Co-Producing Knowledge and Politics for Climate Change Adaptation
The Case of Colombia’s Capital Region

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Thesis submitted as part of the requirements
for the degree of Doctor of Philosophy in Development Planning

The Bartlett Development Planning Unit
University College London

2020
Declaration

I, Mónica Bernal Llanos, confirm that the work presented in this thesis is my own. Where information has been derived from other sources, I confirm that this has been indicated in the thesis.
Acknowledgements

First of all, I would like to acknowledge the support of my primary supervisor, Professor Cassidy Johnson, for her guidance, thought-provoking insights and reliable feedback. However, most of all, I thank her unparalleled ability to empathise with the individual struggles of her doctoral students and her wisdom to help them move forward. Without her support, I doubt I could have completed this thesis. Thanks also to Professor Julio Dávila, my secondary supervisor, for his sharp observations and for sharing his knowledge of the Colombian context.

I thank The Bartlett Development Planning Unit (DPU) for granting me its first departmental scholarship for doctoral studies in 2014, the year of the DPU’s 60th anniversary. I will forever be truly honoured to be the first recipient of this scholarship, and I thank the selection committee formed by Professor Julio Dávila, Professor Vanesa Castán Broto and Dr Colin Marx for this outstanding opportunity. Many thanks also to Michael Casey-Gillman, DPU PhD Programme Administrator, for his unwavering support to all MPhils and PhD candidates at the DPU.

I appreciate the insightful contribution of the 75 interviewees who participated in this study. They set aside one, to two hours in some cases, to share their experiences within and outside the case study. Their testimonies provided a substantial baseline from which to build the findings of this research, and offered this researcher additional motivation to become a development practitioner.

I would also like to thank my colleagues and friends Nick Anim, Rachel Valbrun, Giovana Monteiro, Carolina Reyes, Satya Patchineelam, Andrés López, Walther Zúñiga, Étienne Von Bertrab and Rita Lambert. Our many conversations over coffee and lunch offered much needed moral support, as well as brilliant feedback, during this quite challenging and lonesome academic endeavour.

Special thanks go to Dr José Juan Sánchez Báez, who helped me overcome my health struggles so I could complete my doctoral studies. His support and guidance, for more than five years, were essential to achieve this goal.

Thanks to my mother, Leydan Llanos, for her forever unconditional support, confidence, and prayers, and my sister Andrea Bernal Llanos for continuously offering an
understanding ear. To my father Gabriel Bernal, no longer with us, for being an inspiration. And last but not least thanks to my husband, Brian Channer, to whom I dedicate this work. He is the rock always holding me steady in tempestuous times, and the tender embrace waiting once the storm has passed.
Abstract

Developing countries are increasing their efforts for adapting to climate change as they are more vulnerable and more exposed to its impacts than their industrialised counterparts. This thesis analyses the co-production of knowledge and politics in the context of climate change adaptation to further our understanding of how developing countries, regions and cities are approaching development planning and governance in the context of a changing climate. This study examines the case of Colombia’s Capital Region, formed by Bogotá—Colombia’s capital city—and Cundinamarca, its surrounding region. From 2009 to 2014, Capital Region engaged in the first attempt in Colombia to incorporate climate change adaptation into urban and regional planning and governance, a project catalysed by the worst extensive climate-related disaster that Colombia has experienced to date: La Niña 2010–11.

This research argues that there are two types of co-production for climate change adaptation. One purposeful knowledge co-production, where science and policy stakeholders form partnerships to develop science-informed solutions to the impacts of climate change. The second is an inherent type of co-production. A co-production of knowledge and politics that is intrinsic to purposeful approaches, and which shows how science informing policy is not a unidirectional relationship. Science production for climate change adaptation is not devoid of politics and, on the other hand, policy actors often ‘filter’ science to accommodate exiting institutional arrangements for policy-making and governance more broadly.

