations. This more advanced monitoring capacity appears to address the growing interest of corporations with measurable land, water, and biodiversity goals, such as Coca-Cola and Pepsi. As companies increasingly commit to sustainability objectives beyond carbon, the demand for NbS that offers robust measurement and reporting systems is expected to rise.

Despite these innovations, the Agua Tica Water Fund faced challenges securing financial contributions from government sources. During the fund's design phase, stakeholders proposed allocating a portion of water canon revenues to the trust fund. However, this approach was deemed legally infeasible due to the fund's public-private structure, which prohibited direct government financial contributions. Consequently, the fund's reliance on public finance was replaced by in-kind contributions from government entities, such as technical assistance and institutional support, to bolster the fund's credibility. Notably, Agua Tica did not systematically track these in-kind contributions, and Table 7.3. offers the first attempt to estimate their value through participant interviews. This reliance on in-kind support and legal constraints on public financing pose significant obstacles to scaling NbS for water provisioning ecosystem services.

Further challenges, from the perspective of the Agua Tica Water Fund, have emerged at the local level. For instance, despite collecting water fees, cantons like Belén and Cartago prefer to allocate these funds to the government-run FONAFIFO rather than the Agua Tica Water Fund. This preference stems from a perception of territorial ownership over the fees, with stakeholders expressing reluctance to allocate resources beyond their jurisdiction. One participant explained, *“They see the funds raised through the water fee as theirs and allocating them to Agua Tica feels like sharing them with other cantons at their expense”* (Participant 222). In other words, while the canton recognises the benefit of watershed restoration and protection, the government agency, FONAFIFO, is charged with managing the project implementation funds.

Costa Rica's legislative framework thus presents advantages and disadvantages in Agua Tica's development. While the country's comprehensive water governance system, including water canon revenues and fees, provides a robust institutional foundation, it limits flexibility in fund design and allocation. In contrast, countries without such established frameworks might find it easier to establish public-private water funds that act as both collectors and implementers of water-related revenues. As one participant noted:

*“It's very difficult for us to innovate in some areas, because many issues are just kept in the public sector, such as the water fee. [...] In other countries that don't have this, the water fund can be the tool to provide that kind of law because it doesn't exist. So the water fund becomes not just the driver to generate this law, but also the one that could be in charge of receiving this money [but implementing it].”* (Participant 222)

These observations suggest that institutional and legal flexibility play critical roles in implementing and scaling water funds, particularly in contexts where public-private partnerships are essential for advancing NbS.

Costa Rica's established public programs for financing watershed protection, underpinned by a robust legislative framework, limit the extent to which initiatives like Agua Tica can independently create new mechanisms such as water canon revenues or fees directly allocated to private trust funds. While these constraints pose challenges, they have also created opportunities for Agua Tica to differentiate itself by offering value-added services, such as advanced monitoring and reporting, which go beyond the capabilities of existing government-led programs. Agua Tica leverages a range of methodologies to provide more comprehensive insights into water and ecosystem health, thus enhancing its appeal to stakeholders.

The Agua Tica Water Fund demonstrates that addressing water and hydrological services requires multi-stakeholder engagement across civil society, the private sector, and public institutions. Such engagement necessitates financial resources and technical expertise to design and implement effective governance structures. The Nature Conservancy (TNC), drawing on its experience establishing similar water fund initiatives globally, played a critical role in reducing transaction costs and facilitating stakeholder collaboration. A shared recognition of the risks posed to water resources proved instrumental in securing buy-in from diverse stakeholders, including corporations, public entities, and philanthropic organisations. For example, during the pre-project phase, the Crusa Foundation was the sole funder, providing the philanthropic capital necessary to conduct technical analyses and establish the governance framework. One participant noted:

*"Water security has to involve everyone, from civil society to the private sector to the public sector. [...] They know that they need water to produce, and from the public sector, they know that they need water to provide water for human consumption and civil society. [...] They know they have to do something because if they don't have water, they will die. So it's something that I think our board is very, very committed to, and they forget that they belong to Coca Cola or Pepsi or the [national] water directorate when they are together in the [serving] on the water board. They work as one team." (Participant 222)*

Stakeholders were motivated to cooperate because the continued provision of the water services was threatened, and the challenge was perceived as too large to address individually. However, questions remain about the presence of free rider stakeholders—companies that consume significant water resources but do not contribute to the Water Fund.

The Agua Tica Water Fund stakeholder engagement slowed down the decision-making process. For instance, initially structured as a private trust fund, the Fund's governance structure prevented public sector engagement. The amendment of legal structuring took three years because it required approval from all stakeholders.

Interestingly, the Fund included the participation of FEMSA and FIFO, two private actors considered direct competitors in their market. However, recognising their shared risk to operations due to water scarcity encouraged them to cooperate. This provides further evidence of a common-pool resource being sustainably managed by local actors.

*“They know that they need water to produce and from the public sector they know that they need water to provide water to human consumption and civil society. They know they have to do something because if they don't have water, they will die. So it's something that I think our board is very, very committed and they forget that they belong to Coca Cola or Pepsi or water direction when they are together in the in the water board. They work as a one team.” (Participant 222)*

Beyond corporate and public-sector engagement, the Agua Tica Water Fund also mobilised contributions from individual consumers. Launching the BN Debit Card generated revenue from Costa Rican residents looking support the project's interventions. The high demand for the debit card among residents suggests another potential source of private climate finance.

However, not all private stakeholders are fully integrated into the Agua Tica Water Fund's governance structure. FEMSA and FIFCO are official members, but Intel Corporation is not, only contributing financial resources on a project-by-project basis. One participant noted: “It's easier to just collaborate on the Water Fund but not to get involved” (Participant 222). This highlights the tension between corporate sustainability directives and business viability; companies recognise the need to ensure water availability for production while maintaining their social license to operate.

Capacity building has been central to the Water Fund's success. The TNC played a critical role in introducing the model and training local staff, while additional projects supported technical capacity development. These included: (i) The LandScale Costa Rica project, funded by IUCN, which enhanced impact assessment methodologies for Agua Tica's activities. (ii) The Water Sustainability and Security project, funded by the International Energy Agency, established a hydrometeorological monitoring network to measure spring discharges and groundwater levels. This project also funded the training of Agua Tica personnel at academic institutions.

Despite these achievements, Agua Tica has not yet met its target of mobilising USD 2 million. Its reliance on philanthropic and corporate contributions has limited its ability to secure multilateral finance, except for a capacity-development grant from the International Atomic Energy Agency. This contrasts sharply with the Upper Tana Nairobi Water Fund, where multilateral financing was central in establishing the initiative.

The Agua Tica case underscores the inherent challenges of mobilising public finance for public-private partnerships in contexts where government-led programs already exist to protect watershed services. While Costa Rica's robust institutional framework has provided a strong foundation for water governance, it has also constrained the flexibility of initiatives like Agua Tica. In contrast, countries without such pre-existing frameworks may find it easier to establish water funds that integrate public and private financing mechanisms. As one participant observed:

*"In other countries that don't have this [established framework], the water fund can be the tool to provide that kind of law because it doesn't exist. The water fund becomes not just the driver to generate this law but also the one that could be in charge of receiving and implementing this money."*  
(Participant 222)

This analysis highlights the delicate balance between leveraging existing institutional frameworks and designing innovative mechanisms to address water security challenges.

## **7.8. Conclusion**

This chapter reveals the role and dynamics of private climate finance for water services through the establishment of water funds. It highlights that public-private partnerships can generate multiple revenue streams for an NbS initiative but also requires considerable time and capacity to set up. Key factors influencing success include trust between stakeholders, accountability, governance, and the availability of reliable data.

Private actors with large and direct reliance on a quantifiable ecosystem service such as water services, can be expected to contribute financial resources to projects that safeguard their corporate operations, provided that appropriate governance frameworks and accountability mechanisms are in place. In contrast to Kenya, Costa Rica's longer institutional history may be attributable to more established mechanisms to collect funds for NbS interventions that support water services in the country.

The studies of the two water funds in Kenya and Costa Rica reinforce the literature's findings that public funding, secured through legislation, as seen in Costa Rica, provides the largest sum of climate finance in absolute terms. However, the exact proportion of public to private climate finance was markedly different from suggestions in the literature. While others have concluded that private climate finance plays a marginal role in water funds, representing "less than 10% of funding overall" (Leah L. Bremer et al., 2016, p. 225) in a study on Latin America, the UTNWF demonstrated a ratio closer to ~30%. In the case of Costa Rica's Agua Tica Water Fund, the government contributed more public finance overall than private sources. However, a more in-depth examination, which includes Costa Rica's payments for watershed investments through its national PSA programme, reveals an approximate total of USD 1.2 million in public finance, which is in fact less than the private climate finance contributions from the Agua Tica Water Fund.

Costa Rica's experience highlights the importance of public finance instruments, such as taxation and water tariffs, as a consistent source of NbS finance. While the Kenyan Government imposed water tariffs on water usage, it did not directly contribute public funding to the UTNWF. Instead, it provided in-kind contributions in the form of local government staff time. Rather than relying on domestic public funding, the UTNWF leveraged international multilateral financing. This demonstrates the importance of distinguishing between financing mechanisms, financing channels and sources when seeking to mobilise private and public climate finance.

Categorising climate finance, in particular *private* sources, for the UTNWF proved challenging because it often originated from corporate foundations, such as the FEMSA Foundation, and not corporate budgets. It is worth making a distinction between climate finance provided by not-for-profit entities like the TNC and the philanthropic arms of for-profit entities. While both are non-profit organisations, the FEMSA Foundation derives its funding from the for-profit activities of Coca-Cola, the corporation. In contrast, the TNC's funding comes from membership dues, private contributions, government grants, and other investment returns, which are not publicly disclosed (TNC, 2023).



## Chapter 8. Discussion and conclusion

### 8.1. Findings

This thesis set out to examine the role of private climate finance for NbS. I studied three empirical cases of NbS interventions in Kenya, and complemented the analysis with insights from Costa Rica.

The aim of this chapter is to synthesise the findings and discuss their implications for private climate finance for NbS. How are private climate finance and NbS conceptualised under the UNFCCC, and in the national contexts of Kenya and Costa Rica? How is private climate finance deployed for NbS in a developing country? What are the barriers and enablers of private climate finance for NbS? How can a more nuanced understanding of the roles and drivers of private climate finance support the stakeholders in leveraging additional financial resources for NbS? I also reflect on how the empirical cases contribute to the Paris Agreement and the broader transition towards sustainability.

The analysis revealed several findings, which can be summarised as follows:

1. The conceptualisations of private climate finance and nature-based solutions have become increasingly nuanced at both international and national policy levels, and consequently, in local implementation, reflecting a growing recognition of their complexity. NbS encompasses a wide variety of ecosystems, beyond terrestrial ecosystems, and a multitude of financing structures can support their implementation.
2. Private finance for NbS is shaped by the national context in which it is deployed. Political, historical, and economic factors shape their implementation, necessitating a degree of adaptation to local conditions.
3. The dimensions of private climate finance for NbS vary by project stage, with philanthropic sources predominating in early implementation and return-seeking capital becoming more important in later stages. While corporate return-seeking finance often originates from philanthropic or corporate social responsibility budgets, it is increasingly informed by the dependencies on and benefits of specific ecosystem services.
4. Key enablers of private climate finance for NbS include political stability, local capacity and expertise, supportive regulatory and governance frameworks, transnational networks, especially NGOs, and clear relationships between ecosystem service provisions and private benefits. Long project time horizons and challenges in aligning financial returns with NbS objectives continue to pose barriers.

5. Deployments of private climate finance for NbS tend to be small-scale, primarily supporting carbon sequestration and emissions reductions. A more holistic assessment across ecosystem services, especially those linked to common-pool resources, could enable targeted financing for a broader range of services.

In the remaining chapter, I discuss the findings across empirical cases and countries (section 8.2.), relying on cross-cutting themes to help inform the analysis of the research questions. I subsequently examine the contributions to theory and practice (section 8.3), as well as the limitations of the study (section 8.4.), and potential future areas of research (section 8.5).

## **8.2. Discussion**

### **8.2.1. Towards a more nuanced conceptualisation of private climate finance and NbS**

Early references to the concept of finance for climate action in developing countries largely centred on the role of the state, paying little attention to the potential role of non-state actors such as corporate entities. The initial focus under the UNFCCC was based on a simplistic understanding of the total sum of climate finance. However, the concept of climate finance gradually evolved under the UNFCCC toward a recognition that it was not merely a question of how much climate finance was needed in developing countries, but its source, conditions and allocations. A wide range of financing structures emerged to support NbS implementation, representing both conventional and innovative mechanisms, highlighting the diversity of sources, instruments, and deployment models. This was complemented by greater attention to the role of non-state actors, including the role that private climate finance can play in meeting multilateral environmental goals.

NbS, as a targeted intervention aligned with the objectives of the UNFCCC, has emerged over the past decade. The findings emphasise the significance of acknowledging that private interests and government positions evolve. The analysis of the conceptual evolution of NbS and climate finance under the UNFCCC, as well as with the empirical cases in Kenya, suggests that motivations for both public and private climate finance will continue to change. The UNFCCC initially adopted a narrow understanding of NbS, focusing primarily on terrestrial forest ecosystems, such as through the REDD programme, while excluding interventions such as avoided deforestation of forests. Over time, the scope of nature-based interventions broadened, recognising that NbS addresses the conservation, restoration, and sustainable

use of landscapes—across all types of ecosystems—to contribute to the Paris Agreement, the broader UN SDGs, and environmental agreements such as the UN CBD.

The Kyoto Protocol created an internationally recognised financing mechanism for ecosystem services in developing countries. It assigned a market value to the carbon sequestration potential of terrestrial ecosystems, enabling developing countries to finance emissions-reduction NbS projects. Costa Rica's PSA programme drew on the Kyoto Protocol's CDM for land-use projects, but the mechanism's strict eligibility criteria and technical requirements limited the scope and scale of afforestation and reforestation activities that could in fact be financed. Kenya, on the other hand, had limited participation in the CDM for financing NbS, instead relying on the emergence of voluntary markets.

The Kyoto Protocol provided an early channel for private climate finance to contribute towards NbS under the UNFCCC, laying the foundation for REDD+ and the voluntary carbon markets. Since then, reference to NbS under UNFCCC decisions has encouraged investments into conservation, restoration, and sustainable land use across ecosystems beyond terrestrial forests. Nevertheless, the design and implementation of NbS initiatives remain predominantly guided by measurements for carbon sequestration and storage.

The adoption of the Paris Agreement marked an accelerated shift towards private climate finance and NbS. For the first time, developing countries also had binding obligations on mitigating climate change. The new, bottom-up approach to define NDCs required that developing nations also begin considering their financing requirements of domestic policy and actions. This shift was accompanied by the growing financialisation of the climate discourse and heightened attention to the role of the private sector.

### 8.2.2. National-level determinants of private climate finance for NbS in Kenya and Costa Rica

*“In the same legislation that we created in the payment for ecosystem service [PSA] programme —what was much more interesting is—we banned land use change, and nobody says that because PSA sounds much more progressive. The ban sounds Stalinist—like big government. No one is allowed to change land if you have more than two acres of land, you are not allowed to chop it down. And that is why we have forest coverage In Costa Rica— but nobody wants to hear that.” (Participant 203)*

Kenya and Costa Rica demonstrated markedly different approaches to financing NbS. In both countries, government policies, and each country's historical, institutional, and political context influenced their respective trajectories. Costa Rica's national PSA programme has served as its cornerstone in administering the protection and conservation of ecosystems, highlighting the significance of national context and governance in shaping NbS financing. Costa Rica's national laws secure the allocation of public funds for the payment of ecosystem services to private landowners. A national context with established institutions that effectively leverage public finance for NbS reduces the incentive for non-state private actors to contribute resources.

However, the PSA programme's reliance on revenue from fossil fuel as its primary funding source makes it vulnerable in the long term, particularly if Costa Rica achieves significant reductions in carbon emissions. Recognising this risk, the Costa Rican Government has sought to expand its programme, turning to multilateral institutions (e.g., the World Bank) and the European Union for additional climate finance. This approach requires substantial institutional knowledge, capacity, experience and political will at the national level, conditions that may limit its transferability and applicability across diverse contexts.

In Kenya, the financing of NbS reveals a decentralised approach, encompassing a mix of public and private initiatives, as well as a reliance on international climate finance. The study of empirical cases revealed the extent to which emerging NbS interventions either depend, or intend to, depend on revenue generated from voluntary carbon markets as a central financing mechanism. Accessing international climate finance, requires expertise and transnational networks, resources that may not be accessible to rural communities in developing countries. Despite these constraints, the cases in Kenya appeared to encompass a broader range of ecosystems, extending beyond forests and encompassing multiple tenure systems, highlighting a potential advantage of the decentralised approach, in which project proponents have greater flexibility in the design of NbS interventions. The recent adoption of policy

frameworks, including Kenya's National Carbon Policy, signals an attempt at a more integrated approach for climate and NbS.

Policy coherence remains a challenge for NbS implementation. For example, both Kenya and Costa Rica have established water funds; however, while water usage typically incurs a fee, these funds do not always get reinvested in the areas where NbS take place. In Costa Rica, both the PSA programme and the private-led Agua Tica water fund efforts targeted the same areas, yet their financial operations remained separate. This fragmented approach led to institutional friction and a lack of trust regarding the optimal allocation of resources, particularly from the Costa Rican Government's perspective. In Kenya, while the UTNWF had some involvement from government agencies, it was primarily a non-government led initiative.

The absence of projects listed on the voluntary carbon market in Costa Rica is evidence of the country's effectiveness at applying a jurisdictional approach to the sale of carbon credits in international market. One of the advantages of Costa Rica's jurisdictional approach to the restoration and conservation of landscapes is that it facilitates achieving scale. On the other hand, it requires substantial financial resources and capacity, and can be rigid as seen by the limited flexibility to adapt projects to specific ecosystems, such as mangroves. Moreover, under this model, the government retains primary rights to carbon emissions reductions, which reduces the incentives for non-state actors, particularly for-profit entities, to engage in the Costa Rican carbon market.

### **8.2.3. Dimensions of private climate finance for NbS**

#### **8.2.3.1. Private climate finance across implementation stages**

The empirical cases reveal distinct patterns in the deployment of climate finance for NbS across stages of implementation. In the first stage, or the 'pre-project phase,' philanthropic grants serve as a key source of funding, supporting the feasibility studies necessary to build compelling cases for attracting private sector investment. In-kind support, often in the form of staff time and technical expertise, also proved critical, given the specialised knowledge required for scientific feasibility studies.

In the case of Mikoko Pamoja, despite being a relatively small-scale project, significant resources were required to conduct the feasibility study that could demonstrate the carbon sequestration and storage benefits of mangrove restoration and conservation. During this stage, the project proponents relied entirely on grant funding, primarily sourced from the United Kingdom and channelled through academic and research institutions. The proponents'

access to a long-standing body of research and an established international academic network proved to be an advantage as it facilitated grant acquisition and lowered transaction costs.

The limited involvement of private climate finance from for-profit entities in the pre-project phase of the empirical cases is unsurprising, considering the requirement by companies to have documented evidence of the benefits they will receive before committing financial resources. This creates a challenge for scaling NbS, since securing private investment itself is contingent upon the successful completion of the pre-project phase.

As the NbS empirical cases progressed into the implementation phase, one observed a growing contribution from non-philanthropic private sources. The extent to which each NbS case diversified away from philanthropic grants depended on a variety of factors, such as the type of financing instruments utilised. The UTNWF was designed, from the outset, to leverage both private and public finance through blended financing. Komaza, on the other hand, began its first ten years of operation as a not-for-profit organisation and relied entirely on philanthropic financing during this period. Komaza demonstrated that during the initial years, grants helped establish the case for venture capital investment, which they were then able to raise successfully in pre-seed, seed, and Series A and B rounds.

The empirical cases overwhelmingly demonstrate that private climate finance leveraged for the NbS implementation phase continues to be dominated by non-return-seeking capital. Two out of the three NbS cases (i.e. Mikoko Pamoja and UTNWF) received private climate finance contributions with no repayment or financial return expectations. Komaza was the only NbS initiative that sought to provide a financial return to two types of capital providers: venture capital investors and, later, a commercial loan provider offering concessional terms. This expectation of a financial return through a loan applied to slightly later-stage growth capital intended to scale operations in Kenya. Ultimately, it was the inability to service these financial obligations that led to the dissolution of Komaza after nearly 20 years since its inception.

#### **8.2.3.2. Sources of climate finance for NbS**

Understanding the characteristics of private climate finance requires situating it within the broader context of climate finance and examining its interactions with *public* climate finance, which remains the predominant source of funding for NbS globally.

The only empirical case that successfully leveraged public finance in the form of multilateral finance from the GEF was the UTNWF. Accessing multilateral finance, however, comes with

its challenges. For instance, for non-governmental organisations, one requirement for securing private GEF support is to demonstrate prior commitments of private co-financing. In the case of the UTNWF, the team's strong relationships with both domestic and international government entities facilitated access to GEF funding. The UTNWF also benefited from being led by the TNC, a not-for-profit with considerable international credibility, technical expertise, and institutional capacity.

Komaza was the only NbS initiative among the empirical cases to seek multilateral public finance from the GCF, but it ultimately failed to obtain it due to a lack of support from the Kenyan Government. This underscores a bottleneck, especially for for-profit entities attempting to blend public and private climate finance sources. Komaza faced increased scrutiny from the government due to legal restrictions on channelling funds to for-profit entities, as well as a lack of established practices in partnering with such initiatives. The government's preference for directing public climate finance to non-return-seeking entities, such as the TNC, carries implications for private sector-led NbS initiatives.

#### **8.2.3.3. NbS and the transition towards sustainability: Reducing harm versus transforming supply chains**

Another aspect of private finance for NbS concerns the underlying objective and drivers of the NbS intervention, which influences the type of private climate finance it can attract. More specifically, does the NbS enable private actors to reduce nature-negative financial flows or increase nature-positive financial flows? Applying the spectrum of capital approach (Appendix 2B), each empirical case was shaped by distinct drivers motivating private actors.

Komaza aimed to build a business that transformed the timber supply chain in East Africa and falls into the first category of the spectrum of capital category (i.e. efforts to reduce harm or mitigate negative financial flows). Komaza's overarching objective was to increase positive financial flows into an economic sector that has historically had a negative impact on nature due to unsustainable forestry practices. Unlike Mikoko Pamoja and UTNWF, Komaza attempted to balance generating financial returns with contributing to restoration outcomes. Its approach embedded NbS into a commercial venture to achieve large-scale impact on the transition towards sustainability. The case of Komaza suggests that attempts to transform supply chains towards greater sustainability is more capital-intensive than NbS with limited a limited scope.

Meanwhile, Mikoko Pamoja falls into the second spectrum of capital group (i.e. efforts to increase positive financial flows towards nature). The NbS initiative channelled financial resources into the conservation and restoration of mangroves. The distinction here is that it is a standalone project. Providers of private climate finance are not directly dependent on the ecosystem services generated by the project interventions. In fact, carbon credit buyers were primarily from foreign countries driven by voluntary contributions to meet emissions reduction targets. Their voluntary contributions were further motivated by the project's co-benefits for local communities and biodiversity.

The UTNWF, meanwhile, falls in the middle of the spectrum of capital category. The participation of private for-profit actors in the fund was driven by a dependency on the ecosystem services that the NbS initiative protected, thereby aligning with corporate interests. However, unlike the private climate finance providers of Komaza, UTNWF stakeholders did not anticipate direct financial returns. In other words, the UTNWF represents an example of a mechanism in which private corporations contribute climate finance to ecosystem-service-related activities. These activities were outside their direct control but still impacted their business operations.

Philanthropic capital, driven by impact, is willing to take on more risk, reflected in its presence at the early stages of NbS implementation. This reveals philanthropy's critical role in getting NbS initiatives off the ground. It helps fund activities in the pre-project phase needed for for-profit entities to consider private climate finance contributions. This is a critical step in demonstrating to return-seeking capital providers the potential cost-benefit and business opportunities associated with engaging in the respective NbS initiative.

#### **8.2.4. Towards a private climate finance model for NbS**

##### **8.2.4.1. Introducing a private climate finance model for NbS**

The study reveals the importance of understanding the motivations for private actors to contribute financial resources for NbS, specifically in terms of the types of ecosystem services and economic goods involved in the interventions. The figure below synthesises the relationship between ecosystem services and the classification of economic goods in the context of private financing for NbS. It reveals that financial instruments vary according to the type of goods and services emerging from the ecosystem.



**Figure 8.1. Towards a more streamlined approach for understanding private climate finance for NbS**

| Ecosystem service type | Ecosystem service       | Type of good                                  | Financial instrument*                             | Sources*          |
|------------------------|-------------------------|-----------------------------------------------|---------------------------------------------------|-------------------|
| Provisioning services  | Food                    | Public<br>Private<br>Common-pool<br>Club/toll | Sustainable supply chains                         | Public<br>Private |
|                        | Water                   |                                               | Public-private partnerships (e.g. Water Fund)     |                   |
|                        | Wood                    |                                               | Government-led payment for Ecosystem Service      |                   |
|                        | Fiber                   |                                               | Genetic resources profit sharing (e.g. Cali Fund) |                   |
|                        | Fuel                    |                                               | Public grants                                     |                   |
|                        | Genetic resources       |                                               | Private donations                                 |                   |
| Cultural services      | Biochemicals            | Public<br>Private<br>Common-pool<br>Club/toll | Commercial loans                                  | Public<br>Private |
|                        | Spiritual               |                                               | Concessional loans                                |                   |
|                        | Aesthetic               |                                               | Equity investments                                |                   |
|                        | Educational             |                                               | Carbon credits                                    |                   |
| Regulating services    | Recreational            | Public<br>Private<br>Common-pool<br>Club/toll | Biodiversity credits                              | Public<br>Private |
|                        | Flood prevention        |                                               | Insurance                                         |                   |
|                        | Pollination             |                                               | Taxation                                          |                   |
|                        | Water regulation        |                                               |                                                   |                   |
|                        | Climate regulation      |                                               |                                                   |                   |
|                        | Biodiversity regulation |                                               |                                                   |                   |
| Supporting services    | Disease regulation      | Public<br>Private<br>Common-pool<br>Club/toll |                                                   | Public<br>Private |
|                        | Air quality regulation  |                                               |                                                   |                   |
|                        | Nutrient cycling        |                                               |                                                   |                   |
|                        | Soil formation          |                                               |                                                   |                   |
|                        | Primary production      |                                               |                                                   |                   |

*\*Illustrative, non-exhaustive*

Source: Author

The empirical cases demonstrate that NbS initiatives contribute to the conservation, restoration or sustainable use of multiple ecosystem services, some of which directly leverage private climate finance, while others do not. The inability to leverage private climate finance for certain ecosystem services highlights the influence of the type of economic good. In this context, private goods tend to generate private climate finance for NbS than other types of goods.

The most obvious example of a private economic good emerging from the NbS ecosystem services are claims to carbon sequestration. While carbon sequestration is a public good at the global scale, given that it is both non-excludable and non-rivalrous, carbon credits issued in the voluntary carbon market can be viewed as private goods. All three empirical cases sold—or had the intention of selling—carbon credits in the voluntary carbon markets for the carbon sequestration and storage potential of these NbS initiatives. These credits were predominantly purchased by international buyers seeking to offset their individual or organisational footprint, perceiving climate regulation as a public good, but purchasing credits as a private good with the intention of making individual claims. In essence, the same

ecosystem service (carbon sequestration) can provide two different types of economic goods and therefore be monetizable to different degrees. In sum, the same ecosystem service can provide two types of economic goods.

On the other hand, water provisioning services, in the context of the UTNWF, was a common-pool resource—non-exclusive but rivalrous. Overconsumption of the water resource by any one stakeholder threatened its use by others. It was thus beneficial for private actors, who were dependent on the water services of the Upper Tana River, to cooperate in ensuring the long-term provision of hydrological services. Other, small commercial water users were able to avoid contributions to the UTNWF. While this may appear as a limitation of a voluntary public-private partnership, the Costa Rican PSA programme, a nationally run programme, also relied on voluntary contributions from the private sector to support hydrological services.

Another example, from Mikoko Pamoja, is the fisheries ecosystem services provided by mangrove ecosystems, which are an important nursery for fish. These can be considered private goods in the context of commercial coastal fishing operations, where the government leases areas for exclusive use in managed areas. However, in the case of Gazi Bay, fisheries are considered common-pool resources, as the local community harvests fish species in a manner that is non-excludable but rivalrous. The more fish harvested, the less is available for others.

Despite mangroves' contribution to fisheries stock, private local actors did not contribute private climate finance to Mikoko Pamoja's NbS interventions, even though these resources were considered common-pool goods. This could be attributed to several factors. The first factor is the community's awareness of the relationship between fish populations and mangrove ecosystems. Second, the fish population may not have been at risk in a rural area where communities only engaged in small-scale fishing, rather than large-scale commercial activities where sustainable use would have been of greater concern.

Another ecosystem service, biodiversity regulation, is also worth a discussion. While all three NbS cases in Kenya claimed that their interventions would positively impact biodiversity, none generated private climate finance specifically for this ecosystem service. Stakeholders of Mikoko Pamoja claimed that the project's biodiversity co-benefits were a key driver of interest among carbon credit buyers but were not monitored or financed as such. This is perhaps attributable to a general perception that biodiversity is a global public good—something that may be changing with new regulations emerging, especially in Europe, on corporate

responsibility toward biodiversity.<sup>202</sup> Companies are increasingly recognising these benefits as they implement nature-positive strategies.<sup>203</sup>

This suggests that the *provisioning* of services is more likely to be treated as private economic goods, whereas *regulating* services, such as biodiversity regulation, may require government intervention to address market failures. In the empirical cases, I did not observe sufficient evidence to support private actors explicitly investing in biodiversity protection without government regulation. The absence of private climate finance in this area could indicate that public finance will continue to play a crucial role in safeguarding biodiversity or the need for government regulation to establish compliance markets.

The UTNWF was able to generate multiple revenue sources for demonstrating several ecosystem service benefits—albeit not *all* ecosystem services generated private climate finance. Notably, the interventions led to the adoption of more sustainable agricultural land use practices, reducing soil erosion and improving soil quality, and leveraged private climate finance from smallholder farmers in the form of co-financing, but this represented a marginal proportion of the UTNWF’s total project climate finance. The terms of co-financing given to smallholder farmers also remain unclear. Non-state, return-seeking private climate finance contributed resources with the objective of establishing a quantifiable metric, indicating the amount of water replenished through NbS, thereby contributing to corporate water goals.

Finally, the figure above highlights that ecosystem services vary in terms of the financial instruments to respond to their conservation, restoration and more sustainable use. For instance, generating revenue from ecotourism sites is a well-established business model for generating revenue, as is providing philanthropic grants for conducting research. On the other hand, despite the benefits of mangroves to coastal communities (e.g. serving as buffers against severe weather events), this ecosystem service has not yet generated explicit revenue—public or private—in the context of Mikoko Pamoja. This could be due to the novelty of such approaches, but we are starting to see the emergence of insurance companies exploring the potential for monetising such services (e.g., insurance for coral reefs). It may also be a matter of recognition. Recently, insurance companies have begun incorporating environmental elements, such as intact coral reefs and mangroves, into their risk mitigation calculations, particularly in regions prone to natural disasters. This has been seen with the Mesoamerican Reef Fund in Mexico and the Hawaii Reef Insurance initiatives (2022, 2024).

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<sup>202</sup> See TNFD.

<sup>203</sup> For instance, over 500 organizations have adopted the TNFD (TNFD, 2024).

#### **8.2.4.2. Understanding the drivers of private climate finance for NbS from an ecosystem service and type of economic goods perspective**

The model outlined above (Figure 8.1.) provides a framework for understanding the drivers of private climate finance for NbS. Exploring the relationship between ecosystem services and types of economic goods also sheds light on how these factors influence the applicability of various private climate finance instruments. As discussed in section 8.4.4., private actors may be motivated to reduce harm on nature to secure business operations (e.g., water funds), make a standalone positive contribution to nature (e.g. carbon offsetting or nature-positive contributions), or generate profit directly through an NbS business model (e.g., Komaza). These motivations affect the choice of climate finance instruments. Additionally, the beneficiary of the ecosystem service plays a role in determining who contributes finance and through which instrument.

The table below (Table 8.1) applies the model introduced in section 8.5.1. to one of the NbS empirical cases, Mikoko Pamoja, highlighting the relationship between the climate finance instrument and the type of economic good and the beneficiary. It also reveals that the label 'nature' in NbS is somewhat misleading because NbS interventions tend to focus on one dominant ecosystem service rather than examining nature more comprehensively. The prominence of voluntary carbon markets in recent years has further narrowed the focus of NbS to carbon sequestration and its monetisation through the sale of carbon credits as a financing instrument.

The table below showcases the multitude of ecosystem services provided by Mikoko Pamoja. Taken together with the analysis of private climate finance deployment, it reveals a gap in the extent to which private actors contribute to the maintenance of ecosystem services *beyond* carbon sequestration and storage. The study suggests that there is potential for additional private actors to contribute to the maintenance of ecosystem services that benefit them directly. For instance, we are beginning to see private corporations offering pollination services. These developments suggest new opportunities for financing instruments and NbS business models.<sup>204</sup>

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<sup>204</sup> See BeeHero Inc., for instance. <https://www.beehero.io/>

**Table 8.1. Towards a model for understanding private climate finance applied to Mikoko Pamoja**

| NbS                                   | Ecosystem service     | Ecosystem service                | Type of economic good                                                                      | Beneficiaries (benefits)                                               | Finance instrument (finance source)                                     |
|---------------------------------------|-----------------------|----------------------------------|--------------------------------------------------------------------------------------------|------------------------------------------------------------------------|-------------------------------------------------------------------------|
| Mangrove restoration and conservation | Provisioning services | Timber                           | Private good                                                                               | Forestry households (firewood)                                         | Grant and donation financing to plant wood plots for timber replacement |
|                                       |                       | Food (fisheries, honey)          | Private good; sometimes common-pool resource (CPR) (e.g. fisheries)                        | Fishery and agriculture households (food)                              | Commercial loans, equity investments, donations for honey production    |
|                                       |                       | Water                            | CPR or public good                                                                         | Local (water consumption)                                              | Unclear                                                                 |
|                                       |                       | Medicinal resources              | CPR                                                                                        | Local (medicine)                                                       | Unclear                                                                 |
|                                       | Regulating services   | Crop pollination                 | Public good                                                                                | Agriculture households (increased quality/quantity of crop production) | Commercial loans, equity investments, donations for honey production    |
|                                       |                       | Coastal protection               | Public good                                                                                | Local communities (protection against storms, flooding, etc).          | Unclear                                                                 |
|                                       |                       | Carbon sequestration and storage | Public good unless carbon credits are sold in carbon markets (private good) <sup>205</sup> | Global (carbon); Individuals (clean air)                               | Carbon credits; Donations (private climate finance)                     |
|                                       |                       |                                  |                                                                                            |                                                                        |                                                                         |

<sup>205</sup> Some carbon credit frameworks may be considered club goods. For example, if a consortium of companies finances mangrove restoration project and shares the resulting credits among themselves.

|  |                     |                                       |                                                            |                                                                                                            |                            |
|--|---------------------|---------------------------------------|------------------------------------------------------------|------------------------------------------------------------------------------------------------------------|----------------------------|
|  |                     | Water                                 | Public good                                                | Local (water quality improvement; ground water recharge, sediment trapping); Global (ecological processes) | Unclear                    |
|  |                     | Erosion control                       | Public good                                                | Local inhabitants (natural erosion control)                                                                | Unclear                    |
|  |                     | Temperature regulation                | Public good                                                | Local and global (temperature)                                                                             | Unclear                    |
|  | Supporting services | Biodiversity                          | Public good                                                | Global (provide habitats for species)                                                                      | Carbon credits             |
|  |                     | Nutrient cycling                      | Public good                                                | Global; Local (e.g. soil fertility, agricultural productivity, water quality)                              | Unclear                    |
|  | Cultural services   | Scenic beauty, tourism and recreation | Club good                                                  | Private (tourism attraction)                                                                               | Mangrove boardwalk tickets |
|  |                     | Cultural and spiritual value          | Usually public goods unless excludable (restricted areas). | Local inhabitants                                                                                          | Unclear                    |
|  |                     | Scientific research                   | Usually public good unless proprietary research            | Global (e.g. genetic resources)                                                                            | Research grants            |

Source: Author

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Another example is Stripe Climate and Frontier which pools resources from participating companies to fund carbon removal projects; all contributing companies share collective credit for enabling the carbon removal.

#### **8.2.4.3. Distinguishing between public goods and common-pool resources**

The motivations behind return-seeking private climate finance for NbS were influenced by the specific ecosystem service or good that the private actor aimed to conserve, with variations observed across empirical cases. While the empirical cases highlight that NbS contribute to ecosystem services that combine multiple public and common goods, return-seeking actors tend to be driven by the provision of a single, dominant ecosystem service.

The overexploitation of ecosystem services, such as mangrove timber (i.e. Mikoko Pamoja) and freshwater (i.e. UTNWF), which are rivalrous and non-excludable, diminishes their availability and disrupts ecosystems. Mikoko Pamoja demonstrated that NbS initiatives tend to contribute to multiple ecosystem services. Mikoko Pamoja's interventions protect mangrove forests, which have implications for fisheries, a common-pool resource. The sale of timber would have been a private good in the absence of the project but was largely banned in Kenya. Mangroves also provide shoreline protection, which is a public good being both non-rivalrous and non-excludable to anyone in the area. The sale of carbon sequestration credits in the voluntary carbon markets can be understood as a private or club good, which drives private actors to purchase credits. The environmental and social co-benefits offered by Mikoko Pamoja attracted interest from philanthropic grant providers.

Whether an NbS initiative provides a public, common, private, or club good influences the source and type of climate finance leveraged. This was clearly illustrated in the empirical cases on the water funds in Kenya (i.e. UTNWF) and Costa Rica (i.e. Agua Tica). The threat to the availability of freshwater availability was the single biggest motivation for private actors to finance the initiative in both Kenya and Costa Rica. While the finance leveraged from the private sector was still sourced from their CSR budgets (i.e., philanthropic entities of the corporation), there was an understanding that this risk could potentially have significant impacts on the company's operations. The interventions implemented under the UTNWF also had a positive impact on broader ecosystem services, such as food production of smallholder farmers through the adoption of agroforestry activities. These efforts are potentially contribute to more sustainable supply chains, which are typically considered private goods but contribute to long-term public benefits.

Another example is Mikoko Pamoja, which leveraged multiple revenue sources and contributed to additional economic activities in the area through the provision of various ecosystem services. One of the revenue streams—the sale of carbon credits—was based on the carbon sequestration and storage ecosystem services of the project. While carbon

sequestration and storage are generally considered public goods, the ability to claim these services, combined with government policies encouraging companies to reduce emissions and offset their carbon footprint, has transformed carbon sequestration and storage into a private economic good. This has attracted payments from private actors, particularly those in Western markets.

The community living in the Mikoko Pamoja project area also benefited from the recreational, educational, and scenic ecosystem services provided by the mangrove conservation efforts. For example, ecotourism revenue was generated from the mangrove boardwalk, attracting individual tourists. Additionally, plans to establish beekeeping operations in the mangroves would leverage pollination services, which, while non-excludable, could still result in the production of private goods that benefit from the public relations advantages associated with mangrove conservation.

The empirical cases varied in the extent to which they focused on common-pool resources and private goods as the primary drivers for attracting private climate finance. Komaza concentrated on ecosystem services that would generate private goods. On the one hand, adopting a sustainable supply chain business model requires the ability to capture profit from private goods. Despite these constraints, Komaza sought to leverage additional financing through carbon sequestration claims, which can be classified a club good. Moreover, philanthropic capital supported the project's socio-economic benefits, including poverty alleviation and environmental improvements.

Similarly, in Costa Rica, the government's ability to secure multilateral finance from the World Bank Group and other international public sources (e.g., debt-for-nature swaps) was largely based on the argument that Costa Rica's natural resources constitute a public good that provides benefits the international community. Costa Rica positioned its investment in forest recovery as a contribution to global biodiversity. In other words, the world benefits when a country invests in preserving biodiversity, particularly in a nation rich in natural resources, by foregoing the extraction of natural resources. However, the domestic taxation collected by the government acknowledged that certain aspects of biodiversity preservation, as a public good, needed to be funded by the government itself.



## **8.2.5. Additional considerations**

### **8.2.5.1. Governance structures that enhance trust and accountability**

A common characteristic across the empirical cases is that they deployed governance structures that facilitated trust among all actors providing climate finance. The pre-project phase served as a critical period for setting up a structure that instilled confidence in both public and private stakeholders.

The UTNWF set up public-private partnership models that enabled them to receive climate finance from project stakeholders. Costa Rica's Agua Tica Water Fund, on the other hand, faced constraints in obtaining domestic public climate finance due to legal restrictions on public budgets contributing to private-led initiatives. Komaza adjusted its governance structure, notably transitioning from a not-for-profit to a for-profit enterprise, to obtain private climate finance from venture capital firms.

Setting up a governance structure requires technical expertise. Mikoko Pamoja benefited greatly from its project proponents' relationships with academic institutions in the United Kingdom to support in designing a governance structure that facilitates receiving private climate finance. Registration as a UK entity was pivotal in providing buyers with confidence and trust in the project's carbon credits. Moreover, the involvement of a group of international scientists, measuring and monitoring the project, added credibility to the project. Obtaining technical expertise requires financial resources to secure. The number of researchers who contributed their time to Mikoko Pamoja, pro bono, provided a significant advantage in initiating the NbS initiative.

All three empirical cases in Kenya also relied on international networks to build the technical expertise that supported in setting up governance structures capable of receiving private climate finance. For example, the UTNWF established a governance model which replicated the water fund model already designed and implemented by the TNC in other regions. The involvement of an organization with an international reputation supported the UTNWF in obtaining buy-in from corporations. Moreover, the TNC's capacity to share experience from NbS implementation in other settings reduced the transaction cost of establishing a water fund.

### 8.2.5.2. Addressing the socio-economic needs of local stakeholders as part of the climate-resilient development framework

The empirical cases in Kenya all required the support of local communities, highlighting the role of Free, Prior, and Informed Consent (FPIC) and equitable and just compensation mechanisms. This requires an understanding of the local context and the ability to adapt NbS interventions to the needs of the participating population. The cases reveal that the long-term viability of NbS projects is dependent on this foundational understanding.

The rapid emergence of voluntary carbon credits as a dominant financing instrument for NbS presents risks because current frameworks do not guarantee that proper FPIC and compensation mechanisms are in place. Approaches to FPIC seem largely voluntary and lack standardization across NbS projects. For instance, in the case of Komaza, the interviews revealed that the mechanism for distributing benefits to local communities was essentially an afterthought and did not have to be detailed until two years after approval.

*“What we’ve been seeing is—I would call them ‘Briefcase Carbon Cowboys/Cowgirls’—who are flying around, they come to communities, they distribute KSH 5,000,000 to develop the project. ‘We’ll offer you a guaranteed market price, a guaranteed price.’ It would be fixed so when carbon prices go up, which we estimate will be triple in the next few years, [communities] are not given much flexibility or wiggle room to get more returns as market prices [increases]. And there is somebody in the middle who is getting all the returns.” (Participant 102)*

The examination of climate finance sources indicates the dual nature driving private actor contributions to NbS implementation. For example, the Land Degradation Neutrality Fund, which provided a commercial loan to Komaza, required that Komaza contribute to environmental and socio-economic goals simultaneously.

Despite recognising the necessity of addressing the socio-economic needs within communities, compensation mechanisms and approaches varied. Komaza, for instance, sought to generate direct revenue for individual landowners but didn’t consider sharing revenue from the sale of voluntary carbon credits. In contrast, the other two initiatives, UTNWF and Mikoko Pamoja, operated under governance structures where an independent entity collected and distributed revenue to the community, rather than to individuals. This collective approach may be more susceptible to mismanagement, corruption, and elite capture. It also represents a different developmental model, one that does not directly contribute to individual wealth.

The approach to addressing the socio-economic needs of local stakeholders also depends on land tenure rights. For Mikoko Pamoja, a community-based approach was adopted because the project takes place on public, government-owned land, and individuals lack land tenure rights in mangrove areas. However, in the case of the UTNWF, which involves smallholder landowners, direct payments to landowners could be considered.

## **8.3. Contributions to theory and practice**

### **8.3.1. Contributions to theory**

The study makes several contributions to the theoretical understanding of private climate finance for NbS. It contributes to four areas. First, the analysis reveals the complexity of identifying the financing sources, mechanisms, and channels of deployment for NbS, highlighting the limitations of the current framework for climate finance. We can anticipate this challenge to grow as more financing mechanisms, and NbS initiatives, emerge across ecosystem types. All three empirical cases relied on financing structures that combined multiple sources and instruments. These also evolved over the course of implementation. Accordingly, an analysis into private climate finance for NbS benefits from a nuanced understanding of how the different categories within the climate finance framework interact. For instance, while Komaza's funding rounds can easily be considered venture capital, a closer examination shows that these venture capital funds also relied on public finance sources, such as development finance institutions. The study also extends the climate finance framework by showing the differentiated role that private capital plays in early compared to more advanced project phases.

Second, the study challenges the literature for oversimplifying nature a public good, and, as a result, concluding that it will continue to be financed predominantly by public sources. To the contrary, the empirical cases revealed that NbS initiatives, such as Komaza and the UTNWF, were able to leverage significant sums of private climate finance from non-state actors, even as relatively new initiatives. The motivations for private actors to contribute to NbS are diverse. The national context and project level factors shape a project's ability to leverage private finance. For instance, in Kenya, the empirical cases benefited from a relatively stable political and economic environment, supported by governance frameworks, that provided trust and accountability. Access to technical expertise and international networks further helped reduce project transaction costs. These observations suggest that developing countries with more advanced socio-economic indicators may find it easier to attract and initiate private sector NbS initiatives.

Third, the findings have implications in the context of Ostrom's work on the management of common-pool resources. The empirical cases in Kenya confirm that a decentralised polycentric governance model can attract private climate finance for NbS. While Ostrom's research focused on the interaction of local stakeholders, this study revealed that, in practice, NbS stakeholders increasingly involve public and private stakeholders at *both* local and international levels.

The thesis builds on literature examining the conditions under which private actors cooperate in natural resource management. In particular, it suggests an approach that categorises NbS according to ecosystem services and the type of economic goods they provide. This allows for a more nuanced understanding of the drivers for private actors to contribute financial resources to NbS. This approach also highlights the areas where government and public finance are likely to continue playing an important role. The analysis also confirms that successful governance of natural resources requires the participation of local communities in ways that address their broader socio-economic needs, as emphasised by the climate resilient development framework.

Finally, the existing literature treats climate finance, NbS, and the broader sustainability transition in isolation. The insight from the empirical cases demonstrates the value of examining them in an integrated manner. Private climate finance can target a range of interventions and outcomes. Although established typologies exist for NbS, they remain weak in capturing the relationships between specific financing mechanisms, the role of private finance, and how these interact with the intended outcomes of initiatives. The literature tends to use simple categories to classify NbS finance, whereas this analysis adds depth and context. The thesis builds a more comprehensive approach to examining private climate finance for NbS.

### **8.3.2. Contributions to practice**

The thesis offers practical contributions by examining the dynamics of private climate finance for NbS, with several conclusions relevant for practitioners. The empirical cases challenge the assumption that the costs associated to NbS implementation are negligible, especially in the early stages. Non-return-seeking philanthropic capital will continue to play an important role for NbS implementation in developing countries. Technical expertise and the capacity to structure climate finance, including access to international networks, give project proponents a significant advantage, particularly when the financing model has been proven effective in

other cases. Locating a project in a country with relatively sound governance and a history of channelling private finance further builds trust among international stakeholders.

Moreover, any mobilisation of private finance for NbS must take into consideration the local context, governance frameworks, as well as historical, political, and economic factors. Developing countries with limited domestic budgets are likely to remain constrained in their ability to allocate public financial resources for NbS, unless explicit policies are in place to guarantee a public revenue source, as exemplified by Costa Rica's PSA programme. In the absence of such regulation, the analytical sophistication of an NbS project in terms of its ability to identify ecosystem services and assess economic value to stakeholders will shape a private actor's willingness to provide financial source. Furthermore, the sale of carbon credits in voluntary markets can be expected to continue serving an important source of finance in countries with less developed governance systems.

#### **8.4. Limitations**

The study contains several limitations. The analysis is centred on empirical cases from a single country, Kenya. While the country-specific approach of the study enabled greater depth and detail, it made it more challenging to generalise the results to other developing countries. Moreover, differences in the structure, intervention area, objectives, and scale of the NbS made direct comparability difficult. This may also be inherent to studying NbS, given its broad terminological scope, suggesting that findings may inherently be idiosyncratic.

Comparing countries from two different regions and levels of economic development introduces additional complexities. Costa Rica, classified as an upper-middle-income country, contrasts with Kenya, which is currently categorised as a lower-middle-income country. This disparity is reflected in several socio-economic indicators, where Costa Rica surpasses Kenya on indicators such as GDP per capita, economic diversification, economic stability, education, healthcare, and the Human Development Index. Furthermore, Costa Rica's more stable governance and political environment affect NbS implementation in ways not extensively examined in this study, such as the impact of corruption and institutional development on mobilising private climate finance for NbS. These differences inherently limit the ability to draw broader generalizations from the findings.

The data was collected over multiple years, but did not constitute a longitudinal study to follow long-term changes in the financing dynamics of each NbS. This was addressed by selecting NbS cases based on the criterion that they had already existed for more than five years and were referenced by experts as 'successful' in their ability to leverage finance for

implementation. As a result, each empirical case was also at a different stage of implementation. For example, Komaza had been operating successfully for over a decade and was performing well at the start of the study. However, by the study's conclusion, it faced significant challenges and ultimately ceased operations.

The scoping study of NbS in Kenya and Costa Rica only lasted a few months and was not actively updated during the study, potentially leaving out some NbS projects. Moreover, it relied on data from expert interviews, online searches and other resources in the grey literature, which may have introduced additional bias. Challenges in identifying non-state-led NbS interventions in Costa Rica were compounded by language barriers, given limited fluency in Spanish. Moreover, projects describing themselves with the term 'NbS' are rare, in both countries. Rather, NbS projects tended to describe themselves by one primary impact area or under one ecosystem service, such as 'blue carbon' or 'water.' In Kenya, the concept of nature and NbS was more commonly used in project descriptions, whereas in Costa Rica, they tended to refer to more nuanced language around nature, such as projects providing *specific* ecosystem services, such as biodiversity or hydrological services. All of these factors likely contributed to a bias in the selection NbS cases.

The definition of NbS encompasses a broad range of ecosystems and objectives, which sometimes made it challenging to distinguish NbS efforts from conventional development initiatives such as agricultural activities (i.e. UTNWF), forestry (i.e. Komaza), and marine fisheries (i.e. Mikoko Pamoja). While this introduces additional possibility for bias, it also provides a more holistic understanding of NbS, as these initiatives are interconnected and should be considered together. Again, language may have presented a bias here. To address this, I conducted a scoping study, incorporating input from experts.

A field visit undertaken in Kenya, but not in Costa Rica, influenced the depth of information obtained from the two countries. The study focused on the analysis of empirical cases in Kenya, while a comparable number of interviews were conducted in Costa Rica to ensure a comprehensive understanding of the country's context, despite the absence of a field visit.

The study focused on documented NbS initiatives in Kenya, but it is also important to recognise that there may be potentially more that are not yet fully operational, especially those emerging between the launch of the scoping study and the writing of the dissertation. Therefore, I was unable to incorporate data on *all* NbS projects in each country, and the scoping study is not exhaustive. This should not change the results of the study as the focus was to understand the role and deployment of private climate finance in three empirical cases.

One final limitation was the absence of quantitative analysis of the financial data, which would have helped explore causal links, identify patterns, dependencies, and other contextual

relationships. This gap primarily arose from an absence of comparable data in each country and NbS case, with information often fragmented and lacking standardisation, making qualitative analyses more useful and appropriate to address the research questions.

## **8.5. Possible future research**

This thesis did not seek to prescribe private climate finance solutions for all NbS interventions. Rather, it sought to provide a starting point on understanding the dynamics of private climate finance for NbS in developing countries by studying specific cases.

The study reveals that significant data gaps continue to exist and that there are several potential areas for future research. The following list attempts to address some of the areas that others could build upon, but should not be seen as exhaustive:

- An enlarged study to cover NbS case studies in more developing countries and regions to identify patterns related to the research question and enhance the potential for generalisability of findings.
- An ecosystem-specific study of private climate finance for NbS across multiple cases studies to investigate whether certain patterns exist in the deployment of financial instruments in specific NbS intervention types (e.g. mangroves).
- A financial instrument-specific study of private climate financing for NbS (e.g. carbon or biodiversity credits) across multiple cases.
- An expansion of the scope of NbS to include broader global agreements, such as the Kunming-Montreal Biodiversity Agreement under the Convention on Biological Diversity.
- A study of the application of the model introduced in section 8.5 to specific NbS cases.
- A Longitudinal study to track climate finance for NbS over time.

## 8.6. Conclusion

Addressing global environmental challenges requires the cooperation of non-state actors. The study began with an investigation into the conceptualisation of climate finance, specifically private climate finance, and NbS under the UNFCCC, followed by a scoping study of private climate finance for NbS in Kenya. The case studies allowed for an in-depth examination of three NbS initiatives in a developing country. I found important patterns and linkages, and drew on Costa Rica's experience to help inform the findings on the case studies in Kenya. The existing literature examines climate finance, the private sector, and NbS as separate domains, and has lacked an integrated perspective—a gap that this thesis sought to begin to close.

What did this study reveal about the deployment of private climate finance for NbS in developing countries? The thesis drew on three practical NbS cases to identify the conditions under which private actors are likely to contribute financial resources to NbS. It shed light on the role that private climate finance plays for NbS, demonstrating that this is largely a function of the type of non-state actor involved and their respective motivations. These, in turn, are shaped by the ecosystem services and economic good types provided by the NbS interventions.

Private actors are not a monolithic group. Current climate finance categorisation frameworks have largely failed to reflect nuance on the dynamics of private climate finance deployment for NbS. This analysis represents a first step towards systematically examining the dimensions of private climate finance flows for NbS, as well as the interactions among climate finance sources, instruments, mechanisms and actors.

The motivations driving private *return-seeking* actors should be understood in the context of the beneficiaries of the ecosystem services and economic goods attributed to the NbS intervention. The assumption that all NbS interventions are concerned with the provision of public goods, and therefore of no interest to private actors, is incorrect. Rather, a context-specific analysis of the potential benefits of NbS, taking into consideration the national context and legislation, will indicate which types of private actors are likely to contribute financial resources. The NbS cases in Kenya showed a predisposition towards the sale of carbon credits in voluntary carbon markets as a financial instrument to generate private climate finance. However, this should not lead to the conclusion that carbon credits are the most promising financial instrument for NbS. Rather, it is evidence of a combination of factors in play, including government regulation and advances in monitoring mechanisms of carbon sequestration and storage, which make it possible for corporate actors to measure and report



against this ecosystem service. The provision of freshwater is another ecosystem service, together with carbon sequestration and storage, which is currently considered 'measurable' by private actors. It is thus unsurprising that corporate actors contributing to the UTNWF, as with other water funds, have begun to set corporate targets for water usage and replenishment through NbS, similar to carbon emissions reductions. We can expect a similar phenomenon to take place with other ecosystem services, such as biodiversity, if measurement and monitoring mechanisms for these ecosystem services become more standardised.

An examination into private climate finance for NbS in Costa Rica reveals the prominent role that the state has played in financing conservation and restoration activities in the country. The presence of strong governance, political support for NbS, and institutional capacity, worked in the country's favour. Costa Rica's experience may be less applicable in developing countries with weak governance systems or which lack an institutional history of state-led natural resource management.

While one can expect the government to continue playing a role in providing public finance for NbS, the study indicates that there are significant areas in which private climate finance can also contribute, depending on the ecosystem services and type of economic goods involved, as well as the broader regulatory context. Legislation is constantly evolving at all levels, influencing how private actors allocate their financial resources.

Ultimately, the thesis emphasises the significance of acknowledging that private interests and government positions evolve. Analysis of the conceptual development of NbS and climate finance under the UNFCCC, alongside the empirical cases in Kenya, suggests that motivations driving public and private climate finance are likely to continue changing.

# Appendices

## Appendix 2A. Overview of three NbS case studies

|                                    | Mikoko Pamoja                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             | Upper Tana-Nairobi Water Fund                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | Komaza                                                                                                                                                                                                                                                                                                                                                                                                                                   |
|------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Location</b>                    | Gazi Bay, Kenya<br>(Gazi and Makongeni villages)                                                                                                                                                                                                                                                                                                                                                                                                                                                          | Upper Tana River Basin, Kenya                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | Coastal Kenya (Kalifi, Kwale);<br>Central Kenya                                                                                                                                                                                                                                                                                                                                                                                          |
| <b>Area/Population<br/>in area</b> | 1.17 km <sup>2</sup><br>5,400 inhabitants                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | 17,000 km <sup>2</sup><br>5.3 million people                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | 70-150km <sup>2</sup><br>Approximately 20,000 farmers <sup>206</sup>                                                                                                                                                                                                                                                                                                                                                                     |
| <b>Date of inception</b>           | 2010                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | 2015                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | 2006                                                                                                                                                                                                                                                                                                                                                                                                                                     |
| <b>Description</b>                 | Mikoko Pamoja is a small-scale carbon offset facility that provides long-term incentives for mangrove restoration and protection through community engagement and participation. This is achieved through conservation activities, awareness creation, and the sale of carbon credits. Revenue generated (approx. USD24,000/annum) from the sale of carbon credits is used to support local development projects in water and sanitation, education, health, and environment conservation. <sup>207</sup> | The Upper Tana-Nairobi Water Fund aims to help farmers living upstream employ sustainable farming practices that reduce soil runoff and improve productivity while conserving and restoring the Tana River for the downstream users. <sup>208</sup> This enhances Nairobi's water supply and Kenya's hydropower generation while improving the livelihoods of the people living in the watershed area. <sup>209</sup><br><br>Water funds are based on the concept that preventing water issues at the source is more economical than dealing with them downstream. Investing in green infrastructure that utilizes natural systems to filter sediment and regulate water flow can improve results at a | Komaza is a for-profit forestry company that aims to revive the productivity of degraded lands and provide a reliable, scalable supply of high-quality, sustainable wood. Rather than purchasing land for plantations, Komaza enrolls farmers in a programme in which the latter receive seedlings from Komaza's nursery, training, and knowledge to grow trees over a seven-year period. Komaza subsequently buys the wood off farmers. |

<sup>206</sup> Source: British International Investment (n.d.), Komaza (2020)

<sup>207</sup> Source: Mikoko Pamoja (2023), Participant 106.

<sup>208</sup> Herrin (2023).

<sup>209</sup> TNC (2015).

|                             | Mikoko Pamoja                                                                                                                                                                                                                                                                                        | Upper Tana-Nairobi Water Fund                                                                                                                                    | Komaza                                                           |
|-----------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------|
|                             |                                                                                                                                                                                                                                                                                                      | lower cost than relying solely on traditional grey infrastructure (e.g., reservoirs and treatment systems).                                                      |                                                                  |
| <b>Land tenure</b>          | Mangroves are public land owned and managed by the government                                                                                                                                                                                                                                        | Private land owned by smallholder farmers living in the region                                                                                                   | Private land of smallholder farmers                              |
| <b>Legal entity</b>         | Community-based organization, not-for-profit <sup>210</sup>                                                                                                                                                                                                                                          | Public-private partnership (2011-2015) <sup>211</sup><br>Charitable Trust formed (2015-2021); Independent Kenyan-registered entity (2021-present) <sup>212</sup> | NGO (2006-2015)<br>Private company (2016-2023) <sup>213</sup>    |
| <b>Governance (current)</b> | (1) Mikoko Pamoja Community Organization (MPCO); <sup>214</sup><br>(2) Mikoko Pamoja Steering Committee (MPSG), provides technical support; <sup>215</sup> and<br>(3) Association for Coastal Ecosystem Services (ACES), a charity registered in Scotland, is the project coordinator <sup>216</sup> | Upper Tana-Nairobi Water Fund Governance Board/Steering Partners <sup>217</sup>                                                                                  | Fund<br>Project Operator (Komaza)<br>Board of Directors (Komaza) |

<sup>210</sup> Registered under the laws of the Republic of Kenya as a Community Based Organization (CBO) under the office of Gender and Social Development (ref. no

DSS/MSAMB/DN/34/2012).

<sup>211</sup> “The project started in early 2011 when the idea came to us. Because it was not until 2015 that the Upper Tana Water Fund was formed as a charitable trust. So in between 2011 to 2015, the background work [started], reaching out to potential partners, both in the public and private sector” (Participant 112).

<sup>212</sup> The UTNWF became an independent Kenyan-registered entity in September 2021.

<sup>213</sup> Source: Participant 109.

<sup>214</sup> MPCO is a Government-registered community organization that coordinates community engagement, routine project activities and benefit sharing. It is governed by volunteer office members who are village representatives from the project area. Sources: EPIC Sustainability (2020), Participant 107.

<sup>215</sup> Primarily representatives from Kenya Marine Fisheries Research Institute. Participant 107.

<sup>216</sup> Participant 107.

<sup>217</sup> The Nature Conservancy, Pentair Inc, International Centre for Tropical Agriculture, Tana and Athi Rivers Development Authority, Nairobi City Water and Sewerage Company, East Africa Breweries Ltd, Water Resources Management Authority, Kenya Electricity Generating Company, GEF, Coca-Cola, and Frigoken Ltd. Source: TNC (2022b, 2022a).

|                                              | Mikoko Pamoja                                                                                                                                                                                                   | Upper Tana-Nairobi Water Fund                                                                       | Komaza                            |
|----------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------|-----------------------------------|
| <b>Relevant legislation</b>                  | Forest Act (2006) requires that any project involving local communities in the protection of a forest resource set up a Participatory Forest Management Plan <sup>218</sup> and a User Agreement <sup>219</sup> |                                                                                                     |                                   |
| <b>International public finance partners</b> | Ecosystem Services for Poverty Alleviation (ESPA); <sup>220</sup><br>Edinburgh Napier University; <sup>221</sup>                                                                                                | Global Environment Facility (GEF);<br>International Centre for Tropical Agriculture (CIAT)          | NA                                |
| <b>International private partners</b>        | Earthwatch Institute; <sup>222</sup><br>Plan Vivo Foundation; <sup>223</sup><br>Worldwide Fund for Nature (WWF) Kenya <sup>224</sup>                                                                            | Coca-Cola Inc., Pentair Inc.,<br>Sustainable Agriculture Community Development, TNC (philanthropy), | LDH Technical Assistance Facility |

<sup>218</sup> The Forest Management Plan needs to be signed by the Kenya Forest Service.

<sup>219</sup> The User Agreement is signed between the Community Forest Association (which needs to be set up) and the Kenya Forest Service.

<sup>220</sup> ESPA was a nine-year global interdisciplinary research programme, based in the UK, that aimed to give decision-makers and natural resource users the evidence they need to address the challenges of sustainable ecosystem management and poverty reduction. Based in the United Kingdom and overseen by the Natural Environment Research Council (NERC), ESPA provided funding to KMFRI and Napier University to create the Mikoko Pamoja carbon-offset initiative. Through the ESPA grants, the researchers were able to study the potential impact of REDD+ mechanisms on the sustainable management of mangrove forests and the mitigation of climate change. Research on the mangroves is still ongoing with a current focus on exploring the feasibility of incorporating seagrass carbon into the project to broaden revenue and ecosystem services (UNDP Ecuador Initiative, 2020).

<sup>221</sup> Edinburgh Napier University is a public university based in Scotland, UK. Together with KMFRI, Edinburgh Napier University supports the progress of the Mikoko Pamoja carbon-offset initiative through various activities, including the creation of global networks and the promotion of the project to potential buyers of carbon credits. Additionally, the University investigates and reports on a variety of socioecological factors involved in the project (UNDP Equator Initiative, 2020).

<sup>222</sup> Earthwatch Institute is an international environmental charity. Starting in 2003, Earthwatch started collaborating with Edinburgh Napier University to investigate methods for rehabilitating mangroves and the corresponding marine ecosystems, as well as to assess their carbon storage capacities. Earthwatch volunteers join Mikoko Pamoja each year to set up research plots, gather data and conduct scientific analyses, and interact with the nearby community (UNDP Equator Initiative, 2020).

<sup>223</sup> The Plan Vivo Foundation is a charitable organization based in Edinburgh, Scotland (UK) that provides support to smallholders and communities seeking to manage their land and natural resources in a more sustainable manner. The foundation issues Plan Vivo Certificates (PCVs), which are recorded and tracked via the Market Environmental Registry. The organization certifies the long-term sequestration or reduction of metric tons of CO<sub>2</sub>-equivalent achieved by Mikoko Pamoja (UNDP Equator Initiative, 2020).

<sup>224</sup> WWF-Kenya is a non-governmental organization that has collaborated with Mikoko Pamoja from the beginning by raising funds and engaging with the community to promote mangrove conservation and management of natural resources. WWF has conducted training sessions to build capacity for Mikoko

|                                             | Mikoko Pamoja                                                                                                                                                                                                                  | Upper Tana-Nairobi Water Fund                                                                                                                                                                   | Komaza                                                                                                                                     |
|---------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Domestic public sector stakeholders</b>  | Kenya Forest Sector<br>Community Forest Association                                                                                                                                                                            | Tana and Athi Rivers Development Authority; Nairobi City Water and Sewerage Company; Water Resources Management Authority; Kenya Electricity Generating Company                                 | Kenya Forest Services; Kenya Wildlife Service. Kenya Forestry Research Institute; Local community elders and administrators <sup>225</sup> |
| <b>Domestic private sector stakeholders</b> | Kenya Forest Services (KFS); <sup>226</sup><br>Kenya Marine and Fisheries Research Institute (KMFRI); <sup>227</sup><br>Smallholder farmers                                                                                    | Local implementing partners: The Green Belt Movement, Kenya National Federation of Agricultural Producers, Programme, Frigoken Ltd., East Africa Breweries Ltd (regional)                       | Smallholder landowners                                                                                                                     |
| <b>Interest of public actors</b>            | Village Community:<br><i>Investment in community projects:</i><br>-Water projects<br>-Education – purchase of schoolbooks for communities, renovation of primary school classrooms<br>-Field equipment for local football team | - <i>Reduce water security risk</i> – low storage levels of water; <sup>228</sup> The river supplies 95% of Nairobi's water, and the city is growing approximately. 4% per year; <sup>229</sup> | NA                                                                                                                                         |

Pamoja and other community conservation groups, with the aim of enhancing the community's management and governance of coastal and marine resources (UNDP Equator Initiative, 2020).

<sup>225</sup> For validation of land deed.

<sup>226</sup> KFS is a governmental agency responsible for the sustainable management of Kenya's forest resources, which includes mangroves. KFS operates under the guidance of the Kenya Forest Act of 2005 and 2016 and has signed a 14 co-management agreement with Mikoko Pamoja through the Gogoni-Gazi Community Forest Association (GOGACOF), an organization that serves as the backbone of MPCO with 11 other user groups. KFS carries out frequent monitoring and forest law enforcement to improve forest management and sustainable utilization (UNDP Equator Initiative, 2020).

<sup>227</sup> KMFRI is a national research institution responsible for conducting marine and aquatic research to promote sustainable management and use of aquatic resources. KMFRI has conducted extensive research on mangroves in Gazi Bay, which served as the basis for the development of the Mikoko Pamoja carbon-offset project that utilizes mangroves as natural capital. KMFRI hosts Mikoko Pamoja and offers technical assistance, such as carbon accounting, monitoring, reporting, impact evaluation, and capacity building (UNDP Equator Initiative, 2020).

<sup>228</sup> "Now one of our challenges so far has been because of low levels of storage, because of delayed source water development in terms of conservancy—and it is something that the government is now looking at, because Nairobi's population is also growing every year" (Participant 112).

<sup>229</sup> Sources: TNC (2015), Participant 112.

|                                   | Mikoko Pamoja                                                                                                                                                                       | Upper Tana-Nairobi Water Fund                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | Komaza                                                                                                                                                                               |
|-----------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                                   |                                                                                                                                                                                     | <p><i>-Reduce government expenditures:</i> reduction of cost associated with treating water;<sup>230</sup></p> <p><i>-Reduce business/economic risk</i> – corporations may move operations if they do not have a continued supply of water;<sup>231</sup></p> <p><i>-Reduce energy risk</i> – The Upper Tana River provides 50% of the country's hydropower output;</p> <p><i>-Reduce cost of energy</i> – low quality water requires more chemicals to process, higher cost;</p> <p><i>-Reduce food security risk</i> – Region is an important source of agricultural production</p> |                                                                                                                                                                                      |
| <b>Interest of private actors</b> | Interested in the environmental and social benefits of the project. <sup>232</sup> Hence, the project benefits are measured on biodiversity, climate, and community ("triple win"). | <p><i>Corporations</i></p> <p>-Reduce risks associated to uncertain water supply for operations;</p> <p>-Reduction of operation costs (water quality);</p> <p>-Reputational risk associated to water usage quantities.</p> <p><i>Small holder farmers</i></p>                                                                                                                                                                                                                                                                                                                         | <p><i>Corporation</i> – profits and social impact;</p> <p><i>Impact investors</i> – social impact and returns;</p> <p><i>Smallholder farmers</i> – additional income generation.</p> |

<sup>230</sup> "When we have very high rainfall, we have very poor quality—or very high turbid water, let me use that term—and when we are treating that kind of water, we spend more in terms of chemicals [...]. So that you find in periods, where the water quality is very bad to be normally maybe a few months in a year, maybe three months, or four months, the cost of water treatment chemicals will double and that is in millions of shillings" (Participant 112).

<sup>231</sup> Source: Participant 102.

<sup>232</sup> "Well, you know the whole project relies in showing the three—there is none that's better than the other. It has to bring the triple win—the social has to be demonstrated and that is why even when you're reporting every year, you have to show the three. [...] You have to show that yes, you are continuing to impact our mangroves and the biodiversity that is in there and you have to show that this money we are getting is benefiting the community and at the same time the mangroves are continuing to mitigate climate change, carbon sequestration." Participant 106.

|                               | Mikoko Pamoja                                                                   | Upper Tana-Nairobi Water Fund                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | Komaza                                                                                                                                                                                                                                                                                                                                                                       |
|-------------------------------|---------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                               |                                                                                 | <ul style="list-style-type: none"> <li>-Reduce risks associated to unstable water supply and improve water quality;<sup>233</sup></li> <li>-Reduce risks to economic livelihoods by relying on new income streams (e.g. avocados).</li> </ul>                                                                                                                                                                                                                                                                      |                                                                                                                                                                                                                                                                                                                                                                              |
| <b>Financial innovation</b>   | World's first recorded blue carbon (mangrove) project.                          | First Water Fund in Africa                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | Smallholder Forestry Vehicle; microforestry model (out-grower model); Kenya's largest forestry company despite not owning any land.                                                                                                                                                                                                                                          |
| <b>Role of technology</b>     | No technological innovation                                                     | <ul style="list-style-type: none"> <li>- No technological innovation</li> <li>- However, high reliance on communication tools (mobile phones) for communicating to smallholder farmers</li> </ul>                                                                                                                                                                                                                                                                                                                  | <ul style="list-style-type: none"> <li>- Use of technology to provide real-time management of tree assets and enable a micro-forestry model to scale faster;</li> <li>- R&amp;D to determine the best seeds and site index and for planting at scale;</li> <li>- Using remote sensing and artificial intelligence pilot project for automated monitoring of farms</li> </ul> |
| <b>Innovation in approach</b> | First blue carbon crediting programme in a marine area (mangroves) in the world | <p>PPP for green infrastructure of an entire subregion (Upper Tana)<sup>234</sup></p> <p>New approaches for sustainable land management practices adopted:</p> <ul style="list-style-type: none"> <li>(i) Installation of water pans to help farmers harvest water</li> <li>(ii) Rehabilitation of the riparian buffer zone to enhance water quality</li> <li>(iii) Planting of avocado trees</li> <li>(iv) Introducing terraces and grass strips on steep slopes to reduce soil erosion from farmlands</li> </ul> |                                                                                                                                                                                                                                                                                                                                                                              |

<sup>233</sup> A high percentage of inhabitants (and farmers) in the Upper Tana region are aware of water issues (TNC, 2015).

<sup>234</sup> "Even our own government, the ministry, the key issue is about funding and funding in a structured way—not just ad hoc tree planting events or sometimes very little budget, especially on the government side. It needs to be guided in a structured way and that is one of the ways in which the Upper Tana Water Fund is pioneering in the various watersheds or basins like the Upper Tana, they have also gone to the coast to pioneer this kind of thing" (Participant 112).

|                                                                           | Mikoko Pamoja                                                                                                                                                                                                                                                                                                          | Upper Tana-Nairobi Water Fund                                                                                                                                                | Komaza                                                                                                                                                                                                                            |
|---------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Baseline study conducted</b>                                           | <p>Strong scientific/data background: Ghazi Bay has been the subject of academic studies since the 1990s.</p> <p>Baseline study includes assessments of: carbon sequestration potential, additionality, leakage potential and countermeasures, biodiversity.</p> <p>(Cost estimated at USD 250,000+)<sup>235</sup></p> | A socio-economic baseline study was undertaken by TNC in 2013 & 2014 in three priority sub-watersheds: Sagana-Guru, Thika-Chania and Maragua (Cost unclear).                 | Baseline study was undertaken in 2020 <sup>236</sup> (10 years after start of operations and primarily undertaken for the carbon credits program)                                                                                 |
| <b>Finance tracked (total, estimate)</b>                                  | USD 744,255                                                                                                                                                                                                                                                                                                            | ~USD 24.8M                                                                                                                                                                   | ~USD 57 million                                                                                                                                                                                                                   |
| <b>Public finance sources (including estimated in-kind contributions)</b> | Government grants, research grants; In-kind support: technical support from the government                                                                                                                                                                                                                             | GEF, SIDA, UNDP, county government <sup>237</sup>                                                                                                                            | FMO Bank <sup>238</sup>                                                                                                                                                                                                           |
| <b>Private finance sources</b>                                            | Voluntary donations <sup>239</sup><br>Carbon credit revenue <sup>240</sup>                                                                                                                                                                                                                                             | Private sector contributions to the UTNWF Trust                                                                                                                              | NovaStar Investments, Mirova Land Neutrality Fund; AXA Impact; Philanthropic donations                                                                                                                                            |
| <b>Financial Instrument(s)</b>                                            | <p>Primarily: Voluntary carbon market (mangroves)</p> <p>- Carbon offset finance from the private sector</p>                                                                                                                                                                                                           | <p>Primarily: Grants for payment for ecosystem service (water)</p> <p>-Public grants from multilateral agency (GEF)</p> <p>-Philanthropic grants from the private sector</p> | <p>Primarily: Finance from global capital markets for for-profit forestry corporations (timber sale)</p> <p>-Grants (philanthropy);</p> <p>-Capital instruments: (i) private equity from international venture capital firms,</p> |

<sup>235</sup> Source: Participant 106.

<sup>236</sup> Source: Participant 109.

<sup>237</sup> The county climate change funds were not operational at the time, except for Nyandarua County, which pledged USD 400,000 but has not yet submitted the funds to the project. Source: Participant 102.

<sup>238</sup> FMO is a Dutch development bank structured as a bilateral private-sector international financial institution based in the Hague, the Netherlands. It manages funds for the Ministries of Foreign Affairs and Economic Affairs of the Dutch government to maximize the development impact of private sector investments

<sup>239</sup> Source: Participant 106, 107. Minor amount of donations from individuals and private companies (e.g. Heimatlichter GmbH). Source: Participant 107.

<sup>240</sup> Participant 106



|                                                         | Mikoko Pamoja                                                    | Upper Tana-Nairobi Water Fund                                                                   | Komaza                                                                                                                                                                                                                            |
|---------------------------------------------------------|------------------------------------------------------------------|-------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                                                         |                                                                  |                                                                                                 | (ii) creditor claims (concessional donations from family offices); (iii) Debt (institutional investors, especially family offices, impact-oriented funds, development finance institutions)<br><br>Guarantee (development agency) |
| <b>Investment allocations</b>                           | USD 8,640/year <sup>241</sup>                                    | \$500/farm over three years <sup>242</sup>                                                      | Unclear                                                                                                                                                                                                                           |
| <b>Public/private climate finance</b>                   | Private (philanthropy, private buyers of credits)                | Blended finance (public/private, including philanthropy)                                        | Majority private (philanthropy and investment), some public (FMO Bank)                                                                                                                                                            |
| <b>Sources – origin. Int./national (country/region)</b> | International (Europe)                                           | International/multilateral (GEF)                                                                | International (US/Europe) <sup>243</sup>                                                                                                                                                                                          |
| <b>Sources of finance</b>                               | Primarily, carbon market revenues (also, voluntary/philanthropy) | International tax revenues (e.g. GEF) <sup>244</sup><br>Global capital markets (private sector) | Primarily, global capital markets (also voluntary/philanthropy especially in early days while NGO)<br>Carbon market revenues (2023-)                                                                                              |
| <b>Finance intermediaries</b>                           |                                                                  | Multilateral (Global Environment Facility)<br>Coca Cola and other corporations                  | Komaza Smallholder Forestry Vehicle (SPV)                                                                                                                                                                                         |
| <b>Finance channel</b>                                  | Association for Coastal Ecosystem Services (ACES) <sup>245</sup> | Upper Tana Nairobi Water Fund                                                                   | Komaza Smallholder Forestry Vehicle (SPV)                                                                                                                                                                                         |

<sup>241</sup> This is based on the information that 36% of carbon credit sales are invested into conservation activities.

<sup>242</sup> Participant 118.

<sup>243</sup> NOVASTAR Ventures, AXA Investment Managers, FMO Bank, Mirova Land Degradation Neutrality Fund (LDNF), Mitsui & Co.

<sup>244</sup> “General tax revenues generally pass through domestic public budgets before being allocated to particular objectives, such as international climate finance” Haïtes (2013, p. 19).

<sup>245</sup> Sale of carbon credits and donations are done through ACES.

|                                                         | Mikoko Pamoja                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | Upper Tana-Nairobi Water Fund                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | Komaza                                                                                                                         |
|---------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------|
| <b>Financial structure</b>                              |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | Hybrid fund consisting of (i) an endowment fund <sup>246</sup> and (ii) a revolving fund <sup>247</sup>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             | The SFV is a closed-end vehicle with a duration of 12 years, financed by debt and equity investors. <sup>248</sup>             |
| <b>Business case/financial return/revenue generated</b> | <p>Revenue generated (approx. USD25,000/annum) from the sale of carbon credits<sup>249</sup></p> <p>2,250 tons of carbon sequestered/year at a price of \$10-13 USD/ton.<sup>250</sup> Future price expected: USD 16/ton (2023).</p> <p>Revenue distribution:</p> <ul style="list-style-type: none"> <li>- <i>Restoration activities</i>: 36%</li> <li>- <i>Community development projects</i> (divided equally between the two villages): 32%</li> <li>- <i>Project coordinator</i> (ACES): 6%</li> <li>- <i>Office expenses</i>: 5%</li> <li>- <i>Community wages</i>: 21%</li> </ul> <p>Funds have been used for:</p> | <p>Baseline study indicated that a \$10 million USD investment in watershed interventions would lead to a return of \$21.5 million in economic benefits over a 30-year timeframe.<sup>253</sup></p> <p><i>Smallholder farmers</i>: Up to USD3 million per year in increased agricultural yields for smallholders and agricultural producers;</p> <p><i>Electricity provider</i>: Over USD600,000 increased annual revenue for KenGen<sup>254</sup> due to increased power generation and avoided shutdowns and spillages;</p> <p><i>Water and sewerage provider</i>: Approximately USD250,000 in cost savings a year for NCWSC stemming from avoided filtration, lowered energy</p> | Financial return expected by investors (20% IRR on underlying assets in addition to equity valuation increase); debt providers |

<sup>246</sup> An Endowment fund is defined here as a fund whose capital is invested to generate a steady annual stream of income. Only the investment interest and earnings are spent, while the principal is either maintained or increased (TNC, 2015).

<sup>247</sup> A revolving fund is defined here as one that is periodically replenished through various funding mechanisms such as fees collected and/or contributions from donors (TNC, 2015).

<sup>248</sup> "The proceeds from the investors finance the maintenance of the trees until harvest time, as well as enable the Company to scale its operations. [...] The Company buys back the tree production contracts prior to final harvest at a fair price, calculated using valuation methods agreed at initial investment. The Company is then responsible for the harvest, farmer compensation, transport, processing, and final market sales" CPIC (2022).

<sup>249</sup> Source: Participant 106.

<sup>250</sup> Source: Participant 106.

<sup>253</sup> Source: TNC (2022).

<sup>254</sup> Kenya Electricity Generating Company PLC (KenGen) is a government enterprise in Kenya charged with producing electricity for the country. KenGen is the largest electric power producer in Kenya, generating over 60% of the electricity consumed in the country.

|                                                             | Mikoko Pamoja                                                                                                                                                                                                                                                                                                                                                   | Upper Tana-Nairobi Water Fund                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | Komaza                                                                                                                                                                                                                                                            |
|-------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                                                             | <p>-<i>Water towers for fresh water provision</i> for 3,500 people<sup>251</sup></p> <p>700 schoolchildren received educational materials<sup>252</sup></p> <p>-Furniture for hospitals</p>                                                                                                                                                                     | <p>consumption, reduced sludge disposal costs and fewer shutdown days;</p> <p><i>Improved water quality</i>, with a potential decrease in waterborne pathogens, for more than 500k people.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |                                                                                                                                                                                                                                                                   |
| <p><b>Country context, challenges associated to NbS</b></p> | <p><i>Mangrove deforestation</i> in Kenya has resulted in the destruction of 20% of mangroves over the last 30 years.<sup>255</sup></p> <p>Mangroves are mainly used for provision of poles for construction and firewood.</p> <p><i>Community development challenges:</i></p> <p><i>Reduced fish stocks</i></p> <p><i>Sedimentation and climate change</i></p> | <p><i>Water Security:</i> 60% of Nairobi's residents are water insecure; serves as the primary water supply for 95% of Nairobi's population. Agricultural expansion in the basin led to increased sedimentation and soil erosion, disrupting the water supply, reducing the capacity of reservoirs, and increasing the costs for water treatment.</p> <p><i>Food security:</i> This water source drives the growth of one of the nation's biggest agricultural regions</p> <p><i>Electricity:</i> The region generates 50% of the country's hydropower. Disruptions in the water supply was causing power outages in Nairobi City.</p> <p><i>Important area for biodiversity:</i> The basin comprises areas with distinct biodiversity and renowned national parks.<sup>256</sup></p> <p><i>Climate change:</i> Changing weather patterns have lengthened dry seasons but periods of torrential rainfall remain, which causes water turbidity (i.e., decreasing water quality)</p> <p><i>Economic and Social Development:</i></p> | <p><i>Economic and Social Development:</i> The African continent faces a \$30bn wood deficit by 2030. Resilient timber and lumber supply chains</p> <p><i>Poverty:</i> Coastal Kenya is one of the poorest regions in the country</p> <p><i>Degraded land</i></p> |

<sup>251</sup> Source: ACES (n.d.).

<sup>252</sup> Source: ACES (n.d.).

<sup>255</sup> UNDP Equator Initiative (2020).

<sup>256</sup> Source: TNC (2015).

|                                                | Mikoko Pamoja                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | Upper Tana-Nairobi Water Fund                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | Komaza                                                             |
|------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------|
| <b>Legislation around challenge</b>            | A ban on mangrove deforestation has been in place since 2018 and continues to be renewed. <sup>257</sup>                                                                                                                                                                                                                                                                                                                                                                                                          | PPPs are managed under the Public Finance Management Act; Water and sanitation are under the county government's jurisdiction, not the national government                                                                                                                                                                                                                                                                                                                                                                                                       | Kenya forestry legislation permitting system.                      |
| <b>Climate scope</b>                           | Mitigation and adaptation                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | Mitigation and adaptation                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | Mitigation and adaptation                                          |
| <b>Activities</b>                              | <p><b><i>Reforestation; Avoided deforestation</i></b></p> <p>Phase one [1] is composed of 107 hectares, where we avoid deforestation and restoration. Phase two [2] is composed of 10 hectares, which is a plantation where reforestation and land protection activities are undertaken. Phase three [3] is composed of 0.4 hectares, where reforestation activities on the eroded beach area are undertaken. Employment creation – two forest scouts, project coordinator, temporary jobs during the project</p> | <p><b><i>Watershed conservation and restoration</i></b></p> <p>The Fund addresses threats to water security at their source through targeted, long-term investments in watershed conservation and management. 316 km<sup>2</sup> of riparian lands conserved; 3.6 M trees planted; 51,775 farmers implementing more sustainable land management practices; 15,595 water pans excavated and lined; 717 drip irrigation kits;<sup>258</sup> Training of farmers as Incorporation of new environmental education programme in 96 schools (approx. 35,000 youth)</p> | <p><b><i>Reforestation more sustainable land practices</i></b></p> |
| <b>Mitigation impacts (Carbon sequestered)</b> | 3,000 metric tons of CO2 per year through mangrove restoration and conservation <sup>259</sup>                                                                                                                                                                                                                                                                                                                                                                                                                    | 1.5 million tons of CO2 sequestered through agroforestry on farms <sup>260</sup>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | Unconfirmed                                                        |

<sup>257</sup> One geographical area (the Lamu area, Northern Kenya) is exempt from the ban on mangrove deforestation due to the economic dependency of the local communities. Source: Participant 106.

<sup>258</sup> Drip irrigation is a type of micro-irrigation system that allows water to drip slowly to the roots of plants. The objective is to administer water directly to the root zone, minimizing evaporation and saving water and nutrients (Anjum et al., 2023). Evidence shows farmers may not be using this technology beyond pilot projects (Belder et al., 2007; Kulecho and Weatherhead, 2006, 2005; Wanvoeke et al., 2015).

<sup>259</sup> UNDP Equator Initiative (2020).

<sup>260</sup> Carbon sequestration from 3.5 million trees planted during programme. Source: TNC (2022)

|                                                           | Mikoko Pamoja                                                                                                                                                                                                       | Upper Tana-Nairobi Water Fund                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | Komaza                                                                                                                                                                                       |
|-----------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Adaptation impacts</b>                                 | Adaptation (coastal protection; nursery habitat for fish; water purification).                                                                                                                                      | <p><i>Water quality improvement:</i> Over 50% reduction in sediment concentration in rivers<sup>261</sup> (varying by watershed and time of year), 18% decrease in annual sedimentation in Masinga reservoir,<sup>262</sup></p> <p><i>Water availability:</i> &gt;15% increase in annual water yields across the priority watersheds during the dry season.<sup>263</sup></p> <p><i>Agricultural improvements:</i> Enhanced agricultural yields for smallholder farmers and agricultural producers (up to USD 3M/year), improved land management practices</p> | Adaptation (restoration of degraded land)                                                                                                                                                    |
| <b>Other environmental benefits</b>                       | Biodiversity (nursery habitat for fish, including many species fished by the local community);<br>The brackish water in the mangroves helps reduce the salinity/acidity of the water, which avoids coral bleaching. | Biodiversity (through enhanced water quality, agroforestry, new species recorded <sup>264</sup> )                                                                                                                                                                                                                                                                                                                                                                                                                                                              | Restoration of degraded land;<br>Soil productivity through intercropping;<br>Reduced pressure on indigenous, slow-growing trees by introducing commercial forestry;<br>Biodiversity benefits |
| <b>Other socio-economic benefits by stakeholder group</b> | <i>Economic livelihoods</i> (raising income from fish, forest resources, including carbon credits, and other income-generating activities such as beekeeping and ecotourism)                                        | <p><i>Livelihoods of farmers:</i> USD 50M/year additional income;</p> <p><i>Job creation:</i> 10,000 - 17,400;</p>                                                                                                                                                                                                                                                                                                                                                                                                                                             | Income (a half-acre plot can return \$1,500 to a family).<br>Access to markets (possible future benefit) <sup>269</sup>                                                                      |

<sup>261</sup> These figures are based on expected impacts from the business case modelling exercise (TNC, 2015). Note that the figure varies by watershed and time of year.

<sup>262</sup> These figures are based on expected impacts from the business case modelling exercise (TNC, 2015).

<sup>263</sup> *Ibid.*

<sup>264</sup> 36 bio-monitoring sites recorded a 1,900 total species and three new ones (TNC, 2022).

<sup>269</sup> Komaza was exploring partnerships with large third-party buyers of agricultural inputs (e.g. cowpeas, honey, sorghum) to connect their farmers with new markets. Source: Participant 109.

|                                    | Mikoko Pamoja                                                                                                                                                                                                                     | Upper Tana-Nairobi Water Fund                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | Komaza                                                                 |
|------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------|
|                                    | <i>Improved freshwater</i> access means women spend less time looking for water and doing more meaningful, productive work; water prices go down (increased disposable income) <sup>265</sup>                                     | <i>Agricultural productivity:</i> enhanced due to soil preservation (estimated at \$3M/year after 10 years); <sup>266</sup><br><i>Access to new markets:</i> planning to link farmers' products and by-products of conservation to new markets <sup>267</sup><br><i>NCWSC municipal water supply:</i> avoided use of flocculants, avoided electricity costs, and greater water revenue from reduced use of processed water in backwashing; <sup>268</sup><br><i>KenGen's hydropower production:</i> increased power generation from increased water yield, avoided interruptions in electricity generation |                                                                        |
| <b>Public policy impacts</b>       | Mikoko Pamoja influenced the formulation of the 2017-2027 National Mangrove Ecosystem Management Plan (NMMP) shows the potential for scaling up a local community-led initiative to higher governmental and administrative levels | Unknown                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | Unknown                                                                |
| <b>NbS Intervention activities</b> | Ecological restoration approach: restoration (reforestation) revegetation (ARR); and reducing emissions from avoided deforestation and forest degradation (REDD)                                                                  | Green infrastructure <sup>270</sup> & ecological restoration: Afforestation/restoration, revegetation (ARR)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | Ecological restoration: Afforestation/restoration, revegetation (ARR); |

<sup>265</sup> Participant 106.

<sup>266</sup> TNC (2022).

<sup>267</sup> “We also try to do market linkage for their products and the by-products of conservations. For example, avocado is a by-product of the conservation—we help them to bring it to the market so that they can continue producing at the same time. Then we get the environmental benefits that we should be working for” (Participant 118).

<sup>268</sup> TNC (2015).

<sup>270</sup> This includes vegetation buffer zones along riverbanks, agroforestry, terracing of steep and very steep farmlands, reforestation of degraded lands at forest edges, grass buffer strips in farmlands, and mitigation of erosion from dirt roads.

|                                    | Mikoko Pamoja                                                                                                                                                                                                                                                                                                                                                      | Upper Tana-Nairobi Water Fund                                                                                                                                                                                                                                                                                                                                        | Komaza                                                                                                                                                                                                                                                                |
|------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Monitoring and verification</b> | 2-3x per year monitoring my local community<br>Every five years, Standard (Plan Vivo) does an audit and verification onsite <sup>271</sup>                                                                                                                                                                                                                         | Monitoring framework developed by WRMA, TNC, NCWSC, CIAT and other partners                                                                                                                                                                                                                                                                                          | VERRA for carbon credits.<br>FSC (unconfirmed)                                                                                                                                                                                                                        |
| <b>SDGs</b>                        | SDG 1 (Poverty eradication);<br>SDG 2 (Zero Hunger);<br>SDG 4 (Education);<br>SDG 5 (Gender equality);<br>SDG 6 (Clean Water & Sanitation);<br>SDG 8 (Employment);<br>SDG 10 (Reduced inequality);<br>SDG 13 (Climate Action);<br>SDG 14 (Life below water);<br>SDG 15 (Life on Land);<br>SDG 16 (Peace, Justice and Strong Institutions)<br>SDG 17 (Partnerships) | SDG 1 (Poverty eradication);<br>SDG 2 (Food security);<br>SDG 4 (Education);<br>SDG 5 (Gender equality);<br>SDG 6 (Clean Water & Sanitation);<br>SDG 8 (Employment);<br>SDG 10 (Reduced inequality);<br>SDG 13 (Climate Action);<br>SDG 14 (Life below water);<br>SDG 15 (Life on Land);<br>SDG 16 (Peace, Justice and Strong Institutions)<br>SDG 17 (Partnerships) | SDG 1 (Poverty eradication);<br>SDG 2 (Zero Hunger);<br>SDG 5 (Gender equality);<br>SDG 8 (Employment);<br>SDG 10 (Reduced inequality);<br>SDG 12 (Sustainable consumption/production)<br>SDG 13 (Climate Action);<br>SDG 15 (Life on Land);<br>SDG 17 (Partnerships) |
| <b>Participants</b>                | Village communities of Gazi and Makongeni villages (1,081 households; 5,400 local community members) <sup>272</sup>                                                                                                                                                                                                                                                | Upper Tana River Region (51,775 farmers <sup>273</sup> enrolled);<br>Downstream water users (3.8M of Nairobi's residents) <sup>274</sup>                                                                                                                                                                                                                             | Coastal Kenya and some parts of Central Kenya (36,000 farmers representing 25,000 farms) <sup>275</sup>                                                                                                                                                               |
| <b>Future plans</b>                | Inclusion of seagrass carbon into the project to expand revenues and ecosystem services <sup>276</sup>                                                                                                                                                                                                                                                             | Unknown                                                                                                                                                                                                                                                                                                                                                              | Plans to expand into neighboring markets (e.g. Ethiopia, Mozambique, Rwanda, Tanzania, Uganda) before closure                                                                                                                                                         |

<sup>271</sup> Sources: Participants 101, 106, 110.

<sup>272</sup> Source: Plan Vivo (2023); UNDP Equator Initiative (2020).

<sup>273</sup> As of June 2022 (TNC, 2022).

<sup>274</sup> The Tana River supplies 95% of Nairobi's 4 million residents with water (TNC, 2022).

<sup>275</sup> Sources: Participants 110, 107.

<sup>276</sup> Sources: UNDP Equator Initiative (2020); Participant 106.

|  | Mikoko Pamoja                                                                                                                                                                                                                                                                 | Upper Tana-Nairobi Water Fund | Komaza |
|--|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------|--------|
|  | <p>Provision of clean cooking stoves to the community to reduce the need for wood as a resource.<sup>277</sup></p> <p>Increase price per ton of carbon: Future carbon price (2023) expected at USD 16/ton which would equal USD 36,000 revenue from credits<sup>278</sup></p> |                               |        |

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<sup>277</sup> “[...] The community could get extra money because they’re conserving mangroves through using energy efficient cooking— they’re using less mangroves. So they could find out how many how much wood is being saved from using energy efficient cooking stoves. And that means they are preventing more emissions—you can calculate how much emissions are being prevented, and they could get extra [funds]” (Participant 106).

<sup>278</sup> Source: Participant 106.