In this way, this study offers a critical understanding of how adaptation responses are specific, not only to local geophysical and socioeconomic conditions, but to local ways of understanding and governing novel phenomena. The findings also reveal that in the case of Colombia and Capital Region, there are three main entry points for climate change adaptation into development planning and governance: territorial development, disaster risk management and water sustainability. In addition, the co-production of knowledge and politics for adaptation in Colombia manifests, in spatial terms, as territories of adaptation: through processes of territorial development, through political-administrative, jurisdictional and ecological narratives, and through efforts to mainstream adaptation planning and governance into projects of regional integration.
Impact statement

With the aim of adding helpful insights to the adaptation scholarship in relation to how national and subnational governments in the Global South are advancing efforts to adapt to the impacts of climate change, the following activities have already contributed or are planned in the near future to generate impact.

Conferences and presentations

I have presented this research's context and its findings to four cohorts of master students in the module Disaster Risk Reduction in Cities at the Bartlett Development Planning Unit. To students in this module, engaged with the social, physical and political implications of extreme events and disasters, this research has offered insights into how local stakeholders implement an international pilot project for adaptation. The partnership of TACC Colombia in Capital Region adapted the 'Territorial Approach to Climate Change' from the United Nations Development Programme (UNDP TACC) to the local priorities of the stakeholders involved in the partnership.

I presented the initial stages of this research, with a focus on the review of the adaptation literature, at a conference in Cali, Colombia (21st Conference of Logistics and Supply Chain, 3–4 September 2015). My presentation focused on the implications of climate change impacts for different industries in Colombia, and pathways for adaptation.

I aim to present my research findings to an academic and non-academic audience, including various of the participants who contributed to this study with their testimonies, during the XVIII annual cycle of conferences of the Department of Geography at the National University of Colombia in Bogotá (last quarter of 2021). In this context, I will also share a copy of this thesis with some of the research’s participants who asked for it at the end of their interviews.

Planned publications

Planned outputs include a book (in Spanish and English) on the notion of ‘territories of adaptation’ as local practices of space making in Colombia and in Capital Region, whereby the analytical framework of inherent co-production between knowledge, politics and space becomes visible.
A conference presentation discussing the multiscale technocracy of adaptation starting from international research and policy bodies to national, regional and urban government approaches for adapting to climate change. *International Conference on Climate Change Adaptation*, Prague, September 2021.

Two journal articles on the purposeful and inherent co-production of knowledge and politics in the context of climate change adaptation in developing countries. One article, for *Environment and Urbanization*. The second, for *Management and Environment* (‘Gestión y Ambiente’ in Spanish), a journal from the Institute of Environmental Studies at the National University of Colombia in Bogotá.

**Influencing other practitioners and future practice**

To development practitioners immersed in processes of knowledge co-production for adaptation, this study aspires to offer insights to identify what the meaning of adaptation is among local stakeholders, where priorities for development lie and what types of knowledge are legitimised or overlooked, and why. These insights can help to move from planning to practice, a much-needed transition as a lot of scholarship and practice is still devoted to the planning stage rather than the implementation of adaptation approaches.

This study frames my approach to adaptation and development planning. As a development practitioner, my goal is to engage with diverse epistemic communities and communities of practice from within and outside governmental institutions to identify and promote more inclusive and participatory initiatives for adapting to climate change, even when the initiatives are not labelled as ‘adaptation’, acknowledging how local stakeholders might engage differently with the current and expected impacts of a changing climate. I aim for my research outputs to be co-produced with these diverse epistemic communities and communities of practice to fully embrace the equivalence of knowledge, and its potential to broadening our understanding and practice of adaptation to climate change beyond academia.
Table of contents

List of figures ................................................................................................................................. 13

List of Tables ................................................................................................................................. 16

List of acronyms ............................................................................................................................ 17

1. Introduction ............................................................................................................................... 19
   1.1. Climate change adaptation, an emergent and pivotal policy agenda .................. 19
   1.2. Understanding knowledge and politics ................................................................. 24
   1.3. The knowledge and the politics of climate change ............................................... 25
   1.4. A political ecology of adaptation ............................................................................. 30
   1.5. The case study and the research questions ............................................................... 34