## Appendix 2B. Additional information on literature review

| Spectrum of capital |                                                                              |                                                             |                                                             |                                                                                       |                                                               |                                                                                        |                                                                                   |
|---------------------|------------------------------------------------------------------------------|-------------------------------------------------------------|-------------------------------------------------------------|---------------------------------------------------------------------------------------|---------------------------------------------------------------|----------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|
|                     | Financial-only                                                               | Responsible                                                 | Sustainable                                                 |                                                                                       | Impact                                                        |                                                                                        | Impact-only                                                                       |
|                     | Delivering competitive financial returns                                     |                                                             |                                                             |                                                                                       |                                                               |                                                                                        |                                                                                   |
|                     |                                                                              | Mitigating Environmental, Social and Governance (ESG) risks |                                                             |                                                                                       |                                                               |                                                                                        |                                                                                   |
|                     |                                                                              |                                                             | Pursuing Environmental, Social and Governance opportunities |                                                                                       |                                                               |                                                                                        |                                                                                   |
|                     |                                                                              |                                                             |                                                             | Focusing on measurable high-impact solutions                                          |                                                               |                                                                                        |                                                                                   |
| Focus:              | Limited or no regard for environmental, social or governance (ESG) practices | Mitigate risky ESG practices in order to protect value      | Adopt progressive ESG practices that may enhance value      | Address societal challenges that generate competitive financial returns for investors | Address societal challenges where returns are as yet unproven | Address societal challenges that require a below-market financial return for investors | Address societal challenges that cannot generate a financial return for investors |

Source: Bridges Fund Management (2015)

## Appendix 3A. Additional information on interview participants

### **INTERVIEWS: INTERNATIONAL CLIMATE FINANCE EXPERTS**

| Level of analysis | Type of organization       | Organization                                                            | Interview count | Participant ID                              |
|-------------------|----------------------------|-------------------------------------------------------------------------|-----------------|---------------------------------------------|
| International     | International organization | UNDP Biodiversity Finance Initiative                                    | 1               | Participants No. 17, 23, 34, 52, 61, 74, 94 |
| International     | Policy think tank          | Climate Policy Initiative /                                             | 1               |                                             |
| International     | International organization | Green Climate Fund                                                      | 1               |                                             |
| International     | International organization | UNEP Finance Initiative                                                 | 1               |                                             |
| International     | International organization | Green Climate Fund Private Sector Facility                              | 1               |                                             |
| International     | International organization | United Nations Framework Convention on Climate Change                   | 1               |                                             |
| International     | Academic Institution       | Oxford Said Business School                                             | 1               |                                             |
| International     | International organization | UN Framework Convention on Climate Change Standing Committee on Finance | 1               |                                             |
| Total             |                            |                                                                         | 7               |                                             |

### **INTERVIEWS: KENYA**

| Level of analysis             | Type of organization                 | Organization                                                                                            | Interview count | Participant ID no.           |
|-------------------------------|--------------------------------------|---------------------------------------------------------------------------------------------------------|-----------------|------------------------------|
| NbS Initiative                |                                      |                                                                                                         |                 |                              |
| Mikoko Pamoja                 | Project developer, academia          | Kenya Fisheries Marine and Fisheries, Mikoko Pamoja                                                     | 6               | 101, 106, 107, 108, 132, 133 |
| Upper Tana Nairobi Water Fund | Project implementers, funders        | The Nature Conservancy, Upper Tana Nairobi Water Fund, Coca Cola, Nairobi City Water and Sewage Company | 5               | 103, 111, 112, 118, 130,     |
| Komaza                        | Project implementers, private sector | Komaza, Novastar Ventures                                                                               | 4               | 109, 110, 115, 134           |
| National and regional context |                                      |                                                                                                         |                 |                              |

|        |                                     |                                                                                                             |    |                         |
|--------|-------------------------------------|-------------------------------------------------------------------------------------------------------------|----|-------------------------|
| Policy | National and subnational government | Kenya Forest Service, Ministry of Environment, Treasury, National Environment Trust Fund, County government | 4  | 114, 116, 117, 119, 131 |
| Policy | Regional organization               | African Development Bank, The Nature Conservancy, REDD+ in Kenya                                            | 2  | 102, 103, 120           |
| Other  | International finance               | Acumen Fund                                                                                                 | 2  | 113                     |
| Total  |                                     |                                                                                                             | 23 |                         |

## **INTERVIEWS: COSTA RICA**

| Category                      | Type of organization                                | Organization                                               | Interview count | Participant ID |
|-------------------------------|-----------------------------------------------------|------------------------------------------------------------|-----------------|----------------|
| NBS Initiative                |                                                     |                                                            |                 |                |
| Water Fund                    | Project implementer                                 | Agua Tica Water Fund                                       | 1               | 222            |
| Sustainable supply chains     | Project implementer                                 | Ministry of Environment                                    | 1               | 214            |
| Carbon markets                | Project implementer                                 | Emergent, Jurisdictional REDD+                             | 1               | 215            |
| BIOTA Nexus                   | Project implementer                                 | FUNDECOR                                                   | 1               | 206            |
| Blue carbon                   | Project implementer                                 | Conservation International                                 | 1               | 216            |
| National and regional context |                                                     |                                                            |                 |                |
| National/regional             | National government                                 | Ministry of Environment                                    | 2               | 201, 207       |
|                               | International organization with local presence      | UNDP Costa Rica                                            | 2               | 203, 211       |
| National/regional             | International organization (with regional presence) | Global Environment Facility                                | 1               | 210            |
|                               |                                                     | World Bank <sup>279</sup>                                  | 1               | 220            |
|                               |                                                     | International Institute for Sustainable Development        | 1               |                |
| National/regional             | Regional organization                               | Tropical Agricultural Research and Higher Education Center | 2               | 204, 205, 217  |
| National/regional             | International finance                               | Climate Asset Management                                   | 1               | 202            |

<sup>279</sup> Views expressed by participant are personal views and not that of the organization

|       |                         |                   |    |     |
|-------|-------------------------|-------------------|----|-----|
|       | Government organization | FUNDECOR          | 1  | 218 |
|       | Government organization | FONAFIFO          | 1  | 219 |
|       | Local (not-for profit)  | Fondacion Aliarse | 1  | 208 |
| Total |                         |                   | 18 |     |

## Appendix 3B. Protocol for semi-structured interviews

*\*Sample interview questions. Interviews were tailored based on the interviewee's background and whether they provided insights on specific NbS projects or broader perspectives on climate finance at the national or international level.*

### 1. Introduction

- What does climate finance mean to you?
- Can you tell me how you think about climate finance for NbS?
- In your opinion, what are the most significant challenges associated with scaling up climate finance for NbS in developing countries?
- What are the biggest enablers and barriers for private climate finance in developing countries?
- How is climate finance conceptualised in the UNFCCC and in country [x]?

### 2. Project financing

- Walk me through how the financing for [x project/program] was developed? What was the role of different stakeholders?
- To what extent did international financing vs. domestic financing determine the private sector engagement/financing in the project?
- To what extent was the private sector involved in the project? What was the role of private climate finance in the NbS project?
- In your opinion, would the project have gone ahead without the current funding arrangement? If not, why? If yes, what would alternative funding arrangements look like?
- What are some of the areas in which the financing of NbS could be improved?
- What would encourage greater private sector engagement and financing for nature-based solutions?
- What is the economic return of the project?

### 3. International climate finance

- What do you think explains the imbalance between financial flows for climate mitigation and climate adaptation in [x country]?
- What are the primary challenges to accessing international climate finance and private international climate finance?
- What are the biggest challenges to accessing international climate adaptation finance?
- What are the biggest opportunities for mobilising and effectively channelling international climate finance in [x country]?

### 4. Domestic climate finance

- Tell me about how you think about accessing domestic finance for your projects/[insert relevant area of work].
- What are the opportunities for domestic climate finance in [country]?
- What are the opportunities for raising domestic private climate finance for climate adaptation and resilience in [x country]? How does it differ from private investments in climate mitigation?
- What are the biggest enablers and barriers?

### 5. Mobilizing private sector action through climate finance

- What are the roles and drivers of non-state, private climate finance in [x] project?
- How would you like to see developing country governments mobilise private sector climate finance?
- What are some of the obstacles impeding more private sector investment into conservation, restoration or more sustainable use of natural resources?
- How can climate finance be more effectively used as a tool to spur innovation for climate action?
- What is the role of governments in effectively mobilising climate finance and innovation?

### 6. Expanding prompts

- You mentioned \_\_\_\_\_, what do you mean by that?

- How widespread do you think this opinion is among your peers?
- How is that influenced by \_\_\_\_?
- Tell me more about \_\_\_\_?
- Do you think that is a common opinion among your peers?
- Is there anyone else you would recommend I interview?
- Are there are other themes you would like to address?

## **7. Concluding questions**

- How was it to participate in the interview?
- Were any of the questions too hard, unclear or unpleasant to answer?
- Were there any issues relating climate finance that you thought of but didn't get to talk about?
- Do you feel comfortable referring any other experts that I can interview on this topic?

## Appendix 4A. Climate finance and NbS in the UNFCCC

| Phases of international climate governance <sup>280</sup>                           | Key conferences / reports                      | Guiding principles of international climate regime as they relate to finance                                                                                                                                                                                                  | Institutional establishments                                  | Dominant policy / ideology                              | Role of public vs. private sector finance                                                                                | References to climate finance in UNFCCC                                                                                                                                              | Climate mitigation finance vs. climate adaptation finance in UNFCCC | Reference to nature-based solutions (NbS) in UNFCCC and finance for NbS                                                                                                                   |
|-------------------------------------------------------------------------------------|------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------|---------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>1970s - Mid-1980s</b><br>( <i>Consensus-based universalist decision-making</i> ) | Stockholm Conference on the Environment (1972) | - Acknowledge the right to a clean environment <sup>281</sup><br>- Precursor of concept of 'Common but Differentiated Responsibilities' (CBDR) <sup>282</sup> appeared: Primary responsibility is understood to be with developed countries<br>- Protection of global society | - CITES (1973) <sup>284</sup><br>- UNEP (1972) <sup>285</sup> | State-centred interventionist vision of economic policy | - Declaration refers to 'man, government, countries and people'<br>- Little mention of the private sector in discussions | - No explicit reference<br>- Understanding that the primary responsibility lies with developed countries to compensate developing countries for environmental damage. <sup>286</sup> | No distinction made yet.                                            | - The principles around protecting the world's natural ecosystems and ensuring that they are maintained and restored or improved emerges but no explicit reference to NbS. <sup>287</sup> |

<sup>280</sup> Defined by form of decision-making (Ciplet and Roberts, 2017).

<sup>281</sup> Man has the fundamental right to freedom, equality and adequate conditions of life, in an environment of a quality that permits a life of dignity and well-being, and he bears a solemn responsibility to protect and improve the environment for present and future generations" (UN Stockholm Declaration, 1972).

<sup>282</sup> Common but differentiated responsibilities (CBDR)

<sup>284</sup> Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES) or Washington Convention, 1973 (United Nations, 1973)

<sup>285</sup> United Nations Environment Programme (UNEP).

<sup>286</sup> Newell and Roberts (2016).

<sup>287</sup> Stockholm Declaration Principle 3 (protection of natural ecosystems) and Principle 4 (safeguarding wildlife) (Sohn, 1973).

| Phases of international climate governance <sup>280</sup>                 | Key conferences / reports                    | Guiding principles of international climate regime as they relate to finance                                                            | Institutional establishments                                                                             | Dominant policy / ideology                                                  | Role of public vs. private sector finance                                                                                                                                           | References to climate finance in UNFCCC                                                                                                                                                     | Climate mitigation finance vs. climate adaptation finance in UNFCCC | Reference to nature-based solutions (NbS) in UNFCCC and finance for NbS                                                                |
|---------------------------------------------------------------------------|----------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------|
|                                                                           |                                              | without requirement of cost-effectiveness <sup>283</sup>                                                                                |                                                                                                          |                                                                             |                                                                                                                                                                                     |                                                                                                                                                                                             |                                                                     |                                                                                                                                        |
| Mid-1980s - 1996<br><i>(Consensus-based universalist decision-making)</i> | 'Our Common Future' Brundtland Report (1987) | - Reconciliation between economic growth and environmental concerns<br>- Laid the foundation for the concept of sustainable development | - CMS (1983) <sup>288</sup><br>- IPCC (1988) <sup>289</sup><br>- Montreal Protocol (1989) <sup>290</sup> | Liberal environmentalism is introduced <sup>291</sup> but yet to take hold. | - Business must be part of the solution <sup>292</sup><br>- 'The public sector must compensate the private sector for the additional environmental and social risks' <sup>293</sup> | - No explicit reference<br>- First linking of finance and sustainability made. <sup>294</sup> 'Fair' solutions will involve substantial flows of funding from North to South <sup>295</sup> |                                                                     | - No explicit reference to NbS<br>- Recognition that sustainable land use, forestry and agriculture are important for human well-being |
|                                                                           | Rio Summit (1992)                            | - CBDR+RC <sup>296</sup> formalized into                                                                                                | - UNFCCC (1992) <sup>303</sup>                                                                           |                                                                             | - Private sector viewed with suspicion and a                                                                                                                                        | - Financial assistance to be provided to                                                                                                                                                    | - Focus is on climate mitigation as the ultimate                    | - Forest Principles adopted, providing a voluntary nonbinding                                                                          |

<sup>283</sup> Cipler and Roberts (2017). "Governments and people to exert common efforts for the preservation and improvement of the human environment, for the benefit of all the people and for their posterity" (United Nations, 1972).

<sup>288</sup> Convention on the Conservation of Migratory Species of Wild Animals, 1983 (CMS, 1983).

<sup>289</sup> UN Intergovernmental Panel on Climate Change (IPCC, 1988).

<sup>290</sup> Montreal Protocol on Substances that Deplete the Ozone Layer (1989).

<sup>291</sup> Bernstein (2002)

<sup>292</sup> Cipler and Roberts (2017); Brundtland Commission (1987); L     (1991); Newell and Roberts (2007).

<sup>293</sup> Interview with climate finance expert (Participant 17).

<sup>294</sup> The Stockholm Declaration, for instance, states that policy makers must consider, "the applicability of standards which are valid for the most advanced countries, but which may be inappropriate and of unwarranted social cost for the developing countries" Naidoo (2020).

<sup>295</sup> Newell and Roberts, 2007.

<sup>296</sup> Common but differentiated responsibilities and respective capabilities (CBDR+RC) (UNFCCC, 1992).

<sup>303</sup> UN Framework Convention on Climate Change (UNFCCC, 1992).



| Phases of international climate governance <sup>280</sup> | Key conferences / reports | Guiding principles of international climate regime as they relate to finance                                                                                                                                                                       | Institutional establishments                                                                                                              | Dominant policy / ideology | Role of public vs. private sector finance                                                                | References to climate finance in UNFCCC                                                                                                                                                                                                                                 | Climate mitigation finance vs. climate adaptation finance in UNFCCC                                                                                                                                                                | Reference to nature-based solutions (NbS) in UNFCCC and finance for NbS                                         |
|-----------------------------------------------------------|---------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------|----------------------------|----------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------|
|                                                           |                           | international law (Principle 7, Rio Declaration)<br>- Principle of 'climate equity' emerges<br>- Precautionary action principle emerges <sup>297</sup><br>- Cost-effectiveness and economic growth <sup>298</sup><br>- Developed countries to lead | - UNCBD (1993) <sup>304</sup><br>- UNCCD (1994) <sup>305</sup><br>- GEF (1991) <sup>306</sup><br>- Basel Convention (1992) <sup>307</sup> |                            | threat to environmental protection <sup>308</sup><br>- Limited room given to corporations <sup>309</sup> | vulnerable nations with 'new and additional' monies. <sup>310</sup><br>- Implied acceptance that Annex II countries provide compensation to developed countries <sup>311</sup> (i.e. climate debt) <sup>312</sup><br>- 'Polluter Pays' Principle <sup>313</sup> emerges | solution to climate change.<br>- GEF funds both mitigation and adaptation projects but with a focus on the former. <sup>314</sup><br>- Adaptation largely overlooked in part because of apprehension that it might lead nations to | agreement for the management, conservation, and sustainable development of all types of forests. <sup>317</sup> |

<sup>297</sup> UNFCCC (1992)

<sup>298</sup> The Convention text calls for policies and measures that are 'cost-effective to ensure global benefits at the lowest possible cost' (UNFCCC, 1992).

<sup>304</sup> UN Convention on Biological Diversity (CBD, 1992).

<sup>305</sup> UN Convention to Combat Desertification (UNCCD, 1992)

<sup>306</sup> Global Environment Facility (GEF, 1991)

<sup>307</sup> Basel Convention on hazardous waste (Basel Convention, 1992)

<sup>308</sup> See Principles 15 and 17 of the Rio Declaration (United Nations, 1992a)

<sup>309</sup> See Agenda 21 on Business and Industry (Maljean-Dubois and Richard, 2013).

<sup>310</sup> UNFCCC Articles 4.3 and 4.4 (UNFCCC, 1992).

<sup>311</sup> See Article 11, para. 3 (d) (Khan et al., 2020).

<sup>312</sup> The concepts of 'climate debt,' 'carbon debt,' and 'ecological debt' are based on the argument that developed countries owe developing countries a 'climate debt,' which some argue surpasses the latter's financial debts to the Global North. This calculation accounts for the Global North's disproportionate use of the atmosphere's capacity to absorb carbon without payment (Khan et al., 2020; Martinez-Alier, 2002).

<sup>313</sup> Principle 16 in the Rio Declaration (United Nations, 1992a).

<sup>314</sup> Khan et al. (2020).

<sup>317</sup> Forest Principles (United Nations, 1992c).

| Phases of international climate governance<br>280 | Key conferences / reports | Guiding principles of international climate regime as they relate to finance                                                                                                                                                                                                                                                                                           | Institutional establishments | Dominant policy / ideology | Role of public vs. private sector finance | References to climate finance in UNFCCC | Climate mitigation finance vs. climate adaptation finance in UNFCCC                                                                                                                                                               | Reference to nature-based solutions (NbS) in UNFCCC and finance for NbS |
|---------------------------------------------------|---------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------|----------------------------|-------------------------------------------|-----------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------|
|                                                   |                           | on emissions mitigation<br>- Concepts of 'climate debt', <sup>299</sup> 'carbon debt', <sup>300</sup> 'adaptation debt', <sup>301</sup> 'ecological debt' are introduced in international climate politics in the late 1990s.<br>- Distributive justice incorporated in Convention through provisions on burden sharing among industrialized countries. <sup>302</sup> |                              |                            |                                           |                                         | underemphasize mitigation. <sup>315</sup><br>- Compensatory justice for developing countries relegated to provision on insurance for most vulnerable nations presented by Alliance of Small Island States (AOSIS). <sup>316</sup> |                                                                         |

<sup>299</sup> See definition above on 'carbon debt'.

<sup>300</sup> 'Carbon debt' or 'emissions debt' are concepts to represent the fact that developed countries have used up most of the atmospheric space for carbon emissions storage and therefore should pay developing countries and 'emissions debt' to account for this inequity.

<sup>301</sup> 'Adaptation debt'

<sup>302</sup> The Convention obligates that Annex I countries 'shall' 'meet the costs of adaptation in particularly vulnerable countries (Article 4.4)' (Khan et al., 2020). See also Decision 10/7 of Convention; and Article 4:3 and 11.2 of the Kyoto Protocol.

<sup>315</sup> The UN Framework on Climate Change (1992) makes five references mostly focuses on mitigation but makes five references to adaptation (Ciplet et al., 2015; Khan et al., 2020).

<sup>316</sup> Article 4.4. Khan et al. (2020), Khan (2013)

| Phases of international climate governance<br>280                                                                 | Key conferences / reports | Guiding principles of international climate regime as they relate to finance                                                                                                                                                                                                                                                                                 | Institutional establishments                                                                                                                                                                                                                                                                              | Dominant policy / ideology                 | Role of public vs. private sector finance                                                                                                                                                                                    | References to climate finance in UNFCCC                                                                                                                                                                                         | Climate mitigation finance vs. climate adaptation finance in UNFCCC                                                                                                                          | Reference to nature-based solutions (NbS) in UNFCCC and finance for NbS                                                                                                                                                                                                                                                                                                                                                                                                                                      |
|-------------------------------------------------------------------------------------------------------------------|---------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>1997 - 2009</b><br>( <i>Inclusive multilateralism</i> , <sup>318</sup> <i>top-down compliance governance</i> ) | Kyoto Protocol (1997)     | <ul style="list-style-type: none"> <li>- International governance plays an active regulatory role but is complemented with a market approach</li> <li>- Rigid dichotomy of nations' responsibilities and capabilities (Annex I vs non-Annex I countries)</li> <li>- Developed countries are understood to be responsible for emissions reductions</li> </ul> | <ul style="list-style-type: none"> <li>- Kyoto Protocol (1997), signalling the institutionalization of a regime into a regulatory framework</li> <li>- Kyoto flexible mechanisms : (i) emissions trading, (ii) CDM,<sup>319</sup> (iii) joint implementation</li> <li>- REDD, and, later REDD+</li> </ul> | Top-down regulatory-market hybrid approach | <ul style="list-style-type: none"> <li>- Gradual turn to market-based mechanisms to mobilize private sector</li> <li>- Failure to ratify the Commission on Transnational Corporations (1970s-1990s)<sup>320</sup></li> </ul> | <ul style="list-style-type: none"> <li>- From 2000 and beyond, Least Developed Countries (LDCs), AOSIS, G77 and others began to aggressively push for remuneration of the ecological and climate debts<sup>321</sup></li> </ul> | <ul style="list-style-type: none"> <li>- Climate adaptation still not widely viewed as a core issue in negotiations, despite aggressive push from LDCs, AOSIS, G77.<sup>322</sup></li> </ul> | <ul style="list-style-type: none"> <li>- The Kyoto Protocol required that Annex I Parties report on changes in carbon sinks resulting from deforestation, reforestation, and afforestation.<sup>323</sup></li> <li>- No provisions on finance for NbS; rather, the CDM allowed a portion of emission reduction credits to come from afforestation and reforestation (A/R) projects. However, the inclusion of land use, land use change and forestry projects under the CDM was restricted to A/R</li> </ul> |

<sup>318</sup> Decision-making included all 194 Parties to the UNFCCC and required working collectively to ensure that individual states' interests were represented in the negotiated texts. However, some actors (e.g. the United States and the European Commission) held greater power and influence over other actors in the Kyoto Protocol of 1997 (Ciplet and Roberts, 2017; Levy and Newell, 2002; Meckling, 2011).

<sup>319</sup> The Kyoto Protocol's Clean Development Fund was set up to encourage private sector investment in clean energy projects a levy on which finances the fund (UNFCCC, 2025b).

<sup>320</sup> The goal of the Commission on Transnational Corporations was to formulate a code of conduct for transnational corporations. The Commission continued its work from 1970s to 1990s but was ultimately dissolved due to its inability to ratify an agreeable code of conduct resulting from disagreements between developed and developing countries (Backer, 2006).

<sup>321</sup> Roberts and Parks (2006)

<sup>322</sup> Khan et al. (2020)

<sup>323</sup> Kyoto Protocol B Article 3.3. (UNFCCC, 1997).

| Phases of international climate governance<br>280 | Key conferences / reports                                   | Guiding principles of international climate regime as they relate to finance                                                                                                                                                                                                      | Institutional establishments                                                                                                                                                                           | Dominant policy / ideology | Role of public vs. private sector finance                                                                                                                                                                                                                                                                     | References to climate finance in UNFCCC                                              | Climate mitigation finance vs. climate adaptation finance in UNFCCC                                                                                                                                                                                                                                                | Reference to nature-based solutions (NbS) in UNFCCC and finance for NbS             |
|---------------------------------------------------|-------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|
|                                                   |                                                             | - Global climate justice movement emerges<br>- Concepts around remuneration for ecological and climate debts takes hold<br>- Questions around 'fair' funding allocation criteria emerge<br>- Questions around procedural justice emerge (i.e. governance of financial mechanisms) |                                                                                                                                                                                                        |                            |                                                                                                                                                                                                                                                                                                               |                                                                                      |                                                                                                                                                                                                                                                                                                                    | projects and deforestation was not included. <sup>324</sup>                         |
|                                                   | UNFCCC Conference in Marrakesh (2001) / Johannesburg (2002) |                                                                                                                                                                                                                                                                                   | - UN Global Compact<br>- Carbon Disclosure Project<br>- Principles for Responsible Investments<br>- Adaptation Fund<br>- Least Developed Countries Fund (LDCF)<br>- Special Climate Change Fund (SCCF) |                            | - A paradigm shift takes hold as the role of the private sector comes to the fore in international fora <sup>326</sup><br>- Governments create incentives and framework to govern FDI<br>- Focus on climate finance through developing finance institutions; Public-Private Partnerships <sup>327</sup> (PPP) | Still unclear which 'vulnerable' countries should be prioritized for climate finance | - This period witnessed the laying out of infrastructures and operationalization for adaptation finance under newly established funds under UNFCCC. <sup>328</sup> First substantial packages on adaptation adopted (2001). Three Funds established. <sup>329</sup><br>- GEF begins to adopt a broader approach to | Developed states rejected the establishment of a forest fund (2001). <sup>331</sup> |

<sup>324</sup> Figuières et al. (2010)

<sup>326</sup> UN SG: "We are realizing that it is only by mobilizing the corporate sector that we can make significant progress" (United Nations, 2002).

<sup>327</sup> Public-private partnerships (PPP) "were introduced in 2002 as one of the 'tangible results' of the Johannesburg Summit for Sustainable Development" (Maljean-Dubois and Richard, 2013).

<sup>328</sup> Khan et al. (2020).

<sup>329</sup> The three Funds established through the COP7 Marrakesh Accords (2001) were the following: Least Developed Countries Fund (LDCF) and the Special Climate Change Fund (SCCF) under the Convention and the Adaptation Fund under the Kyoto Protocol (UNFCCC, 2001).

<sup>331</sup> Humphreys (2012)

| Phases of international climate governance<br>280 | Key conferences / reports        | Guiding principles of international climate regime as they relate to finance                                                                                                                        | Institutional establishments                                                                                       | Dominant policy / ideology | Role of public vs. private sector finance | References to climate finance in UNFCCC                                                                                                                                   | Climate mitigation finance vs. climate adaptation finance in UNFCCC                                                                                                                                                                                                                                | Reference to nature-based solutions (NbS) in UNFCCC and finance for NbS                                                                                                                                                                                                                                                                           |
|---------------------------------------------------|----------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------|----------------------------|-------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                                                   |                                  |                                                                                                                                                                                                     | <ul style="list-style-type: none"> <li>- Climate Investment Fund (2008)</li> <li>- Others<sup>325</sup></li> </ul> |                            |                                           |                                                                                                                                                                           | adaptation funding. <sup>330</sup>                                                                                                                                                                                                                                                                 |                                                                                                                                                                                                                                                                                                                                                   |
|                                                   | UNFCCC Conference in Bali (2007) | <ul style="list-style-type: none"> <li>- Developing countries make climate adaptation a key demand at negotiations (Bali)</li> <li>- Concept of 'Burden sharing mechanism' is introduced</li> </ul> |                                                                                                                    |                            | NA                                        | <ul style="list-style-type: none"> <li>International Blueprint on Adaptation calls for predictable and adequate funding for adaptation in vulnerable countries</li> </ul> | <ul style="list-style-type: none"> <li>- Bali Action Plan puts adaptation and finance as two of the four pillars together with mitigation and technology transfer.<sup>332</sup></li> <li>- Adaptation Fund operationalized with the GEF working as the Trustee (for LDCF and SCCF too)</li> </ul> | <ul style="list-style-type: none"> <li>- REDD becomes a stand alone mechanism at COP13 in Bali (2007)<sup>333</sup></li> <li>- REDD provided a mechanism to incentivize developing countries to reduce emissions from forest deforestation and degradation; it was an output-based payment, financed by donor countries.<sup>334</sup></li> </ul> |
|                                                   | UNFCCC Conference                | - Governance by disclosure and                                                                                                                                                                      | N/A                                                                                                                | Growing focus on           | Voluntary mitigation actions              | - Focus on quantitative                                                                                                                                                   | Civil society groups called for                                                                                                                                                                                                                                                                    | - The US \$30 billion commitment of new                                                                                                                                                                                                                                                                                                           |

<sup>325</sup> Other codes of conduct and guidelines proposed by international organizations to govern the activities of the private sector include the following: 1977 Tripartite Declaration of Principles Concerning Multinational Enterprises and Social Policy (ILO, 2001), 1980 UNCTAD Set of Multilaterally Agreed Equitable Principles and rules for the Control of Restrictive Business Practices (United Nations, 2000), the Policy and Performance Standards on Social and Environmental Sustainability of the International Finance Corporation (IFC, 2025), and the United Nations Guiding Principles on Business and Human Rights 'Protect, Respect and Remedy' (United Nations, 2011).

<sup>330</sup> The GEF began funding adaptation projects when it was established in 1993. However, the institution initially required that all funding be spent on projects that result in global public goods benefits, which has since been argued to be an impediment to adaptation projects which tend to have localized benefits (Ciplet et al., 2013; Kahn et al., 2014; Khan et al., 2020).

<sup>332</sup> Khan et al. (2020).

<sup>333</sup> Fuchs et al. (2022).

<sup>334</sup> Figuières et al., (2010).

| Phases of international climate governance<br>280 | Key conferences / reports | Guiding principles of international climate regime as they relate to finance                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | Institutional establishments | Dominant policy / ideology | Role of public vs. private sector finance | References to climate finance in UNFCCC                                                                                                                                                                                                                                        | Climate mitigation finance vs. climate adaptation finance in UNFCCC | Reference to nature-based solutions (NbS) in UNFCCC and finance for NbS                                                                                                                                                                                                                                                                                                |
|---------------------------------------------------|---------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------|----------------------------|-------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                                                   | in Copenhagen (2009)      | <p>voluntarism (pledge &amp; review introduced)</p> <ul style="list-style-type: none"> <li>- Interpretation of CBDR shifts: Responsibility is now with <u>all</u> countries, except for LDCs &amp; SIDS</li> <li>- Strong justice demands from civil society groups, but failure to achieve objective of legally binding, enforceable treaty and for wealthy countries to pay a 'climate debt'</li> <li>- Any international aid is subject to nationally appropriate mitigation actions and subject to international reporting and verification</li> </ul> |                              | market-based mechanisms    | of wealthy countries                      | <p>metrics for climate finance</p> <ul style="list-style-type: none"> <li>- Two significant pledges (2009-2010): (i) Deliver USD 30 billion in 'Fast Start' finance in three years; (ii) Scaling up international climate finance to USD \$100 billion/year by 2020</li> </ul> | innovative <i>public</i> finance mechanisms to fund adaptation.     | <p>and additional resources from developed nations encompasses support for REDD initiatives.<sup>335</sup></p> <ul style="list-style-type: none"> <li>- IUCN submits the first position paper referencing NbS, focusing on the contribution of land use and forestry sector for emissions reductions, but does not define it at COP15 (2009).<sup>336</sup></li> </ul> |

<sup>335</sup> Copenhagen Accord (UNFCCC, 2009).

<sup>336</sup> After IUCN's introduction of NbS, 'it was largely outside of the UNFCCC that a lot of progress on the conceptualisation of NbS was made (i.e. the European Commission, G7 and G20). The European Commission emphasised NbS as an urban climate solution, which may explain why the literature to date has been dominated by NbS in urban areas of developed countries. Sources: IUCN (2009); Warren (2020).

| Phases of international climate governance<br>280                          | Key conferences / reports | Guiding principles of international climate regime as they relate to finance                                                                                                                                                                                             | Institutional establishments                                                                                                                           | Dominant policy / ideology                 | Role of public vs. private sector finance                                                                                                                                                                                                                                                                  | References to climate finance in UNFCCC                                                                                                                                                                                                                        | Climate mitigation finance vs. climate adaptation finance in UNFCCC                                                                               | Reference to nature-based solutions (NbS) in UNFCCC and finance for NbS                                                                                                                                                                                                                                                                    |
|----------------------------------------------------------------------------|---------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>2010 - 2015</b><br><i>(Bottom-up, transparency-oriented mechanisms)</i> | UNFCCC in Cancun (2010)   | <ul style="list-style-type: none"> <li>- Developed countries are responsible for climate change and therefore have a responsibility to provide financial support to developing countries</li> <li>- Concepts of 'country-ownership' and 'southern-led' emerge</li> </ul> | <ul style="list-style-type: none"> <li>- Green Climate Fund</li> <li>- UNFCCC Standing Committee on Finance (SCF) established<sup>337</sup></li> </ul> | Growing focus on market-based mechanisms   | <ul style="list-style-type: none"> <li>- Failure to reach public finance commitment by nations</li> <li>- Absence of innovative <i>public</i> finance mechanisms for adaptation</li> <li>- Focus on developing market-based policies and mechanisms (e.g. green bonds, impact investments, CSR)</li> </ul> | <ul style="list-style-type: none"> <li>- Climate finance should be 'new and additional' to existing development aid</li> <li>- Climate finance to developing countries should aim to slow, halt, reverse forest cover and carbon loss<sup>338</sup></li> </ul> | Prioritization of adaptation finance for the 'most vulnerable developing countries', specifically mentioning LDCs, SIDS and Africa <sup>339</sup> | <ul style="list-style-type: none"> <li>-The plus in REDD+ emerges in the Cancun Agreements (Reducing Emissions from Deforestation and Forest Degradation, Plus Conservation of Forest Carbon Stocks, Sustainable Management of Forests, and Enhancement of Forest Carbon Stocks)<sup>340</sup></li> <li>-The GCF includes REDD+</li> </ul> |
|                                                                            | Paris Agreement (2015) /  | - Pledge and review principles institutionalized through INDCs                                                                                                                                                                                                           | Bilateralism and multilateral partnerships                                                                                                             | Neoliberalism in climate policy takes hold | - Deemphasizing of public responsibility in favour of a focus                                                                                                                                                                                                                                              | - Climate finance annual target of \$100bn to increase by 2025                                                                                                                                                                                                 | - Adaptation finance gap becomes increasingly                                                                                                     | The Paris Agreement marked a critical point for REDD+. It recognizes the role of                                                                                                                                                                                                                                                           |

<sup>337</sup> The Standing Committee of Finance (SCF) was established at COP 16. At COP 21, in line with decision 1/CP.21, paragraph 63, it was decided that the SCF will serve the Paris Agreement in line with its functions and responsibilities established under the COP. The SCF meets at least twice a year (UNFCCC, 2025c). The Standing Committee on Finance advises the COP on financial matters related to climate change, monitoring and assessing the provision of funds to developing countries. It coordinates, with the objective of enhancing, the effectiveness of the financial mechanisms under the UNFCCC, conducting biennial assessments of climate finance flows.

<sup>338</sup> UNFCCC COP 16 (Cancun), 2010: "...In the context of provision of adequate and predictable support to developing country Parties, Parties should collectively aim to slow, halt and reverse forest cover and carbon loss according to national circumstances, consistent with the ultimate objective of the Convention, as stated in its Article 2" (UNFCCC, 2010b). This language appears again in UNFCCC Decision 9/CP.19 and the Sharm el Sheikh Implementation Plan (UNFCCC, 2022c).

<sup>339</sup> UNFCCC COP16 (Cancun), 2010: para. 8 (UNFCCC, 2010b).

<sup>340</sup> Fuchs et al. (2022).

| Phases of international climate governance<br>280 | Key conferences / reports                                     | Guiding principles of international climate regime as they relate to finance                                                                                                                                                                                                                                                                                                                                                    | Institutional establishments                            | Dominant policy / ideology | Role of public vs. private sector finance                                                                                                                                                                                                                                                                                                                                                                                                               | References to climate finance in UNFCCC                                                                                                                                                                                                                                                                                                                                                                           | Climate mitigation finance vs. climate adaptation finance in UNFCCC                                        | Reference to nature-based solutions (NbS) in UNFCCC and finance for NbS                                                                                            |
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|                                                   | Addis Ababa Action Agenda on Financing for Development (2015) | <ul style="list-style-type: none"> <li>- Shift in interpretation of CBDR:<sup>341</sup></li> <li>- 'everyone is responsible'</li> <li>- Universalism of expectation that most nations make contributions</li> <li>- Departure from principles of distributive justice and equity<sup>342</sup></li> <li>- Three groups of countries:<sup>343</sup> Developed, developing, and least developed countries (LDCs)/small</li> </ul> | authorized <sup>348</sup> and increasingly common place |                            | <ul style="list-style-type: none"> <li>on markets and private sector to solve collective problems<sup>349</sup></li> <li>- Growing focus on how to effectively leverage private sector to engage on climate change</li> <li>- Continued marketization of environmental issues: <ul style="list-style-type: none"> <li>- Incentives for markets and investors to 'shift the trillions'</li> <li>- Finance reductive to managerial</li> </ul> </li> </ul> | <ul style="list-style-type: none"> <li>- No new concrete climate finance pledges</li> <li>- Ambiguity reintroduced around which nations are responsible for climate finance and concept of additionality</li> <li>- Climate finance for climate change 'loss and damage' watered down<sup>350</sup></li> <li>- Binding for nations to report their actions and levels of finance support<sup>351</sup></li> </ul> | evident (approximately only 10% of climate finance flows are estimated to be in adaptation) <sup>352</sup> | forests for climate mitigation and gave new impetus to international efforts to halt deforestation and degradation, and support forest restoration. <sup>353</sup> |

<sup>341</sup> Pauw (2019).

<sup>342</sup> Some distributive justice language is provided in the (non-binding) Preamble of the Agreement. However, there is a lack of institutional constructs that encourage distributive justice in practice (Ciplet and Roberts, 2017).

<sup>343</sup> This replaces the Annexes in the Kyoto Protocol which specifies the responsibilities and capabilities of each country (Annex I and II).

<sup>348</sup> States are allowed to form their own alliances of voluntary cooperation in NDC implementation. See article 6 of Paris Agreement (Ciplet and Roberts, 2017).

<sup>349</sup> Ciplet et al. (2018)

<sup>350</sup> The critical issue of 'loss of damage' from climate change impacts that cannot be adapted to has been watered down with the explicit language in the Decision text that the measure 'does not involve or provide a basis for any liability and compensation (CP.21 Decision 51 (Ciplet and Roberts, 2017)).

<sup>351</sup> CP.21.13 (UNFCCC, 2015b)

<sup>352</sup> Buchner et al. (2021)

<sup>353</sup> Fuchs et al. (2022)



| Phases of international climate governance<br>280 | Key conferences / reports | Guiding principles of international climate regime as they relate to finance                                                                                                                                                                                                                                                                                                                 | Institutional establishments | Dominant policy / ideology | Role of public vs. private sector finance | References to climate finance in UNFCCC                                                   | Climate mitigation finance vs. climate adaptation finance in UNFCCC | Reference to nature-based solutions (NbS) in UNFCCC and finance for NbS |
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|                                                   |                           | <p>island developing states (SIDs)</p> <p>- Thus far, reporting by developed countries has been 'partial and obfuscatory'<sup>344</sup></p> <p>- Finance flows should be <i>consistent</i><sup>345</sup> and <i>integrated</i>,<sup>346</sup> implying both a qualitative and quantitative role for the financial system in the shift to a new sustainable economic system<sup>347</sup></p> |                              |                            | quantified and market-based measures      | - Transparency framework for developing countries to report on financial support received |                                                                     |                                                                         |

<sup>344</sup> Ciplet (2017), Neufeldt et al. (2021), Weikmans and Roberts (2019).

<sup>345</sup> Making finance flows consistent with low emission, climate-resilient development was one of the main objectives of the Paris Agreement (Naidoo, 2020).

<sup>346</sup> Integrating sustainability into trade and finance flows emerged out of the Addis Ababa Action Agenda on Financing for Development and the 2015 SDGs (Naidoo, 2020).

<sup>347</sup> Naidoo (2020).

| Phases of international climate governance<br>280                                                                | Key conferences / reports | Guiding principles of international climate regime as they relate to finance                                                                                                                                                                                       | Institutional establishments                                                                                                                                                                                                 | Dominant policy / ideology | Role of public vs. private sector finance                                                                                                                                                                                                                                                         | References to climate finance in UNFCCC                                                                                                                                                                                                                                                                                                                                                                                                     | Climate mitigation finance vs. climate adaptation finance in UNFCCC                                                                                                                                                   | Reference to nature-based solutions (NbS) in UNFCCC and finance for NbS                                                                                                                                                                                                                                                                |
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| <b>2015 - Present</b><br><i>(Transparency-oriented mechanisms. Intensified multilateralism and bilateralism)</i> | Glasgow (2021)            | <ul style="list-style-type: none"> <li>- Economy-wide transformation</li> <li>- Alignment of finance sector with net-zero 2050 pathway</li> <li>- Information-sharing and mutual accountability<sup>354</sup></li> <li>- Focus on sectoral partnerships</li> </ul> | <ul style="list-style-type: none"> <li>- Emergence of private climate and nature funds (e.g. Bezos Earth Fund; ALTERRA Fund)</li> <li>- Failure to establish new 'loss and damages' fund for vulnerable countries</li> </ul> |                            | <ul style="list-style-type: none"> <li>- Concept of public sector's responsibility to create an 'enabling environment' emerges</li> <li>- New finance pledges combine public and private climate finance actors (e.g. LEAF Partnership for tropical forest conservation)<sup>355</sup></li> </ul> | <ul style="list-style-type: none"> <li>- Failure to reach \$100 bn annual target by 2020<sup>356</sup></li> <li>- New collective climate finance goal to be agreed by 2025 (starting from USD 100 bn per year)</li> <li>- Launch of new work programme to reach Collective Quantified Goal by COP29 in 2024.<sup>357</sup></li> <li>- Mobilization of new finance for sectoral partnerships</li> <li>- Financial commitments for</li> </ul> | <ul style="list-style-type: none"> <li>- Commitment to at least double funding for adaptation by 2025</li> <li>- Recognition of the rising costs of losses and damage in developing countries (adaptation)</li> </ul> | <ul style="list-style-type: none"> <li>- Glasgow Climate Pact omitted NbS language in the last hours of negotiations, but adopted the Glasgow Leaders Declaration on Forests and Land Use<sup>359</sup> in the sidelines of the conference. The Declaration is underpinned with pledges for forest-related climate finance.</li> </ul> |

<sup>354</sup> Van Asselt et al. (2016), Gupta and Asselt (2019).

<sup>355</sup> The LEAF (Lowering Emissions by Accelerating Forest Finance) Coalition was announced at COP26 (Glasgow) that it has mobilized \$1 billion for countries and states committed to increasing ambition to protect tropical and sub-tropical forest conservation commensurate with the scale of the climate change challenge (Emergent, 2021).

<sup>356</sup> The OECD estimated that total international climate finance reached USD 80.4 billion in 2019; USD 83.3 billion 2020; USD 89.6 billion in 2021 (OECD, 2020a, 2023a).

<sup>357</sup> UNFCCC COP26 launched a work programme to negotiate a so-called 'New Collective Quantified Goal' (NCQG) by COP29 in 2024. The work programme includes the organization of technical expert dialogues, annual reports and consultations with stakeholders to determine the needs of developing countries based on science-based assessments (UNFCCC, 2023).

<sup>359</sup> The agreement was signed by 142 governments and included countries with major tropical forests (e.g. Brazil, the Democratic Republic of Congo), which, together, accounted for more than 90% of the global forest area).

| Phases of international climate governance <sup>280</sup> | Key conferences / reports            | Guiding principles of international climate regime as they relate to finance | Institutional establishments | Dominant policy / ideology | Role of public vs. private sector finance | References to climate finance in UNFCCC                                                                                                                                        | Climate mitigation finance vs. climate adaptation finance in UNFCCC                       | Reference to nature-based solutions (NbS) in UNFCCC and finance for NbS                                                                                                                                                                                                    |
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|                                                           |                                      |                                                                              |                              |                            |                                           | nature positive pathway <sup>358</sup><br>- Multilateral Development Banks (MDBs) pledge to mainstream nature into investments                                                 |                                                                                           |                                                                                                                                                                                                                                                                            |
|                                                           | Sharm El Sheikh (2022); Dubai (2023) |                                                                              |                              |                            |                                           | -The UAE announces \$30B fund to mobilize \$250B<br>- OECD claims it has reached the \$100 billion annual climate finance goal, two years after the 2020 target <sup>360</sup> | Loss and Damage Fund \$500M, initially to be housed at World Bank, to be launched in 2024 | - NbS included within a COP decision for the first time, encouraging countries to use it as an approach for mitigation and adaptation, <sup>361</sup> but focused on forests.<br>- NbS definition adopted in UNEA and UNFCCC COP28<br>-CBD COP 15 agrees to raise \$200 bn |

<sup>358</sup> \$20 billion of public and private finance was pledged towards forest and land use at COP26 (Glasgow). Multilateral development banks announced a commitment to mainstreaming nature into their investments and policy dialogues with countries (UNFCCC, 2022d, 2021).

<sup>360</sup> OECD (2023a).

<sup>361</sup> "Encourages Parties to consider, as appropriate, nature-based solutions or ecosystem-based approaches, taking into consideration United Nations Environment Assembly resolution 5/5,31 for their mitigation and adaptation action while ensuring relevant social and environmental safeguards" (UNFCCC CP.27 Sharm el-Sheikh Implementation Plan, XIV. Forest) (UNFCCC, 2022c).

| Phases of international climate governance<br>280 | Key conferences / reports | Guiding principles of international climate regime as they relate to finance | Institutional establishments | Dominant policy / ideology | Role of public vs. private sector finance | References to climate finance in UNFCCC | Climate mitigation finance vs. climate adaptation finance in UNFCCC | Reference to nature-based solutions (NbS) in UNFCCC and finance for NbS |
|---------------------------------------------------|---------------------------|------------------------------------------------------------------------------|------------------------------|----------------------------|-------------------------------------------|-----------------------------------------|---------------------------------------------------------------------|-------------------------------------------------------------------------|
|                                                   |                           |                                                                              |                              |                            |                                           |                                         |                                                                     | annually for biodiversity                                               |

## Appendix 4B. Additionality attributes referenced by international climate and development finance institutions

| Attribute of additionality                                                                         | UNFCCC Clean Development Mechanism (CDM) | UNFCCC Joint Implementation (JI) | International financial institutions (IFIS) | Multilateral development banks (MDBs) | GEF | GCF | GCF Investment Criteria Scorecard V2 |
|----------------------------------------------------------------------------------------------------|------------------------------------------|----------------------------------|---------------------------------------------|---------------------------------------|-----|-----|--------------------------------------|
| Project activity (technology) is a <b>first of its kind</b>                                        | X                                        | X                                |                                             |                                       | X   | X   | X                                    |
| Define <b>alternatives</b> to the project activity                                                 | X                                        | X                                |                                             |                                       |     | X   |                                      |
| Project activity faces <b>barriers</b> that prevent it from happening without concessional support | X                                        | X                                | X                                           | X                                     | X   | X   | X                                    |
| Project activity is <b>not</b> regarded as ' <b>common practice</b> ' (includes element of [1])    | X                                        | X                                |                                             |                                       | X   | X   | X                                    |
| <b>Investment baseline</b> identified based on conservative assumptions                            | X                                        | X                                |                                             |                                       |     | X   | X                                    |
| Project activity in <b>lower income</b> country                                                    |                                          |                                  | X                                           |                                       |     | X   |                                      |
| Project activity includes <b>knowledge transfer</b> that enables development outcomes              |                                          |                                  | X                                           | X                                     | X   | X   | X                                    |
| Project activity involves <b>innovative financing structures</b>                                   |                                          |                                  |                                             | X                                     |     | X   |                                      |
| Project activity enables <b>resource mobilization</b>                                              |                                          |                                  |                                             | X                                     | X   |     | X                                    |
| Project activity enables <b>regulatory change</b>                                                  |                                          |                                  |                                             | X                                     | X   |     | X                                    |
| Project activity promotes adoption of <b>higher environmental and social standards</b>             |                                          |                                  |                                             | X                                     | X   |     |                                      |

Source: GCF (2023d, pp. 3–4)

## Appendix 4C. Private climate finance for climate action in developing countries

| No.  | Themes                                                                                                                                              | Sample quote                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
|------|-----------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 1.a. | <b>Achieving the net-zero transition requires significant private sector contribution</b>                                                           | <p><i>"It's clear from what we are seeing, at least from our perspective, that in terms of financing and mere number of investments, the majority of investment need to be done by the private sector—so that's absolutely unquestionable in my opinion, but the governments need to do something to enable this kind of investments, so obviously proportionate but they need to make their part yes."</i> (Participant 52)</p> <p><i>"Public sector funding is not going to take you all the way. In fact, will be a very small portion and hence saying 'let's ramp that up'—you know it's not happening. [...] The commitments that are coming in [are] very tiny. And hence you know you need to get private sector involved, otherwise you know there isn't enough funding for anything."</i> (Participant 34)</p>                                                                                                                                                                                                |
| 1.b. | <b>Governments focus on private climate finance as a way to relieve pressure to deliver on the \$ 100 billion annual pledge from public budgets</b> | <p><i>"And the problem is that now [there is a] very blurry kind of responsibility. Who has to transfer that [money]? [Is it] the private sector or the public sector? And that is creating ...a distortion in terms of their responsibilities that countries have. Because, first, now we know that \$100 billion is not enough and, second, because what the Paris Agreement is telling us is that even if you transfer the \$100 billion, the ultimate goal is the consistency of financial flows to the greenhouse gas emissions pathway."</i> (Participant 74)</p> <p><i>"I do understand that government's own budgets are constrained and there needs to be a general perception that if we want to take above the climate and biodiversity crisis, we need to step away from a purely a public funding driven model to tackle these issues because they need to be hardwired in the economy."</i> (Participant 23)</p>                                                                                          |
| 1.c. | <b>Shift towards greater awareness of nature and biodiversity</b>                                                                                   | <p><i>"I think globally the awareness of biodiversity in the private sector and the finance sector has shifted massively like in the last three years which means the awareness within governments that we work with has changed, awareness even within our [...] teams in the countries has changed. The appetite from the private [...] and finance sector[s] to engage with these sorts of things is shifting and we hope it will shift more."</i> (Participant 94)</p> <p><i>"Well certainly I can say there's a lot of focus on nature right now in a surprising way [...]. I'm always surprised to see that the world is waking up to the importance of nature in 2021. I think it was pretty clear even before that if you cut a tree that releases CO2 in the atmosphere that contributes to a series of other negative impacts."</i> (Participant 52)</p>                                                                                                                                                      |
| 1.d  | <b>The shift in attention towards the private sector acknowledges the role businesses have played on climate change and biodiversity loss</b>       | <p><i>"You know 70% of emissions coming from the top 100 companies [...] so then they're also responsible for the action, right? And I think that is becoming a big narrative—if you're causing [harm], you have to find those solutions as well—it shouldn't [just] be pushed onto the government sector. There is a sense of responsibility. [...] It's also saying you [are] responsible for operating [and] you're profiting from these [natural] resources. It's [about] bringing back that accountability."</i> (Participant 34)</p> <p><i>"So I think it has evolved. I think there is now a growing understanding by [...] more and more people that the degree to which the financial sector needs to be part of the solution, and the wider private sector, [and] needs to be better reflected in policy. And, also, I think being clear between countries as what is the actual share of public money out of the 100 billion that's going to be made available on an annual basis."</i> (Participant 23)</p> |
| 1.e  | <b>Governments' shifting attention towards the private sector is driven by a neoliberal agenda</b>                                                  | <p><i>"I think that climate change has been weaponized and monetized by that word 'opportunity.' [...] I declare the fact that this is a strong neo-liberal agenda behind the framing of risk and opportunity. If you look at [...] sustainable finance frameworks [...], they [are] all about [how] the reserve banks are going to face a whole lot of risk, but then the investment banks are going to have a fantastic opportunity. [...] To do what? To make money? Is that going to contribute to a good wholesome holistic world?"</i> (Participant 17)</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
| 1.f  | <b>There is a need for regulation; incentives</b>                                                                                                   | <p><i>"Just working on the carrot by crowding in private climate finance is just too loose, it won't work. It will work with some [business] leaders, but it won't</i></p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |

|     |                                                                                                                                                           |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
|-----|-----------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|     | <b>to encourage the private sector are insufficient</b>                                                                                                   | <i>work for the wider sector. [...] You still need strong laws and regulations that. That basically force the wider sector to move, and I think that would be true for all countries around the world.” (Participant 23)</i>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
| 1.g | <b>Private actors are seeking high returns on investment; opportunities in the renewable energy sector address this demand but are less clear for NbS</b> | <i>“When they look at climate projects, there’s a lot of space where they can make good money by investing in good climate stuff—there’s like a real profit to be made. And then there’s ‘do no harm’ investments that [...] development banks can fund. In the biodiversity space, it’s not weighed the same—it’s more of a public good that is probably not going to generate revenue. [...] What they’re saying is we need to put more emphasis in the biodiversity space, we need to put more emphasis on reducing harm, rather than how do we make money out of investing in biodiversity. We know there are ways we can—absolutely, but it’s not near the scale of investing in wind farms and solar panels [...].” (Participant 94)</i>                                                                                                                                              |
| 1.h | <b>The development of NbS projects remains a challenge for the private sector (supply-side)</b>                                                           | <i>“The private sector will only come in when they have demonstratable scalable project. And that’s a big challenge. So the project ideation becomes really important. What are the projects that you can develop and design that would be attractive for private sector?” (Participant 34)</i><br><br><i>“The bottleneck is on the limited availability of projects that banks can finance. And, on the other hand, the limited willingness from investors and banks to finance business models that have limited track records where repayment periods are too long. Therefore, the needs often of some form of risk mitigation through guarantee.” (Participant 23)</i>                                                                                                                                                                                                                  |
| 1.i | <b>Corporate buy-in for nature is needed</b>                                                                                                              | <i>“The fate of biodiversity is decided in boardrooms of big corporations, and not just by ministries of environment, but also other ministries that have often a bigger impact on it like mining, agriculture, finance etc.” (Participant 23)</i>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
| 1.j | <b>Options for channelling private climate finance for nature is limited by options</b>                                                                   | <i>“[There is a] distinction that needs to be made here. [1] One, it’s pure conservation finance—finance that uses conservation as the main source of revenue from tourism or the sale of carbon credits or other forms [of finance]; [2] the other is basically greening finance by building in positive climate and biodiversity targets when financing different types of say agricultural commodities, forestry or other sectors [where] conservation or climate is not the key focus—the key focus is the revenue generated from the sale of cocoa for example. But you’re trying to finance it in a different way that is not in a similar destructive way as it’s been in the past and the present. In my view, the latter has more potential for scale simply because what is reflected in a market economy is the products that we consume on a daily basis.” (Participant 23)</i> |
| 1.k | <b>Private sector focuses on mitigation over adaptation</b>                                                                                               | <i>“Inevitably, if you start with the economics rather than the ownership, you know [for] mitigation [...] there’s a relatively straightforward economic argument why that makes sense from a private sector [perspective]. [...] [...] Developing countries are very keen, of course, rightly, to demand bigger flows in adaptation funding. And you might argue that we should include private sector funding. Easy to say, hard to do so. We have some. [...] The predominant share of the [GCF] portfolio today is mitigation.” (Participant 61)</i>                                                                                                                                                                                                                                                                                                                                    |

## Appendix 4D. Barriers and enablers for accessing international climate finance in developing countries

| Category                                                  | Themes                                                                                                                                  | Description / Quote                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
|-----------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Access to and allocation of international climate finance | Small countries are not accessing GCF funds                                                                                             | “Okay, I will give you the money as long as you have the system to monitor how much you are going to manage this money.” But that’s why small countries are not accessing to the GCF, because it’s too tough--it’s too difficult.” (Participant 74)                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
|                                                           | Accessing international climate finance is contingent on national monitoring and review capability                                      |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
|                                                           | National capacity is a major bottleneck to accessing international climate finance                                                      | “The reason is that there is low capacity—developing and creating high-class, high-level climate projects in developing countries is difficult, especially the ones that can get funded.” (Participant 34)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
|                                                           | The majority of international funds go through international intermediary institutions to fill the capabilities gap                     | “Most of the money is actually going through international organizations, so [the GCF] is not meeting its core objective of developing [countries] getting access to direct entities.” (Participant 34)<br>“On the other hand, you know many, many of the international entities have those capabilities.” (Participant 34)                                                                                                                                                                                                                                                                                                                                                                                       |
|                                                           | Ensuring country ownership remains a key challenge                                                                                      | “Accredited entities are meant to ensure that funding can reach the ground while reducing the transaction costs for multilateral entities.” (Participant 17)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
|                                                           | Operational challenges for developing countries to work with multilateral agencies                                                      | “You know the physical distance itself is a challenge. Language itself is a barrier. You know. How do you communicate to many developing countries that don’t have English as a first language? [...] Those smaller things can also add up in creating this expectation gap, so it’s just adding more and more [over] time becoming challenging for distant countries to access funding.” (Participant 34)                                                                                                                                                                                                                                                                                                        |
|                                                           | Effectiveness of international climate finance is not always clear                                                                      | “From a GCF perspective, they have to spend [the] money—they’re on this timeline as well. They have five years and then they want to replenish that money. They want to show that they have actually utilized the money, so it’s a classic case of you know, pushing money, but they [don’t] have the right vehicles or right mechanisms to push that money down so it’s again the whole skew is going towards international entity. So one of the big questions is—is this new if it’s reinforcing the same models? Is this really transformational?” (Participant 34)                                                                                                                                           |
|                                                           | International climate finance structure is perpetuating low national level capacity                                                     | “The right capacity doesn’t exist in places where it’s required and it doesn’t seem that it will exist because more and more projects are going towards international organizations.” (Participant 34)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
|                                                           | Domestic politics and power dynamics affect access to international climate finance                                                     | “Then there is also a dynamic within the country about who is controlling the flow of climate finance into the country. We had situations in the GCF, in meetings, our boss at the Africa workshop, he got mad and said to all of the NDAs, ‘if any of you end up being gatekeepers to GCF funding, we will fire you as the NDA.’ It was a highly politically incorrect thing for him to say, but because he was an ex-minister of The Gambia, he could pull it off and say it. He was he was lived because some countries—some ministries—were seeing the fact that [because] they had the engagement portfolio with the GCF, they were using that as a basis for whatever control mechanisms.” (Participant 17) |
|                                                           | Financial instruments, such as guarantee and impact funds, are used in international climate finance to reduce the risk of NbS projects | “A guarantee fund that aims at basically providing guarantees for long term lending with Rabobank FMO and we hope to involve other finance institutions, so that’s more the lending site—a guarantee as a vehicle or solution to enable a bank to issue loans they would otherwise not do.<br>The second [instrument] is on private equity, so we’ve set up a fund that reduces the cost for either setting up a new fund or develop a pipeline of bankable projects by covering up to 50% of these costs. But these are reimbursable grants. So if the private equity investor is successful in either closing a fund or closing a deal, they have to pay                                                        |



| Category                                                | Themes                                                                                                                                                               | Description / Quote                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
|---------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                                                         |                                                                                                                                                                      | <i>back the money to us so we can reuse it. But it's without interest. We've helped capitalize a novel Impact Fund and we have a fund in Indonesia that's called the Tropical Landscape Finance facility. So all of these are examples that I hope will lead to some successes and then basically use those concrete examples to then entice others to follow suit."</i> (Participant 23)                                                                                                                                           |
|                                                         | <b>Climate and nature (biodiversity) are treated as separate issues, and hinders the mobilization of finance for NbS</b>                                             | <i>"I think they're too separate at the moment. I think even within UNEP we could do a better job. [...] It really seems that you either focus on one or the other and you don't account for the similarities or the need for synergy basically."</i> (Participant 23)                                                                                                                                                                                                                                                              |
| <b>International development finance</b>                | <b>The power dynamic in international aid is replicated in climate finance</b>                                                                                       | <i>"There is a power dynamic, there is a political economy of what development finance has done to developing countries, putting them in a mindset that... we don't engage strategically with the funding coming in."</i> (Participant 17)                                                                                                                                                                                                                                                                                          |
|                                                         | <b>Piecemeal project-based approach to development aid disbursement</b>                                                                                              | <i>"But remember, the vast majority of [GCF] funding is not policy related or regulation related—it is to fund the projects themselves."</i> (Participant 61)                                                                                                                                                                                                                                                                                                                                                                       |
|                                                         | <b>A country's capacity to assert its independence in the face of external donors depends on historical interactions and engagements with development assistance</b> | <i>"[...] Not every country is empowered to do that, you see, so it depends in some way on the relationship individual countries have with development assistance more broadly. The mobilization and the use of climate finance seems to be a little bit a function of those kinds [of] historical, political relationships. So there is a strong power dynamic behind climate finance ..."</i> (Participant 17)                                                                                                                    |
| <b>Domestic implementation of international finance</b> | <b>Finance to leapfrog the traditional development pathways</b>                                                                                                      | <i>"How to do this [leapfrogging] when no one else has?"</i> (Participant 34)                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
|                                                         | <b>Impact of international climate finance on the ground questionable</b>                                                                                            | <i>"But then how is this mechanism—which represents the largest public fund and largest global structure that's come after many years of negotiations between countries that agreed—how is this shaping funding on the ground and what's the process through which funding is getting [to] the ground? And what are some of the challenges and some of the data sets?"</i> (Participant 61)                                                                                                                                         |
|                                                         | <b>International climate finance agencies tend to centralize their cooperation (one local agency)</b>                                                                | <i>"The national designated authorities—that [...] is absolutely key. Yeah, so that would be typically the ministry of environment, but not always you know—that [is something] the government decides. So that they hold the pen in terms of that country programme and the policy so that that would be that they would represent until we call that a node or something in terms of interacting between the funding, certainly official funding, including from the GCF and the country programs for sure."</i> (Participant 61) |
|                                                         | <b>Importance of developing long-term local national capacity</b>                                                                                                    | <i>"You had to put a lot of effort, but once you put the effort in, [the recipient country] got it and they were able to go through the cycle. You could see countries even on the outside [that] look like they might struggle, such as Zimbabwe, but [they are] very well-educated, very bright people who knew precisely what they want."</i> (Participant 17)                                                                                                                                                                   |
|                                                         | <b>After lack of capacity, developing countries face other common challenges</b>                                                                                     | <i>"Their constraint was mandate issues, their constraint was like corruption, credit rating issues that was overarching over the whole country, so they were systemic issues that were not specific to the project, that were not specific to what they could be eligible for, but there was a challenge for them in that they were tainted by a certain historical context that made it difficult for Zimbabwe."</i> (Participant 71)                                                                                             |

## Appendix 4E. Domestic public climate finance in developing countries

| Themes                                                                                                                           | Sample quote                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
|----------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Need for a comprehensive, holistic approach to climate finance integrated into domestic policies and wider economy</b>        | <p><i>"At the moment, too many in the UN and too many in the civil society movements are still relying on donor funding and then using grant money to tackle these problems in isolation from say, the real economy. And that is just not going to work in my view. And the \$100 billion will also not be mobilized just by that."</i> (Participant 23)</p> <p><i>"The climate conversations are always [...] related to only the environmental perspective and we see it as something that has to go hand in hand to hand with the creation of jobs [and] the reduction of poverty. We don't see that climate change can be tackled if we do not talk about the core problems in developing countries."</i> (Participant 74)</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
| <b>Significant knowledge gaps on finance for adaptation, including NbS</b>                                                       | <i>"We've got the main problem that adaptation might actually be happening, but it's not reported and [not clear] to the researchers that look at this."</i> (Participant 52)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
| <b>Challenges to the assumption that international climate finance will fund the net-zero transition in developing countries</b> | <i>"It would be naive to think that that, even though there is a moral responsibility for developed countries to help developing countries in the transition, [that this will be] the majority of funds [that] they will use to transition their own economy."</i> (Participant 23)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
| <b>Importance of having domestic climate finance data and needs assessments</b>                                                  | <p><i>"So 'doing their homework,' is not about mobilizing the resources domestically—[it's] about understanding what we need to get done, what can we finance ourselves, what is our ask to international climate funders beyond the realms of I need a loan for renewable energy plant, beyond I need to rehabilitate mangrove forests."</i> (Participant 17)</p> <p><i>"At the same time. I think the question for developing countries is what kind of cost-effective investments they could make themselves, including through smart budget allocation that are also catalysing their own economic growth and at the same time deal with some of some of these environmental crisis is so they should not just wait for developed countries to act, but really be proactive themselves."</i> (Participant 23)</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
| <b>Strong domestic climate finance institutions, policies, funds, mechanisms, and initiatives enhance climate action</b>         | <i>"National mechanisms [...] are helpful—where you don't just rely on global funding, but you are also trying to make that challenge a very important challenge within the country. Because part of the challenge is that if it has to be on climate [it] has to be owned by the country. [...] Is the Ministry of Environment active? Is it doing projects or not? And those requirements will come in when you want to access funding. So if you do those steps before, it's always helpful."</i> (Participant 34)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
| <b>Taking a proactive domestic climate approach enhances access to international climate finance</b>                             | <p><i>"What they did really well was that instead of taking reactive approach, [they took a] proactive approach. They were like, 'OK, let's take a few steps forward, let's create the mechanisms. [...] What does a global organization entity require?' And so they want transparency in one system, [...] national mechanisms. What they did was they set up a climate fund as well. I don't know how successful it is, but they said, 'we have a national climate fund –let's put the seeds in.' [...] That has a positive impact because a lot of funders want to work with countries where they have access. It's easier for them to get to as well [when you] already have [the] systems and laws and procedures set up [in] the country. The government is very active as well, and so Bangladesh could be a good example."</i> (Participant 34)</p> <p><i>"I think the question for developing countries is what kind of cost-effective investments could they make themselves, including through smart budget allocation that are also catalysing their own economic growth and at the same time deal with some of some of these environmental crisis is so they should not just wait for developed countries to act, but really be proactive themselves."</i> (Participant 23)</p> <p><i>"I think the question for developing countries is what kind of cost-effective investments could they make themselves, including through smart budget allocation that are also catalysing their own economic growth and at the same</i></p> |

|                                                                                                                                            |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
|--------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                                                                                                                                            | <i>time deal with some of some of the these environmental crisis is so they should not just wait for developed countries to act, but really be proactive themselves.”</i>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
| <b>The public sector has been slow to invest in NbS in developing countries</b>                                                            | <i>“The amount of time I’ve taken to work with Rabobank to convince the Dutch government [to invest in NbS] – 2.5 years for \$40 million and I don’t know how many thousands of emails and meetings. If you would extrapolate that it just won’t work. So it needs to be higher amounts that take less time. And the same is true, for example, for the Green Climate Fund. That it’s taking too long and it’s too cumbersome. To make that happen, so that’s more on the funding side.” (Participant 52)</i>                                                                                                                                                                                                                                                                                                                                     |
| <b>Developing country governments adopt varying degrees of openness to collaborating with the private sector on climate action and NbS</b> | <i>“Country A for example was very sceptical of the private sector. It was one of my first missions out to a country and I did not know the sensitivity [around the] private sector nor by the civil society organizations. I was almost booted out of the minister’s office because we [had to] speak to different constituents in the country on how they see Country X accessing the Green Climate Fund and what they might want to bring those reflections back, because we can do a country scoping. And he was like, ‘you are speaking to government now, you don’t need to speak to anybody else; we will tell them what they need to do you know.’ A similar one was Country B you know.”<sup>362</sup> (Participant 17)</i>                                                                                                              |
| <b>The challenge of nature valuation is an obstacle to scaling projects at the national level</b>                                          | <i>“How do you value some of those things [is] the big question. Valuation comes in, well, there are efforts being done [...]. Somewhere in there you know there may be good niche examples of nature-based solutions coming in. If I look at the GCF portfolio, they talk about some of these ecosystem-based approaches, so you’ll see at least the terminology is being used, but sometimes it’s difficult to say how it’s been done. Then we’re working with the River system, [which] will improve this element. It will have this value or that value, and they’re much more broad. So of course you know you work with that but I’m not sure how it’s being done. Or you know what’s really happening. I wouldn’t be the right expert for that. But I know that there are, you know there are efforts in this space.” (Participant 34)</i> |
| <b>Need for regulation that recognizes the intrinsic value of nature</b>                                                                   | <i>“[...] until all governments agree that biodiversity has an intrinsic price that we need to pay for, and [...] markets have appraised that sufficiently, I don’t think we’ll get to the scale. (Participant 23)<br/>Indeed, at the moment it is the opposite—the ones who are best able to externalize costs can offer the product for the cheapest price. And again, so that is again, much of [what] you would call innovation, but that you need to work on the consumer side, you need to work on the producer side and you need to work on the financing and taking the technology side basically.” (Participant 23)</i>                                                                                                                                                                                                                  |
| <b>Comprehensive policy-making requires collaboration across governmental institutions</b>                                                 | <i>“So far you know that climate and conversations are always like, or ore most of the time, related to only that environmental perspective and we see it as something that has to go really hand in hand to hand with a creation of jobs in in the reduction of poverty in we don’t see that climate change can be tackled if we do not talk about like the core problems in developing countries.” (Participant 94)</i>                                                                                                                                                                                                                                                                                                                                                                                                                         |

<sup>362</sup> The participant has requested that the names of the countries not be disclosed in the study. Country A and B are both located in the African continent.

## Appendix 4F. An enabling environment for climate finance

Creating an ‘enabling environment’ for climate finance can be defined by the following four components:

Providing the **institutional arrangements** necessary to mainstream environmental issues across governmental entities, extending beyond the purview of the Ministry of Environment. These institutional arrangements should enable stakeholders (governmental, non-governmental and private actors) to collaborate, partner and invest in the achievement of common environmental goals. Intermediary actors, perceived as neutral, such as international organizations, play a role in translating and communicating the gaps between government and non-government actors (e.g., UN, GCF, UNDP).

**Policies and policy instruments** in which environmental concerns are incorporated and part of the entire process of policy design (from beginning to end) and include all relevant stakeholders, both within public sector (cross sector ministries), the private sector and non-government actors. This includes policies that support specific technology adoption and policies that favour the wider investment landscape, such as promoting finance for sustainable land use practices. It also means aligning national policies with international commitments and developing a long-term strategy in which the national finance strategy responds to the achievement of the country’s NDC.

**National budget alignment** in which climate finance budget allocations are treated holistically and comprehensively, while leveraging domestic resources for the achievement of environmental goals. It also seeks to ensure that national resource allocation into positive environmental areas while reducing investments in areas that have a negative impact on the environment, with the ultimate objective of phasing out any public budget investments with negative environmental impacts (e.g., brown subsidies).

**Capacity development** entails monetary and non-monetary investments in the long-term technical capacity, know-how, and knowledge of local staff in government and non-governmental stakeholder groups on environmental objectives. Currently, international climate finance resources tend to flow into political staff with a high-turnover rate due to the nature of political cycles. Capacity development includes investments in the skills and knowledge of non-governmental stakeholders (e.g., NGOs, research institutes, independent bodies) who are here acknowledged to play a critical role in the development, implementation, and review of projects on the ground.

**Private sector engagement** is considered a critical element in mobilizing sufficient funds for the achievement of environmental objectives driven by the thinking that governments alone cannot meet the challenge due to shrinking public budgets. The prevailing discourse within multilateral institutions posits that the onus lies on governments to ensure that the right legislative, regulatory and market conditions are in place to allow the private sector to play a role in the transition to a low-carbon, green economy. Moreover, in this view it is the government’s responsibility to ensure that there is sufficient supply and demand for “bankable” projects for the private sector to invest in (e.g., bankable projects for NbS).



## Appendix 4G. Country-level analysis: Kenya and Costa Rica

| National level Indicators                              | Kenya                                                                                                 | Costa Rica                                                                                                                                 |
|--------------------------------------------------------|-------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------|
| <b><i>Socio-demographic indicators</i></b>             |                                                                                                       |                                                                                                                                            |
| Population <sup>363</sup>                              | 56 million<br>(27 <sup>th</sup> globally; 7 <sup>th</sup> in SSA)                                     | 5.2 million<br>(122 <sup>th</sup> globally; 18 <sup>th</sup> in LAC)                                                                       |
| Official languages                                     | Swahili and English                                                                                   | Spanish                                                                                                                                    |
| Human Development Index (HDI) ranking                  | HDI 0.575 (152 <sup>nd</sup> ) <sup>364</sup>                                                         | HDI 0.809 (58 <sup>th</sup> )                                                                                                              |
| Religions                                              | 85.5% Christianity; 10.9% Islam; 1.6% no religion; 0.7% traditional faiths; 1.3% other <sup>365</sup> | 72.6% Christianity; 27% no religion; 0.4% other <sup>366</sup>                                                                             |
| Education (literacy rate) <sup>367</sup>               | 78.02%                                                                                                | 97.65%                                                                                                                                     |
| <b><i>Geopolitical indicators</i></b>                  |                                                                                                       |                                                                                                                                            |
| Region                                                 | Sub-Saharan Africa (SSA)                                                                              | Latin America and the Caribbean (LAC)                                                                                                      |
| Governance system                                      | Unitary presidential republic                                                                         | Unitary presidential republic; Oldest continuous democracy in Latin America                                                                |
| Independence                                           | 1964 (from United Kingdom)                                                                            | 1821 (from Spain)<br>1823 (from first Mexican Empire)<br>1838 (from the Federal Republic of Central America)<br>1850 (recognized by Spain) |
| Area                                                   | 580,367 km <sup>2</sup> (48 <sup>th</sup> )                                                           | 51,100 km <sup>2</sup> (126 <sup>th</sup> )                                                                                                |
| Corruption perception index <sup>368</sup>             | 32 (123 <sup>th</sup> )                                                                               | 54 (48 <sup>th</sup> )                                                                                                                     |
| Democracy index <sup>369</sup>                         | 5.05 (94 <sup>th</sup> )                                                                              | 8.29 (17 <sup>th</sup> )                                                                                                                   |
| OECD Membership                                        | No                                                                                                    | Yes                                                                                                                                        |
| <b><i>Economic indicators</i></b>                      |                                                                                                       |                                                                                                                                            |
| World Bank income group                                | Lower middle income country <sup>370</sup>                                                            | Upper middle income country <sup>371</sup>                                                                                                 |
| World Bank operational lending category <sup>372</sup> | Blend                                                                                                 | IBRD                                                                                                                                       |
| GDP (2021) <sup>373</sup>                              | USD 90,372.80 M                                                                                       | USD 66,456.65 M                                                                                                                            |
| GDP growth (2021) <sup>374</sup>                       | 7.52%                                                                                                 | 7.6%                                                                                                                                       |
| GNI per capita (2021) <sup>375</sup>                   | USD 1,620                                                                                             | USD 11,510                                                                                                                                 |
| Gini index (2020) <sup>376</sup>                       | 40.8                                                                                                  | 49.3                                                                                                                                       |

<sup>363</sup> Source: United Nations Population Fund (2023a).

<sup>364</sup> Source: UNDP Human Development Report (2023b).

<sup>365</sup> Source: Government of Kenya (2020b).

<sup>366</sup> Source: Murillo (2021).

<sup>367</sup> Sources: Transparency International (2021) and World Population Review (2023).

<sup>368</sup> Source: Transparency International (2021).

<sup>369</sup> Source: Economist Intelligence Unit (2022).

<sup>370</sup> Lower-middle-income country is defined as USD 1,086 to USD 4,255. Source: The World Bank (2023b).

<sup>371</sup> Upper-middle-income country is defined as USD 4,256 to USD13,205. Source: The World Bank (2023).

<sup>372</sup> Operational lending categories (IDA, IBRD and Blend) is one of the ways in which the World Bank classifies countries (The World Bank, 2025).

<sup>373</sup> Source: The World Bank (2023a).

<sup>374</sup> Source: The World Bank (2023b).

<sup>375</sup> Source: The World Bank(2023c).

<sup>376</sup> Source: The World Bank (2023d).

| <b>National level Indicators</b>                                                   | <b>Kenya</b>                                                                              | <b>Costa Rica</b>                                                   |
|------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------|---------------------------------------------------------------------|
| Poverty headcount ratio at national poverty lines (% of population) <sup>377</sup> | 36.1% (2015)                                                                              | 30% (2020)                                                          |
| Trade openness (average for 1960-2021) <sup>378</sup>                              | 163 <sup>rd</sup>                                                                         | 108 <sup>th</sup>                                                   |
| Global Innovation Index <sup>379</sup>                                             | 88 <sup>th</sup> globally (4 <sup>th</sup> in region)                                     | 68 <sup>th</sup> globally (7 <sup>th</sup> in region)               |
| Central government debt (% of GDP)                                                 | 66.9% (Sept 2022)                                                                         | 78.37% (Dec 2021)                                                   |
| Ease of Doing Business (World Bank Ranking) <sup>380</sup>                         | 56 <sup>th</sup>                                                                          | 74 <sup>th</sup>                                                    |
| Current account balance (% of GDP) <sup>381</sup>                                  | 5.2%                                                                                      | -3.3%                                                               |
| FDI, net inflows (% of GDP) <sup>382</sup>                                         | 0.42% (151 <sup>th</sup> )                                                                | 5.5% (36 <sup>th</sup> )                                            |
| Top economic sectors <sup>383</sup>                                                | 54% services (of which 11% tourism)<br>22% Agriculture, forestry, fishing<br>17% industry | 66.87% services sector<br>20.55% industry<br>4.45% agriculture      |
| Dependency on tourism <sup>384</sup>                                               | 2 million visitors / year (2019)                                                          | 3.366 million visitors / year (before COVID)                        |
| Cost of living ranking                                                             | 445 <sup>th</sup>                                                                         | 294 <sup>th</sup>                                                   |
| <b>Environmental indicators</b>                                                    |                                                                                           |                                                                     |
| Vulnerability to climate change (ND-GAIN Country Index) <sup>385</sup>             | 149 <sup>th</sup> (out of 182 countries ranked)                                           | 61 <sup>st</sup> (out of 182 countries ranked)                      |
| Ecosystem vitality index <sup>386</sup>                                            | 34.60 (144 <sup>th</sup> )                                                                | 46.40 (79 <sup>th</sup> )                                           |
| Forest cover <sup>387</sup>                                                        | 5.7% (2010)                                                                               | >50% (2010)                                                         |
| Deforestation rate <sup>388</sup> (annual change rate)                             |                                                                                           |                                                                     |
| 1990-2000                                                                          | -13%                                                                                      | -0.76%                                                              |
| 2000-2005                                                                          | -12%                                                                                      | 0.95%                                                               |
| 2005-2010                                                                          | -11%                                                                                      | 0.90%                                                               |
| <b>Paris Agreement: Revised Nationally Determined Contributions (2020-2030)</b>    |                                                                                           |                                                                     |
| NDC focus (mitigation vs. adaptation)                                              | Mitigation and Adaptation                                                                 | Mitigation and Adaptation, and cross-cutting issues: <sup>389</sup> |
| Mitigation goal                                                                    | No reference to carbon neutrality.                                                        | Carbon neutrality by 2085                                           |

<sup>377</sup> Source: United Nations (2023c).

<sup>378</sup> Source: The Global Economy (2023).

<sup>379</sup> Source: WIPO (2022).

<sup>380</sup> Source: The World Bank (2023e).

<sup>381</sup> Source: The World Bank (2023f).

<sup>382</sup> Source: The World Bank (2023g).

<sup>383</sup> Sources: Data for Kenya (2023a) and Costa Rica from Statista (2023b).

<sup>384</sup> Source: UNCTAD (2017, p. 24).

<sup>385</sup> Notre Dame Global Adaptation Initiative (2023).

<sup>386</sup> The EPI Ecosystem Vitality policy objective measures how well countries preserve, protect, and enhance ecosystems and the services they provide. It comprises 42% of the total EPI score and comprises six issue categories: Biodiversity & Habitat, Ecosystem Services, Fisheries, Acid Rain, Agriculture, and Water Resources. Source: Yale University (2023).

<sup>387</sup> Sources: Global Forest Watch (2023), Garcia-Ulloa and Koh (2016).

<sup>388</sup> Positive number represents reversal. Data from Mongabay Rainforests data (2023).

<sup>389</sup>

| National level Indicators                                  | Kenya                                                                                                                                                                                                                                                                                                                                                                                                                                     | Costa Rica                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
|------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                                                            | Abatement of 32% by 2030 relative to BAU scenario levels                                                                                                                                                                                                                                                                                                                                                                                  | Keep emissions below 9.4 MtCO <sub>2</sub> e by 2030                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
| References to Nature-based solutions for mitigation action | <p>Overview of references to NbS found in the footnote.<sup>390</sup></p> <ul style="list-style-type: none"> <li>• Goal of achieving tree cover of at least 10% of the land area</li> <li>• Scaling up NBS for mitigation</li> <li>• Enhancement of REDD+ activities</li> <li>• Making efforts towards achieving land degradation neutrality</li> <li>• Climate smart agriculture</li> <li>• Blue economy (coastal carbon PSA)</li> </ul> | <p>Four direct references to NbS and 56 overall references in updated NDC.</p> <ul style="list-style-type: none"> <li>• Maintain forest cover at 60% and ensure that it does not compete with agricultural sector<sup>391</sup></li> <li>• Zero deforestation rate of mature forests</li> <li>• Enhancement of REDD+ activities</li> <li>• Climate smart agriculture<sup>392</sup></li> <li>• Land planning, infrastructure and construction, integrated waste management<sup>393</sup></li> </ul> <p>Several cross-cutting goals also refer to NbS:</p> <ul style="list-style-type: none"> <li>• Goal 10 (actions for climate empowerment)<sup>394</sup></li> <li>• Goal 11 (transparency and continuous improvement)<sup>395</sup></li> <li>• Goal 12 (finance)<sup>396</sup></li> <li>• Goal 13 (climate policies, strategies and plans)<sup>397</sup></li> </ul> |

<sup>390</sup> References to NbS in Kenya's updated NDC: "3.1. Scaling up nature-based solutions for mitigation; Table 2. Prioritised Adaptation Programme. P2: Flood risk management incorporating nature based solutions; P7: Establish at least 2,000 hectares to promote nature based (non-wood forest products) enterprises across the country; P14: Promote and expand opportunities for nature based enterprises including seaweed farming, and mangrove ecotourism. P15: Integrate the use of nature based solutions, including the implementation of national mangrove management plan, into national and country development plans. P32: Introduce nature based solutions in flood control especially around informal settlements and selected urban areas" (Government of Kenya, 2020a).

<sup>391</sup> All of the nine forest & biodiversity-related contributions on mitigation in Costa Rica's Revised NDC refers to NbS through visual reference.

<sup>392</sup> All eight agriculture-related contributions on mitigation in Costa Rica's Revised NDC refer to NbS through visual reference.

<sup>393</sup> See contributions 4.1., 5.1., and 6.1. of Costa Rica's Revised NDC 2020.

<sup>394</sup> See goal 10.1 (climate empowerment strategy), 10.4 (participation of different stakeholder groups), 10.6 (inclusive participation of business, government and academia), 10.7 (participation of stakeholder groups for climate adaption), 10.9 (participation of minority groups), 10.8 (inclusion of youth), 10.11 (inclusion of youth).

<sup>395</sup> See goal 11.1. (NDC monitoring system), 11.2 (enhanced institutional capacity for independent analysis of climate action), 11.3. (indicator monitoring of youth, women and minorities), 11.4. (data collection on minorities), 11.5 (publicly available climate data platforms), 11.6 (coastal wetlands data incorporation into national greenhouse gas inventories), 11.7 (data collection on hydrometeorological threats), 11.8 (climate data policy), 11.9 (public health data collection), 11.10 (national forest monitoring system inclusion of land cover changes, use of ecosystems, and climate change).

<sup>396</sup> Only two sub-goals in section 12 refer to NbS: sub-goal 12.7 (sustainable infrastructure and the creation of green jobs) and 12.9 (Costa Rican Compensation Mechanism).

<sup>397</sup> See goal 13.1. (economic strategy), 13.3 (payment for ecosystem services and other carbon pricing instruments), 13.4 (inclusive sustainable development fund), 13.5 (bioeconomy), 13.6 (cooperation with other ministries on climate action), 13.7 (climate adaptation plan), 13.9 (climate adaptation policy



| National level Indicators                          | Kenya                                                                                                                                                                                                                                                                                                    | Costa Rica                                                                                                                                                                                                                                                                                                                                                                                            |
|----------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Nature-based solutions for adaptation              | <ul style="list-style-type: none"> <li>• Climate smart agriculture</li> <li>• Restoration of degraded forests</li> <li>• Agroforestry farmlands</li> <li>• Blue carbon initiatives</li> <li>• NBS initiatives and enterprises (forestry, seaweed farming, mangroves, ecotourism, blue carbon)</li> </ul> | <ul style="list-style-type: none"> <li>• Land development and territorial ordering</li> <li>• Climate-smart agriculture and livestock<sup>398</sup></li> <li>• Forests and territorial biodiversity<sup>399</sup></li> <li>• National, regional and subregional climate change policies, strategies and plans, including gender issues</li> <li>• Oceans and water resources<sup>400</sup></li> </ul> |
| Private sector reference in NDC                    | Specific references to promoting NBS enterprises in agroforestry, forestry, mangroves, ecotourism, seaweed farming, efficient water-use initiatives                                                                                                                                                      | Six references to private sector. No reference to private sector in finance section of NDC. No references relating specifically to private sector and NBS.                                                                                                                                                                                                                                            |
| Number of references to NbS in revised NDC 2020    | 6 references <sup>401</sup>                                                                                                                                                                                                                                                                              | 56 references <sup>402</sup>                                                                                                                                                                                                                                                                                                                                                                          |
| ESG, climate, biodiversity disclosure requirements | No specific sustainability reporting requirements for private companies. However, there are many reporting requirements asking companies to disclose information in relation                                                                                                                             | ESG disclosure not mandatory                                                                                                                                                                                                                                                                                                                                                                          |

cooperation with regions), 13.10 (adaptation planning incorporated into regional and local planning instruments), 13.11 (gender equality policy and climate action), 13.12 (nature-based solutions as a policy for climate action and biodiversity protection). Goal 13.12 specifically refers to continuing its leadership position in the High Ambition Coalition for People and Nature as a strategic forum to promote synergies between climate action and biodiversity protection (See page 62 of NDC).

<sup>398</sup> See NDC 7.1 (low-emissions, resilient farming), 7.2 (circular farming), 7.3 (low-emission, resilient livestock system), 7.5 (agri-livestock climate adaptation), 7.6 (managed pastures expansion), 7.7 (resilient farming practices), 7.8 (food guides to promote local seasonal food consumption).

<sup>399</sup> See NDC 8.1 (strengthening NbS for climate action), 8.2 (enhanced land management practices for emissions reductions), 8.3 (expansion of the ecosystem services payment programme), 8.4 (maintain and increase forest coverage), 8.5 (zero deforestation of mature forests), 8.6 (ecosystem-based adaptation), 8.7. (increase in silvopastoral and agroforestry systems), 8.8 (better land management practices to prevent land degradation and promote biodiversity in secondary growth forests), 8.9 (Territorial Environmental Forest Plan implementation).

<sup>400</sup> See NDC 9.1 (protect 30% of its oceans), 9.2. (water security through better land management practices), 9.3. (wetlands management), 9.4. (protection and conservation of blue carbon ecosystems), 9.5 (protect and conserve 100% of coastal wetlands), 9.6 (management and monitoring of coastal wetlands), 9.7 (halt or reverse the net loss of coastal wetlands), 9.8 (blue carbon ecosystem restoration), 9.9 (sustainable community management of coastal wetlands, including mangroves), 9.10 (ecosystem services payments for blue carbon), 9.11 (public-private investments for the restoration and conservation of mangroves), 9.12 (sustainable fisheries sector).

<sup>401</sup> References to NbS in Kenya's updated NDC: "3.1. Scaling up nature-based solutions for mitigation; Table 2. Prioritized Adaptation Programme. P2: Flood risk management incorporating nature-based solutions; P7: Establish at least 2,000 hectares to promote nature-based (non-wood forest products) enterprises across the country; P14: Promote and expand opportunities for nature-based enterprises, including seaweed farming and mangrove ecotourism. P15: Integrate the use of nature-based solutions, including the implementation of national mangrove management plan, into national and country development plans. P32: Introduce nature-based solutions in flood control, especially around informal settlements and selected urban areas." Source: Kenya's revised NDC (2020).

<sup>402</sup> Four direct references to NbS are made in Costa Rica's NDC and 56 references, primarily in the NDC sub-goals, indicate NBS-related activities through visual icon references. Some of the goals lack clarity in how they relate or will be implemented.

| National level Indicators                                        | Kenya                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | Costa Rica                                                                                                                                                 |
|------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                                                                  | to environmental issues (e.g. waste, water, energy management, biodiversity protection). <sup>403</sup>                                                                                                                                                                                                                                                                                                                                                                                        |                                                                                                                                                            |
| <b>Environmental legislative factors</b>                         |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |                                                                                                                                                            |
| Constitutional recognition of the right to a healthy environment | Yes <sup>404</sup>                                                                                                                                                                                                                                                                                                                                                                                                                                                                             | Yes <sup>405</sup>                                                                                                                                         |
| Ecosystem vitality index <sup>406</sup>                          | 34.60 (144 <sup>th</sup> )                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | 46.40 (79 <sup>th</sup> )                                                                                                                                  |
| Deforestation laws                                               | No ban on logging; Regional ban on mangrove logging in four counties (2018-); Kenyan Agriculture Act (2009) includes measures that require every agricultural landholder to conserve 10% of forest cover                                                                                                                                                                                                                                                                                       | National level ban on deforestation with few exceptions; ban on conversion of mature forests (1996); regulated logging requires government approval (1996) |
| Environmental legislation                                        | Article 42 of the Constitution of Kenya, 2010 (Constitution) enshrines every person's right to a clean and healthy environment as a fundamental right within Kenya.<br>Article 69 of the Constitution also obligates the State with respect to the environment, including sustainable management of natural resources, maintaining a minimum tree cover, and protecting biodiversity. The Climate Change Act (2016) provides the legal framework for achieving low-carbon climate development. |                                                                                                                                                            |

<sup>403</sup> Source: WBCSD (WBCSD, 2018)

<sup>404</sup> See Constitution of Kenya (Government of Kenya, 2010), Article 42. "Every person has the right to a clean and healthy environment, which includes the right— (a) to have the environment protected for the benefit of present

and future generations through legislative and other measures, particularly those contemplated in Article 69; and

(b) to have obligations relating to the environment fulfilled under Article 70."

<sup>405</sup> Costa Rican Constitution of 1949 and amendments (Constitute, 2021). Article 50: "All persons have the right to a healthy and ecologically balanced environment. For that, they are legitimated to denounce the acts that infringe this right and to claim reparation for the damage caused.[...] Every person has the human, basic and non-renounceable right of access to potable water, as an essential material for life. Water is an asset of the nation, essential to protect such human right. Its use, protection, sustainability, conservation and exploitation will be governed by that which the law created for these effects establishes[,] and the supply of potable water for consumption by persons and the populations will have priority."

<sup>406</sup> The EPI Ecosystem Vitality policy objective measures how well countries are preserving, protecting, and enhancing ecosystems and the services they provide. It comprises 42% of the total EPI score and is made up of six issue categories: Biodiversity & Habitat, Ecosystem Services, Fisheries, Acid Rain, Agriculture, and Water Resources. Yale University (2023), Environmental Performance Index.

| National level Indicators                                             | Kenya                                                                                                                                                                    | Costa Rica                                                                                                                                                          |
|-----------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                                                                       | Full list of other relevant legislation available in the footnote. <sup>407</sup>                                                                                        |                                                                                                                                                                     |
| National Payment for Ecosystem Services programme                     | No national level PSA programme                                                                                                                                          | Yes (1996 Forest Law No 7575); 1996 Forest Law establishes Payment for Ecosystem Services Programme which rewards landholders for their environmental services      |
| Environmental management bodies                                       | Kenya Forest Service; Kenya Wildlife Services; 2005 Forest Act requires public participation and collaboration with local communities to develop forest management plans | FONAFIFO <sup>408</sup><br>SINAC <sup>409</sup>                                                                                                                     |
| <b>Climate finance factors</b>                                        |                                                                                                                                                                          |                                                                                                                                                                     |
| National climate finance assessments undertaken                       | Landscape of climate finance in Kenya (2020)<br>Development of NDC financing strategy underway                                                                           | Unclear. Recent efforts to estimate the financial cost of the national adaptation plan, but unclear if current administration is continuing efforts. <sup>410</sup> |
| National climate fund                                                 | Climate Change Fund established by law (2016) <sup>411</sup><br>Resource mobilization strategy to operationalize the climate fund underway                               | National fund (FONAFIFO) established in 1996                                                                                                                        |
| Climate finance assessments for NDC implementation                    | Estimated at USD 62 billion (2020-2030)                                                                                                                                  | Assessment in progress <sup>412</sup>                                                                                                                               |
| Climate finance strategy: National vs. domestic climate finance (NDC) | Committed to mobilize 13% of climate finance from domestic sources; 87% from international sources                                                                       | No reference to share of climate finance coming from domestic vs. international sources in NDC                                                                      |
| References to finance for NbS in NDC implementation                   | None                                                                                                                                                                     | None                                                                                                                                                                |

<sup>407</sup> Relevant regulations and policies from the Kenyan Government: Carbon Markets Regulation 2024 (Government of Kenya, 2024) (Government of Kenya, 2024), Kenya Vision 2030 (Government of Kenya, 2008a); Draft National Green Fiscal Incentives Policy Framework (Government of Kenya, 2022); Guidance on Climate-related Risk Management (Government of Kenya, 2021c); National Livestock Policy (Government of Kenya, 2019); National Oceans and Fisheries Policy (Government of Kenya, 2008b); Agricultural Sector Transformation and Growth Strategy 2019-2029 (Government of Kenya, 2018); Kenya Smart Agriculture Strategy 2017-2028 (Government of Kenya, 2017c); Kenya National Reducing Emissions from Deforestation and Forest Degradation Strategy (Government of Kenya, 2021b); National Drought Management Authority Act (Government of Kenya, 2016b); Water Act 2016 (Government of Kenya, 2016c); Forest Conservation and Management Act (Government of Kenya, 2016d).

<sup>408</sup> FONAFIFO is the National Forest Financing Fund of Costa Rica and agency responsible for disbursing PSA payments to participating entities.

<sup>409</sup> National System of Conservation Areas, Costa Rica.

<sup>410</sup> Interview with Participant 201 (Costa Rica).

<sup>411</sup> Government of Kenya (2016).

<sup>412</sup> The GCF approved funding for assessing climate finance flows in 2022 (GCF, 2022b).

| <b>National level Indicators</b>                              | <b>Kenya</b>                                                               | <b>Costa Rica</b>                                                       |
|---------------------------------------------------------------|----------------------------------------------------------------------------|-------------------------------------------------------------------------|
| National green bonds programme                                | Kenya Green Bond Programme launched 2017 but not active to date (Jan 2023) | First certified green bond issued (2021)                                |
| Cost of living ranking                                        | 445 <sup>th</sup>                                                          | 294 <sup>th</sup>                                                       |
| Net ODA (2020) <sup>413</sup>                                 | USD 3,987.9 million                                                        | USD 209.6 million                                                       |
| Net ODA/GNI (%) <sup>414</sup>                                | 4.1%                                                                       | 0.4%                                                                    |
| Bilateral share (gross ODA) (%) <sup>415</sup>                | 36.1%<br>(top three donors: World Bank, US, IMF)                           | 89%<br>(top three donors: France, Japan, USA)                           |
| Funding from Global Environment Facility (GEF) <sup>416</sup> | USD 21 M                                                                   | USD 16 M<br>(6 <sup>th</sup> largest donor of gross ODA for Costa Rica) |
| Funding received from Green Climate Fund (GCF) <sup>417</sup> | USD 293.5 M                                                                | USD 393.9 M                                                             |

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<sup>413</sup> Source: OECD (OECD, 2023c, 2020b).

<sup>414</sup> *Ibid.*

<sup>415</sup> *Ibid.*

<sup>416</sup> GEF (2022).

<sup>417</sup> GCF overview for Costa Rica (2023) and Kenya (2023e).

## Appendix 4H. Overview of climate finance in Kenya

Share of current public vs. private climate finance flows in Kenya compared with the regional average in Sub-Saharan Africa (2018 data)

| Type of finance                                   | Public climate finance      | Private climate finance     | Total climate finance <sup>1</sup> | International vs. domestic climate finance (% of total flows) <sup>2</sup> | Regional average: International vs. domestic climate finance (Sub-Saharan Africa) (% of total flows) |
|---------------------------------------------------|-----------------------------|-----------------------------|------------------------------------|----------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------|
| <i>Domestic climate finance</i> <sup>3</sup>      | <b>USD 569 M</b><br>(28.3%) | <b>USD 281 M</b><br>(31%)   | <b>USD 843 M</b>                   | <b>42%</b>                                                                 | <b>10%</b>                                                                                           |
| <i>International climate finance</i> <sup>4</sup> | <b>USD 380 M</b><br>(14%)   | <b>USD 537 M</b><br>(26.7%) | <b>USD 1.2 B</b>                   | <b>58%</b>                                                                 | <b>90%</b>                                                                                           |
| Total                                             | <b>USD 950 M</b>            | <b>USD 818 M</b>            | <b>USD 2 B</b>                     | <b>NA</b>                                                                  | <b>NA</b>                                                                                            |

Source: Mazza et al. (2021).  
Adjusted from KES to USD according to the 2022 exchange rate.

Kenya's estimated finance needs to meet climate mitigation and adaptation needs compared to current global climate finance flows in USD

| Area                                            | Kenya: Annual estimated climate finance needs 2020-2030 (% of total) | Global: Current climate finance flows (biennial average 2019/20) (% of total) |
|-------------------------------------------------|----------------------------------------------------------------------|-------------------------------------------------------------------------------|
| Climate finance for mitigation                  | 28%                                                                  | 90%                                                                           |
| Climate finance for adaptation                  | 72%                                                                  | 7.4%                                                                          |
| Multiple objectives                             | Unknown                                                              | 2.5%                                                                          |
| Total estimated finance needs (annual estimate) | USD 6.2 B <sup>6</sup>                                               | USD 632 B                                                                     |

Source (Kenya figures): Kenya's Updated NDC 2020-2030 (2020)  
Source (Global figures): Buchner et al. (2021)

## Appendix 4I. Scoping study of private climate finance for NbS in Kenya

| Name, year of inception, organization type              | Finance flows tracked (USD) <sup>418</sup><br><i>Figures are approximate</i> | Source of finance                                              | Intermediaries <sup>419</sup> | Instruments                                                                                                                          | Channel <sup>420</sup>               | Implementing institution (Project Proponent) | Intervention area                                       | Description <sup>421</sup>                                                                                   |
|---------------------------------------------------------|------------------------------------------------------------------------------|----------------------------------------------------------------|-------------------------------|--------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------|----------------------------------------------|---------------------------------------------------------|--------------------------------------------------------------------------------------------------------------|
| <b>Komaza (2006)</b><br><i>Privately held company</i>   | \$65-67.9M                                                                   | Blended finance (international private + international public) | NA                            | Grants (e.g. Mulago), loans (blended), carbon credits (unknown buyers), private equity (Mirova, AXA Investments, Apple Restore Fund) | Komaza                               | Komaza                                       | Mitigation (carbon), sustainable supply chains (timber) | Forestry company aiming to revive the productivity of degraded lands in Kenya, contribute to carbon capture. |
| <b>One Acre Fund (2006)</b><br><i>Social enterprise</i> | Unclear total;                                                               | Blended finance (international private +                       | Unknown (multiple)            | Loans (blended),                                                                                                                     | Unknown but includes a debt facility | One Acre Fund                                | Adaptation (agriculture, agroforestry, sustainable land | One Acre Fund supplies smallholder farmers in East Africa with asset-based financing and                     |

<sup>418</sup> Approximate figures are presented, sourced from publicly available information or data gathered through interviews. Only tracked finances were incorporated when comprehensive financial data was unavailable.