2. Literature review ....................................................................................................................... 41
   2.1. Framing climate change adaptation ............................................................................. 41
       2.1.1. CCA as an issue of development ................................................................. 43
       2.1.2. CCA as a function of vulnerability reduction .............................................. 45
       2.1.3. CCA as a pro-poor and urban endeavour ..................................................... 47
       2.1.4. CCA as subordinate, complimentary, or as a policy alternative to mitigation .... 50
       2.1.5. CCA as an issue of urban governance ............................................................ 52
       2.1.6. CCA beyond the urban scale ............................................................................. 55
       2.1.7. CCA as intrinsically linked to disaster risk management ............................ 56
       2.1.8. CCA as transformative ............................................................................... 57
       2.1.9. CCA as the result of social learning and collective action ............................ 58
       2.1.10. CCA as the result of co-production ............................................................... 60
2.2. Adding to co-production ................................................................. 65

2.3. Conclusions ...................................................................................... 66

3. Analytical framework ........................................................................ 68

3.1. Linkages between STS and political ecology ................................. 68

3.2. Analytical lenses .............................................................................. 72

3.2.1. The idiom of co-production .......................................................... 72

3.2.2. Epistemic geographies ................................................................. 77

3.3. The analytical framework of inherent co-production .................... 79

3.4. Conclusions....................................................................................... 81

4. Research methodology ..................................................................... 82

4.1. Ontological and epistemological perspectives ............................... 83

4.2. Research method and case selection .............................................. 85

4.3. Information elicitation, data analysis and research questions ........ 88

4.4. Research limitations, challenges and ethics ................................. 96

4.5. Conclusions....................................................................................... 99

5. Research context and background ................................................... 100

5.1. 1991, A new Colombian constitution ........................................... 100

5.2. 1993, Institutionalising environmental governance in Colombia .... 101

5.3. 2000, The beginning of Capital Region .......................................... 103

5.4. 2009, The start of TACC Colombia .............................................. 105

5.5. 2010–11, La Niña: a turning point in Colombia's planning and governance ...... 118

5.6. 2012, The start of Bogotá Humana .............................................. 120
6. The co-production of knowledge and politics for climate change adaptation in Colombia: the national scale

6.1. The making of identities

6.1.1. Reshaping existing identities

6.1.2. A technocracy of adaptation

6.1.3. CCA vis-à-vis DRM

6.2. The making of discourses

6.2.1. CCA as conformism

6.2.2. CCA as a label

6.2.3. CCA as global/local/urban

6.2.4. Ecosystem-Based Adaptation

6.2.5. CCA as vulnerability reduction

6.2.6. CCA as an issue of development

6.2.7. CCA as transformation

6.2.8. Community-Based Adaptation

6.2.9. CCA as a sociological, anthropological approach

6.2.10. Climate change or climate variability?

6.2.11. CCA as water sustainability

6.3. The making of institutions

6.3.1. Colombia's national systems for environment, risk and climate change management

6.3.2. Normative frameworks

6.3.3. Three different development models to incorporate adaptation

6.4. Conclusions
7. The co-production of knowledge and politics for climate change adaptation in Capital Region and Bogotá: the regional and the urban scale ................................. 165

7.1. The making of identities .................................................................................................................. 165

7.1.1. The identities of the partners within TACC Colombia ................................................................. 166
7.1.2. The identity of TACC Colombia .................................................................................................. 175
7.1.3. The identity of the expert ............................................................................................................ 179

7.2. The making of discourses ............................................................................................................... 182

7.2.1. CCA as determinant for regional development ........................................................................... 183
7.2.2. CCA as sustainable water governance ....................................................................................... 185
7.2.3. CCA intrinsic to risk management .............................................................................................. 187

7.3. The making of representations ..................................................................................................... 190

7.3.1. Climate change scenarios ........................................................................................................... 192
7.3.2. Vulnerability assessment ............................................................................................................ 196
7.3.3. Portfolio of adaptation projects .................................................................................................. 200

7.4. The making of institutions: TACC Colombia in Bogotá Humana .............................................. 202

7.4.1. Bogotá Humana Development Plan ............................................................................................ 203
7.4.2. Bogotá's District Plan for DRM and CCA .................................................................................. 206
7.4.3. IDIGER, the District Institute of Risk Management and Climate Change ............................... 208

7.5. The role of international bodies in local processes of co-production ........................................... 210

7.6. Conclusions ..................................................................................................................................... 213

8. Territories of adaptation ................................................................................................................... 215

8.1. Territorial development as a starting point for adaptation ............................................................ 216

8.2. Boundaries for adaptation .......................................................................................................... 220