<sup>419</sup> “Most climate finance is not distributed directly by governments to end-users, but is distributed through government agencies and development banks” (Haites et al., 2013, pp. 21).

<sup>420</sup> “Disbursement channels are those organizations that work directly to disburse funds for climate mitigation and adaptation projects including those from public sector, public-private partnerships, multilateral organizations, NGOs and civil society. They may be local, regional, national, or international organizations. [...] Source-channel relationships could be investigated further to determine the types of partnerships being formed to deliver climate finance.” (p. 25, Haites, ed. 2013).

<sup>421</sup> Based on publicly available information at time of writing of thesis (November 2023).

|                                                          |                                     |                                                                |                |                                                                          |                  |                                                               |                                                                                                                                       |                                                                                                                                                                                                                                                                                                     |
|----------------------------------------------------------|-------------------------------------|----------------------------------------------------------------|----------------|--------------------------------------------------------------------------|------------------|---------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                                                          | \$ 20M debt facility <sup>422</sup> | international public)                                          |                | Grants (full list in footnote <sup>423</sup> ), debt <sup>424</sup>      |                  |                                                               | management practices)                                                                                                                 | agriculture training services to reduce hunger and poverty. Largest provider of agricultural inputs in Africa, and one of the largest smallholder agroforestry project implementers.                                                                                                                |
| <b>EarthAcre (2021)</b><br><i>Privately held company</i> | \$1.1M (equity)<br>\$300k (grants)  | Blended finance (international private + international public) | NA             | Equity, grants, carbon credits, biodiversity credits (no buyers to date) | EarthAcre        | EarthAcre (biodiversity credits)<br>Boomitra (carbon credits) | Mitigation (enhanced soil organic carbon in grasslands, enhanced livestock management), restoration and conservation for biodiversity | EarthAcre is a biodiversity and carbon credit developer. The company provides a holistic approach to addressing the joint climate and biodiversity crises by developing conservation and restoration projects. The company transfers revenues directly to local communities and indigenous peoples. |
| <b>The International Small Group &amp;</b>               | Unknown                             | Blended finance                                                | USAID (grant); | Grants, carbon credits (VERRA                                            | Clean Air Action | Clean Air Action                                              | Mitigation through Agriculture,                                                                                                       | TIST is a combined reforestation and sustainable                                                                                                                                                                                                                                                    |

<sup>422</sup> The \$20million debt facility is provided by a consortium of six lenders and is anchored by a commitment from the MacArthur Foundations' Catalytic Capital Programme (Neichin and Isenberg, 2020).

<sup>423</sup> One Acre Fund has received grants from: Audacious Project, Bill & Melinda Gates Foundation, Bezos Earth Fund, Cartier Philanthropy, Children's Investment Fund, Co-Impact, COMON Foundation, Dovetail Impact Foundation, Draper Richards Kaplan Foundation, Dutch Postcode Lottery, Ecosia, Ezrah Charitable Trust, Focusing Philanthropy, Global Innovation Fund, Government of Netherlands, Howard Buffett Foundation, Ikea Foundation, Jasmine Social Investments, John Deere Foundation, King Philanthropies, Latter-Day Saints Charities, Mastercard Foundation, One Percent For The Planet, Pershing Square, USAID, Virgin Unite, Whole Planet Foundation. Unclear in which countries these grants were used in (i.e. in Kenya or other African countries) (One Acre Fund, 2023).

<sup>424</sup> The \$20million debt facility is provided by a consortium of six lenders and is anchored by a commitment from the MacArthur Foundations' Catalytic Capital Programme. Source: Neichin and Isenberg (2020).

|                                                                                                                 |                           |                                                                |                        |                                                                    |                         |                                     |                                                                                                             |                                                                                                                                                                                                                                                                                                           |
|-----------------------------------------------------------------------------------------------------------------|---------------------------|----------------------------------------------------------------|------------------------|--------------------------------------------------------------------|-------------------------|-------------------------------------|-------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Tree Planting Programme (TIST) in Kenya (2004)</b> <sup>425</sup><br><i>Programme led by private company</i> |                           | (international private + international public)                 |                        | registry), <sup>426</sup><br>equity (Clean Air Action Corporation) | Corporation (CAAC)      | Corporation (CAAC)                  | Forestry and Other Land Use activities (carbon); Afforestation, Reforestation & Restoration (biodiversity); | development project carried out by subsistence farmers. Local farmers are trained to integrate tree planting with their farmed lands, which protects their crops from extreme weather events like drought, increases biodiversity, sequesters carbon and provides more sustainable income. <sup>427</sup> |
| <b>Acumen Resilient Agriculture Fund (2018)</b><br><i>Impact fund</i>                                           | \$58M <sup>428</sup>      | Blended finance (international public + international private) | Green Climate Fund     | Co-financed via equity (\$50M) and grants (\$6M) <sup>429</sup>    | Acumen Capital Partners | Acumen Capital Partners             | Adaptation (agriculture)                                                                                    | ARAF supports early-growth innovative agribusinesses that enhance the climate resilience of small-holder farmers in Africa.                                                                                                                                                                               |
| <b>Integrated landscape-scale</b>                                                                               | Unknown (Stated target of | Blended finance (international                                 | The Nature Conservancy | Investor capital and                                               | The Nature Conservancy  | TNC's Africa Forest Carbon Catalyst | Mitigation (carbon removal);                                                                                | The development facility funds sustainable, for-profit                                                                                                                                                                                                                                                    |

<sup>425</sup> Registered as a project under the VERRA Climate Gold, Community Gold, Biodiversity Gold programme, and the Verified Carbon Standard programme. This NbS initiative also appears in the VERRA voluntary carbon project section below. The decision to include it in both sections was because it is the oldest VERRA-registered NbS-related initiative project in Kenya, and its inclusion in the above table provides insight into its financing. It highlights that, despite being registered in the voluntary carbon market and generating revenue from carbon credits, the initiative also sourced other types of finance (e.g., grants).

<sup>426</sup> Buyers of the carbon credits include the following: Delta Airlines, Castrol, FedEx, and individual buyers. Source: International database on REDD+ projects and programs (2023).

<sup>427</sup> Note that the TIST Programme in Kenya is registered as multiple projects in the VERRA registry, distinguishing between project objective: ID 594 TIST Programme in Kenya, VCS 001; ID 595 TIST Programme in Kenya VCS 002; ID 596 TIST Programme in Kenya VCS 003; ID 597 TIST Programme in Kenya VCS 004; ID 737 TIST Programme in Kenya, VCS 005; ID 899 TIST Programme in Kenya VCS 006; ID 996 TIST Programme in Kenya VCS 009; ID 2338 TIST Programme in Kenya VCS 010.

<sup>428</sup> Acumen Resilient Agriculture Fund (ARAFUND, 2023).

<sup>429</sup> Co-financed by GCF (\$26M) and others (\$30M) which include FMO, Soros Economic Development Fund, PROPARCO, Children's Investment Fund Foundation, Global Social Impact, IKEA Foundation.



|                                                                                                                           |                                           |                                                                                                                                                          |                             |                                                                                                     |                         |                            |                                                                      |                                                                                                                                                                                                                                                                                                                                                                                   |
|---------------------------------------------------------------------------------------------------------------------------|-------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------|-----------------------------------------------------------------------------------------------------|-------------------------|----------------------------|----------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>restoration project via the Africa Forest Carbon Catalyst (2021)</b><br><i>Investment facility</i>                     | raising \$10M from philanthropic funding) | public + international private)                                                                                                                          |                             | philanthropy (TNC)                                                                                  | cy (TNC) <sup>430</sup> |                            | forest conservation, biodiversity conservation; improved livelihoods | forest-related startups that undertake landscape-scale restoration, leveraging investor capital to amplify their impact and achieve widespread forest conservation and restoration.                                                                                                                                                                                               |
| <b>African Forest Landscape Restoration Initiative (AFR100)<sup>431</sup></b><br><i>Pan-African government Initiative</i> | \$1.5B <sup>432</sup>                     | Blended finance <sup>433</sup> (international public + international/private). Public-private partnership (CI, NEPAD, Global EverGreening Alliance, WRI) | Global Environment Facility | Grants worth \$1b (GEF, German government, World Bank) <sup>434</sup> Private finance worth \$540M. | World Bank              | Unknown (country specific) | Mitigation (carbon removal) and Adaptation (forest restoration)      | GEF AFR100 supports businesses that restore Kenya's drylands. The Restoration Initiative develops 'bankable' projects to contribute to the restoration and maintenance of critical landscapes which provide global environmental benefits and more resilient economic development. Funding also seeks to provide technical assistance for nature-based solutions in 10 countries. |

<sup>430</sup> TNC offers support to test and pilot new approaches while de-risking investments. TNC provides a blended finance approach (via the Africa Forest Carbon Catalyst) and includes a development facility, run by TNC, and an 'investment facility' formed and managed by a third-party investment adviser.

<sup>431</sup> AFR100 is a country-led effort to bring 100 million hectares of land in Africa into restoration by 2030. The Kenyan Government is a participating country.

<sup>432</sup> World Resources Institute (2015).

<sup>433</sup> GEF/AFR100. Public-private partnership (CI, NEPAD, Global EverGreening Alliance, WRI).

<sup>434</sup> Breakdown unclear but distributed among GEF AFR100 countries.

|                                                                               |                       |                                                                                 |                             |                                                                                                                                                          |                                                                                    |                                   |                                                                                                     |                                                                                                                                                                                                                                                                                                         |
|-------------------------------------------------------------------------------|-----------------------|---------------------------------------------------------------------------------|-----------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------|-----------------------------------|-----------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Restore Fund (2021)</b><br><i>For-profit impact fund led by Apple</i>      | \$200M <sup>435</sup> | Private finance (international)                                                 | Restore Fund                | Capital instruments (likely equity and loans) and government grants                                                                                      | Restore Fund. Public-private partnership (CI, local government, local communities) | Conservation International        | Mitigation and adaptation (restoration of degraded savannahs)                                       | The Restore Fund invests in commercial forestry projects, aiming to unlock forests' natural solution potential for businesses. By generating both financial returns and measurable carbon impacts, the fund seeks to drive global investment in carbon removal, fostering broader change in the future. |
| <b>Upper Tana-Nairobi Water Fund (2011)</b><br><i>Non-profit organization</i> | \$12.4M +             | Blended finance (international public; international private; national private) | Global Environment Facility | Payment for Ecosystem Services via public-private sector grants (GEF, Government of Kenya), Sale of carbon credits (international private buyers) Grants | Global Environment Facility                                                        | Upper Tana-Nairobi Water Trust    | Mitigation (restoration, afforestation); adaptation (agriculture, land restoration, water security) | The UTNWF supports farmers living upstream of the Tana River <sup>436</sup> in employing sustainable farming practices to reduce soil runoff, improve land productivity, whilst conserving and restoring the river for downstream users in Nairobi.                                                     |
| <b>Mikoko Pamoja (2010)</b>                                                   | \$240K <sup>437</sup> | Blended finance (international)                                                 | Mikoko Pamoja               | Carbon credits (international private)                                                                                                                   | Unknown                                                                            | Association for Coastal Ecosystem | Mitigation (conservation and                                                                        | Mikoko Pamoja is a small scale carbon offset facility that                                                                                                                                                                                                                                              |

<sup>435</sup> Unclear how much of this funding is disbursed to Kenya as this is a fund operating in multiple countries.

<sup>436</sup> The Tana River supplies 95% of the water for Nairobi and 60% of Kenya's hydropower (TNC, 2015).

<sup>437</sup> Mikoko Pamoja generates about USD 24,000 per year and has been generating revenue since 2013. Source: interviews with project stakeholders.

|                                                                                                                                 |                     |                                                               |         |                                                                                                         |                                       |                   |                                                                                                                           |                                                                                                                                                                                                                                                                                                                                                   |
|---------------------------------------------------------------------------------------------------------------------------------|---------------------|---------------------------------------------------------------|---------|---------------------------------------------------------------------------------------------------------|---------------------------------------|-------------------|---------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <i>Non-profit organization</i>                                                                                                  |                     | private climate finance and international public)             |         | buyers), grants                                                                                         |                                       | Services (ACES)   | restoration); adaptation (resilience against flooding and extreme weather events); livelihoods ( fisheries), biodiversity | provides incentives for local community members to conserve mangroves in the Gazi Bay area. It is the first blue carbon credit project.                                                                                                                                                                                                           |
| <b>AAA Programme for sustainable supply chains for coffee</b><br>(unknown)<br><i>For profit programme led by Nespresso Inc.</i> | \$6M <sup>438</sup> | Blended finance (international private; international public) |         | Grant (World Bank's IFC BioCarbon Fund), private investments (Nespresso Sustainability Innovation Fund) | World Bank's IFC                      | TechnoServe (NGO) | Agricultural output (sustainable supply chains); mitigation and biodiversity (agroforestry), Adaptation (food security)   | The Programme provides technical and financial support to increase sustainable land management practices for enhanced productivity and sustainability. It is the first private sector collaboration to fund an environmental initiative through a business entity for the World Bank BioCarbon Fund Initiative for Sustainable Forest Landscapes. |
| <b>Mastercard Priceless Planet Coalition (2021)</b>                                                                             | Unknown             | Blended finance (International private; international public) | Unknown | Private (Mastercard); Public philanthropic (CI, WRI)                                                    | Priceless Planet Coalition Mastercard | Unknown           | Mitigation (carbon removal); adaptation (agroforestry, assisted natural regeneration)                                     | The Coalition aims to plant 100 million trees worldwide through 18 global projects. The initiative in Kenya focuses on the restoration of forests and water supply in                                                                                                                                                                             |

<sup>438</sup> Nespresso (2024).

|                                                              |                         |                                                               |                           |                                                                                                                        |                             |                                                   |                                                                                                                                        |                                                                                                                                                                                                                                                                                                                                          |
|--------------------------------------------------------------|-------------------------|---------------------------------------------------------------|---------------------------|------------------------------------------------------------------------------------------------------------------------|-----------------------------|---------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                                                              |                         |                                                               |                           |                                                                                                                        |                             |                                                   |                                                                                                                                        | the 185,000-acre region of Makuli-Nzaui in southwest Kenya.                                                                                                                                                                                                                                                                              |
| <b>Landscape Resilience Fund (2021)</b><br><i>Foundation</i> | \$100M by 2025 (target) | Blended finance (international private; international public) | Landscape Resilience Fund | Private equity and grants (e.g. CHANEL anchor investor), philanthropic (e.g. WWF); Grant (Global Environment Facility) | Global Environment Facility | South Pole Carbon Asset Management (Fund Manager) | Adaptation (resilient supply chains), biodiversity (conservation and restoration), Mitigation (climate-smart agriculture), livelihoods | The Fund blends public, philanthropic, and private climate finance to strengthen climate resilience, focusing on sustainable agricultural and forestry supply chains in developing countries. The fund provides technical assistance for small and medium-sized enterprises towards investment readiness and concessional loans to SMEs. |

## Appendix 4J. Scoping study of private climate finance for NbS in Costa Rica

| Name, year of inception, organization                                            | Finance flows tracked   | Source of finance                                                              | Intermediaries <sup>439</sup>                        | Instruments                                                                                                                           | Channel <sup>440</sup> | Implementing institution (Project proponent)                                               | Intervention area                                                                                         | Description / innovative finance approach                                                                                                                                                                                                                                 |
|----------------------------------------------------------------------------------|-------------------------|--------------------------------------------------------------------------------|------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------|------------------------|--------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Payment for Ecosystem Service Program (1997-)</b><br><i>Public initiative</i> | USD 524M <sup>441</sup> | Blended finance (domestic public, international public, international private) | Fondo Nacional de Financiamiento Forestal (FONAFIFO) | Domestic public budgets (fossil fuels tax, water tax, carbon credits and public-private agreements) (\$200M 1986-2011) <sup>442</sup> | FONAFIFO               | FONAFIFO <sup>443</sup> / Sistema Nacional de Áreas de Conservación (SINAC) <sup>444</sup> | Mitigation (carbon), resilience (water regulation), biodiversity protection and other (landscape beauty). | The PSA programme is a financial mechanism to promote forest conservation and restoration. Private landowners receive direct payments five or 10-year contracts for activities such as forest protection, reforestation, sustainable forest management, and agroforestry. |
|                                                                                  |                         |                                                                                | Costa Rican Tourism Institute                        | International private climate finance (tourism offset calculator) <sup>445</sup> (2020-)                                              | FONAFIFO               |                                                                                            |                                                                                                           |                                                                                                                                                                                                                                                                           |

<sup>439</sup> “Most climate finance is not distributed directly by governments to end-users, but is distributed through government agencies and development banks” (Haïtes, 2013, p. 21).

<sup>440</sup> “Disbursement channels are those organizations that work directly to disburse funds for climate mitigation and adaptation projects including those from public sector, public-private partnerships, multilateral organizations, NGOs and civil society. They may be local, regional, national, or international organizations. [...] Source-channel relationships could be investigated further to determine the types of partnerships being formed to deliver climate finance.” (Haïtes, 2013, p. 25).

<sup>441</sup> Of which USD100 million in non-reimbursable funds. Sources: Moore (2022), Centre for Public Impact (Centre for Public Impact, 2023).

<sup>442</sup> Source: Obando (2022).

<sup>443</sup> FONAFIFO is Costa Rica’s National Forest Financing Fund (FONAFIFO, 2023).

<sup>444</sup> SINAC is the National System of Conservation Areas in Costa Rica.

<sup>445</sup> Costa Rica is now encouraging visitors to offset the carbon footprint generated in flights and land travel in order to facilitate the raising of financial resources for the Payment of Environmental Services Programme (PSA), following an agreement signed by the Costa Rican Tourism Institute (ICT) and the National Forest Financing Fund (FONAFIFO). The amount of finance raised is unclear, however.

| Name, year of inception, organization | Finance flows tracked | Source of finance                | Intermediaries <sup>439</sup>                 | Instruments                                                                                        | Channel <sup>440</sup>             | Implementing institution (Project proponent) | Intervention area                               | Description / innovative finance approach                                               |
|---------------------------------------|-----------------------|----------------------------------|-----------------------------------------------|----------------------------------------------------------------------------------------------------|------------------------------------|----------------------------------------------|-------------------------------------------------|-----------------------------------------------------------------------------------------|
|                                       |                       |                                  | World Bank Forest Carbon Partnership Facility | International public finance, results-based payment (\$60M from World Bank in 2020) <sup>446</sup> | Ministry of Environment and Energy |                                              |                                                 |                                                                                         |
|                                       |                       |                                  | Green Climate Fund                            | Public multilateral finance, results-based payment (\$54M from GCF in 2020) <sup>447</sup>         | MINAE <sup>448</sup>               |                                              |                                                 |                                                                                         |
|                                       |                       |                                  | Earthshot Prize <sup>449</sup>                | Grants (\$1.3M from EarthShot Prize)                                                               | Unknown                            |                                              |                                                 |                                                                                         |
|                                       |                       |                                  | Norway                                        | Bilateral public finance (\$10M 2020)                                                              | Unknown                            |                                              |                                                 |                                                                                         |
|                                       |                       |                                  | LEAF Coalition                                | International private climate finance (\$10M 2020)                                                 | Unknown                            |                                              |                                                 |                                                                                         |
| <b>Payment for Ecosystem Services</b> | Unknown               | Unknown (likely blended finance) | Unknown                                       | Payment for ecosystem service                                                                      | FONAFIFO                           | FONAFIFO/ National Capital Trust             | Mitigation (carbon), biodiversity (pollination, | The programme aims to replicate the PSA model to other ecosystem services beyond public |

<sup>446</sup> In August 2023, Costa Rica became the first Latin American country (and second country globally) to receive a payment from the World Bank's Forest Carbon Partnership Facility (FCPF) for reducing carbon emissions from deforestation and forest degradation (i.e. REDD+).

<sup>447</sup> \$54.1 million to be granted to Costa Rica by the Green Climate Fund for emissions avoided in 2014 and 2015. That money is primarily intended to strengthen and improve the PSA Programme in private lands and indigenous territories.

<sup>448</sup> Ministry of Environment of Costa Rica

<sup>449</sup> Earthshot Prize Winner 2021 (BBC News, 2021).

| Name, year of inception, organization                                                                               | Finance flows tracked              | Source of finance                                                             | Intermediaries <sup>439</sup>                                  | Instruments                                                                                                | Channel <sup>440</sup>               | Implementing institution (Project proponent)            | Intervention area                       | Description / innovative finance approach                                                                                                 |
|---------------------------------------------------------------------------------------------------------------------|------------------------------------|-------------------------------------------------------------------------------|----------------------------------------------------------------|------------------------------------------------------------------------------------------------------------|--------------------------------------|---------------------------------------------------------|-----------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Programme 2.0 (TBD)</b> <sup>450</sup><br><i>Public initiative</i>                                               |                                    |                                                                               |                                                                |                                                                                                            |                                      |                                                         | conservation of marine, wetland areas), | forests to marine, wetlands, and other ecosystem services, such as pollination. A compensation scheme is also addressed within the model. |
| <b>Lowering Emissions by Accelerating Forest Finance (LEAF) Coalition (2021-)</b><br><i>Non-profit organization</i> | <b>\$14M (2023)</b> <sup>451</sup> | Blended finance (private international and public international)              | Emergent <sup>452</sup>                                        | Emissions Reductions Purchase Agreements for Jurisdictional REDD+ emissions reductions and removal credits | Emergent Coalition                   | Emergent Coalition                                      | Mitigation (carbon)                     |                                                                                                                                           |
| <b>Debt-for-Nature Swaps (1987/88, 2007, 2010)</b>                                                                  | <b>\$65M</b> <sup>453</sup>        | Primarily public international finance; some minor philanthropic grants; some | Natural Resources Conservation Fund (1987); Costa Rica Forever | Bilateral agreements for debt relief: \$8 M from Sweden, Netherlands (1988), <sup>455</sup>                | Natural Resources Conservation Fund; | Different organizations across the years <sup>460</sup> | Mitigation (carbon), biodiversity       | A part of the country's foreign debt is retired in exchange for a commitment to finance domestic conservation and restoration efforts     |

<sup>450</sup> Launch date unclear as of December 2023.

<sup>451</sup> Emergent (2023).

<sup>452</sup> The LEAF Coalition is convened and coordinated by Emergent, a non-profit organization dedicated to ending tropical deforestation. LEAF aims to channel funds to forest governments by purchasing high-integrity jurisdictional REDD+ credits. LEAF Coalition members include the Rockefeller Foundation, NICFI (Norway), EDF (USA), GDI, Oak Hill Capital, Good Energies, Latham and Watkins, Amazon, Nestle, BlackRock, Walmart.

<sup>453</sup> Expenditure to purchase the debt on the secondary market. Mongabay (2007).

<sup>455</sup> Note: Sweden and the Dutch Government did not use their own official debt in the transaction; rather, they purchased commercial bank debt on the secondary market (Occhiolini, 1990).

<sup>460</sup> 1988 (National Park Foundation of Costa Rica), 1988 (Netherlands), 1988 (Sweden), 1989 (The Nature Conservancy).

| Name, year of inception, organization                          | Finance flows tracked                                                | Source of finance                | Intermediaries <sup>439</sup>           | Instruments                                                                                                                                                                       | Channel <sup>440</sup>         | Implementing institution (Project proponent) | Intervention area                                 | Description / innovative finance approach                                                                                                                                                                                                                                                                   |
|----------------------------------------------------------------|----------------------------------------------------------------------|----------------------------------|-----------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------|----------------------------------------------|---------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <i>Public initiative</i>                                       |                                                                      | domestic finance                 | Association (2007, 2010) <sup>454</sup> | \$891K from NPF (1988); <sup>456</sup> \$784k from TNC; <sup>457</sup> \$26M from USA (2007); \$2.52M from TNC and CI (2007); <sup>458</sup> \$27M from USA (2010) <sup>459</sup> | Costa Rica Forever Association |                                              |                                                   | with the freed up financial resources.                                                                                                                                                                                                                                                                      |
| <b>Biobusiness Platform (2018)</b><br><i>Public initiative</i> | <b>\$84.9M</b> (distribution across projects unclear) <sup>461</sup> | Unknown (likely blended finance) | BIOFIN Costa Rica                       | Unclear (likely commercial debt and equity)                                                                                                                                       | Unclear                        | Unclear                                      | Sustainable supply chains (interventions unclear) | This programme seeks to mobilize impact investment funds and financing through preferential green credits. The aim is to promote companies that make sustainable use of biodiversity or whose business models seek to mitigate, reduce or eliminate the negative impacts of human activities on ecosystems. |

<sup>454</sup> A conservation fund established to receive direct payments in exchange for debt relief (TNC, 2010)

<sup>456</sup> NPF is the National Park Foundation of Costa Rica (Occhiolini, 1990).

<sup>457</sup> Source: Occhiolini (1990).

<sup>458</sup> Source: Mongabay (2007).

<sup>459</sup> Source: Asociación Costa Rica por siembre and Il Canje por Naturaleza (2010).

<sup>461</sup> According to the BIOFIN website, \$ 84.9M has been mobilized and contributed to catalyse six financial solutions and the 'Women + Nature Programme.' The six financial solutions are listed in the table. Source: UNDP BIOFIN (2023).



| Name, year of inception, organization                                                                      | Finance flows tracked | Source of finance                | Intermediaries <sup>439</sup> | Instruments                    | Channel <sup>440</sup> | Implementing institution (Project proponent) | Intervention area                                                                       | Description / innovative finance approach                                                                                                                                                                                                                                                                                                                                                                                             |
|------------------------------------------------------------------------------------------------------------|-----------------------|----------------------------------|-------------------------------|--------------------------------|------------------------|----------------------------------------------|-----------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Payment for Ecosystem Services Programme (PSA 2.0) (TBD)</b> <sup>462</sup><br><i>Public initiative</i> |                       | Unknown (likely blended finance) | BIOFIN Costa Rica             | Payment for ecosystem services | FONAFIFO               | FONAFIFO/ National Capital Trust             | Mitigation (carbon), biodiversity (pollination, conservation of marine, wetland areas), | The programme aims to replicate the PSA model to other ecosystem services beyond public forests to marine, wetlands, and other ecosystem services, such as pollination. A compensation scheme is also addressed within the model.                                                                                                                                                                                                     |
| <b>Thematic Bond for Protected Areas (TBD)</b> <sup>463</sup><br><i>Public initiative</i>                  |                       | Unknown (likely blended finance) | BIOFIN Costa Rica             | Green bonds                    | Unclear                | Unclear                                      | Biodiversity, local livelihoods (revenue generation)                                    | This programme aims to create favorable conditions for issuing green bonds by securitizing future income from the National Protected Areas System (SINAC). The funds raised will be used to enhance infrastructure in Protected Areas, leading to improved quality and diversification of tourist services. This, in turn, is expected to facilitate the contracting of concessions for non-essential services, increasing income and |

<sup>462</sup> Launch date unclear as of December 2023.

<sup>463</sup> Launch date unclear as of December 2023.

| Name, year of inception, organization                                                                         | Finance flows tracked | Source of finance                                                                                      | Intermediaries <sup>439</sup> | Instruments                                                                                      | Channel <sup>440</sup> | Implementing institution (Project proponent) | Intervention area                                                                    | Description / innovative finance approach                                                                                                                                                                                                                                                                                                                                                             |
|---------------------------------------------------------------------------------------------------------------|-----------------------|--------------------------------------------------------------------------------------------------------|-------------------------------|--------------------------------------------------------------------------------------------------|------------------------|----------------------------------------------|--------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                                                                                                               |                       |                                                                                                        |                               |                                                                                                  |                        |                                              |                                                                                      | financial sustainability for SINAC.                                                                                                                                                                                                                                                                                                                                                                   |
| <b>Concessions Platform for Protected Areas (TBD)</b> <sup>464</sup><br><i>Public initiative</i>              |                       | Blended finance through public-private partnerships                                                    | BIOFIN Costa Rica             | Unclear (Payment for ecosystem services)                                                         | Unclear                | Unclear                                      | Biodiversity, local livelihoods (revenue generation)                                 | This programme establishes concession systems for non-essential services in protected areas and tourist landscapes, promoting revenue growth for protected areas, including SINAC, and fostering inclusive development for local communities. These concessions, functioning as PPPs, aim to enhance employment opportunities, mitigate wildlife poaching, and safeguard cultural and natural assets. |
| <b>Huella del Futuro [Footprints4 ourFuture]</b> <sup>465</sup><br><b>(2018-)</b><br><i>Public initiative</i> |                       | Blended (public to jumpstart project, then crowdsourcing from private actors); EU, Germany, GIZ, CCAD, | Unclear                       | Domestic public and private donations; international finance. As of 01-12-2023, raised \$1.8M in | Unclear                | BIOFIN with Huella del Futuro                | Carbon sequestration, water security, biodiversity conservation, scenic beauty, food | The initiative targets private and public companies, financial institutions, bilateral cooperation, and individual donors to provide economic relief                                                                                                                                                                                                                                                  |

<sup>464</sup> Launch date unclear as of December 2023.

<sup>465</sup> The founding partners of this initiative are the Office of the Presidency of the Republic, the Ministry of Environment and Energy (MINAE), the National Forest Financing Fund (FONAFIFO), the Environmental Bank Foundation (FUNDAM), the Biodiversity Finance Initiative (BIOFIN), the United Nations Development Programme (UNDP). Source: Huella del Futuro. "Our Partners," (2023).

| Name, year of inception, organization                                                                               | Finance flows tracked                            | Source of finance                                                                   | Intermediaries <sup>439</sup>                                             | Instruments                                                      | Channel <sup>440</sup> | Implementing institution (Project proponent) | Intervention area                                                                                                                               | Description / innovative finance approach                                                                                                                                                                                                                                                                                      |
|---------------------------------------------------------------------------------------------------------------------|--------------------------------------------------|-------------------------------------------------------------------------------------|---------------------------------------------------------------------------|------------------------------------------------------------------|------------------------|----------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                                                                                                                     |                                                  | SICA, UNDP BIOFIN                                                                   |                                                                           | crowdfunding (primarily domestic private sector and individuals) |                        |                                              | security, economic livelihoods (jobs)                                                                                                           | while contributing to ecosystem restoration.                                                                                                                                                                                                                                                                                   |
| <b>Seed Capital and Entrepreneurship for Sustainable Tourism (2018-)</b> <sup>466</sup><br><i>Public initiative</i> |                                                  | Blended (public finance but will leverage private capital through entrepreneurship) | Domestic (Development Banking System and MINAE)                           | Seed funding (likely equity and debt)                            | Unclear                | BIOFIN                                       | More sustainable tourism sector, local livelihoods (jobs), scenic beauty, biodiversity                                                          | The seeks to provide seed capital and funding for entrepreneurs operating in the sustainable tourism sector.                                                                                                                                                                                                                   |
| <b>EcoEnterprises Fund</b> <sup>467</sup><br>(1998)<br><i>Private impact fund</i>                                   | Unclear but at least \$105M across Latin America | Blended (private and some public);                                                  | Ecoenterprises Fund; European Investment Bank among others <sup>468</sup> | Equity and loans                                                 | Unclear                | Ecoenterprises Fund                          | Biodiversity (forestry, ecotourism, ocean-based interventions), climate mitigation (ag-tech, renewable energy, circular economy), social equity | EcoEnterprises Fund is an impact investment fund that invests in small businesses across Latin America that preserve the integrity of natural capital while contributing to local economies and biodiversity. They support businesses that protect and support ecosystems through activities such as forestry, ecotourism, and |

<sup>466</sup> Source: UNDP BIOFIN (2023).

<sup>467</sup> Source: EcoEnterprises Fund (2023).

The fund's portfolio companies are not fully publicly disclosed. Annual reports were examined for relevance for the scoping study, and only one company was identified as relevant (ProNuvo).

<sup>468</sup> See European Investment Bank (European Investment Bank, 2023).

| Name, year of inception, organization                                             | Finance flows tracked | Source of finance                                        | Intermediaries <sup>439</sup>                                                                  | Instruments                    | Channel <sup>440</sup> | Implementing institution (Project proponent) | Intervention area                                                                                                                   | Description / innovative finance approach                                                                                                                                                                                  |
|-----------------------------------------------------------------------------------|-----------------------|----------------------------------------------------------|------------------------------------------------------------------------------------------------|--------------------------------|------------------------|----------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                                                                                   |                       |                                                          |                                                                                                |                                |                        |                                              | (women-led, IPLC)                                                                                                                   | ocean-based businesses.                                                                                                                                                                                                    |
| <b>ProNuvo</b> <sup>469</sup><br>(2018-)<br><i>Private company</i>                | Unclear               | Unclear (likely private)                                 | Unclear (likely loans, equity and grants)                                                      | Unclear                        | Unclear                | ProNuvo                                      | Mitigation (circular economy, lower carbon footprint from livestock),                                                               | ProNuvo is a company specializing in reducing agri-waste through sustainable food waste upcycling. The company transforms residual organic waste into feedstock feed by cultivating insects as alternative protein source. |
| <b>Água Tica Water Fund</b> <sup>470</sup><br>(2012-)<br><i>Public initiative</i> | \$806K <sup>471</sup> | Blended (domestic public, international public, private) | MINAE <sup>472</sup> with Founding Members <sup>473</sup> of Fund (public-private partnership) | Payment for ecosystem services | Água Tica Water Fund   | Água Tica Water Fund                         | Climate resilience (water security), biodiversity (agroforestry, reforestation and conservation), climate mitigation (agroforestry) | Costa Rica's first water fund secures long-term financing for conservation actions across 607 hectares of critical water recharge areas to ensure the health of rivers and watersheds.                                     |

<sup>469</sup> ProNuvo (2023). <https://pronuvo.com/>

<sup>470</sup> AguaTica Fund (2024).

<sup>471</sup> Agua Tica (2024).

<sup>472</sup> Ministry of Environment and Energy of Costa Rica [Ministerio de Ambiente y Energía (MINAE)].

<sup>473</sup> Founding members of the Water Fund are: the Ministry of Environment and Energy (MINAE), AYA, Banco National, BLP law firm, Coca-Cola Costa Rica, Coca-Cola FEMSA, Public Service Company of Heredia [*Empresa de Servicios Públicos de Heredia*], Florida Bebidas, CRUSA Foundation, DIRECCION de Aqua, Fundacion FEMSA, FUNDECOR, the Nature Conservancy, UNAGUAS, Universidad Nacional Costa Rica, SHIFT Porter Novelli

| Name, year of inception, organization                                                                                                     | Finance flows tracked                           | Source of finance                   | Intermediaries <sup>439</sup>                                                                       | Instruments              | Channel <sup>440</sup>                         | Implementing institution (Project proponent)   | Intervention area                             | Description / innovative finance approach                                                                                                                                                                                                                                      |
|-------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------|-------------------------------------|-----------------------------------------------------------------------------------------------------|--------------------------|------------------------------------------------|------------------------------------------------|-----------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                                                                                                                                           |                                                 |                                     |                                                                                                     |                          |                                                |                                                | and reforestation), more sustainable land use |                                                                                                                                                                                                                                                                                |
| <b>RAICES Incubation program</b> <sup>474</sup><br>(date unclear)<br><i>Public initiative</i>                                             | Unclear                                         | Public domestic finance             | Domestic (Ministry of Environment and Energy, CONAGEBIO, MNICR, Impact Hub San Jose) <sup>475</sup> | Unclear                  | Unclear <sup>476</sup>                         | RAICES                                         | Sustainable tourism                           | Raíces is a start-up incubation programme in Costa Rica focused on the generation and consolidation of sustainable tourism ventures in indigenous territories. The programme disburses grants of USD 10,000 per project.                                                       |
| <b>Ecosystem-based Adaptation to increase climate resilience in the Central American Dry Corridor and the Arid Zones of the Dominican</b> | \$268.4M (unclear how much Costa Rica received) | Public international (multilateral) | Public international (Green Climate Fund)                                                           | Grant, loans, guarantees | Central American Bank for Economic Integration | Central American Bank for Economic Integration |                                               | The programme aims to strengthen the climate resilience of rural communities, including farmers and entrepreneurs, by providing them with financing and technical assistance that creates an enabling environment for the investment and update of large-scale ecosystem-based |

<sup>474</sup> Raíces (2024)

<sup>475</sup> *Ibid.*

<sup>476</sup> Partners include: Instituto Costarricense de Turismo, Banca para el Desarrollo, Semillas de Transformación, BIOFIN, UNDP. Support is provided by Ministry of Environment and Energy (MINAE), CONAGEBIO, MNICR, Impact Hub San Jose.

| Name, year of inception, organization                                       | Finance flows tracked | Source of finance                                                 | Intermediaries <sup>439</sup> | Instruments    | Channel <sup>440</sup> | Implementing institution (Project proponent) | Intervention area                                                                            | Description / innovative finance approach                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
|-----------------------------------------------------------------------------|-----------------------|-------------------------------------------------------------------|-------------------------------|----------------|------------------------|----------------------------------------------|----------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Republic (2022-)</b> <sup>477</sup><br><i>Public project</i>             |                       |                                                                   |                               |                |                        |                                              |                                                                                              | adaption and water/energy-efficient technologies.                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
| <b>Voluntary Domestic Carbon Market (2013-)</b><br><i>Public initiative</i> | Unclear               | Domestic and international private climate finance (corporations) | Unclear                       | Carbon credits | <b>BanC02</b>          | <b>BanC02</b>                                | Climate mitigation (carbon reduction); biodiversity (forest conservation and reforestation), | A voluntary carbon market in which carbon credits are issued and traded between local companies to compensate for emissions that they cannot reduce. Companies looking to become carbon neutral or offset a portion of their emissions implement sustainable practices within their operation and purchase carbon credits through BanC02 for unavoidable emissions. Companies and individuals can also sell a surplus of emissions reductions to the bank. Note: it is not a cap-and-trade system. <sup>478</sup> |

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<sup>477</sup> GCF (2024).

<sup>478</sup> A cap-and-trade system sets a carbon ceiling that forces businesses to either reduce their emissions or trade for the right to pollute.

**Scoping Study: Projects registered under the voluntary carbon market in Costa Rica (NbS relevant)<sup>479</sup>**

| No. | Name of project (ID No.)                                                                                                                                                                            | Project Proponent     | Standard(s) <sup>480</sup>         | Project type | Distinctions | Crediting period start date | Crediting period end date | Estimated Annual Emission Reductions | Hectares      |
|-----|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------|------------------------------------|--------------|--------------|-----------------------------|---------------------------|--------------------------------------|---------------|
| 0   | Avoided Deforestation Through the Payment of Environmental Services in Rainforests Located on Private Lands in the Conservation Area of the Central Volcanic Mountain Range of Costa Rica (ID 1601) | Pax Natura Foundation | VERRA CCB                          | REDD         | NA           | NA (validation expired)     | NA (validation expired)   | NA                                   | NA            |
| 1   | Reforestation Project in Costa Rica (ID 11708)                                                                                                                                                      | BaumInvest AG         | Gold Standard for the Global Goals | A/R          | NA           | 2022-05-24                  | 2062-05-24                | 26,031                               | 1,141         |
| 2   | BaumInvest Forest Landscape Restoration Programme (ID 11707)                                                                                                                                        | BaumInvest AG         | Gold Standard for the Global Goals | A/R          | NA           | 2022-05-12                  | 2072-05-12                | 26,000                               | Not specified |
| 3   | BaumInvest Reforestation Project                                                                                                                                                                    | BaumInvest            | Gold Standard for the Global Goals | A/R          | NA           | 2007-10-01                  | 2035-10-01                | 3,333                                | Not specified |
| 4   | VisionsWald - VisionForest                                                                                                                                                                          | Guerdenker GmbH       | Gold Standard for the Global Goals | A/R          | NA           | 2014-06-01                  | 2020-06-01                | 500                                  | 620           |

<sup>479</sup> Projects listed on the VERRA and Gold Standard registries.

<sup>480</sup> Note: Editions of Standards are not differentiated in this table.

## Scoping study: Breakdown of Payment for Ecosystem Services Programme in Costa Rica<sup>481</sup>

| Finance type                   | Finance flows tracked (USD) <sup>482</sup><br><i>Figures are approximate</i> | Source of finance / type                                                                                                | Intermediaries <sup>483</sup> / Channel       | Instruments                                                                                                                                                                           | Function                                                                                                                                                                                                |
|--------------------------------|------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Fossil fuel tax revenue</b> | ~\$10M/per year (2001-)                                                      | Public                                                                                                                  | Ministry of Finance, Reecope, FONAFIFO        | 3.5% of total revenues generated through the fossil fuel tax allocated to FONAFIFO                                                                                                    | Payment from Costa Rican carbon users for the carbon sequestration benefits of the PSA program                                                                                                          |
| <b>Water service payments</b>  | ~5M/per year (1999-2004)<br>Pagiola says 0.5m/year between 1999-2004 = 2.5M  | Public (Hydropower producers, bottlers, municipal water supply systems, irrigation water users, hotels <sup>484</sup> ) | FONAFIFO                                      | Certificados de Servicios Ambientales (CSA) <sup>485</sup> (voluntary)                                                                                                                |                                                                                                                                                                                                         |
| <b>Water tariff</b>            | ~USD 5million/year (2005-)                                                   | Water users                                                                                                             | MINAE (Water Directorate), FONAFIFO and SINAC | Water tariff introduced under Costa Rica's Water Law (mandatory). 50% of total revenue collected goes to the Water Directorate, the remaining 50% is divided equally between FONAFIFO | A conservation fee earmarked for watershed conservation. According to reports, the fee is to generate USD 19 million/year of which 25% (~5 million) is distributed to the PSA programme. <sup>487</sup> |

<sup>481</sup> Values are approximate.

<sup>482</sup> Approximate figures are presented, sourced from publicly available information or data gathered through interviews. In instances where comprehensive financial data was unavailable, only tracked finances were incorporated.

<sup>483</sup> "Most climate finance is not distributed directly by governments to end-users, but is distributed through government agencies and development banks" (p. 21, Haites, ed. 2013).

<sup>484</sup> These include: Energia Global, Nacional de Fuerza y Luz (CNFL), other hydropower producers, US utility provider. Source: Pagiola (2007).

<sup>485</sup> A standardized instrument that pay for the conservation of one hectare of forest in a specified area.

<sup>487</sup> Pagiola (2007).



|                                                                                    |                                                                                                     |                                                                                            |                            |                                                                       |                                                                                                                                                                                                                                                                                    |
|------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------|----------------------------|-----------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                                                                                    |                                                                                                     |                                                                                            |                            | (25%) and SINAC (25%). (Article 13 & 14, Water Decree) <sup>486</sup> |                                                                                                                                                                                                                                                                                    |
| <b>Kyoto Protocol Joint implementation projects (CDM)</b><br>(Coopegri project)    | USD 900,000                                                                                         | Private finance (independent US power producers to purchase carbon offsets) <sup>488</sup> |                            | Carbon offsets and grants for habitat protection                      |                                                                                                                                                                                                                                                                                    |
| <b>Biodiversity payment<br/>Eco-markets Project</b><br>Multilateral public finance | <b>Eco-markets Project</b><br>Multilateral public finance (USD 8 million); MMBIEM Project (USD10m); |                                                                                            | GEF                        | Grant                                                                 | Payments to biodiversity priority areas, including biodiversity conservation and carbon sequestration benefits (Pagiola, 2007)                                                                                                                                                     |
|                                                                                    | USD 0.5 million                                                                                     |                                                                                            | Conservation International | Grant                                                                 | Biodiversity conservation, paying 50% of the cost of agroforestry contracts in Osa and Amistad Pacifico conservation areas and by paying 50% of the costs of planting up to 80,000 trees under agroforestry contracts in the buffer zone of Chirripó National Park (Pagiola, 2007) |

<sup>486</sup> Source: (Sistema Costarricense de Informacion Juridica, 2005).

<sup>488</sup> Castro et al. (2000).

|                                                                                               |                      |                                     |                                         |                                    |                                                                                   |
|-----------------------------------------------------------------------------------------------|----------------------|-------------------------------------|-----------------------------------------|------------------------------------|-----------------------------------------------------------------------------------|
| <b>Biodiversity payments</b>                                                                  |                      |                                     |                                         |                                    |                                                                                   |
| <b>Carbon payment</b>                                                                         | USD 2M               | Norwegian private and public sector | FONAFIFO                                | Certifiable Tradeable Offset (CTO) | Reforestation and afforestation under the Kyoto Protocol's CDM                    |
| <b>Carbon payment, LEAF COALITION</b>                                                         | USD 10M              | Government of Norway                | Emergent LEAF Coalition, FONAFIFO/MINAE |                                    | 1 million tons to the government of Norway and other donors                       |
| <b>Huetar Norte Forest Program</b>                                                            | \$12M (2003)         | Bilateral public grant (Germany)    |                                         |                                    |                                                                                   |
| <b>Debt-for-nature-swaps</b>                                                                  | CA\$ 11.4 M (2000)   | Bilateral public (Canada)           | FONAFIFO                                |                                    |                                                                                   |
| <b>Carbon Fund / World Bank</b><br>Multilateral public finance                                | USD 60 M (2018-2022) | Results-based payment for REDD+     | World Bank, FONAFIFO, SINAC, FUNBAM     | Results based finance for REDD+    | Avoided deforestation and avoided degradation and enhancement of forest coverage. |
| <b>GCF</b>                                                                                    | USD 54M (2014-2015)  | Results-based payments for REDD+    | GCF, FONAFIFO, SINAC, UNDP              | Results based finance for REDD+    | Avoided deforestation, emissions reductions.                                      |
| <b>Mainstreaming Market Based Instruments for Environmental Management Programme (MMBIEM)</b> | \$10 M (2007)        |                                     |                                         |                                    |                                                                                   |

Sources: Castro et al. (2000), Cameron (2015), Pagiola (2006), interviews.