8.2.1. Political boundaries .................................................................................................................... 222
8.2.2. Regional Climate Change Nodes ............................................................................................... 224
8.2.3. Ecological structures: the ecosystem as the territory .......................................................... 227

8.3. From urban to regional planning and governance: from Bogotá to Capital Region to Central Region ................................................................................................................. 234

8.3.1. From Bogotá To Capital Region .......................................................................................... 235

8.3.2. From Capital Region to Central Region .............................................................................. 239

8.4. Did TACC Colombia in Capital Region fail as an exercise of purposeful co-production? ........................................................................................................................................... 243

8.5. Conclusions ................................................................................................................................ 248

9. Discussion and conclusions .............................................................................................................. 250

9.1. The analytical framework of inherent co-production ................................................................. 251

9.2. Territories of adaptation ............................................................................................................ 255

9.3. A technocracy of adaptation ...................................................................................................... 256

9.4. Three entry points for adaptation planning and governance in Colombia and Central Region .............................................................................................................................. 259

9.4.1. Territorial Development ....................................................................................................... 259

9.4.2. Disaster risk management .................................................................................................... 262

9.4.3. Water sustainability ............................................................................................................. 264

9.5. Policy implications ..................................................................................................................... 266

9.6. Suggestions for future research ................................................................................................. 267

References ......................................................................................................................................... 269

Appendix One: List of interviewees/research participants ................................................................. 289

Appendix Two: Information Sheet .................................................................................................... 292

Appendix Three: Consent Form ......................................................................................................... 294
List of figures

Figure 1. Colombia and Capital Region (Bogotá–Cundinamarca). Source: Adapted from IDEAM et al. (2014).................................................................................................................. 35

Figure 2. The analytical framework of inherent co-production. Source: Author........... 79

Figure 3. Timeline of the research context. Source: Author................................. 88

Figure 4. Capital Region (Bogotá–Cundinamarca). Source: Adapted from UNDP Colombia (2013).................................................................................................................. 89

Figure 5. Timeline of this research. Source: Author........................................... 96

Figure 6. Map of elevations in the territory of Capital Region. Source: Adapted from Agustin Codazzi Geographic Institute (2011)........................................................................... 104

Figure 7. The eleven partners of TACC Colombia in Capital Region. Source: Author107

Figure 8. INAP in the Páramo of Chingaza (territory of Capital Region). Source: Adapted from Agustin Codazzi Geographic Institute (2011) and World Bank et al. (2011)..... 111

Figure 9. Impacts of La Niña 2010-11 in Útica, Cundinamarca. Source: map adapted from Creative Commons (2012) and photo adapted from EL TIEMPO.COM (2015)........... 113

Figure 10. Jurisdiction of Corpoguavio and the other three environmental authorities in Capital Region. Source: Adapted from Creative Commons (2012), Corpoguavio (2007) and CAR Cundinamarca (2015).................................................................. 115

Figure 11. The governance structure of TACC Colombia. Source: Author.............. 117

Figure 12. The nine Climate Change Nodes. Source: Adapted from IDEAM et al. (2017) ................................................................................................................................. 129

Figure 13. Páramo areas in Colombia and in Capital Region. Source: Adapted from UNDP Colombia (2013) and the Ministry of Environment (2020) ......................... 153

Figure 14. Three governance systems for adaptation. Source: Author................... 155
Figure 15. Colombia's National Climate Change Adaptation Plan: from the conceptual to the final framework. Source: Author .............................................................. 160

Figure 16. Three different models for the incorporation of adaptation into development planning. Source: Author ......................................................................................... 163

Figure 17. Climate-related emergency and disaster events in Capital Region (1980–2011). Source: Adapted from IDEAM et al. (2014) .............................................. 189

Figure 18. The seven policy briefs of TACC Colombia. Source: Author (images from IDEAM et al., 2014a) ........................................................................................................... 191

Figure 19. Scenarios for changes in precipitation in Capital Region for the periods: 2011–2040, 2041–2070, and 2071–2100. Source: Adapted from IDEAM et al. (2014b) ..... 194

Figure 20. Scenarios for changes in temperature in Capital Region for the periods: 2011–2040, 2041–2070, and 2071–2100. Source: Adapted from IDEAM et al. (2014b). .... 195

Figure 21. Integrated vulnerability levels in the municipalities of Capital Region. Source: Adapted from IDEAM et al. (2012) .............................................................................. 198

Figure 22. Areas of intervention of project Páramos. Source: Adapted from Creative Commons (2012) ........................................................................................................ 205

Figure 23. ‘By 2030, all Colombia territories will be adapted to climate change.’ A mapped depiction of MADS’ goal/discourse to the UNFCCC. Source: Adapted from UNDP Colombia (2013). .............................................................................. 223

Figure 24. From political boundaries to jurisdicitional boundaries: the Regional Climate Change Nodes. Source: Adapted from UNDP Colombia (2013) and IDEAM et al. (2017) .............................................................. 225

Figure 25. Adaptive Territorial Ecological Structure (EETA) of the River Blanco watershed. Source: Adapted from Creative Commons (2012) and IDEAM (2011) .... 228

Figure 26. Images of the páramo of Chingaza. Source: Above, photo by Philipp Weigel (2010). Below, photo from Acueducto (2014) ......................................................... 231
Figure 27. A geographical vs. a political depiction of the páramo areas in Colombia. Source: Author adapted from UNDP Colombia (2013) and JUSTICIA (2017)........ 232

Figure 28. From Capital Region to Central Region. Source: Adapted from UNDP Colombia (2013)........................................................................................................................................................................235

Figure 29. The Thomas van der Hammen Reserve, part of Bogotá’s Main Ecological Structure (EEP). Source: Adapted from Creative Commons (2012) and Observatorio De Conflictos Ambientales (2017) ........................................................................................................................................237

Figure 30. Páramo areas in Central Region. Source: Adapted from Semana (2016) and UNDP Colombia (2013). ..................................................................................................................................................................241

Figure 31. The analytical framework of inherent co-production put forward by this research. Source: Author........................................................................................................................................................................252
List of Tables

Table 1. Answering the research questions. ................................................................. 38
Table 2. Grey literature referenced by the research participants......................... 92
Table 3. Colombia's 1st, 2nd and 3rd National Communications to the UNFCCC .... 110
Table 4. TACC pilot projects in Colombia, Uruguay, Uganda, Perú and Nicaragua... 180
Table 5. Adaptation Projects for Capital Region Defined by TACC Colombia ....... 201
List of acronyms

CARs  Regional Environmental Authorities
CCA  Climate Change Adaptation
CI  Conservation International
CONPES  National Council for Social and Economic Policy
CONPES  Institutional Strategy for the Articulation of Policies and Actions in Climate Change
COP  UNFCCC Conference of the Parties
DNP  Department of National Planning
DRM  Disaster Risk Management
DRR  Disaster Risk Reduction
EBA  Ecosystem-Based Adaptation
EEA  European Environmental Agency
EEP  Main Ecological Infrastructure
EETA  Adaptive Territorial Ecological Infrastructure
ENSO  El Niño Southern Oscillation
GHGs  Greenhouse Gases
IDEAM  National Institute of Hydrology, Meteorology and Environmental Studies
IDIGER  Institute for Risk Management and Climate Change
INAP  National Pilot Project for Climate Change Adaptation
INDCs  Intended National Determined Contributions
IPBES  The Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services
IPCC  Intergovernmental Panel on Climate Change
MADS  Ministry of Environment and Sustainable Development
MEPOT  Review Proposal for Bogotá’s POT
NNP  Natural National Parks
PNACC  National Climate Change Adaptation Plan
PNCC  National Climate Change Policy
POMCA  Watershed Development and Management Plans
POT  Territorial Development Plan
<table>
<thead>
<tr>
<th>Acronym</th>
<th>Full Form</th>
</tr>
</thead>
<tbody>
<tr>
<td>STS</td>
<td>Science and Technology Studies</td>
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<tr>
<td>SINA</td>
<td>National Environmental System</td>
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<td>SISCLIMA</td>
<td>National System for Climate Change</td>
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<tr>
<td>SNGRD</td>
<td>National System for Disaster Risk Management</td>
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<tr>
<td>SREX</td>
<td>IPCC's special report on Managing the Risks of Extreme Events and Disasters to Advance Climate Change Adaptation</td>
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<td>SUDS</td>
<td>Sustainable Urban Drainage Systems</td>
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<tr>
<td>TACC</td>
<td>Territorial Approach for Climate Change</td>
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<tr>
<td>TVA</td>
<td>Tennessee Valley Authority</td>
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<tr>
<td>UNAL</td>
<td>National University of Colombia</td>
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<td>UNDP</td>
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<td>UNISDR</td>
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1. Introduction