## Appendix 5A. Additional background information on case study: Komaza

### The timber industry in Kenya

**Table 5.3. Projected demand (million m<sup>3</sup>), supply and projected surplus (+) or deficit (–) of wood products.**

|                | Firewood | Charcoal | Timber | Poles | Total        |
|----------------|----------|----------|--------|-------|--------------|
| <b>DEMAND</b>  |          |          |        |       |              |
| 2011/12        | 18.7     | 16.3     | 5.3    | 1.4   | <b>41.7</b>  |
| 2031/32        | 21.7     | 19.2     | 7.6    | 2.2   | <b>50.7</b>  |
| % change       | 16       | 18       | 43     | 58    | <b>22</b>    |
| <b>SUPPLY</b>  |          |          |        |       |              |
| 2011/12        | 13.6     | 7.4      | 7.4    | 3.0   | <b>31.4</b>  |
| 2031/32        | 14.9     | 8.1      | 9.0    | 3.7   | <b>35.7</b>  |
| % change       | 10       | 9        | 22     | 23    | <b>14</b>    |
| <b>DEFICIT</b> |          |          |        |       |              |
| 2011/12        | –5.0     | –9.0     | +2.1   | +1.6  | <b>–10.3</b> |
| 2031/32        | –6.8     | –11.1    | +1.4   | +1.5  | <b>–15.0</b> |

Summarised from MEWNR, 2013b

From: Government of Kenya (2016a)

## Estimates of wood supply potential from different sources in Kenya

**Table 5.4. Estimates of wood supply (million m<sup>3</sup>) potential from different sources.**

|                                      | Firewood    | Charcoal   | Timber     | Poles      | Total       |
|--------------------------------------|-------------|------------|------------|------------|-------------|
| Natural forests in public land       | 0.5         | 0.3        | -          | -          | <b>0.8</b>  |
| Forest plantations on public land    | 0.3         | 0.2        | 1.3        | 0.2        | <b>2.0</b>  |
| Communal and private natural forests | 1.9         | 1.0        | 1.3        | 0.2        | <b>4.9</b>  |
| Communal and private plantations     | 0.5         | 0.3        | 0.4        | 0.6        | <b>1.8</b>  |
| Trees on farmland                    | 10.3        | 5.6        | 4.4        | 1.5        | <b>21.8</b> |
| <b>Total</b>                         | <b>13.5</b> | <b>7.4</b> | <b>7.4</b> | <b>3.0</b> | <b>31.3</b> |

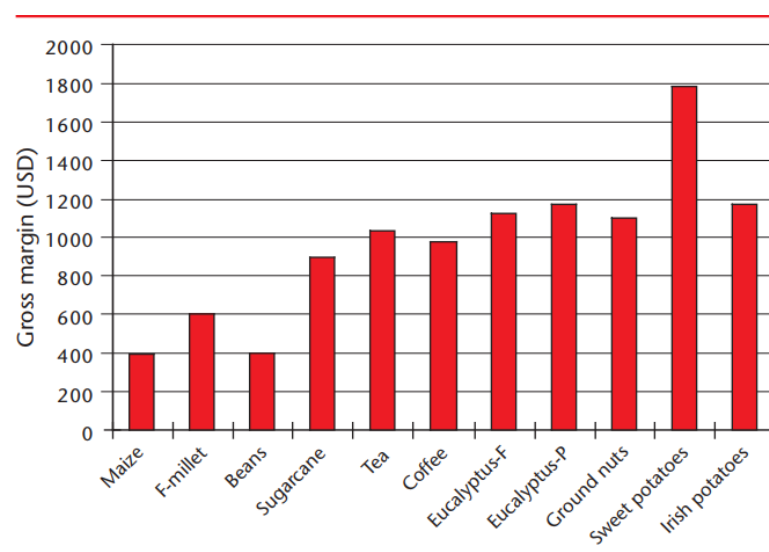
**Table 5.5. Estimates (%) of wood supply potential from different sources.**

| Source                       | Firewood | Charcoal | Timber | Poles | Total     |
|------------------------------|----------|----------|--------|-------|-----------|
| Public forests               | 6        | 7        | 18     | 7     | <b>9</b>  |
| Communal and private forests | 18       | 18       | 23     | 43    | <b>21</b> |
| Trees on farmland            | 76       | 75       | 59     | 50    | <b>70</b> |

Summarised from MEWNR, 2013b.

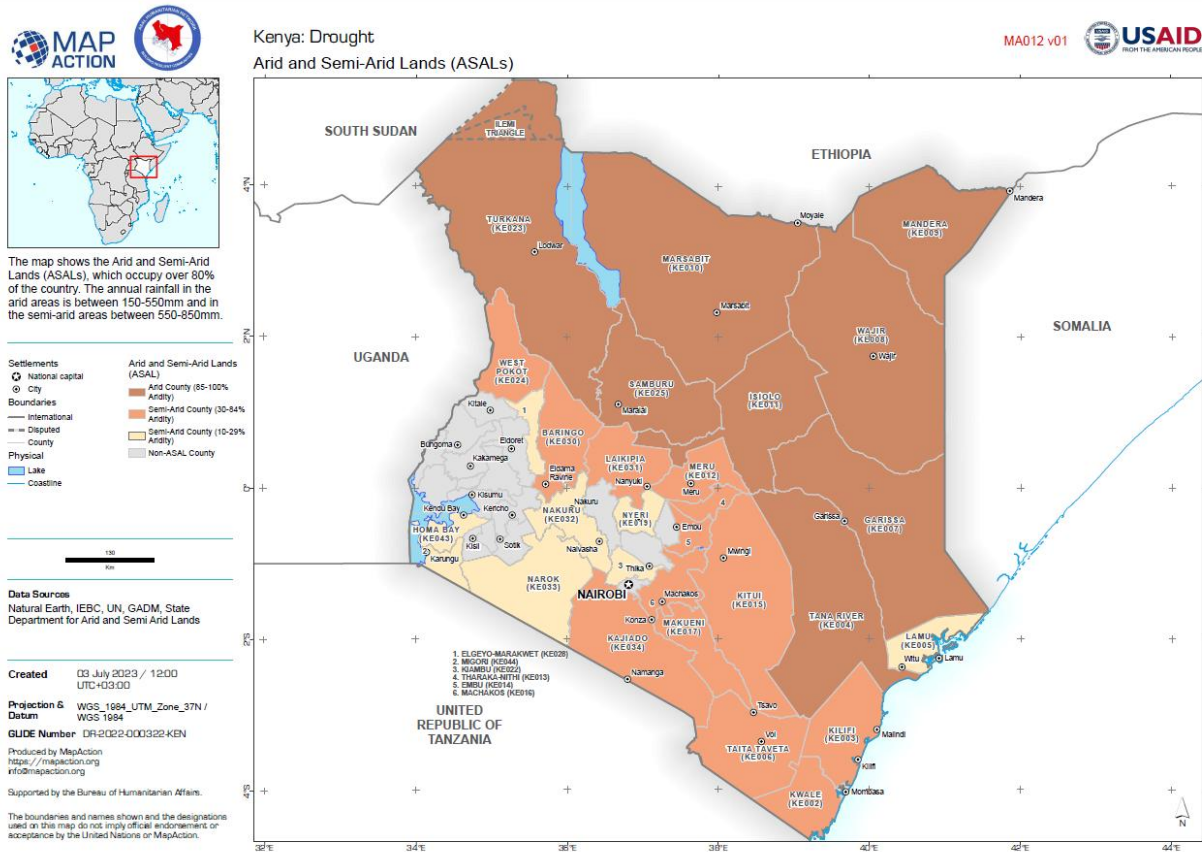
From: Government of Kenya (2016)

### Gross margins for 1 hectare of selected crops planted, Kisii district, Kenya



Source: Ndegwa et al. (2011)

## Map of Kenya's Arid and Semi-Arid Lands



Source: ASAL Humanitarian Network and MapAction (2023)

## Drivers of deforestation and forest degradation in Kenya

Table 5.1. Drivers of deforestation.

| Category                                  | Direct drivers                                                                                                                                                                                                                                                                                                                                       | Indirect drivers                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
|-------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Governance</b>                         | <ul style="list-style-type: none"> <li>Inadequate application of basic silvicultural and ecological principles for forest management.</li> <li>“Tragedy of the commons” resulting in conflicts over natural resources.</li> </ul>                                                                                                                    | <ul style="list-style-type: none"> <li>Inadequate integration of the forest sector with other stakeholders.</li> <li>Unclear forest responsibilities and weak conflict-management capacity.</li> <li>Weak forest governance and institutions.</li> <li>Corruption, illegal logging, weak enforcement.</li> <li>Inadequate benefit sharing from forest resources.</li> <li>Diverse perceptions of importance of forests.</li> <li>Communal land tenure systems and their application.</li> <li>Lack of private ownership, unclear tenure and access to forest resources.</li> </ul>                                                                                                |
| <b>Policy</b>                             | <ul style="list-style-type: none"> <li>Overgrazing and inadequate regulation of grazing in forest reserves and community lands.</li> </ul>                                                                                                                                                                                                           | <ul style="list-style-type: none"> <li>More focus shifted to water towers, paying less attention to dryland woodlands, including the coastal and riparian forests.</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
| <b>Economic drivers</b>                   | <ul style="list-style-type: none"> <li>Clearing of forest for agriculture.</li> <li>Degradation of forest.</li> <li>Charcoal and fuel wood from unsustainable production.</li> <li>Infrastructure and urbanisation.</li> <li>Conversion of communal forest to agriculture.</li> <li>Mining within forest areas.</li> <li>Illegal logging.</li> </ul> | <ul style="list-style-type: none"> <li>Demand is higher than supply.</li> <li>Heavy bureaucracy and poor efficiency obstructing competitiveness.</li> <li>Limited knowledge of tree growing (and necessary silviculture) as an enterprise.</li> <li>Poverty, high prices for agriculture products, subsidised fertiliser, tax exemption for certain agricultural machinery resulting in unhealthy competition for land.</li> <li>Fixed timber prices at low levels.</li> <li>Rapidly increasing population has heightened the demand for land.</li> <li>Few or no livelihood options have created overdependence on agriculture and mounting pressure on forest lands.</li> </ul> |
| <b>Technology drivers</b>                 | <ul style="list-style-type: none"> <li>Poor uptake of new technologies.</li> <li>Poor awareness of deforestation impacts.</li> <li>Poor knowledge of tree planting.</li> </ul>                                                                                                                                                                       | <ul style="list-style-type: none"> <li>Uncertain availability of timber and wood for processing enterprises.</li> <li>Low investment in wood processing resulting in ineffective processing.</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
| <b>Cultural and environmental drivers</b> | <ul style="list-style-type: none"> <li>Unsustainable utilisation, including overgrazing.</li> <li>Conflict at multiple levels.</li> <li>Fires are deliberate, accidental, poorly managed and they destroy forests.</li> <li>Wildlife damage impacting regeneration.</li> </ul>                                                                       | <ul style="list-style-type: none"> <li>Traditional farming methods in a context of increased population and overstocking of animals.</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |

Source: Government of Kenya (2016a, p. 31)

## Forest ownership by broad category in Kenya based on NDC baseline data (2010)

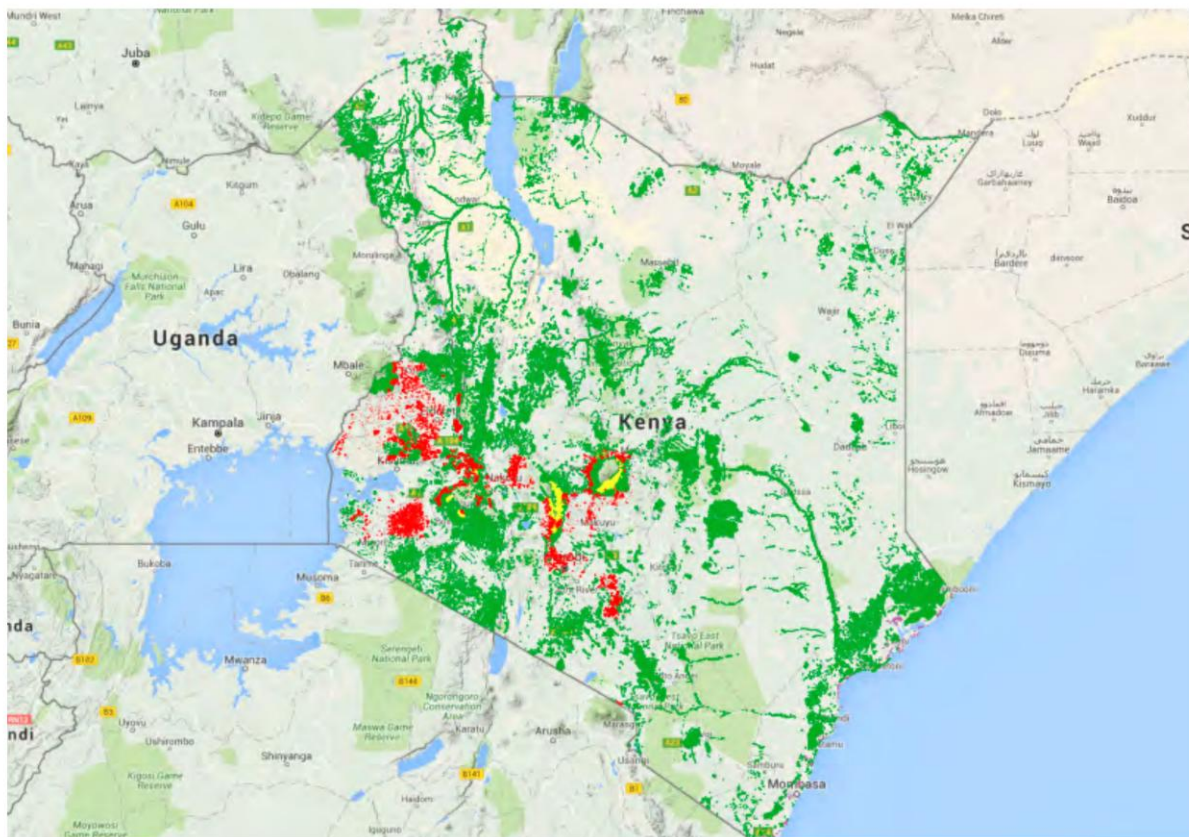
**TABLE 2: Forest ownership by broad category**

| Type of forest   | Public (gazetted) | Private/community-owned | Total (ha)       |
|------------------|-------------------|-------------------------|------------------|
| Natural forests  | 905,000           | 2,945,000               | 3,850,000        |
| Plantations      | 120,000           | 72,000                  | 192,000          |
| Bamboo forests   | 71,000            | 15,000                  | 86,000           |
| Mangrove forests | 1,000             | 9,000                   | 10,000           |
| <b>Total</b>     | <b>1,097,000</b>  | <b>3,041,000</b>        | <b>4,138,000</b> |

Source: GIS analysis of KFS forest cover dataset (KFS, 2013).

Source: UNEP (2017, p. 9), Kenya Forest Service (2013).

## Map of forest cover in Kenya

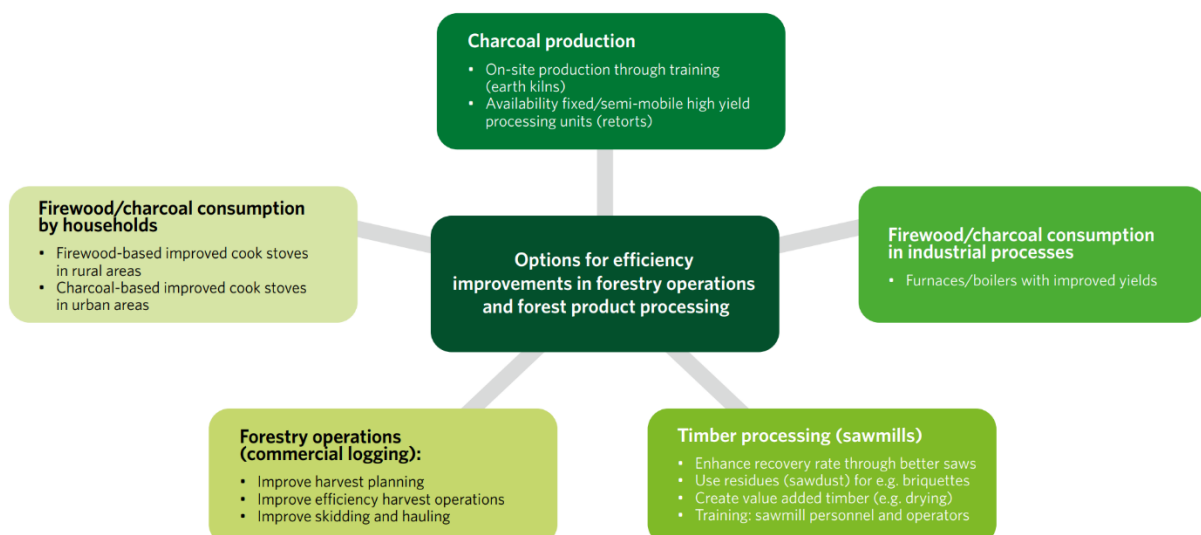


Legend: Green shows natural forests, red shows plantations, yellow shows bamboo forests, and purple shows mangrove forests.

Source: UNEP (2017, p. 16) using KFS 2010 data (2013).



## Areas for optimizing efficiency in the forest and timber sectors in Kenya



Source: UNEP (2017)

## Logging Bans Imposed by the Government of Kenya

| Duration  | Scope of ban                                                                                                                                                                                                           |
|-----------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 1999-2011 | A 13-year ban on timber harvesting in public forests due to poor harvesting conditions and the resulting difficulty in ensuring the sustainable management of public forests (both natural and plantations).           |
| 2018-2023 | Ban on timber harvesting in public and community forests. The government partially lifted the ban for certain areas during this time period to accommodate the livelihoods of local communities (e.g., the Lamu area). |

Source: UNEP (2017); Obura (2020); Fuchs (2023)

**Literature findings on barriers to private climate finance in the sustainable forestry and timber sector in developing countries and Kenya**

| <b>Barrier</b>                                                                       | <b>Description</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
|--------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>High real and perceived risks</b>                                                 | These risks encompass political instability, insecure land tenure, currency fluctuations, social and environmental challenges, and concerns regarding reputation. Notably, reputational risks can significantly impede the mobilization of institutional investments, such as pension funds, particularly in forestry ventures within developing nations.                                                                                                                                                                                                                                                                                                             |
| <b>Lack of availability of both domestic and foreign equity and loan financing</b>   | This scarcity is particularly pronounced in forestry investments, where a lack of capital coincides with a limited comprehension of forestry sector investments among financial institutions. Securing international equity financing, especially for projects below the USD20–25 million threshold, is a challenge.                                                                                                                                                                                                                                                                                                                                                  |
| <b>Unfavorable terms for financing</b>                                               | Access to domestic debt financing may entail excessively high interest rates in local currency and short repayment periods ranging from six months to three years. Furthermore, debt financing is frequently contingent upon securing adequate equity, thereby linking the scarcity of equity with the availability of debt financing.<br>In Kenya, the available financial mechanisms in local banks are usually not tailored to the needs of forestry investments in which commercial plantations have extended rotation cycles. The absence of long-term forestry licenses adds further complexity, necessitating additional collateral to secure loan facilities. |
| <b>Higher up-front costs of preparing investment projects in the forestry sector</b> | This is due to various factors, including a dearth of information regarding forest resources and investment opportunities, as well as associated risks. Moreover, small and medium-sized projects encounter higher transaction costs throughout the investment cycle, further amplifying the financial burden.                                                                                                                                                                                                                                                                                                                                                        |
| <b>Lack of infrastructure</b>                                                        | Weak physical infrastructure leads to inefficiencies in the sector, impedes market access and increases overall transaction costs. It acts as a barrier to encouraging investment.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
| <b>Bureaucracy</b>                                                                   | Government bureaucracy often renders the operational landscape for companies more challenges. This ranges from licensing and registration procedures to lender and borrower protections, credit information availability, transport infrastructure, taxation, regulations, and transaction costs. This bureaucratic burden weighs particularly heavily on small and medium-sized enterprises situated in rural areas.                                                                                                                                                                                                                                                 |
| <b>Corruption</b>                                                                    | Rent seeking and corruption continue to be challenges in most countries, leading to a higher cost of doing business and adversely affecting the competitiveness of products in the market.                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
| <b>Lack of technical knowledge and skills</b>                                        | Many developing countries lack a labour force with sufficient technical skills that enable the sector to make advancements towards greater efficiency and sustainability. Kenya faces a particularly large forestry and timber expertise shortage. A 13-year harvesting ban on government land led to many sawmills and processing plants closing down and a lot of the forestry skills and expertise being lost and people transitioned into other sectors.                                                                                                                                                                                                          |

Source: Author's adaptation from Castren et al. (2014) and Government of Kenya (2016).

**Recommendations in the literature for increasing private climate finance in the sustainable forestry and timber sector in developing countries**

| <b>Category</b>                  | <b>Recommended action</b>                                                                                                                                                                         | <b>Stakeholder</b>                                                                             |
|----------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------|
| <b>Addressing knowledge gaps</b> | Strengthening the information base on domestic and international private climate finance for sustainable forest management                                                                        | Academia, international organizations (e.g. UNCTAD, FAO)                                       |
|                                  | Improving forestry and timber data collection (e.g. suitable lands for investments, growth, and yield, growing conditions, risks)                                                                 | Domestic governments, international organizations, NGOs, academia                              |
| <b>Policy and legislation</b>    | Strengthening land tenure systems                                                                                                                                                                 | Domestic governments                                                                           |
|                                  | Policy and legal frameworks for private sector investments in forestry and processing, incentivizing investments with targeted incentive schemes                                                  | National governments                                                                           |
|                                  | Improving forest sector governance and transparency, reducing corruption                                                                                                                          | National governments                                                                           |
| <b>Infrastructure</b>            | Improving the country's transport and other physical infrastructure (e.g. roads, ports, electricity, labor markets)                                                                               | National governments                                                                           |
| <b>Financial instruments</b>     | Reducing investment risks (both real and perceived) through financial instruments such as guarantees (e.g. first-loss guarantees), public-private partnerships, and innovative financing schemes. | Multilateral finance organizations (GCF, GEF) national development finance institutions (DFIs) |
|                                  | Improving access to financing and the development of innovative financing mechanisms that favor long-term investments                                                                             | Multilateral finance organizations (GCF, GEF). DFIs)                                           |
|                                  | Support smallholders and communities in achieving economies of scale and accessing finance                                                                                                        | National governments, Multilateral finance organizations (GCF, GEF, DFIs)                      |

Source: Author's own presentation from Castren et al., (2014) and Government of Kenya(2016)

## Appendix 5B Additional project-level information on case study: Komaza

### Komaza's Partnership with Smallholder Farmers based on the 'Outgrower' Forestry Model

| Stakeholder        | Services provided by the stakeholder                                                                                                                                                      | Expected benefits for the stakeholder                                                                 | Advantages of the model to the stakeholder                                                                                                                         |
|--------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Komaza Inc.</b> | <ul style="list-style-type: none"><li>• Provision of seedlings and inputs</li><li>• Provision of technical expertise</li><li>• Farmer training</li><li>• Monitoring and support</li></ul> | <ul style="list-style-type: none"><li>• Tree ownership</li><li>• Cost-efficient wood supply</li></ul> | <ul style="list-style-type: none"><li>• Elimination of the need to purchase land</li><li>• Reduction or elimination of infrastructure costs and salaries</li></ul> |
| <b>Farmer</b>      | <ul style="list-style-type: none"><li>• Land for trees (1-3 ha)</li><li>• Labor (e.g., planting and monitoring interventions)</li><li>• Security of land</li></ul>                        | <ul style="list-style-type: none"><li>• Guaranteed buyer of timber at above market prices</li></ul>   | <ul style="list-style-type: none"><li>• Opportunity to enter the timber market without upfront costs or debts</li></ul>                                            |

Source: Author's own representation based on information from interviews, Komaza (2021) and Rode et al. (2014)

### Interests and risks of respective stakeholder groups engaging with Komaza

| Stakeholder group by finance type | Example                     | Interest in engaging with Komaza                                                                                                                                                                                | Risk in engaging with Komaza                                                                                                                                                                                             | Risk for Komaza                                                                                                                                                                                                             |
|-----------------------------------|-----------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Return-seeking investor           | NOVASTAR Ventures           | - Return on investment and ESG impact: Potential for high return on capital (10-100x) for a business model that addresses timber supply deficit while simultaneously proving high-impact social forestry impact | - Business risk: operational inefficiencies increase business cost, placing revenue generation at risk (e.g. tree theft, premature sale of land; premature sale of timber)<br>Financial risk: High capital requirements. | Dilution of ownership; loss of control; expectations for high returns and demanding financial performance over a relatively short period of time; market and industry risks may make raising additional funding challenging |
|                                   | Land Degradation Fund (LDN) | - Low-risk concessional loan<br>Commercial investment into the proof of concept                                                                                                                                 | Financial risk: loan default in the event of insolvency. This was mitigated by signing a secured loan, providing legal rights to obtain company shares in the event of a loan default.                                   | Financial risks: Loan was contingent on Komaza successfully raising Series C round within one year of loan.                                                                                                                 |
| Grant provider                    | Mulago Foundation           | - Social and environmental impact                                                                                                                                                                               | Impact risks: Uncertain social and environmental outcomes due to monitoring and evaluation complexities.                                                                                                                 | Financial risks: Capital from grants too inconsistent and levels too insufficient to sustain growth                                                                                                                         |
| Carbon credit buyer               | Apple Inc. <sup>489</sup>   | - Net-zero target: Apple Inc. partnered with Komaza to support the development of carbon credits, via Verra, to offset residual corporate emissions.                                                            | Reputational risk: Lack of project rigor (leakage, permanence, additionality) leads to scrutiny in the media                                                                                                             | Regulatory risks; project performance risks; market risks due to fluctuating carbon credit prices; permanence                                                                                                               |

<sup>489</sup> Note that despite initial conversations to purchase carbon credits, the transaction was not carried out.

|    |                    |                                                                                                                                                                                                            |                                                                                                                                                                                                                                                                  |                                                                                                                                                                             |
|----|--------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|    |                    |                                                                                                                                                                                                            |                                                                                                                                                                                                                                                                  | risks (e.g. forest fires, diseases, illegal logging)                                                                                                                        |
| NA | Smallholder farmer | - Economic livelihoods: Engaging in activities that strengthen climate resilience and contribute to economic livelihoods by providing non-climate dependent income and crop diversification opportunities. | - Risk of business failure leading to payment default;<br>- Long time horizon (5-15 years before income generated)                                                                                                                                               | Permanence risk: Loss of tree assets due to theft, fire, disease and/or sale of land;<br>Revenue risks: Suboptimal tree maintenance and growth, impacting revenue potential |
| NA | Komaza             | - Profitability, socio-economic and environmental impact                                                                                                                                                   | Business risk: operational inefficiencies increase business cost, placing revenue generation at risk (e.g. tree theft, premature sale of land; premature sale of timber)<br>Financial risk: Inability to raise sufficient capital for business to reach maturity | NA                                                                                                                                                                          |

Source: Author's own analysis based on stakeholder interviews

**Overview of Komaza’s NbS impact areas, as reported in carbon project documentation, and potential concerns or risks**

| <b>Impact area</b>                            | <b>Objectives<sup>490</sup></b>                              | <b>Expected benefits of activities<sup>491</sup></b>                                                                                                                         | <b>Indicators<sup>492</sup></b>                                                 | <b>Concerns or risks</b>                                                                                                                                                             |
|-----------------------------------------------|--------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Climate mitigation</b>                     | Increased carbon stock                                       | Estimated annual emissions reductions over a 30-year crediting period: 286,630 tons of carbon sequestered through standing stock of trees <sup>493</sup>                     | Total net change in carbon stocks since project start in each monitoring period | - Permanence concerns arising from potential tree theft, land sales, forest fires, disease, etc.<br>- Additionality defined as a strategy to mitigate risks on the path to breakeven |
| <b>Climate adaptation</b>                     | Enhanced climate adaptation through improved land management | Trees provide shade and retain moisture under the canopy which supports intercropping activities                                                                             | None provided                                                                   | - The absence of measurement mechanisms renders the impacts uncertain.                                                                                                               |
|                                               |                                                              | - Trees serve as windbreaks, prevent soil erosion, improved soil organic carbon, enhancing agricultural output and strengthening resilience to the effects of climate change | None provided                                                                   | - The absence of measurement mechanisms renders the impacts uncertain.                                                                                                               |
| <b>Biodiversity impacts and other nature-</b> | Increased forest cover and wildlife habitat                  | - Planting of an estimated 1 million trees annually, 25%+                                                                                                                    | - Number of trees planted, including the percentage of                          | - Number of trees planted does not take into consideration                                                                                                                           |

<sup>490</sup> As identified by Komaza in the Verra Registry (2023). “Komaza Smallholder Farmery Forestry Kenya.” Accessed 2024-01-23.

<sup>491</sup> Taken from Verra Registry (2023). “Komaza Smallholder Farmery Forestry Kenya.” Accessed 2024-01-23.

<sup>492</sup> As identified by Komaza in its Monitoring Plan. Verra Registry (2023) “Komaza Smallholder Farmery Forestry Kenya.” Accessed 2024-01-23.

<sup>493</sup> Verra Registry (2023) “Komaza Smallholder Farmery Forestry Kenya.” Accessed 2024-01-23.

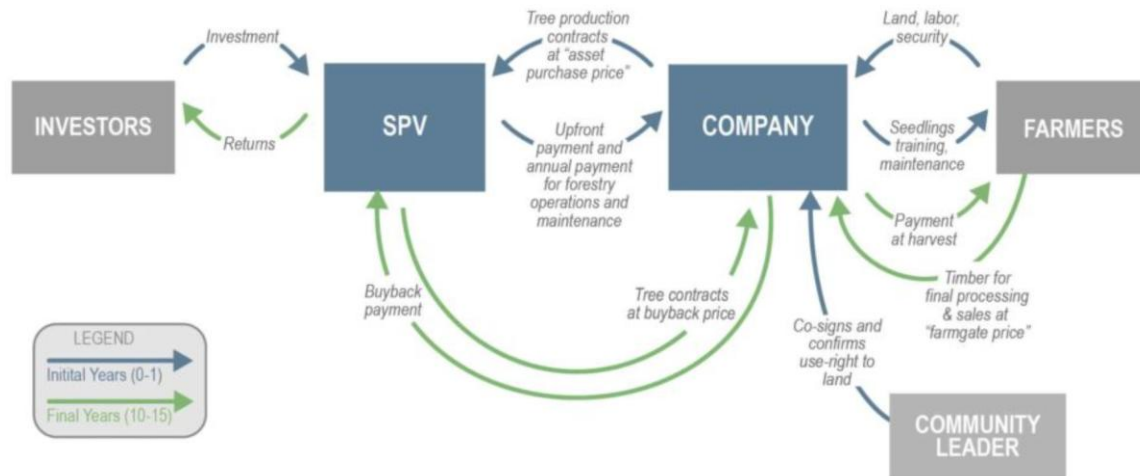
| Impact area                   | Objectives <sup>490</sup>                                           | Expected benefits of activities <sup>491</sup>                                                               | Indicators <sup>492</sup>                                                                                                              | Concerns or risks                                                                                                                                                                                                                                                |
|-------------------------------|---------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>related impacts</b>        |                                                                     | Melia Vokensii (indigenous), with the remaining percentage non-indigenous Eucalyptus.                        | native species (output indicator).                                                                                                     | survival rates; this may be addressed in net change in forest cover in project area<br>- Eucalyptus are not an indigenous species to Kenya and may have an impact on water resources availability<br>- New species introduction may introduce pests and diseases |
|                               |                                                                     | - Increased tree cover and habitat for flora and fauna, reducing pressure on neighboring indigenous forests. | - Net change in forest cover in project area (outcome indicator)                                                                       | - Dispersed tree planting via the out-grower model may not allow for significant forest cover change                                                                                                                                                             |
|                               |                                                                     |                                                                                                              | - Net change in the population trend of trigger species; at least 10 vulnerable or 1 critically endangered species (outcome indicator) | - Only one biodiversity-specific indicator included                                                                                                                                                                                                              |
|                               | Reduced pressure on high conservation value areas and other patches | - Increased wood supply for fuel wood to reduce pressure on neighboring indigenous forest                    | - Net change in HCV areas in the vicinity of Komaza project activities (outcome indicator)                                             | - Unclear whether this is an appropriate metric given that the HCV areas may not be in the vicinity of the Komaza project activities                                                                                                                             |
| <b>Socio-economic impacts</b> | Improve rural livelihoods                                           | - Commercial tree planting provides an additional diversified income and strengthens the                     | - Number of farmers receiving seedlings from Komaza (output indicator)                                                                 | - Number of trees planted does not take into consideration survival rates; this may be addressed in net change in                                                                                                                                                |



| Impact area | Objectives <sup>490</sup>                                                                                           | Expected benefits of activities <sup>491</sup>                                                                                                                 | Indicators <sup>492</sup>                                                                                                                                        | Concerns or risks                                                                                                                        |
|-------------|---------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------|
|             |                                                                                                                     | resilience of smallholder farmers                                                                                                                              |                                                                                                                                                                  | forest cover in project area                                                                                                             |
|             |                                                                                                                     | - Once harvested, the farmers benefit from a guaranteed price, ensuring a reliable and assured market demand.                                                  | - Total farmer payments (output indicator)<br>- Share of farmers who make or plan to make an investment as a direct result of Komaza payment (outcome indicator) | - Compensation to smallholder farmers from carbon credits unclear<br>- Safeguards for farmers (if the company enters insolvency) unclear |
|             | Women's empowerment                                                                                                 | - Promotion of gender equality through deliberate efforts, with 50% of farmers being women, leading to a more inclusive and equitable socio-economic landscape | - Share of Komaza female farmers enrolled (output indicator).                                                                                                    | NA                                                                                                                                       |
|             | Community strengthening                                                                                             | - Unclear which activities will be undertaken to support this objective                                                                                        | - Number of farmer groups constituted.                                                                                                                           | - Unclear which activities will be undertaken to support this objective.                                                                 |
|             | Reduced pressure on high conservation value areas and other forest patches; Improvement of forest management skills | - Provision of training and support for forestry practices, inputs (seedlings) for commercial woodlots increases region's forest management skills             | - Number of farmers receiving environmental awareness training (output indicator)                                                                                |                                                                                                                                          |

Source: Author's own compilation based on interview and documents submitted by Komaza and available in the Verra Registry (2024)

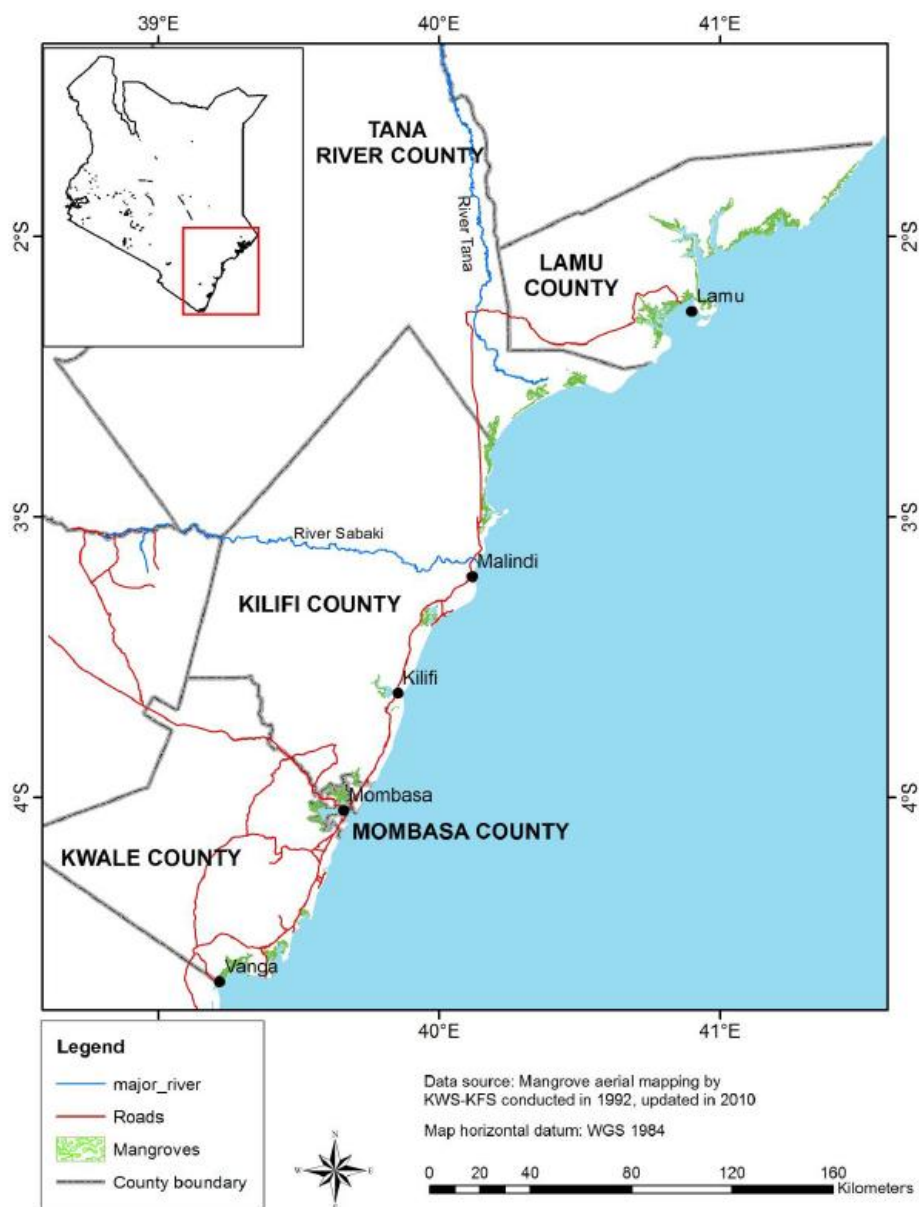
**Komaza's Smallholder Forestry Vehicle as an innovative investment mechanism to enable private investments that support smallholder farmers**



Source: Climate Finance Lab (2018)

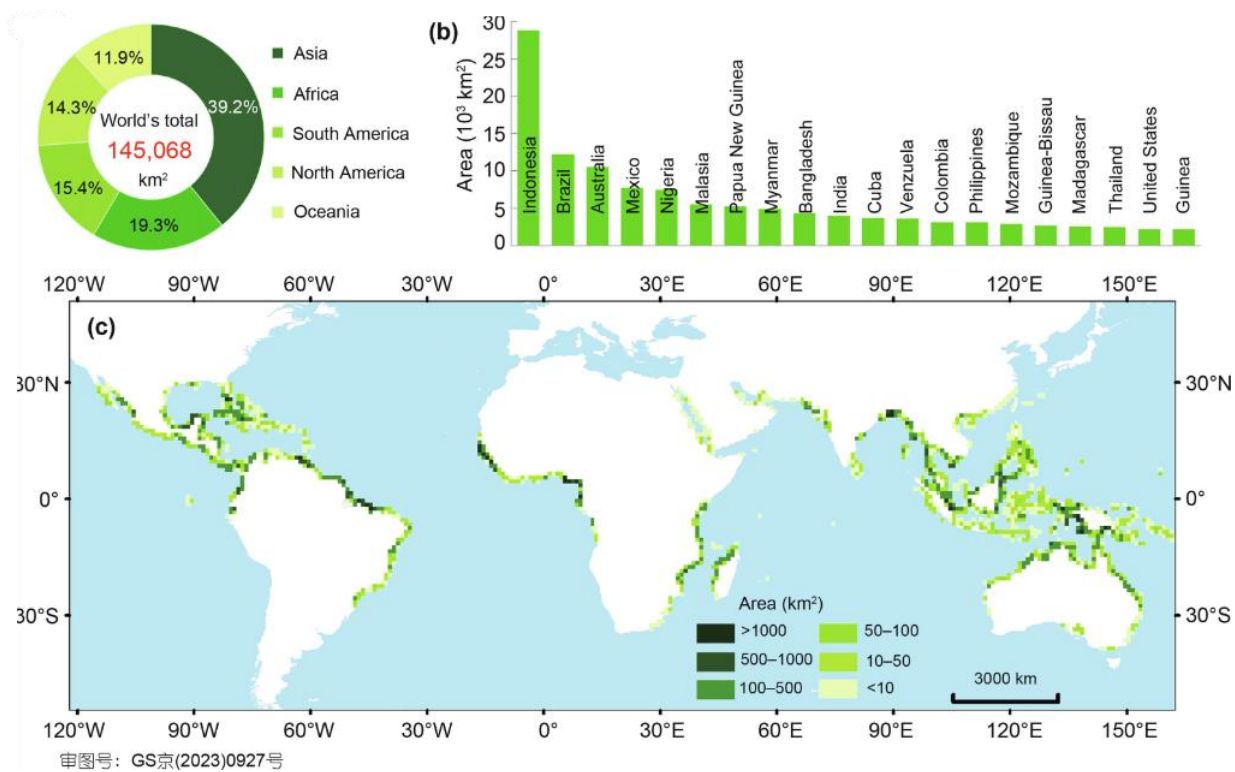
## Appendix 6A. Additional background information on case study: Mikoko Pamoja

Map of mangrove distribution along the coastal strip of Kenya



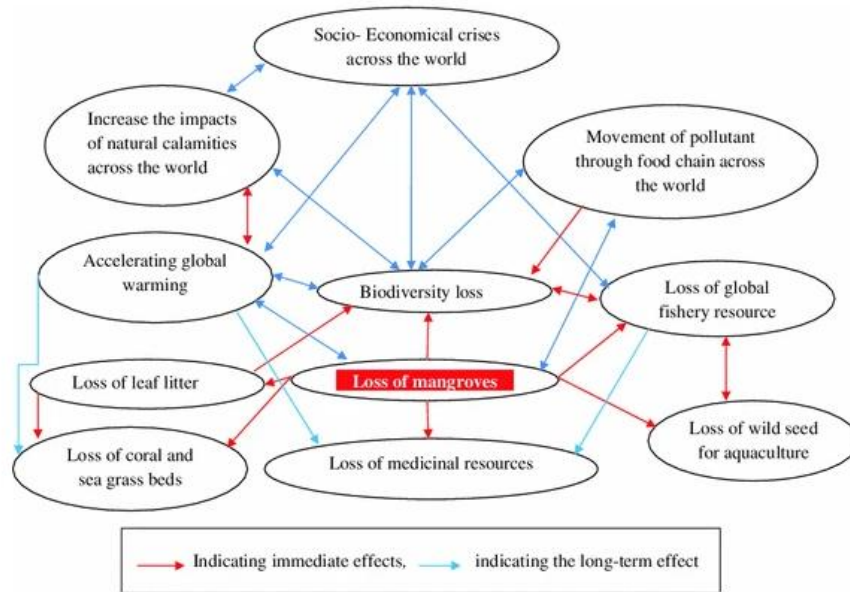
Source: Government of Kenya (2017)

Global map of the spatial distribution of mangrove forests



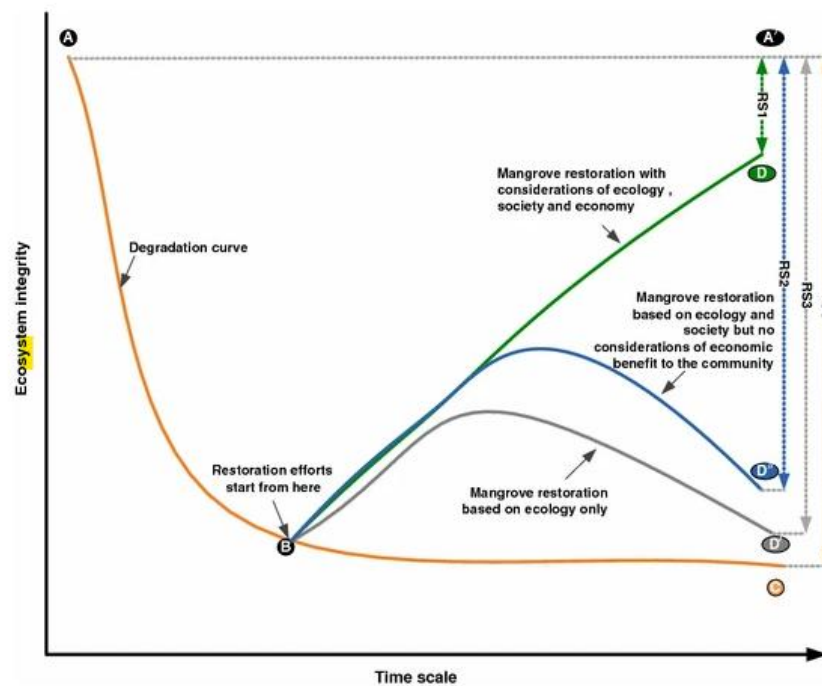
Source: Jia et al. (2023)

Schematic diagram of the effects of global mangrove loss



Source: Sandilyan and Kathiresan (2012b)

### A hypothesis on the concept of mangrove restoration; influenced by ecology, society and economy



Source: Biswas et al. (2009)

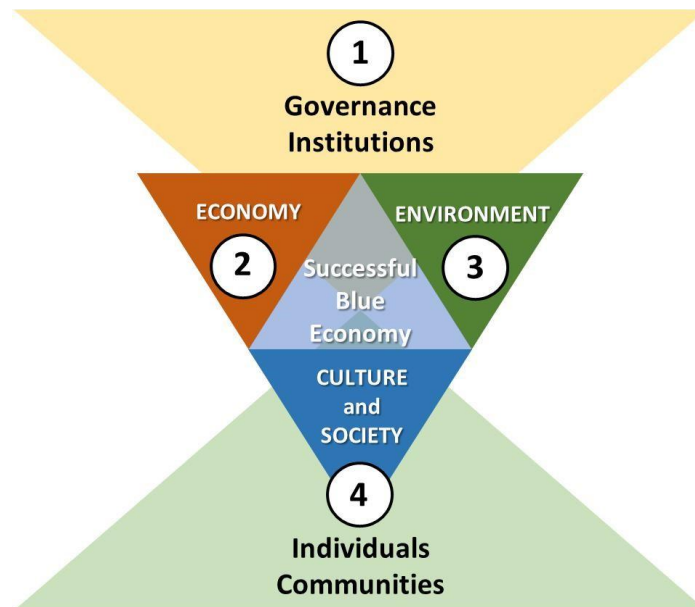
## Full spectrum sustainability (FSS) for assessment of blue economy activities in Africa

| Full-spectrum sustainability category | Sustainable objectives                             | Example indicators                                                                                              |
|---------------------------------------|----------------------------------------------------|-----------------------------------------------------------------------------------------------------------------|
| Ecological                            | Productivity and trophic structure                 | Recruitment dynamics, indigenous knowledge                                                                      |
|                                       | Biodiversity                                       | Species assemblage structure, biodiversity indicators, indigenous knowledge                                     |
|                                       | Habitat and ecosystem integrity                    | Pollution, habitat restoration, ecological indicators, indigenous knowledge, maintenance of ecological services |
| Economic                              | Viability and prosperity                           | Human demographics, capacity building, technical assistance                                                     |
|                                       | Sustainable livelihoods                            | Livelihood index, financial empowerment, ownership                                                              |
|                                       | Distribution of access and benefits                | Equity, the inclusion of marginalized groups, women, youth and indigenous communities, ownership                |
| Social and Cultural                   | Health and wellbeing                               | Social factors, social development, quality of life                                                             |
|                                       | Sustainable communities                            | Social capital, social structure                                                                                |
|                                       | Ethical practices                                  | Rights of people, respect for indigenous practices and traditions                                               |
| Governance and Institutional          | Legal and policy support                           | Legal support for indigenous people, favorable people-centered policies                                         |
|                                       | Governance structure                               | Organized groups, multi-sectoral involvement, the involvement of indigenous people                              |
|                                       | Cooperation and accountability in decision process | Collaboration, accountability, the involvement of indigenous people, use of indigenous knowledge                |

Source: Okafor-Yarwood (2020)

**Representation of the blue economy triangle (comprising culture and society, economy and environment); the top-down policy-driven and bottom-up community-led approaches needed for a successful blue economy; and the four key components of sustainability:**

**(1) governance and institutions, (2) economy, (3) environment, and (4) culture and society.**



Source: Okafor-Yarwood (2020)

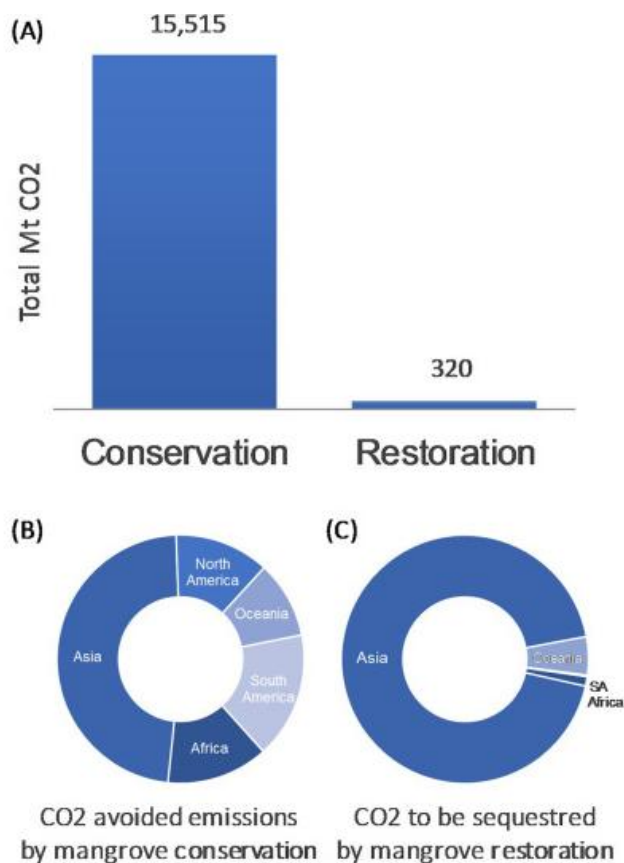
**Countries responsible for 90% of GHG emissions from mangrove deforestation between 2002 and 2017, and respective CO<sub>2</sub> emissions estimated based on the assumption that between 25% and 100% of the carbon stored in the living biomass and down to 1 m depth into the soils of mangroves have been lost to the atmosphere**

| Country           | Lost mangrove area (ha) | Emissions (tCO <sub>2</sub> ) |               |
|-------------------|-------------------------|-------------------------------|---------------|
|                   |                         | 25% scenario                  | 100% scenario |
| Indonesia         | 70,766                  | 38,038,341                    | 152,153,362   |
| Malaysia          | 40,191                  | 21,155,522                    | 84,622,088    |
| Myanmar           | 12,830                  | 5,753,786                     | 23,015,145    |
| Philippines       | 4937                    | 2,599,727                     | 10,398,908    |
| Papua New Guinea  | 4627                    | 2,328,371                     | 9,313,482     |
| Thailand          | 3627                    | 1,670,081                     | 6,680,323     |
| Malaysia          | 2924                    | 1,642,487                     | 6,569,946     |
| Vietnam           | 3394                    | 1,622,231                     | 6,488,924     |
| Palau             | 2380                    | 1,419,444                     | 5,677,774     |
| Cambodia          | 2264                    | 1,014,734                     | 4,058,934     |
| India             | 2047                    | 920,400                       | 3,681,602     |
| Brunei Darussalam | 1039                    | 459,640                       | 1,838,560     |
| Kenya             | 829                     | 436,945                       | 1,747,779     |
| Mozambique        | 617                     | 257,455                       | 1,029,819     |
| Australia         | 525                     | 224,882                       | 899,529       |

Source: Jakovac et al. (2020b)



## Contribution of mangrove conservation and restoration to climate change mitigation across continents



Note: Total amounts of CO2 avoided emissions by the conservation of remaining mangroves, and to be sequestered by mangrove restoration (A); Contribution of continents to CO2 avoided emissions if they conserve the remaining mangroves (B); Contribution of continents to CO2 sequestration by restoration of deforested mangroves (C).