1.1. Climate change adaptation, an emergent and pivotal policy agenda

The 2020 Sustainable Development Goals (SDGs) Report by the United Nations concludes that, before the COVID-19 pandemic, the progress to meet the SDGs by 2030 was already off track. With the pandemic, the unprecedented health, economic and social crisis will make achieving the goals even more challenging (United Nations, 2020). Regarding SDG 13, 'Climate action', the world is way off track to achieve the 1.5°C limit to global warming. Despite the 6% drop in emissions, resulting from the drastic reduction in human activity due to the COVID-19 crisis, the 1.5°C target is still unattainable. Furthermore, emissions are expected to rise as more and more restrictions are lifted (United Nations, 2020).

Between 2018 and 2019, aided significantly by social media, Swedish activist Greta Thunberg became the face of a youth climate movement leading the most massive climate strike in history (BBC News, 2020). Greta's discourse centres on humanity facing its major existential crisis arising from climate change. However, with the onset of the pandemic earlier this year and, later, with the assassination of George Floyd at the hands of the police, previous civic demonstrations advocating for governments worldwide to take urgent action to address climate change have taken a step back behind mass demonstrations—particularly in the UK and the US—against systemic racism and governmental measures (or lack of) to deal with the impacts of the pandemic.

Nevertheless, this research sees these three phenomena—climate change, systemic racism and the mishandling of the pandemic—as consequences of the same practice: the search for perpetual economic growth at the expense of human and non-human entities. In the name of perpetual economic growth, we now have anthropogenic climate change after decades of producing fossil fuels and releasing carbon dioxide to the atmosphere. Systemic racism has become the most powerful tool to oppress and dominate over human populations, particularly communities racialised as 'Black' so that few elites can enjoy the benefits of perpetual growth. The mishandling of the pandemic by many governments worldwide has revealed what they prioritise: economic growth over human lives and livelihoods. Overall, the three phenomena expose and exacerbate existing inequalities and injustices.
Civic demonstrations calling for urgent measures to mitigate carbon emissions, to challenge systemic racism and to prioritise human lives over the economy amid the pandemic, are then forms of protest against the common existential threat to humanity that the search for perpetual economic growth represents. This research focuses on the impacts of climate change because it has long been a persistent concern to this researcher who frames it as the most overarching and imminent of perils.

This framing, as well as Greta's, echoes that of many activists, social and natural scientists, politicians and members of the civil society worldwide. In 2018, during a global summit in Austria, the United Nations Secretary-General António Guterres described climate change as "an existential threat for most life on the planet including, and especially, the life of humankind" (United Nations, 2018). Emeritus Professor Will Steffen, from Australian National University, claims that we have likely already triggered a "global tipping cascade" (i.e., Amazon rainforest, West Antarctic ice sheet, Greenland ice sheet), a trajectory towards collapse that will take us to a less habitable and warmer world regardless of whether we reduce emissions (Moses, 2020).

Climate change, specifically global warming, is thus an ever-increasing concern of national and sub-national governments worldwide. The upsurge in the intensity and frequency of climate-related disasters over the last 30 years has demonstrated that the impacts of climate change can be a deterrent for development (Intergovernmental Panel on Climate Change, 2014a). In 2018 alone, climate-related disasters affected more than 39 million people, resulting in deaths, disrupted livelihoods and economic losses (United Nations, 2020). Developing countries are the most affected, with greater vulnerability levels than industrialised nations. High poverty rates, insufficient or inadequate service infrastructure and large portions of the population located in risk-prone areas are all compounding to render these countries significantly ill-equipped to deal with the impacts of global warming, such as floods, storms, heatwaves, droughts, wildfires, among others.

According to the Intergovernmental Panel on Climate Change (IPCC)—the United Nations body that assesses the global science on climate change—anthropogenic actions have accelerated the rate of global warming due to the rising concentrations of greenhouse gases (GHGs) in the atmosphere since the industrial era (IPCC, 2014). The term 'Anthropocene' was coined in 2000 by the atmospheric chemist and Nobel Laureate Paul Crutzen to suggest that a new geological epoch—marked by anthropogenic action—
succeeded the Holocene sometime in the mid-twentieth century, and the term is now well-established in peer-reviewed articles from across the sciences and humanities as well as popular literature (Besley & Peters, 2020).

'Climate action' is one of 17 Sustainable Development Goals that the UN member countries adopted in 2015 "as a universal call to action to end poverty, protect the planet and ensure that all people enjoy peace and prosperity by 2030" (United Nations Development Programme, 2020). Goal 13 aims to take urgent action to combat climate change and its impacts. For the IPCC, there are two primary responses to address climate change: mitigation and adaptation. In 2014, the fifth and most recent Assessment Report (AR) of the IPCC defined mitigation of climate change as "a human intervention to reduce the sources or enhance the sinks of greenhouse gases" (IPCC, 2014, p. 125). The same report defines adaptation as:

"the process of adjustment to actual or expected climate and its effects. In human systems, adaptation seeks to moderate or avoid harm or exploit beneficial opportunities. In some natural systems, human intervention may facilitate adjustment to expected climate and its effects." (IPCC, 2014, p. 118)

However, the IPCC 2018 Special Report on the impacts of global warming of 1.5°C above pre-industrial levels offers a more comprehensive definition, including 'incremental' and 'transformational' adaptation as well as adaptation limits (IPCC, 2018a, p. 542):

"In human systems, the process of adjustment to actual or expected climate and its effects, in order to moderate harm or exploit beneficial opportunities. In natural systems, the process of adjustment to actual climate and its effects; human intervention may facilitate adjustment to expected climate and its effects.

Incremental adaptation: adaptation that maintains the essence and integrity of a system or process at a given scale. In some cases, incremental adaptation can accrue to result in transformational adaptation (Termeer et al., 2017; Tábbara et al., 2018).

Transformational adaptation: Adaptation that changes the fundamental attributes of a socio-ecological system in anticipation of climate change and its impacts.

Adaptation limits: the point at which an actor's objectives (or system needs) cannot be secured from intolerable risks through adaptive actions.

1 The IPCC Assessment Reports (ARs) compile worldwide peer-reviewed literature on the science of climate change. The 1st AR was prepared in 1990 and the following 2nd, 3rd, and 4th in 1995, 2001 and 2007 respectively. The next, the 6th, will be released in 2022.
• Hard adaptation limit: No adaptive actions are possible to avoid intolerable risks.

• Soft adaptation limit: Options are currently not available to avoid intolerable risks through adaptive action."

The 2018 report calls for more immediate and aggressive action to curb GHGs emissions and to adapt to climate change. Arguably then, the report defines adaptation reflecting the findings of the growing literature that positions transformational adaptation as a more radical way to tackle the root causes of vulnerability to climate change impacts and risks (Alexander, 2013; Eriksen, Nightingale, & Eakin, 2015; Klein et al., 2014; Mushtaq, 2018; Pelling, 2011; Revi et al., 2014; Termeer, Dewulf, & Biesbroek, 2017; Wise et al., 2014).

To date, 189 parties or member states to the United Nations Framework Convention on Climate Change (UNFCCC)—the United Nations entity tasked with supporting the global response to the threat of climate change—have ratified the Paris Agreement. In 2015, the Paris Agreement settled on holding the global temperature well below 2°C above pre-industrial levels (1850-1900), and to pursue an ideal limit of 1.5°C (United Nations, 2020). In 2018, the IPCC special report on the 1.5°C limit concluded, with high confidence, that the impacts of climate change are projected to be lower at 1.5°C compared to 2°C. According to this special report on global warming, if global carbon dioxide (CO2) emissions do not start to decline at a decisive speed well before 2030, we are much more likely to hit 2°C and even above (IPCC, 2018b). The latter is the more probable scenario. The 2018 Emissions Gap Report of the United Nations Environment Programme (UNEP) concluded that GHGs show no signs of peaking and that global CO2 emissions for energy and industry increased in 2017 after three years of stabilisation (UNEP, 2018).