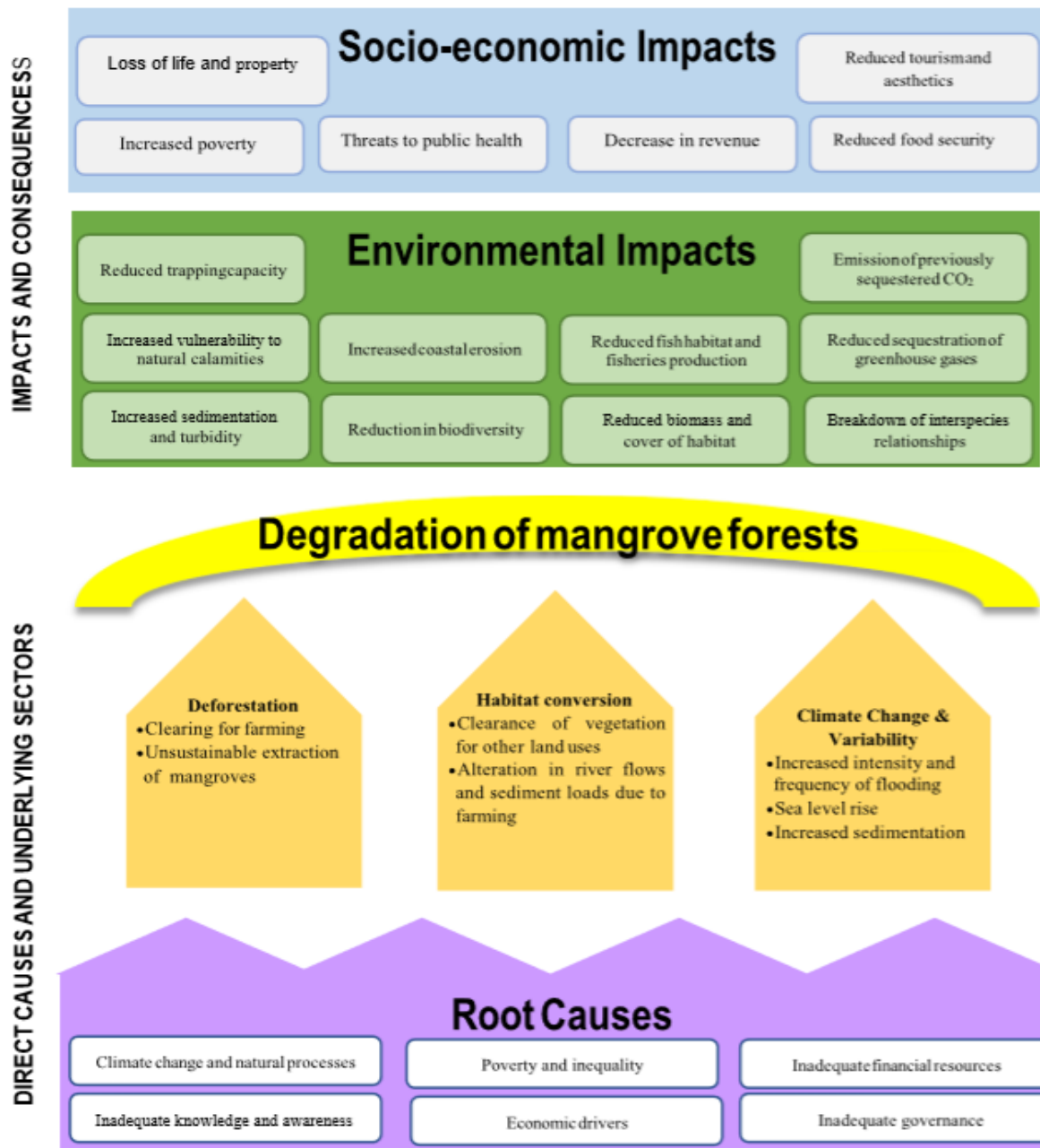
Source: Jakovac et al., 2020

### Valuation of mangrove ecosystems in Kenya

| <b>Product and services</b> | <b>KES ha<sup>-1</sup>yr<sup>-1</sup></b> |
|-----------------------------|-------------------------------------------|
| Building poles              | 30,659.5                                  |
| Fuel wood                   | 4,505.0                                   |
| Onsite fisheries            | 9,612.7                                   |
| Beekeeping                  | 1,249.5                                   |
| Integrated aquaculture      | 408.0                                     |
| Education & Research        | 65,469.6                                  |
| Tourism                     | 782.0                                     |
| Carbon sequestration        | 21,896.0                                  |
| Shoreline protection        | 134,866.1                                 |
| <b>Total</b>                | <b>269,448.3</b>                          |

Source: Government of Kenya (2017)

## Drivers and impacts of mangrove degradation in Kenya



Source: Plan Vivo (2020)

## Appendix 6B. Additional project-level information on case study: Mikoko Pamoja

### Overview of Mikoko Pamoja project stakeholders

| stakeholder type                                                                            | Stakeholder name                                                                                     |
|---------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------|
| <b>International public actors</b> (governments)                                            | NA                                                                                                   |
| <b>International private actors</b> (business)                                              | Confidential                                                                                         |
| <b>International private actors</b> (academic institutions)                                 | Edinburgh Napier University (UK)<br>Bangor University (UK)<br>Vrije University of Brussels (Belgium) |
| <b>International private actors</b> (philanthropic or non-profit organization)              | Earthwatch Institute<br>WWF International                                                            |
| <b>Domestic public actors</b> (government)                                                  | Kenya Marine Fisheries Research Institute<br>Kenya Forest Service                                    |
| <b>Domestic or regional private actors</b> (business)                                       | One corporation (confidential)                                                                       |
| <b>Domestic or regional private actors</b> (philanthropic or non-governmental organization) | NA                                                                                                   |
| <b>Domestic private actors</b> (individuals)                                                | Gazi and Makogeni villages                                                                           |

Source: Author

## Interests and risks of respective stakeholder groups engaging with Mikoko Pamoja

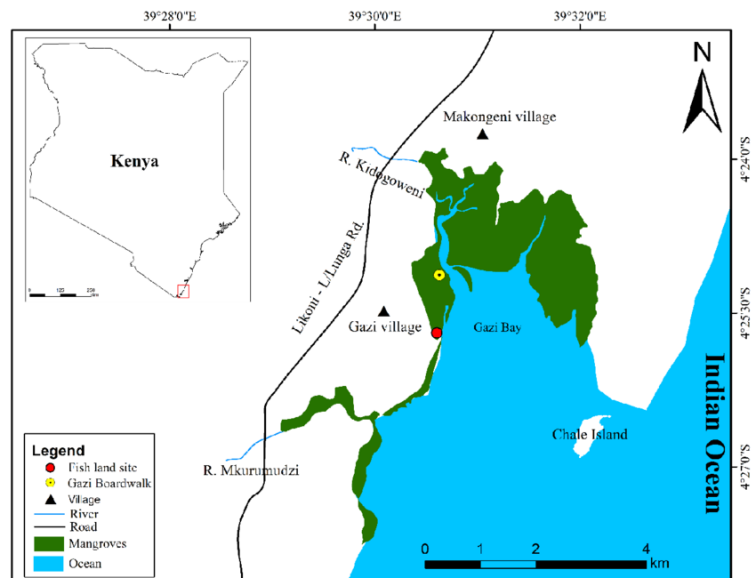
| Stakeholder group by finance type | Example                                           | Risk in BAU scenario                                                                                                                                                                             | Interest in engaging with Mikoko Pamoja (expected benefits)                                                                                                                                                      | Risk in engaging with Mikoko Pamoja                                                                                                                                                                                                                     | Risk for Mikoko Pamoja                                                                                          |
|-----------------------------------|---------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------|
| In-kind support                   | ACES                                              | Scientific research indicating the continued deterioration of mangroves does not effectively translate into on-the-ground actions to mitigate or reverse this trend.                             | -Scientific support to establish baseline and support the setup of the project<br>- The involvement of a UK entity and research body enhances confidence and credibility among international carbon credit buyer | - Reputational risk: The potential challenge to the credibility of the scientists involved if the on-the-groundwork is not successful                                                                                                                   | ACES fails to attract sufficient carbon credit buyers to facilitate the continuation of the blue carbon project |
| Grant provider                    | Research Council of the United Kingdom            | Failure of the international community to achieve global goals outlined in the Paris Agreement on climate change and the Global Biodiversity Framework                                           | Providing support                                                                                                                                                                                                | - Mismanagement of funds and corruption: diversion of funds for unauthorized purposes<br>- Lack of accountability and transparency<br>- Insufficient local capacity to execute effectively<br>- Environmental and social risks not adequately addressed | NA                                                                                                              |
|                                   | EarthWatch Institute/ Edinburgh Napier University | - High dependency on Upper Tana River: 90% of water supply for business operations was provisioned from the river. <sup>1</sup><br>- Increased likelihood of conflict with local communities, as | Lower project initiation cost                                                                                                                                                                                    | - Mismanagement of funds and corruption: diversion of funds for unauthorized purposes<br>- Public perception risk: mismanagement of project could result in public relations challenges                                                                 |                                                                                                                 |

|                              |                                                   |                                                                                                                                                                             |                                                                                                                                                                                                                             |                                                                                                                                                                                                                                                                                                                                                                                                      |                                                                                                                                                                          |
|------------------------------|---------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                              |                                                   | they perceived companies as extracting all the water.                                                                                                                       |                                                                                                                                                                                                                             | - Community relations risk: Project mismanagement may worsen relations with local communities.                                                                                                                                                                                                                                                                                                       |                                                                                                                                                                          |
| <b>Carbon credit revenue</b> | <b>Businesses (carbon credit brokers)</b>         | <b>Market risk:</b> Price volatility of carbon credits due to changes in supply and demand.<br><b>- Regulatory and compliance risks:</b> Changes in regulations and climate | Opportunity for profits through the resale of carbon credits at a premium price.                                                                                                                                            | <b>Verification and credibility risks:</b> The quality and credibility of credits depends on the project's ability to deliver on objectives and if this is found to be lacking, it makes the credits worthless.<br><b>Reputational risks:</b> The perception of unethical behavior, projects lacking transparency and rigor, or involvement in greenwashing can damage the organization's reputation | There is a lack of transparency and control concerning which corporations purchase from carbon credit brokers and whether they adhere to the project's values statement. |
|                              | <b>NGOs and philanthropies</b>                    |                                                                                                                                                                             | Mission alignment of blue carbon project that provides co-benefits: Climate change mitigation, biodiversity conservation, community livelihood benefits, advocacy and awareness of the importance of blue carbon ecosystems | <b>Market and financial risks:</b><br>- Regulatory and policy risks:<br>- Implementation and operational risks                                                                                                                                                                                                                                                                                       |                                                                                                                                                                          |
|                              | <b>Business (retail, etc.)</b>                    |                                                                                                                                                                             | Ability to offset and contribute to their corporate net zero targets                                                                                                                                                        | - Community and Social risks<br><b>- Social license to operate:</b>                                                                                                                                                                                                                                                                                                                                  |                                                                                                                                                                          |
|                              | <b>Academic institutions and event organizers</b> |                                                                                                                                                                             | Offset and contribute to a net zero course or conference                                                                                                                                                                    | Projects that do not consider local communities affects the success and broker's reputation                                                                                                                                                                                                                                                                                                          |                                                                                                                                                                          |
|                              | <b>Individuals/Family offices</b>                 | Failure of the international community to address climate change will impact individuals and                                                                                | - Potential to offset personal footprints<br>- Mission alignment of blue carbon project that provides co-                                                                                                                   |                                                                                                                                                                                                                                                                                                                                                                                                      | Small transaction sizes ranging from \$45 to \$468 incur high processing costs                                                                                           |

|    |                                    |                                                                                                                                                                                                             |                                                                                                                                                                   |                                                                                                                                                                                                                                                         |    |
|----|------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----|
|    |                                    | family in the long-term                                                                                                                                                                                     | benefits: Climate change mitigation, biodiversity conservation, community livelihood benefits, advocacy and awareness of the importance of blue carbon ecosystems |                                                                                                                                                                                                                                                         |    |
| NA | <b>Gazi and Makongeni villages</b> | Lack of community incentives to protect mangroves, leading to aggravated climate change effects such as loss of farmland, soil salinization, and reduced coastal protection against extreme weather events. | Community receives additional revenue to fund community projects (e.g. water treatment facility)                                                                  | <ul style="list-style-type: none"> <li>- Risk that the cost-benefit results for the community</li> <li>- Implementation failure</li> <li>- Mismanagement of funds and corruption, including the diversion of funds for unauthorized purposes</li> </ul> | NA |

Source: Author

## Map of Gazi Bay



Source: Map of Mikoko Pamoja's project site in Gazi Bay, Kenya (Runya et al. (2023))



**Mikoko Pamoja project area, taken from Sentinel 2 (February 2019), and associated activities**



| Key            | Activity area name and size (ha) | Baseline land cover type                 | Activity type                                        | Interventions                                   |
|----------------|----------------------------------|------------------------------------------|------------------------------------------------------|-------------------------------------------------|
| Blue outline   | Activity area 1 (107 ha)         | <i>Rhizophora mucronata</i> forest       | Conservation (avoided deforestation and restoration) | <i>Rhizophora mucronata</i> forest conservation |
| Red outline    | Activity area 2 (10 ha)          | <i>Rhizophora mucronata</i> plantations  | Reforestation and forest protection                  | <i>Rhizophora mucronata</i> plantations         |
| Yellow outline | Activity area 3 (0.4 ha)         | Degraded former <i>Sonneratia</i> forest | Reforestation of eroded beach area                   | <i>Sonneratia alba</i> plantations              |

Source: Plan Vivo (2020)

Appendix 7A. Additional background information to case study: Upper Tana Nairobi Water Fund (UTNWF)

Dimensions of water security and sustainability



Figure 1-2 Dimensions of water security and sustainability (Varis et al., 2017)

Source: UNESCO (2019)

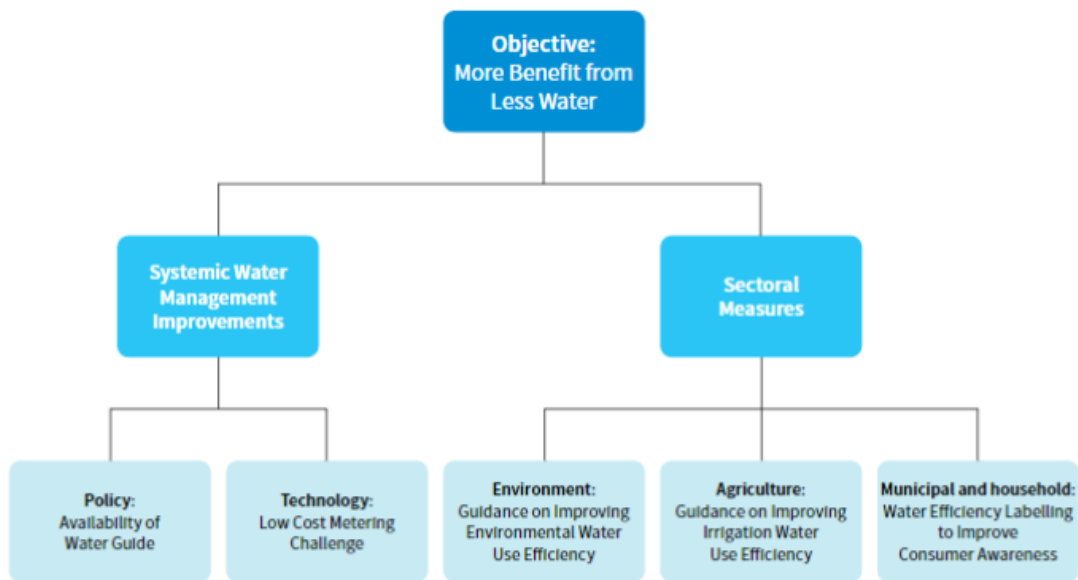
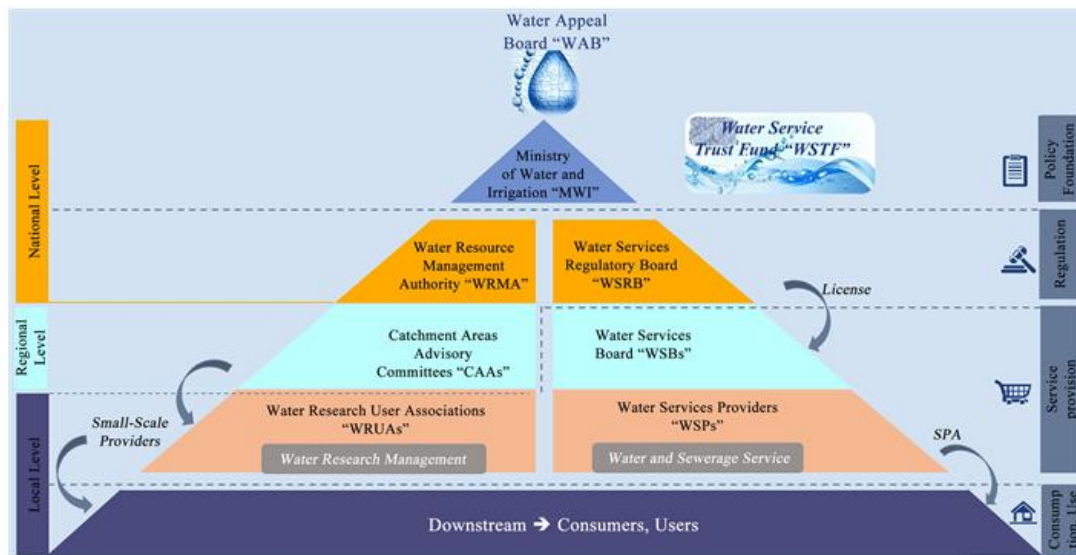


Figure 1-4 HLPW roadmap for enhancing efficiency

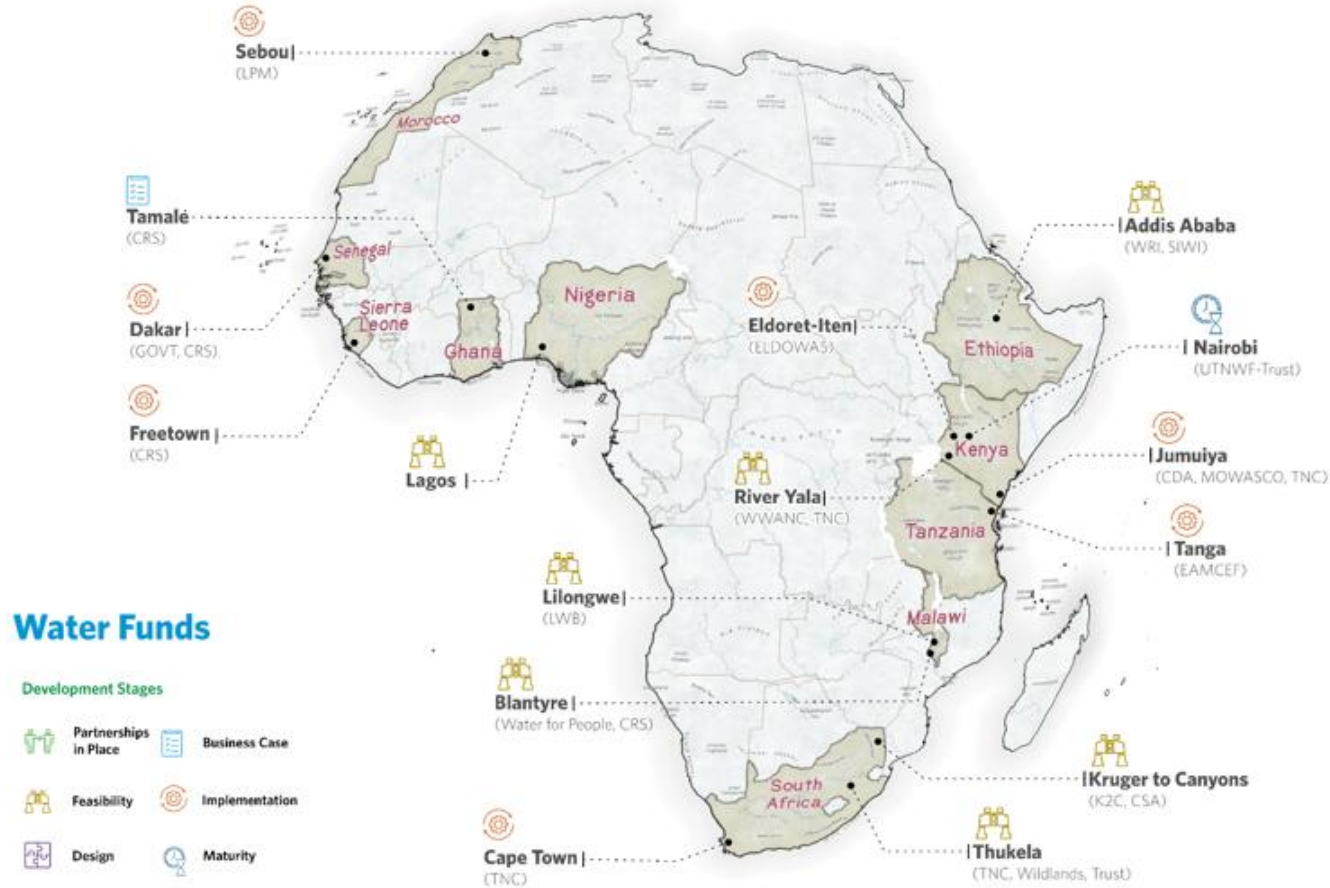
Source: UNESCO (2019)

## Institutional setup of water management and provision in Kenya under the Water Act 2022



Source: Mulwa et al. (2021b), Nyanchaga (Nyanchaga, 2016)

Collective action water funds under development in Africa as of April 2024



Source: TNC (2024)

### Types of Payments for Water Ecosystem Services in the water sector

| PSA type                                      | PSA mechanism                   | Definition                                                                                                                                                                                                   | Example                                                                                                                                      |
|-----------------------------------------------|---------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Government-financed</b>                    | Subsidy watershed PSA           | Public finance rewards land managers for enhancing or protecting ecosystem services. The funders do not directly benefit from the management activities.                                                     | China's Sloping Landscape Conversion Program                                                                                                 |
| <b>Hybrid (User- and Government-financed)</b> | Collective action watershed PSA | An institution pools resources from multiple water users (private parties, NGOs, government bodies) to pay upstream landowners for management actions that improve water quality and provide other benefits. | Upper Tana Nairobi Water Fund;<br>Quito's Water Conservation Fund;<br>Costa Rica's Agua Tica in the Grande and Virilla Rivers sub-watersheds |
| <b>Hybrid (User- and Government-financed)</b> | Bilateral watershed PSA         | A single water user compensates one or more parties for activities that deliver hydrological benefits to the payer or serve to mitigate impacts from their activities.                                       | New York City Catskill/Delaware Watersheds                                                                                                   |
| <b>Hybrid (User- and Government-financed)</b> | Instream buybacks               | Water rights are purchased or leased from historic rights holders and retired, which leaves the water in-stream to deliver water-quality benefits and ensure healthy ecological flows.                       | Australia's Restoring the Balance Programme                                                                                                  |
| <b>Compliance</b>                             | Quality trading and offsets     | Water service providers comply with regulations by paying landowners for activities that improve a measure of water quality (such as nutrients, salinity or temperature) in exchange for credits.            | Australia's Hunter River Salinity Trading Scheme                                                                                             |

Source: Author's adaptation, separating PSA type and PSA mechanism, from Salzman et al. (2018a, p. 137)

## Appendix 7B: Additional project-level information on case study: Upper Tana Nairobi Water Fund (UTNWF)

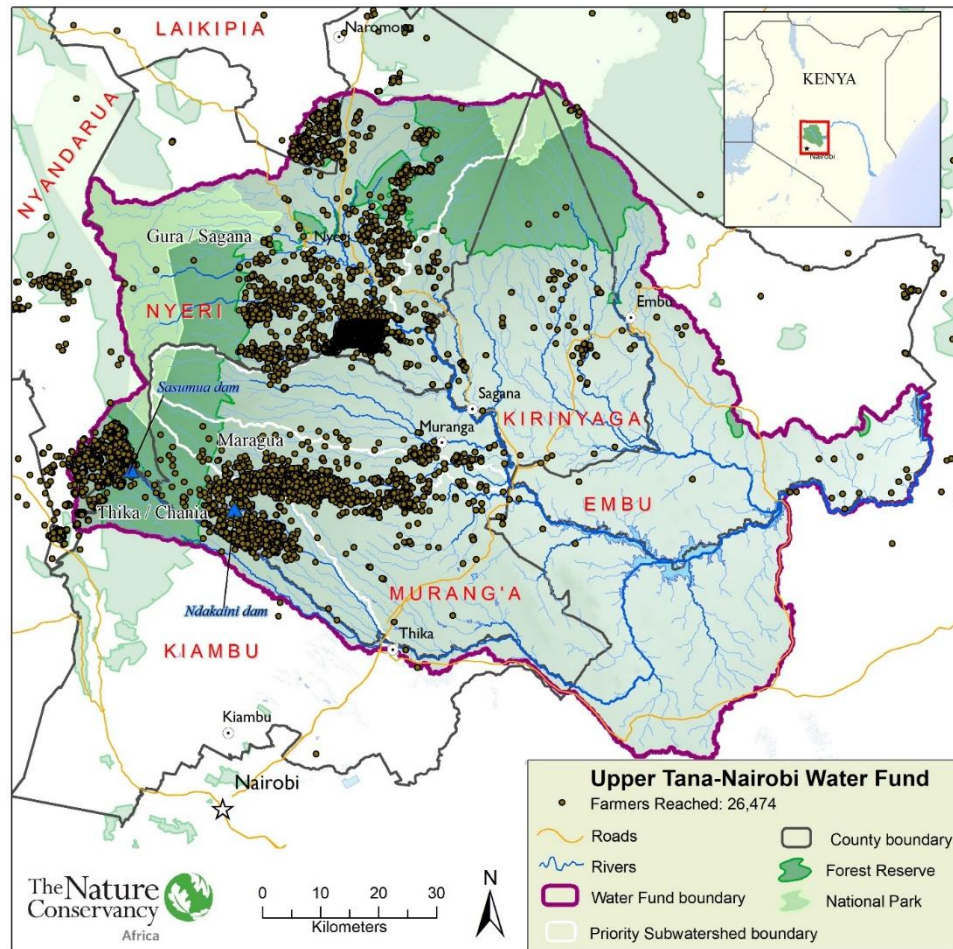
Upper Tana-Nairobi Water Fund Project boundary in Kenya



Source: TNC (2020)



## Overview of the Upper Tana-Nairobi Water Fund NbS intervention areas



Source: TNC (TNC, 2019b)

## Overview of project costs to set up and/or maintain a collective action water fund

| Grouping                             | Major activity category                  | Examples of activities included                                                                                                                                                                                                                                                                                                           |
|--------------------------------------|------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Administration and transaction costs | Stakeholder outreach                     | <ul style="list-style-type: none"> <li>- Stakeholder identification and outreach (including surveys, interviews, visits)</li> <li>- Coordination with programme partners</li> <li>- Partner enrollment and management</li> </ul>                                                                                                          |
|                                      | Legal services                           | <ul style="list-style-type: none"> <li>- Institutional, legal, and policy analyses/studies</li> <li>- Contracts preparation and management</li> <li>- Legal processes required for programme establishment</li> <li>- Enforcement of contracts in case of non-compliance</li> </ul>                                                       |
|                                      | Technical analyses                       | <ul style="list-style-type: none"> <li>- Biophysical analyses and modeling</li> <li>- Socio-economic analyses</li> <li>- Business case analysis (return on investment; cost-effectiveness)</li> </ul> <i>(includes field visits, focus group meetings, surveys, expert consultation)</i>                                                  |
|                                      | Programme management                     | <ul style="list-style-type: none"> <li>- Programme strategy design, fundraising, administration</li> <li>- Training and capacity building workshops that programme staff participate</li> <li>- Landowner enrollment (selection, engagement, contract negotiations, etc.)</li> </ul>                                                      |
|                                      | Communications                           | <ul style="list-style-type: none"> <li>- Marketing, outreach materials, web materials; internal and external reporting</li> <li>- Event organization</li> </ul>                                                                                                                                                                           |
|                                      | Monitoring                               | <ul style="list-style-type: none"> <li>- Hydrologic, biodiversity, or socio-economic monitoring</li> <li>- Landowner compliance monitoring</li> <li>- Data management</li> <li>- Contract design, implementation, and maintenance of monitoring system</li> <li>- Impact evaluation</li> </ul>                                            |
| Intervention costs                   | Interventions implemented by the program | <ul style="list-style-type: none"> <li>- NbS intervention costs borne by programme for directly implementing NbS or for assisting landowners in implementation</li> <li>- Design and planning, equipment, materials, maintenance, technical assistance to landowners</li> <li>- Contracts to implement conservation activities</li> </ul> |
|                                      | Payments (cash or in-kind) to landowners | <ul style="list-style-type: none"> <li>- Payments (cash or in-kind) to landowners and/or communities for implementing agreed-upon interventions</li> <li>- Cost of purchasing and delivering in-kind support to landowners/communities</li> </ul>                                                                                         |
| Other                                | Other                                    | Anything not falling under categories above                                                                                                                                                                                                                                                                                               |

Source: Kang et al. (2023) (Kang et al., 2023)



## Water services by end user

| Water user                                           |                                                                         | Services received                                                                                                                                                                                                      |                                                                                                            |
|------------------------------------------------------|-------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------|
|                                                      |                                                                         | Quantity                                                                                                                                                                                                               | Quality                                                                                                    |
| <b>Hydroelectric dams</b>                            | Annual and intra-annual reservoirs                                      | Maximum water supply throughout the year.                                                                                                                                                                              | Reduced sedimentation, the importance of which depends on the reservoir capacity to accommodate sediments. |
|                                                      | Daily reservoir levels                                                  | Maximum daily supply, especially during dry seasons when rainfall is limited.                                                                                                                                          |                                                                                                            |
| <b>Run-of-river hydropower plants</b> <sup>494</sup> |                                                                         | Maximum water retention in the watershed to provide constant flow. Changes from soil quick flow (saturated forest soils) to overland flows will have some effect on buffering river flows and hydroelectric operation. |                                                                                                            |
| <b>Urban and rural residential water consumers</b>   | Municipal and private water utilities companies                         | Constant water supply throughout the year for drinking. Reduced flood risks during wet seasons and water shortages during dry seasons.                                                                                 | Improved water quality especially in catchment areas that reduce treatment costs.                          |
|                                                      | Landowners                                                              | Constant water supply throughout the year for drinking and other activities, such as subsistence farming. Reduced flood risks during wet seasons and water shortages during dry seasons.                               |                                                                                                            |
| <b>Industrial water users</b>                        | Agricultural sector (e.g. farmers)                                      | Constant flow of water, especially in the dry season, for agriculture, reduced risk of floods.                                                                                                                         | Water quality in terms of toxins, salination, etc.                                                         |
|                                                      | Distilleries, film processors, microchip manufacturers, food processors | Constant flow of water throughout year                                                                                                                                                                                 | Reduced contamination of water                                                                             |

<sup>494</sup> Run-of-river is a hydropower generation method that harnesses the natural flow of a river or stream to generate electricity. Unlike traditional hydroelectric dams that create large reservoirs by impounding water, run-of-river systems do not significantly alter the natural flow or watercourse of the river; rather a portion of the river's water is diverted and channeled through a canal or pipeline to a powerhouse.

|                         |                                                                          |                                                                                |                                                                                       |
|-------------------------|--------------------------------------------------------------------------|--------------------------------------------------------------------------------|---------------------------------------------------------------------------------------|
|                         | Commercial fisheries, sport fisheries, fishery management agencies, etc. |                                                                                | Reduced contamination of water. Reduced aquatic productivity and destruction of coral |
| <b>Tourists</b>         |                                                                          | Water availability throughout the year, especially during dry (tourist) season | Improved water quality, reduced degradation of tourism sites                          |
| <b>Ecological flows</b> |                                                                          | Availability of water flows, especially in dry seasons                         | Reduced siltation, sedimentation, suspended toxins from agriculture, etc.             |

Source: Adapted from Porras (2008, pp. 30–31)

**Overview of NbS water catchment interventions aimed at improving water quality and quantity**

| <b>Intervention</b>                    | <b>Description</b>                                                                                                                                                  | <b>UTNWF Intervention method (Yes/no)</b> |
|----------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------|
| Agricultural best management practices | Implementation of cover crops, terracing of steep farmlands, agroforestry, planting grass strips, contour farming to prevent or reduce sediment and nutrient runoff | <b>Y</b>                                  |
| Forest fuel treatment                  | Conducting controlled burns or mechanical treatment to reduce wildfire severity and related sediment and ash pollution                                              | <b>N</b>                                  |
| Forest protection                      | Purchase of easements, land rental, conservation agreements, fencing and funding for park guards to maintain naturally forested areas                               | <b>N</b>                                  |
| Irrigation efficiency                  | Shift from flood to variable rate and precision irrigation, and lining irrigation canals to reduce leakage and net water consumption                                | <b>Y</b>                                  |
| Ranching best management practices     | Reduce cattle-related land degradation with silvopasture practice, rotational grazing and fencing as well as livestock waste disposal to protect water quality      | <b>N</b>                                  |
| Invasive species removal               | Physical removal of invasive alien species through mechanical, chemical, or biological means (e.g. Eucalyptus trees in the Upper Tana region)                       | <b>Y</b>                                  |
| Reforestation                          | Restoration and planting of native trees and shrubs in critical areas to reduce erosion and related sediment transport                                              | <b>Y</b>                                  |
| Riparian restoration                   | River bank restoration and protection to reduce erosion and improve water quality (e.g. planting grass terrasses)                                                   | <b>Y</b>                                  |
| Dirt road management                   | Construction of sediment traps and culverts along roadways and resurfacing of dirt and gravel roads to reduce sediment runoff into waterways                        | <b>Y</b>                                  |
| Wetland installation                   | Conversion of portions of farmland to constructed wetlands to trap nutrient runoff                                                                                  | <b>N</b>                                  |

Source: Adapted from TNC (2016)

### UTNWF: Overview of intervention activities, inputs and associated cost

| Intervention type | Intervention                | Activity                | Description                                                                                                                                                                                                                                         | Inputs         | Cost of inputs | Eligible for carbon accreditation | Co-benefits for biodiversity (BD) | Co-benefits for livelihoods <sup>495</sup> |
|-------------------|-----------------------------|-------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------|----------------|-----------------------------------|-----------------------------------|--------------------------------------------|
| Agroforestry      | Agricultural best practices | Fruit Orchards          | Planting of trees. Mixture of mango, avocado, orange, and macadamia planted at approximately 9x9m spacing                                                                                                                                           | Tree seedlings | Not indicated  | Yes                               | Yes                               | Yes                                        |
|                   |                             | Alley cropping          | Rows of trees ( <i>Grevillia robusta</i> ); shrubs ( <i>Leucaena trichandra</i> and <i>Calliandra calothyrsus</i> ); and bamboo ( <i>Dendrocalamus asper</i> ), with crops planted between rows.                                                    | Not indicated  | Not indicated  | Yes                               | Yes                               | No                                         |
|                   |                             | Enrichment fallows      | Rows of trees ( <i>Markhamia lutea</i> and <i>Casuarina equisetifolia</i> ) and shrubs ( <i>Leucaena trichandra</i> , <i>Calliandra calothyrsus</i> and <i>Sesbania sesban</i> ) and crops planted between rows                                     | Not indicated  | Not indicated  | Yes                               | Yes                               | No                                         |
|                   |                             | Dispersed interplanting | Mixture of tree species (e.g. <i>Prunus Africana</i> , <i>Olea europaea cuspidate</i> , <i>Warburgia ugandensis</i> , <i>Juniperus procera</i> , <i>Hagenia abyssinica</i> , <i>Dombeya rotundifolia</i> , <i>Vitex keniensis</i> , <i>Fraxinus</i> | Not indicated  | Not indicated  | Yes                               | Yes                               | No                                         |

<sup>495</sup> Attributed 'yes' if benefits are direct.

|                          |                       |                         |                                                                                                                                 |                                                                                             |                                                                                                 |     |     |     |
|--------------------------|-----------------------|-------------------------|---------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------|-----|-----|-----|
|                          |                       |                         | <i>pennsylvanica</i> , <i>Acacia xanthopsea</i> ) planted with > 10 m between trees                                             |                                                                                             |                                                                                                 |     |     |     |
|                          |                       | Boundary planting       | Trees ( <i>Grevillea robusta</i> and <i>Croton megalocarpus</i> ) planted at approximately 3 m intervals along field boundaries |                                                                                             | Not indicated                                                                                   | Yes | Yes | No  |
| Improved land management | Riparian restoration  | Grass terraces          | Stabilization of steep slopes (>12%) by terracing with Congo grass, Napier grass and trees                                      | 90 splits of high value variety of Congo grass ( <i>Brachiaria</i> spp.) per 10m of terrace | USD 2.7 per 10m of terrace                                                                      | No  | Yes | Yes |
|                          |                       | Grass terraces          | Stabilization of steep slopes (>12%) by terracing with Napier grass and trees                                                   | 40 canes of Napier grass per 10m of terrace                                                 | USD 1.2 per 10m of terrace                                                                      | No  | Yes | Yes |
|                          |                       | Riparian buffers        | Napier grass is planted in slopes less than 12% to conserve soil and water, and stabilize riverbanks                            | 240 canes of Napier grass per 10m of riparian buffer                                        | USD 4 per 10m of riparian buffer                                                                | No  | Yes | Yes |
|                          | Dirt road management  | Road erosion mitigation | Stabilization of rural road shoulders using Congo grass ( <i>Brachiaria ruziziensis</i> )                                       | Not indicated                                                                               | Not indicated                                                                                   | No  | Yes | Yes |
|                          | Irrigation efficiency | Rainwater harvesting    | Harvesting rainwater in excavated ponds that are lined with UVI treated liners for dry season farming (water pans)              | UVI treated polythene liner of 250 micro thickness                                          | USD 44 for a 24m <sup>3</sup> water pan; USD 73 for a 50m <sup>3</sup> water pan; and \$100 for | No  | Yes | Yes |

|                       |                                                |                                                         |                                                                                                                                 |               |                                  |    |     |          |
|-----------------------|------------------------------------------------|---------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------|---------------|----------------------------------|----|-----|----------|
|                       |                                                |                                                         |                                                                                                                                 |               | a 100m <sup>3</sup><br>water -aj |    |     |          |
|                       |                                                | Efficient water use and crop diversification            | Installing small holder low-head drip irrigation technology for efficient water application and cultivation of high-value crops | Not indicated | Not indicated                    | No | Yes | Yes      |
| Ecosystem restoration | Wetland installation                           | Riparian and wetlands conservation                      | Establish vegetation buffer zones using indigenous trees, bamboo, and Napier grass                                              | Not indicated | Not indicated                    | No | Yes | Yes      |
|                       | Reforestation                                  | Reforestation of degraded lands                         | Enrichment planting and protection of natural regeneration of native species, including removal of Eucalyptus trees.            | Not indicated | Not indicated                    | No | Yes | Indirect |
|                       | Riparian restoration                           | Landslides and quarries rehabilitation                  | Includes planting of trees in areas where landslides have occurred and rehabilitation on quarry sites                           | Not indicated | Not indicated                    | No | Yes | Yes      |
| Other                 | Prevention of ecosystem conversion/degradation | Construction of efficient cooking methods (e.g. Biogas) | Biogas avoid the cutting down of trees for fuel and also use of GHG that would otherwise be emitted into the atmosphere         | Not indicated | Not indicated                    | No | Yes | Yes      |

Source: UTNWF Trust (2023)

### Overview of UTNWF stakeholder type and entities

| Stakeholder type                                                                     | Entity                                                                                                                                                               |
|--------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>International public</b> (multilateral government)                                | Global Environment Facility                                                                                                                                          |
| <b>International private</b> (business)                                              | Coca-Cola Africa Foundation<br>Pentair PLC.<br>Co-operative Bank of Kenya                                                                                            |
| <b>International private</b> (philanthropic or non-governmental organization)        | The Nature Conservancy<br>International Centre for Tropical Agriculture (CIAT)                                                                                       |
| <b>Domestic public sector</b> (government)                                           | Government of the Republic of Kenya<br>Tana and Athi Rivers Development Authority<br>Water Resources Management Authority                                            |
| <b>Domestic public sector</b> (state-owned enterprise)                               | Nairobi City Water and Sewerage Company<br>Kenya Electricity Generating Company                                                                                      |
| <b>Domestic private sector</b> (business)                                            | Frigoken Ltd.<br>East Africa Breweries Ltd.                                                                                                                          |
| <b>Domestic or regional private</b> (philanthropic or non-governmental organization) | The Green Belt Movement<br>Kenya National Federation of Agricultural Producers<br>Jomo Kenyatta University<br>Sustainable Agriculture Community Development<br>Kenya |

Source: Author

### Upper Tana-Nairobi Water Fund Steering Committee Members (2015-2017)

| Stakeholder type<br>(public or private)              | Organization                                           | Financial or in-kind<br>contribution to the<br>UTNWF |
|------------------------------------------------------|--------------------------------------------------------|------------------------------------------------------|
| International public<br>(multilateral<br>government) | Global Environment Facility                            | Financial                                            |
| International private<br>(business)                  | Coca-Cola Africa Foundation                            | Financial                                            |
|                                                      | Pentair PLC.                                           | Financial                                            |
| International private<br>(philanthropic or NGO)      | The Nature Conservancy                                 | In-kind                                              |
|                                                      | International Centre for Tropical<br>Agriculture       | NA                                                   |
|                                                      | CARITAS                                                | Implementing/<br>monitoring partner                  |
|                                                      | Sustainable Agriculture Community<br>Development Kenya | Implementing/<br>monitoring partner                  |
| Domestic public<br>(government)                      | Tana and Athi Rivers Development<br>Authority          | NA                                                   |
|                                                      | Water Resources Management Authority                   | Implementing/<br>monitoring partner                  |
| Domestic public (state-<br>owned enterprise)         | Nairobi City Water and Sewerage<br>Company             | Financial                                            |
|                                                      | Kenya Electricity Generating Company                   | NA                                                   |
| Domestic public (other)                              | Jomo Kenyatta University                               | Implementing/<br>monitoring partner                  |
| Domestic/regional<br>private (business)              | Frigoken Ltd.                                          | Financial and in-kind                                |
|                                                      | East Africa Breweries Ltd.                             | Financial                                            |

Source: TNC (2016)

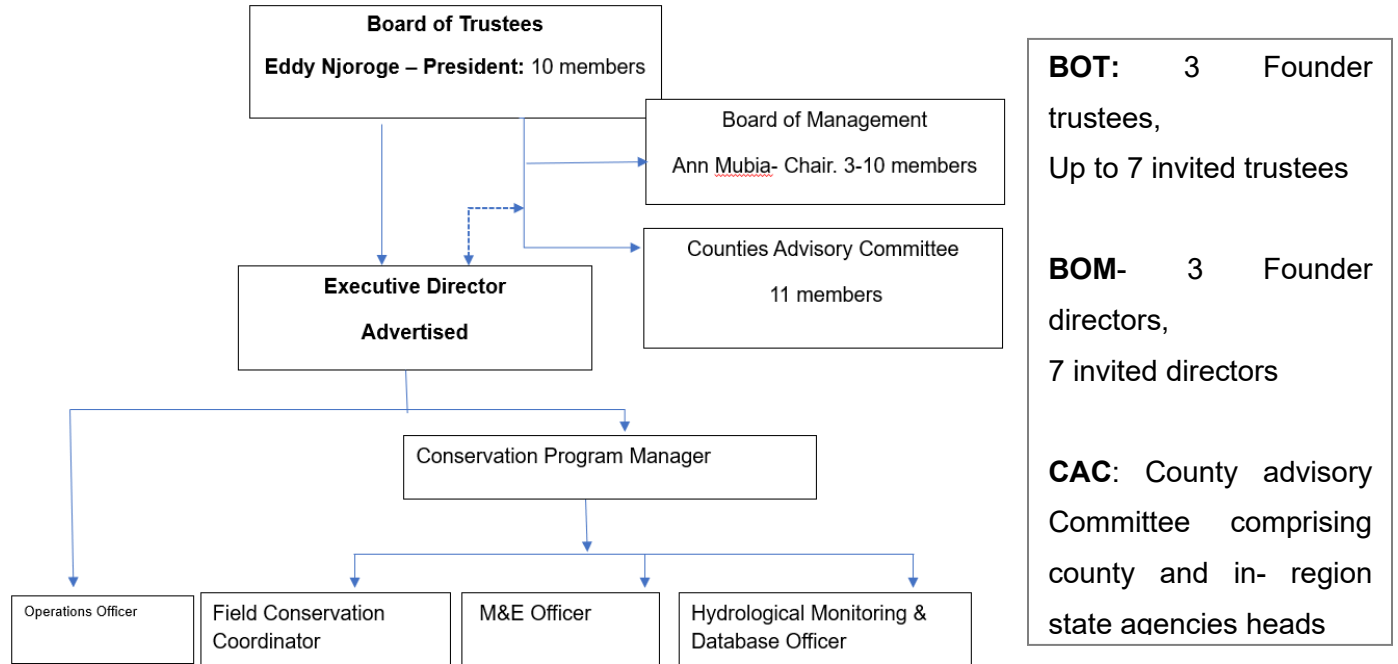


**Upper Tana-Nairobi Water Fund Board of Trustees (2017-)**

| <b>Stakeholder type<br/>(public or private)</b>              | <b>Organization</b>                                 | <b>Name and title at<br/>organization</b>               | <b>Financial or in-<br/>kind contribution<br/>to the UTNWF</b> |
|--------------------------------------------------------------|-----------------------------------------------------|---------------------------------------------------------|----------------------------------------------------------------|
| <b>International<br/>public</b> (multilateral<br>government) | NA                                                  |                                                         |                                                                |
| International private<br>(business)                          | Pentair PLC.                                        | Ajit Tulo (Senior<br>Director, India &<br>Africa)       | Financial                                                      |
| International private<br>(philanthropic or<br>NGO)           | The Nature Conservancy                              | Munira Anyonge-<br>Bashir (Kenya<br>Programme Director) | In-kind                                                        |
| Domestic public<br>(government)                              | Ministry of Environment<br>and Forestry             | Agnes Yobterik<br>(Director)                            | Financial                                                      |
|                                                              | Laikipia County                                     | Joshua Irungu<br>(Governor)                             | NA                                                             |
|                                                              | Nyandarua County                                    | Francis Kimemia<br>(Former Governor)                    | NA                                                             |
| Domestic public<br>(state-owned<br>enterprise)               | Nairobi City Water and<br>Sewerage Company          | Nahashon Muguna<br>(Managing Director)                  | Financial                                                      |
|                                                              | Athi Water Services<br>Board                        | Michael Thuita (CEO)                                    | NA                                                             |
|                                                              | Nairobi Water Fund                                  | Eddy Njoroge<br>(President)                             |                                                                |
| Domestic/regional<br>private (business)                      | Advanced Helios Process<br>Solutions Ltd (aHPS Ltd) | Emmanuel Rurema<br>(Managing Director)                  | NA                                                             |
|                                                              | Frigoken Ltd.                                       | Karim Dostmohamed<br>(Managing Director)                | Financial and in-<br>kind                                      |

Source: UTNWF (2024a)

## Upper-Tana Nairobi Water Fund Governance model



Source: UTNWF (2024b)

### The public-private partnership model: Upper Tana Nairobi Water Fund

| Stakeholder                                 | Services provided by the stakeholder                                                                                                                                                                                                                                                             | Expected benefits for the stakeholder                                                                                                                                                                                                                                                                                                                                                                                                                                                             | Advantages of the model to the stakeholder                                                                                                                                                                                                                                                                                                                                        |
|---------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Public sector (government)                  | <ul style="list-style-type: none"> <li>• Financing for NbS interventions</li> <li>• Provision of in-kind support (e.g. staff time)</li> </ul>                                                                                                                                                    | <ul style="list-style-type: none"> <li>• Increased agricultural yield for population</li> <li>• More consistent water supply for Nairobi</li> <li>• Reduced water treatment costs</li> <li>• Increased hydropower production due to higher water yield and reduced sedimentation</li> <li>• Contribution to global environmental goals (e.g. agroforestry, biodiversity, carbon sequestration)</li> <li>• Contribution to wider SDGs (e.g. increased employment, poverty alleviation)</li> </ul>  | <ul style="list-style-type: none"> <li>• Access to multilateral financing (GEF)</li> <li>• Lowered project cost due to blended finance</li> <li>• Risk-sharing with private sector actors</li> <li>• Enhanced service quality due to expertise of TNC and partners</li> <li>• Transfer of expertise and technical assistance</li> <li>• Innovation and experimentation</li> </ul> |
| Private sector (landowner; upstream farmer) | <ul style="list-style-type: none"> <li>• Land for NbS interventions (~0.6 ha)</li> <li>• Labor (e.g. planting and monitoring interventions)</li> <li>• Security of land</li> <li>• Cost sharing of some more expensive inputs (e.g. drip irrigation system, rainwater harvesting pan)</li> </ul> | <ul style="list-style-type: none"> <li>• Input ownership (e.g. trees, grass strips)</li> <li>• Training and knowledge-sharing to enhance agricultural output</li> <li>• Enhanced water supply</li> <li>• Free inputs (e.g. avocado seedlings)</li> <li>• Reduced cost for more expensive inputs due to subsidies provided by UTNWF</li> <li>• Adoption of new technologies and approaches</li> <li>• Agribusiness development: new value chains developed (e.g. honey, premium coffee)</li> </ul> | <ul style="list-style-type: none"> <li>• Risk-sharing with private sector and government</li> <li>• Transfer of expertise and technical assistance</li> </ul>                                                                                                                                                                                                                     |
| Private sector (businesses)                 | <ul style="list-style-type: none"> <li>• Financing for NbS interventions</li> </ul>                                                                                                                                                                                                              | <ul style="list-style-type: none"> <li>• Enhanced water supply and quality</li> <li>• Reduced business operation costs</li> <li>• Enhanced bottom line</li> <li>• Reduced uncertainty</li> </ul>                                                                                                                                                                                                                                                                                                  | <ul style="list-style-type: none"> <li>• More cost-effective and scalable than individual interventions</li> <li>• Risk-sharing with public sector and other private sector actors</li> </ul>                                                                                                                                                                                     |

|                             |                                                                                                                                                                                                                      |                                                        |    |
|-----------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------|----|
| Implementing agency (UTNWF) | <ul style="list-style-type: none"> <li>• Provision of tree and plant seedlings, and other inputs</li> <li>• Provision of technical expertise</li> <li>• Farmer training</li> <li>• Monitoring and support</li> </ul> | <ul style="list-style-type: none"> <li>• NA</li> </ul> | NA |
|-----------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------|----|

Source: Author

### Overview of the types of financial structures of collective action environmental funds

| Financial structure | Definition                                                                                                                                                                                            | Advantages and disadvantages                                                                                                                                                                                                                                            |
|---------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Endowment fund      | Fund where the capital is invested in order to generate a steady annual stream of income. Only the investment interest and earnings are spent, while the principal is either maintained or increased. | <ul style="list-style-type: none"> <li>- Requires substantial initial capital to generate sufficient interest on principal</li> <li>- Requires good governance practices to maintain or increase principal</li> <li>- Lowers dependence on continued funding</li> </ul> |
| Sinking Fund        | Fund designed to disburse its entire capital, in addition to its investment income over a fixed period of time, usually a relatively long period.                                                     | <ul style="list-style-type: none"> <li>- Demands significant initial capital raising effort</li> <li>- Implies a finite project duration, potentially misaligned with NbS initiatives that often entail continued maintenance expenses</li> </ul>                       |
| Revolving fund      | A fund in which the capital is spent and that periodically (e.g., annually) is replenished through fees collected and/or through donor contributions.                                                 | <ul style="list-style-type: none"> <li>- Requires less initial capital raising effort</li> <li>- Risk of reliance on donor contributions</li> </ul>                                                                                                                     |
| Hybrid fund         | A fund that combines two or more of these funding mechanisms.                                                                                                                                         | Allows for more flexibility by leveraging multiple finance mechanisms                                                                                                                                                                                                   |

Source: TNC (2015, p. 5), Smith (2000)

### Interests and risks of respective stakeholder groups engaging with the UTNWF

| Stakeholder group by finance type | Example           | Risk in BAU scenario                                                                                                                                                                                                                                     | Interest in engaging with UTNWF (expected benefits)                                                                                                                                                                                   | Risk in engaging with UTNWF                                                                                                                                                                                                                             | Risk for UTNWF                                                                                                                                  |
|-----------------------------------|-------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------|
| Grant provider                    | GCF               | - Failure to achieve global goals outline in Paris Agreement and Global Biodiversity Framework                                                                                                                                                           | - Country support to achieve global environmental targets                                                                                                                                                                             | - Mismanagement of funds and corruption: diversion of funds for unauthorized purposes<br>- Lack of accountability and transparency<br>- insufficient local capacity to execute effectively<br>- Environmental and social risks not adequately addressed | - Multilateral donor funding may discourage smaller private entities to contribute<br>- Lengthy processing time to receive multilateral finance |
|                                   | Coca-Cola Company | - High dependency on Upper Tana River: 90% of water supply for business operations was provisioned from the river. <sup>496</sup><br>- Increased likelihood of conflict with local communities, as they perceived companies as extracting all the water. | - Corporate social responsibility: public relations benefits<br>- Lower business operational risks, recognizing that it is highly dependent on water for its products <sup>497</sup><br>- Alignment with 2030 Water Security Strategy | - Time horizon: Relatively long time before impact expected to be seen on business operations<br>- Mismanagement of funds and corruption: diversion of funds for unauthorized purposes                                                                  | - Financial risk: Finance from large multinational corporations may discourage smaller corporations from contributing                           |

<sup>496</sup> “Then the real focus is on watershed conservation and that was the important/ critical piece for the company—then to look at where are the sources of water for our Nairobi-based plant which was the biggest manufacturing outlet” (Participant 111).

<sup>497</sup> “Coca-Cola Company is one of the largest beverage companies in the world—and locally as well, within Kenya and Africa. And the company was very clear, that it needed to be responsible with regards to the availability of water to the extent [of] its impacts of producing the beverages [on] the availability of water, which then would impact business continuity. And therefore the company had a water strategy that focused on replenishment. And so effectively making commitments to ensure that the water used in producing the beverages [was] replenished so that they were available for other people or for communities, but as well as sustainable for the business” (Participant 111).

|  |                                       |                                                                                                                                                                                                                                                      |                                                                                                                                                        |                                                                                                                                                                                                  |                                         |
|--|---------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------|
|  | Pentair PLC                           | - Loss of business: Clients were facing increased risk due to uncertain water supply. Increased likelihood of conflict with local communities, as they perceived companies as extracting all the water.                                              | - Lower their client risks due to uncertain water supply. <sup>498</sup><br>- Secure long-term business operations.                                    | - Public perception risk: mismanagement of project could result in public relations challenges<br>- Community relations risk: Project mismanagement may worsen relations with local communities. |                                         |
|  | Frigoken Ltd.                         | - High supply chain dependency on Kenyan economy: 80% of operations based in Kenya, representing 70,000 small holder farmers.<br>- Increased likelihood of conflict with local communities, as they perceived companies as extracting all the water. | - Mitigate supply chain and business operation risk.<br>Mitigate social, environmental and governance risks.                                           |                                                                                                                                                                                                  |                                         |
|  | East Africa Breweries                 | - High dependency on Upper Tana River for business operations: consumed 2-5% of total water supply from river.<br>- Increased likelihood of conflict with local communities, as they perceived companies as extracting all the water.                | - Corporate social responsibility: Public relations benefits<br>- Higher impact potential through collective action model than funding own initiative. |                                                                                                                                                                                                  | Financial risk:<br>Inconsistent funding |
|  | Nairobi City Water and Sewage Company | - Likely increase in cost of operations<br>- Greater uncertainty of water supply                                                                                                                                                                     | Business operations:<br>Cost savings stemming from avoided filtration, lowered energy                                                                  |                                                                                                                                                                                                  | Inconsistent funding                    |

<sup>498</sup> Pentair PLC is a global water treatment company. Pentair PLC's clients were facing an increased risk due to uncertainty in water supply. This increased the likelihood of conflict with local communities, as their client companies were perceived as heavy users diminishing the water table. Source: Participant 103

|                       |                                                               |                                                                                                                                                                                         |                                                                                                                                                                                                                                                                                         |                                                                                                                                                                                                                                                                             |                                                                                                                                                                                                                                                                             |
|-----------------------|---------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                       |                                                               |                                                                                                                                                                                         | consumption, reduced sludge disposal costs and fewer shutdown days.                                                                                                                                                                                                                     |                                                                                                                                                                                                                                                                             |                                                                                                                                                                                                                                                                             |
|                       | TNC                                                           | NA                                                                                                                                                                                      | <ul style="list-style-type: none"> <li>- Social impact (supporting local communities).</li> <li>- Environmental impact (co-benefits for climate and biodiversity).</li> </ul>                                                                                                           | Impact risks: Uncertain social and environmental outcomes due to monitoring and evaluation complexities.                                                                                                                                                                    | - Financial risk: Grants from philanthropic actors insufficient and inconsistent to achieve scale for NbS interventions                                                                                                                                                     |
|                       | County governments (Laikipia, Nyeri, Murang'a, and Nyandarua) | - Increased water insecurity of local constituents leading to potential tensions and conflict in the communities, a decline in food productivity and an impact on economic livelihoods. | <ul style="list-style-type: none"> <li>- Political support from constituency</li> <li>- Socio-economic impacts: enhanced water supply for residents; income generation for constituents; increased hydropower generation; enhanced water security for citizens</li> </ul>               | Risk of staff turnover                                                                                                                                                                                                                                                      |                                                                                                                                                                                                                                                                             |
| Payments              | Smallholder farmer                                            | - Reduced water supply due to climate change and other environmental factors                                                                                                            | <ul style="list-style-type: none"> <li>- New revenue streams</li> <li>- Lower operating costs due to more secure water supply</li> </ul>                                                                                                                                                | - Cost-benefit not always clear: Certain NbS interventions will not yield individual benefits but rather accrue community benefits (e.g. impact of terracing)                                                                                                               | - Stakeholder risk: Reliance on individual landowners to implement and monitor NbS interventions without direct compensation                                                                                                                                                |
| Carbon credit revenue | Undisclosed                                                   | <ul style="list-style-type: none"> <li>- Carbon pricing mechanisms increase due to regulatory mechanisms</li> <li>- Climate change increases cost of doing business</li> </ul>          | <ul style="list-style-type: none"> <li>- Contribution to carbon neutrality goals</li> <li>- Contribution to SDG and wider corporate ESG and CSR targets</li> <li>- Risk mitigation: Some companies hedge future regulatory changes that may impose costs on carbon emissions</li> </ul> | <ul style="list-style-type: none"> <li>- Risk that the project fails to deliver on anticipated carbon emissions reductions, biodiversity benefits and/or socio-economic benefits</li> <li>- Regulatory risk that may affect the value or validity of the credits</li> </ul> | <ul style="list-style-type: none"> <li>- Regulatory risk: Lack of clarity on how Kenyan Government will tax carbon credits</li> <li>- Permanence risk: Loss of tree assets (e.g. due to sale of land);</li> <li>- Revenue risks: Suboptimal tree maintenance and</li> </ul> |



|    |       |  |                                                                                                                                                                                                |                                                                                                                 |                                                                                                                                                                                                                                                                                             |
|----|-------|--|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|    |       |  | - Support for climate projects that are aligned with their values<br>Market demand: some consumers and investors prefer to engage with companies that demonstrate environmental responsibility | - Risk of permanence, additionality and leakage that could potentially result in public relations controversies | growth, impacting revenue                                                                                                                                                                                                                                                                   |
| NA | UTNWF |  | NA                                                                                                                                                                                             | NA                                                                                                              | - Risk of losing institutional knowledge: Staff seconded from local governments are often re-allocated to new areas<br>- Partnership risk: disagreement between stakeholders<br>- Communication risk:<br>- Financial risk: Inconsistent or inadequate funding to continue NbS interventions |

Source: Author

## Overview of UTNWF's NbS impact areas as reported in carbon project documentation, and potential concerns or risks

| Impact area               | Objectives <sup>499</sup>             | Expected benefits of activities <sup>500</sup> as reported in documentation                                                                                                                                                           | Indicators <sup>501</sup>                                                                                                                                        | Progress to date (Reported by UTNWF)                                                                                                                                                                                                                                                                                     | Concerns or risks                                                                                                                                                                            |
|---------------------------|---------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Climate mitigation</b> | Increased carbon stock (2017-)        | Estimated total emissions reductions over 20 year crediting period: 1,039,191 tons of carbon sequestered <sup>502</sup> from ecosystem restoration and rehabilitation, and improved agricultural land management through agroforestry | Number of trees planted                                                                                                                                          | <ul style="list-style-type: none"> <li>- 3.7 million agroforestry trees growing in watershed</li> <li>- 54,500 upstream landowners with mature conservation outcomes</li> <li>- 100,000+ additional farmers implementing ongoing agroforestry activities</li> <li>- 117 biogas units installed to reduce GHGs</li> </ul> | <ul style="list-style-type: none"> <li>- Carbon rights are vested in the titled landowner. Permanence concerns arise due to the risk of land use change, such as from land sales.</li> </ul> |
| <b>Climate adaptation</b> | Enhanced resilience to climate change | <b>Enhanced water supply:</b> Expecting 50% reduction in sediment concentration in rivers and 18% in Masinga reservoir                                                                                                                | <ul style="list-style-type: none"> <li>- Reduced sedimentation levels</li> <li>- Reduced waterborne pathogens for upstream and downstream water users</li> </ul> | <ul style="list-style-type: none"> <li>-UTNWF reports 11% more water for city</li> <li>- UTNWF reports 16% less sediments in rivers</li> </ul>                                                                                                                                                                           |                                                                                                                                                                                              |

<sup>499</sup> As identified by TNC (2016) and Plan Vivo (2024) (2023). "Komaza Smallholder Farmery Forestry Kenya." Accessed 2024-01-23.

<sup>500</sup> Taken from Verra Registry (2023). "Komaza Smallholder Farmery Forestry Kenya." Accessed 2024-01-23.

<sup>501</sup> As identified by Komaza Inc. in its Monitoring Plan. Verra Registry (2023) "Komaza Smallholder Farmery Forestry Kenya." Accessed 2024-01-23.

<sup>502</sup> TNC (2024). "Climate impacts: Protecting Biodiversity for Climate, Water and Food Security."

| Impact area                                                  | Objectives <sup>499</sup>                   | Expected benefits of activities <sup>500</sup> as reported in documentation                                                                                                                                                                    | Indicators <sup>501</sup> | Progress to date (Reported by UTNWF)                                                                                                                                                                                       | Concerns or risks                                                                                                                                                                                |
|--------------------------------------------------------------|---------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                                                              |                                             |                                                                                                                                                                                                                                                |                           |                                                                                                                                                                                                                            |                                                                                                                                                                                                  |
|                                                              |                                             | Enhanced soil fertility, texture and structure through enhanced nutrient retention and nitrogen fixation                                                                                                                                       | Unclear                   | <ul style="list-style-type: none"> <li>- 611 km of terraces excavated on steep lands</li> <li>- 1,037 km of grass strips planted</li> <li>- 288,279 acres of farmlands under improved soil and water management</li> </ul> | - The absence of measurement mechanisms renders the impacts uncertain. The potential improvements, although potentially significant, are not explicitly identified as such in the documentation. |
| <b>Biodiversity impacts and other nature-related impacts</b> | Enhance biodiversity and ecosystem services | <ul style="list-style-type: none"> <li>- Enhanced soil fertility, texture and structure, benefiting biodiversity.</li> <li>- Increase in ecosystem services (e.g. pollination)</li> <li>- Increase in type and abundance of species</li> </ul> | Unclear                   | <ul style="list-style-type: none"> <li>- 54,500 upstream landowners with mature conservation outcomes</li> <li>- 1,900 freshwater fauna species impacted</li> <li>- 1,726 acres of forest areas rehabilitated</li> </ul>   | - The absence of measurement mechanisms renders the impacts uncertain. The potential improvements, although potentially significant, are not explicitly identified as such in the documentation. |

| Impact area                   | Objectives <sup>499</sup>                                                          | Expected benefits of activities <sup>500</sup> as reported in documentation   | Indicators <sup>501</sup>                                                                                                                                                                                                                                                  | Progress to date (Reported by UTNWF)                                                                                                                                                                                              | Concerns or risks                                                                                                                                                                                |
|-------------------------------|------------------------------------------------------------------------------------|-------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Socio-economic impacts</b> | <b>Enhance food security of local communities</b>                                  | Participating farmers report increased food production <sup>503</sup>         | <ul style="list-style-type: none"> <li>- Number of household members supported in coping with the effects of climate change</li> <li>- Crop production and productivity in the project area (target: 30% increase in food production compared to 2025 baseline)</li> </ul> | <ul style="list-style-type: none"> <li>- 1.3m fruit trees yield USD 67m fruits annually (trees planted 2017-19)</li> <li>- Three large communal water pans rehabilitated</li> <li>- 717 drip irrigation kits installed</li> </ul> | - The absence of measurement mechanisms renders the impacts uncertain. The potential improvements, although potentially significant, are not explicitly identified as such in the documentation. |
|                               | <b>Improve human well-being and quality of life for upstream local communities</b> | Participating farmers report increased incomes, improved supply of freshwater | <ul style="list-style-type: none"> <li>- Percentage of households with improved Multidimensional Poverty Assessment Tool score (target: 30% increase in income compared to 2025 baseline).</li> </ul>                                                                      | <ul style="list-style-type: none"> <li>- 1.3m fruit trees yield \$50m fruits annually, attributed to 17,400 green jobs</li> </ul>                                                                                                 | - The absence of measurement mechanisms renders the impacts uncertain. The potential improvements, although potentially significant, are not explicitly identified as such in the documentation. |

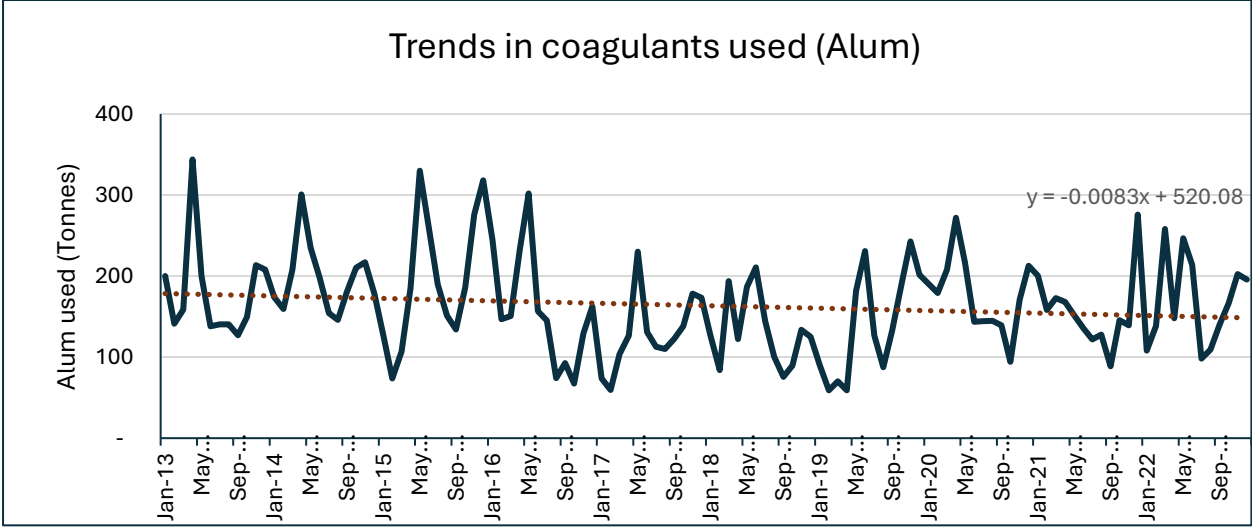
<sup>503</sup> This is expected due to an increase in fruits production through avocado and mangoes, increased dairy production due to increased high-quality fodder, increased income through crop and diversification.

| <b>Impact area</b>       | <b>Objectives<sup>499</sup></b>     | <b>Expected benefits of activities<sup>500</sup> as reported in documentation</b>     | <b>Indicators<sup>501</sup></b>                                                 | <b>Progress to date (Reported by UTNWF)</b>                                       | <b>Concerns or risks</b>                                                                                                                                                                         |
|--------------------------|-------------------------------------|---------------------------------------------------------------------------------------|---------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                          | <b>Reduce water treatment costs</b> | USD 250,000 in annual cost-savings by water service providers from avoided filtration | - Chemical usage in water treatment plant (trends in coagulants used over time) | Unclear                                                                           | - The absence of measurement mechanisms renders the impacts uncertain. The potential improvements, although potentially significant, are not explicitly identified as such in the documentation. |
| <b>Corporate impacts</b> | <b>Corporate impacts</b>            | Enhanced water supply and quality for corporate activities                            | Unclear                                                                         | Unclear                                                                           | - The absence of measurement mechanisms renders the impacts uncertain. The potential improvements, although potentially significant, are not explicitly identified as such in the documentation. |
| <b>Other</b>             | <b>Environmental education</b>      | Enhanced environmental awareness among youth                                          | Unclear                                                                         | 96 schools with new environmental education programs (approximately 35,000 youth) | - The absence of measurement mechanisms renders the impacts uncertain. The potential improvements, although potentially                                                                          |

| Impact area | Objectives <sup>499</sup> | Expected benefits of activities <sup>500</sup> as reported in documentation | Indicators <sup>501</sup> | Progress to date (Reported by UTNWF) | Concerns or risks                                                        |
|-------------|---------------------------|-----------------------------------------------------------------------------|---------------------------|--------------------------------------|--------------------------------------------------------------------------|
|             |                           |                                                                             |                           |                                      | significant, are not explicitly identified as such in the documentation. |

Source: Author's own compilation based on interviews and documents submitted by Plan Vivo, UTNWF and TNC, available on the Plan Vivo Registry (2024).

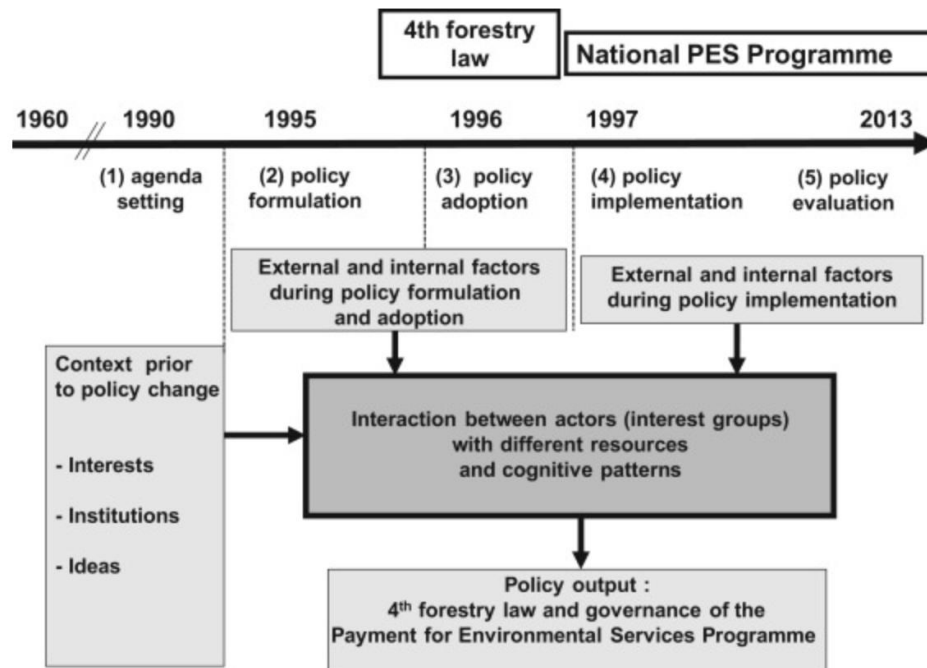
**Nairobi City Water Sewage Company: Chemical usage at water treatment plant (2013-2022)**



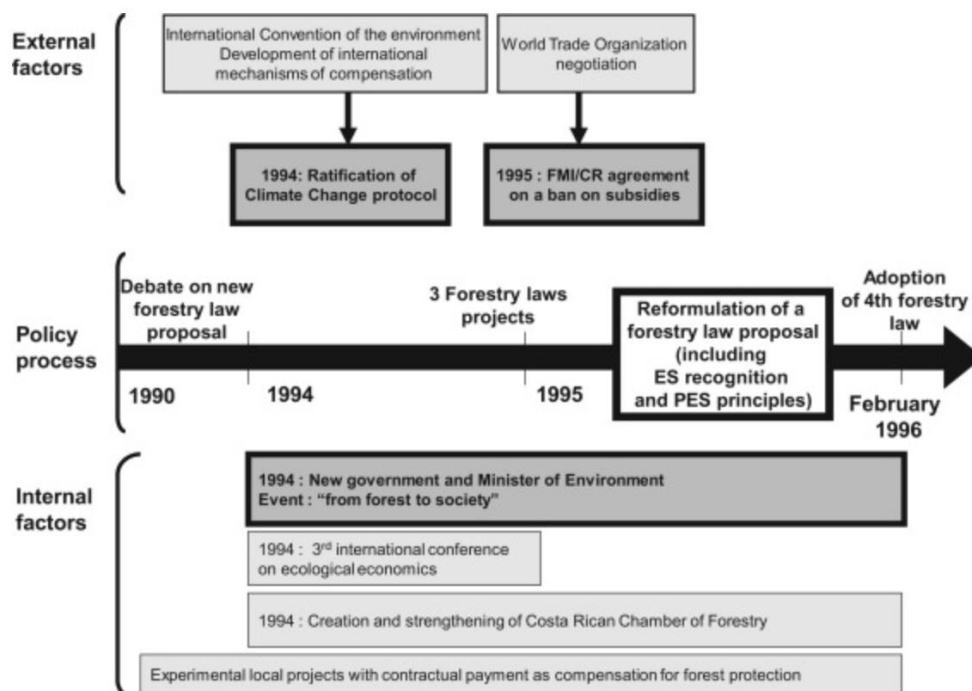
Source: TNC (2024)

## Appendix 9A. Additional information on Costa Rica

### Analytical framework for the analysis of the policy process applied to the Costa Rican Payment for Environmental Services Programme (PSAP)



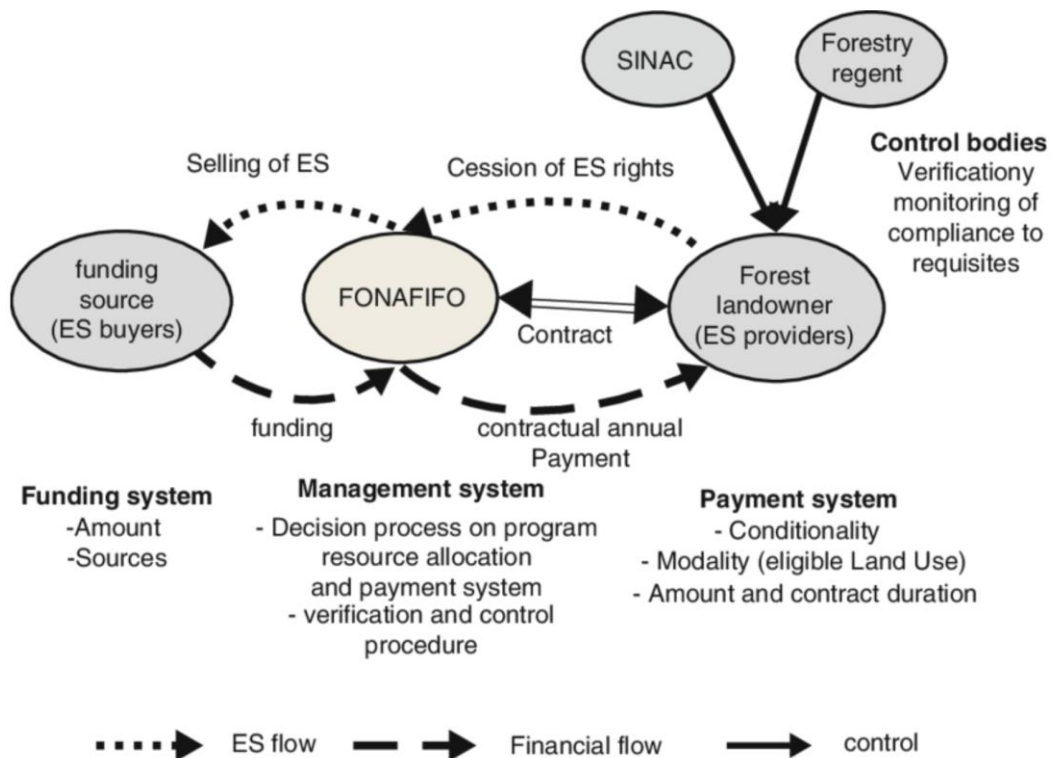
Source: Le Coq et al. (2015)





Source : Le Coq et al. (2015)

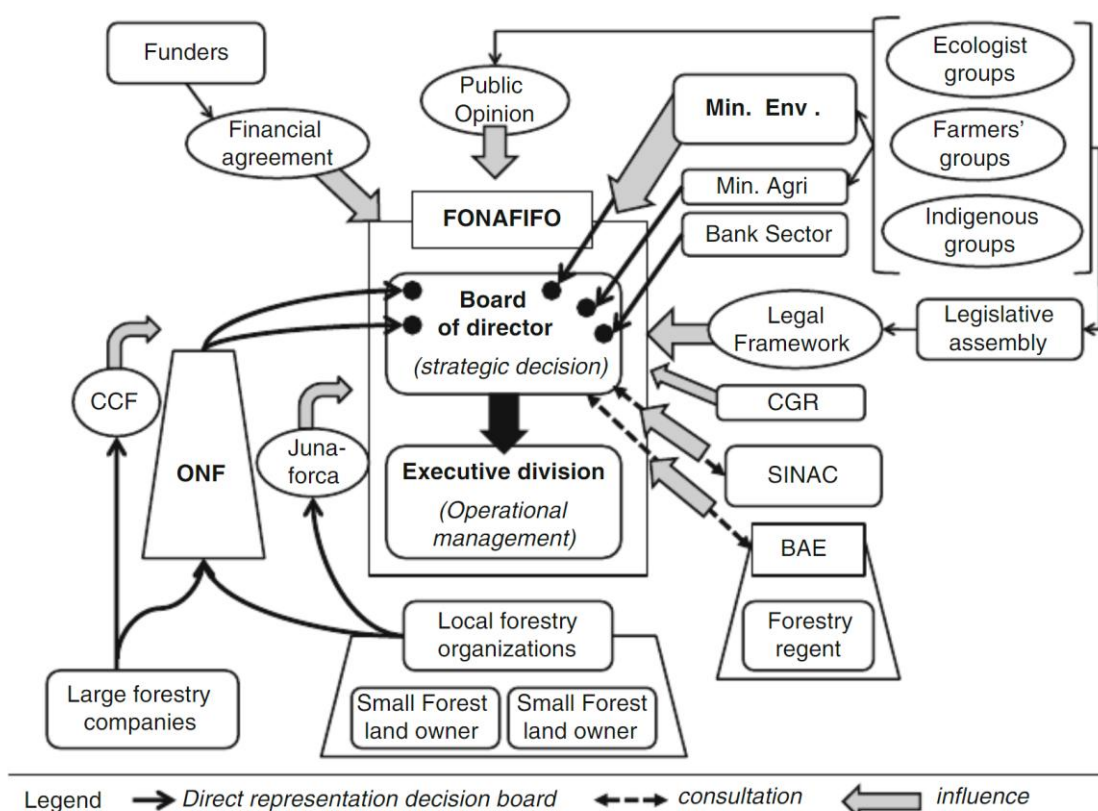
### Basic principles of PSA programme functioning



1 Basic principles of PESF functioning (Source: Authors derived from interviews with FONAFIFO)

Source: Le Coq et al. (2013)

### Governance structure of Costa Rica's PSA programme



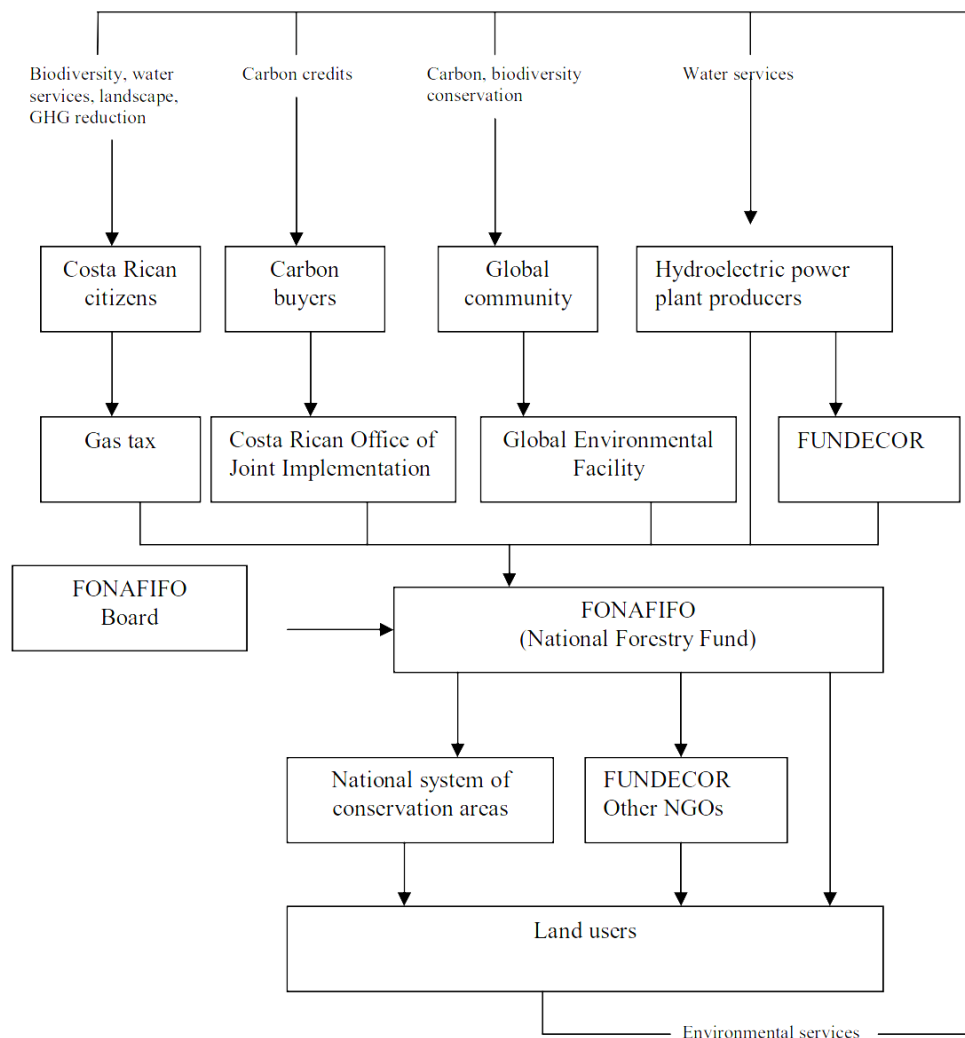
Source Le Coq et al. (2013)

## Vision and stakeholder interests of Costa Rica's PSA programme

| sectors                              | Agricultural                                         |                                                   | Forestry                                                                |                                                          | Environmental                                                               |
|--------------------------------------|------------------------------------------------------|---------------------------------------------------|-------------------------------------------------------------------------|----------------------------------------------------------|-----------------------------------------------------------------------------|
| Stakeholders' groups                 | Large (business) farmers                             | Small farmers (peasant)                           | Small forestry farmers                                                  | Large forest landowner and wood manufacturers            | Environmentalists and ecologists                                            |
| Related Public institutions          | Ministry of agriculture and animal husbandry         |                                                   | Ministry of Environment                                                 |                                                          |                                                                             |
|                                      |                                                      |                                                   | FONAFIFO                                                                |                                                          | SINAC                                                                       |
| Leading professional representatives | CNAA                                                 | UPA National MNC                                  | ONF                                                                     |                                                          | FECON                                                                       |
|                                      |                                                      |                                                   | JUNAFORCA                                                               | CCF                                                      |                                                                             |
| Forest vision                        | Forest as an empty space "unproductive space"        |                                                   | Forest as a provider of good (and ES – especially Carbon sequestration) |                                                          | Forest as provider of multiple ES, (and especially support to biodiversity) |
| Main interests on forest issue       | Maintain land use extension for agricultural purpose | Develop agricultural production and agro forestry | Sustain forestry activity (community management for income generation)  | Sustain forestry activity (wood production for industry) | Maintain biodiversity and natural ecosystem                                 |

Source: Le Coq et al (2013)

## Costa Rica's Payment for Environmental Services Programme and financing sources



Source: Perez (2009). Adapted from Pagiola (2002).

**Estimated environmental values of primary forests (1989, USD/ha)**

| <b>Type of benefit</b>                                  | <b>Average annual value</b> |
|---------------------------------------------------------|-----------------------------|
| <b>1. Hydrological benefits</b>                         |                             |
| a) Water supply for urban centers                       | 2.3-4.6                     |
| b) Loss of hydroelectric production potential           | 10-20                       |
| c) Protection of agricultural land                      | 0.25-2.0                    |
| d) Flood control                                        | 4-9                         |
| Subtotal                                                | ~17-36                      |
| <b>2. Carbon sequestration</b>                          | 80-120                      |
| <b>3. Ecotourism</b> (non-consumptive use values)       | ~13-25                      |
| <b>4. Future pharmaceuticals</b> (option values)        | 0.15                        |
| <b>5. Funds transfers</b> (existence and option values) | ~13-32                      |
| <b>TOTAL</b>                                            | ~102-214                    |
| Net present value at 8%                                 | ~1,277-2,671                |

Source: Castro et al. (2000). Adapted from Constantino and Kishor (1993).

**Estimates of mangrove area, the percentage lost, and the mean annual rate of loss in Costa Rica**

| Country    |                 | Mangrove area (ha) |                          | Percentage loss of mangrove area (ha) | Annual rate of loss (ha y <sup>-1</sup> ) | Annual percentage loss rate |
|------------|-----------------|--------------------|--------------------------|---------------------------------------|-------------------------------------------|-----------------------------|
|            | Estimate (2021) | Estimate (2011)    | Earliest estimate (1979) |                                       |                                           |                             |
| Costa Rica | 52,802          | 39,034             | 64,452 (1979)            | 39.4                                  | 794                                       | 1.23                        |

Source: Data from SINAC et al. (2023), Giri et al. (2011)

## Difference between the Clean Development Mechanism (CDM) and Reduced Emissions from Deforestation and Forest Degradation (REDD+) under the United Nations Framework Convention on Climate Change

|                        | CDM                                                                                                                                        | REDD+                                                                                                                                                                                                                                                                                       |
|------------------------|--------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Activities             | <ul style="list-style-type: none"> <li>• Reducing emissions from afforestation</li> <li>• Reducing emissions from reforestation</li> </ul> | <ul style="list-style-type: none"> <li>• Reducing emissions from deforestation</li> <li>• Reducing emissions from forest degradation</li> <li>• Conservation of forest carbon stocks</li> <li>• Sustainable management of forests</li> <li>• Enhancement of forest carbon stocks</li> </ul> |
| Coverage               | Uneven distribution in favor of emerging economies (China, India, Brazil); bypasses least developed countries (for example, in Africa)     | Focus on least developed countries in the tropics (e.g. Democratic Republic of Congo and Laos)                                                                                                                                                                                              |
| Scale                  | Project-based                                                                                                                              | National, sub-national or hybrid                                                                                                                                                                                                                                                            |
| Compliance & Liability | Low host country involvement                                                                                                               | Higher host country involvement                                                                                                                                                                                                                                                             |

Source: Bhullar (2013b)

### Types of REDD+ projects

|                   | Project-level REDD+                                          | Nested REDD+                                                   | Jurisdictional REDD+                                                                                     |
|-------------------|--------------------------------------------------------------|----------------------------------------------------------------|----------------------------------------------------------------------------------------------------------|
| <b>Scale</b>      | Defined area of forest                                       | Defined area of forest                                         | Entire jurisdiction (national or subnational)                                                            |
| <b>Baseline</b>   | Independently set for the specific area                      | Variety of approaches                                          | Average deforestation across the whole jurisdiction aligned with international reporting standards       |
| <b>Framework</b>  | Independent standards (e.g. Verra) or national methodologies | Independent standards (e.g. Verra Jurisdictional Nested REDD+) | National or international frameworks (e.g. World Bank's FCPF) and independent standards (e.g. ART TREES) |
| <b>Founding</b>   | Voluntary carbon market                                      | Nested projects are only beginning to be developed             | Results-based financing and voluntary carbon markets                                                     |
| <b>Advantages</b> | Often easier to implement smaller scale                      | Better monitoring of leakage                                   | Economies of scale (e.g. MRV costs)                                                                      |

|                      |                                    |                                                               |                                                       |
|----------------------|------------------------------------|---------------------------------------------------------------|-------------------------------------------------------|
|                      | Proven success                     | More reliable baselines                                       | Leakage automatically considered                      |
|                      | Local context and needs considered | Easier transition than implementing jurisdictional approaches | Land rights can be more clearly addressed             |
| <b>Disadvantages</b> | Baseline often inflated            | Methodologies yet to be proven                                | Complex to manage                                     |
|                      | Hard to monitor leakage            | Ignores local drivers of deforestation                        | Challenging to obtain enough samples to set baselines |
|                      |                                    |                                                               | Benefit-sharing risks                                 |

Source: Thompson et al. (2022)

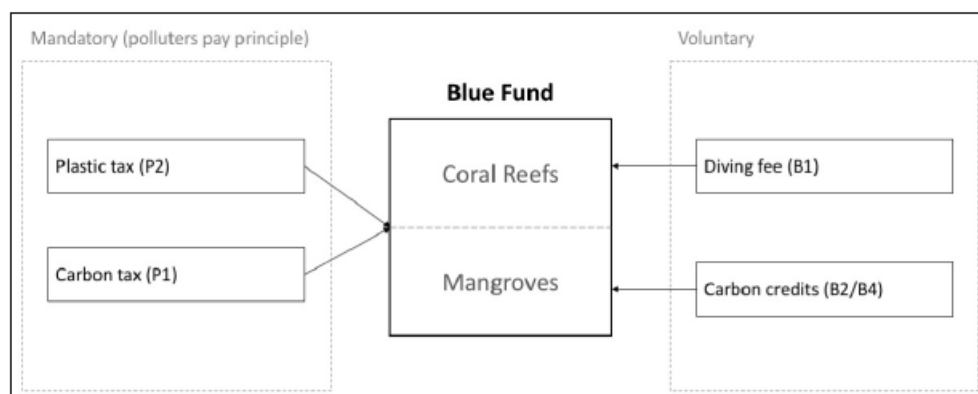
## National Regulatory Framework Relevant For Mangrove Conservation And Restoration Under The National Blue Carbon Strategy

| National Legislation                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | Strategic policies                                                                                                                                                                                                                                                                                                                                                                                                                  |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <ul style="list-style-type: none"> <li>• <b>Law 276:</b> Water Law</li> <li>• <b>Law 6043:</b> Maritime-Terrestrial Zone Law</li> <li>• <b>Law 7317:</b> Wildlife Conservation Law</li> <li>• <b>Law 7554:</b> Organic Environmental Law</li> <li>• <b>Law 8436:</b> Fisheries Law</li> <li>• <b>Law 7575:</b> Forestry Law</li> <li>• <b>Law 9814:</b> Law to regulate the sustainable production of salt and farmed shrimp in both conventional and organic methods; and its regulation: Executive Decree 43333-MINAE-MAG.</li> <li>• <b>Law 10304:</b> Law to recover Costa Rica's tuna resources and promote their sustainable use for the benefit of the Costa Rican people.</li> <li>• <b>Executive Decree No. 22550</b> of September 14, 1993: Declares wetlands in the mangrove areas adjacent to the country's continental and insular coastlines.</li> <li>• <b>Executive Decree No. 36427-MINAET</b> of January 25, 2011, and its amendment: Establishes the National Wetlands Programme and the National Wetlands Committee as the implementing body of the Ramsar Convention within the National System of Conservation Areas.</li> <li>• <b>Decree No. 41775-MP-MSP-MAG-MINAE-MOPT-TUR:</b> Establishes the governance mechanism for marine spaces under the jurisdiction of the Costa Rican State.</li> </ul> | <ul style="list-style-type: none"> <li>• <b>National Climate Change Strategy 2009</b></li> <li>• <b>National Wetlands Policy 2017-2030</b></li> <li>• <b>National Decarbonization Plan 2019-2050</b></li> <li>• <b>National Risk Management Plan</b></li> <li>• <b>National Adaptation Plan to Climate Change 2022-2026</b></li> <li>• <b>National Strategy for the Restoration of Costa Rica's Landscapes 2021-2050</b></li> </ul> |

Source: Costa Rica's National Blue Carbon Strategy (SINAC, 2023)



**Proposed mandatory and voluntary funding sources for a potential Blue Fund in Costa Rica, each depending on the type of relation (negative impact or benefit) society has on coral reefs and mangroves**



Source: Hernández-Blanco (2019)

**Agua Tica Water Fund stakeholder type and entities**

| Stakeholder type                                                              | Entity                                                                                                                                                                                                   |
|-------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>International public</b> (multilateral government)                         | International Energy Agency                                                                                                                                                                              |
| <b>International private</b> (business)                                       | Intel Corporation<br>ALO Advisors LLC (SWCA)                                                                                                                                                             |
| <b>International private</b> (philanthropic or non-governmental organization) | The Nature Conservancy                                                                                                                                                                                   |
| <b>Domestic public sector</b> (government)                                    | Government of Costa Rica, Water Directorate of the Ministry of Environment and Energy (MINAIE);<br>the Foundation for the Development of the Central Volcanic Mountain Range (FUNDECOR)                  |
| <b>Domestic public sector</b> (state-owned enterprise)                        | Empresa de Servicios Publicos de Heredia S.A (ESPH)/ Public Services Company of Heredia;<br>Instituto Costarricense De Acueductos Y Alcantarillados/ Costa Rican Institute of Aqueducts and Sewers (AyA) |
| <b>Domestic private sector</b> (business)                                     | Florida Ice and Farm Company S.A. (FIFCO) <sup>504</sup><br>BLP Law Firm<br>Banco Nacional de Costa Rica                                                                                                 |

<sup>504</sup> A Costa Rican food and beverages company with regional production and distribution rights of PEPSICO.

|                                                                                         |                                                                                                                                                         |
|-----------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------|
|                                                                                         | Cooperativa de Productores de Leche Dos Pinos R.L                                                                                                       |
| <b>Domestic or regional private</b><br>(philanthropic or non-governmental organization) | Crusa Foundation<br>FEMSA Foundation (Coca Cola)<br>National University of Costa Rica<br>Union of Communal Aqueducts of the Canton of Grecia (Unaguas); |
| <b>Domestic private</b> (academic institutions)                                         | Costa Rica National University Stable Isotopes Laboratory (UNA-SIL)                                                                                     |

Source: Author's own compilation

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