Although most of the UNFCCC parties have committed to both adaptation and mitigation, the parties acknowledge that developed nations must place a sharper focus on mitigation while developing countries must focus on adaptation. Levels of GHGs emissions have been and continue to be significantly higher in countries from the Global North since it is there where the bulk of the world's industrialisation has taken place. Meanwhile developing countries with fewer industrial activities contribute less to global GHGs concentrations but bear the burden of the impacts of climate change.
Although the IPCC offers definitions for mitigation and adaptation, and measures to address both, adaptation has proven to be a much vaguer and slippery concept. While mitigation is mainly about a global attempt to reduce GHGs, adaptation concerns local authorities and citizens, and it can entail different and even opposing policies (Grundmann, 2007). From poverty reduction for increasing the resilience of populations dangerously exposed to climate change impacts to relocation from hazard-prone areas; from provision or upgrading of drainage systems to developing drought-resilient crops to large infrastructure projects, among others. Moreover, these practices may not necessarily be labelled as adaptation actions but more in general, as approaches towards sustainable development. Indeed, for some scholars, adaptation and sustainable development can be synonymous (Fankhauser, 1998), and an opportunity to challenge inequalities and our relationship with the environment (Pelling, 2011).

This research focuses on adaptation because the different ways in which it is unfolding in developing countries provides a rich context to understand how knowledge and politics interact to address climate change as a potential deterrent to development. Conversely, the impacts of climate change unveil the loopholes of past, and current development approaches (Adger, 2016; Berrang-Ford et al., 2019; Boyd, Ensor, Castán Broto, & Juhola, 2014; Bulkeley, 2013; Carmin, Anguelovski, & Roberts, 2012; Chu, 2016; Olazabal, Chiabai, Foudi, & Neumann, 2018; Robinson, 2020; Schipper, 2009; Schipper & Pelling, 2006; Scoville-Simonds, Jamali, & Hufty, 2020). These loopholes have rendered developing countries more vulnerable to climate-related impacts, and continue to reproduce vulnerabilities hence challenging the discourse of climate change as a 'new' threat to development.

According to the IPCC's 2012 Special Report on Managing the Risks of Extreme Events and Disasters to Advance Climate Change Adaptation (SREX), the construction and accumulation of climate-related disaster risk has been triggered by unplanned urban growth, the expansion of informal settlements in low-lying areas, underinvestment in drainage infrastructure among others (IPCC, 2012). Furthermore, according to EM-DAT (2020) between 1970 to 2020, 95% of deaths from climate-related disasters have occurred in developing countries. The most vulnerable populations include urban poor in informal settlements, refugees, internally displaced people, and those living in marginal areas. Besides, the economies of many developing countries rely heavily on agriculture, a sector especially exposed to climate extremes (IPCC, 2014).
Nevertheless, and although the threat is not new, the production of new climate knowledge to inform policy is a crucial driver of current adaptation actions. Thus, this thesis poses that by looking at the interplay between knowledge production and politics in the context of climate change adaptation we can gain a better understanding of how adaptation efforts are re-shaping development planning and climate governance in developing countries and, at the same time, how existing development approaches and governance schemes define how developing countries approach adaptation.

1.2. Understanding knowledge and politics

"That knowledge gives power is a truism at least since the times of the Greek" (Fals Borda, 1996, p. 177). Heraclitus and Socrates acknowledged the truism, and since then the fascination with power/knowledge has continued with more recent recognition that material production may have far fewer implications than knowledge production (Fals Borda, 1996).

The power/knowledge maxim has encouraged philosophers of science to examine the relationship between power and knowledge and their use as a form of social control. The work of Michel Foucault (1971, 1972, 1973, 1979) is perhaps the most notable amongst social theorists in bringing together the analysis of power and knowledge. Foucault questioned the aim of modern human sciences (biological, psychological and social) to offer universal truths about human nature, and instead framed such truths as the result of, or contingent upon, ethical and political commitments and historical forces (Gutting & Oksala, 2019).

This research understands knowledge as the process through which humans come to know and understand the world. Thus, knowledge can have as multiple sources as humans are in the world. However, through the literature review (Chapter Two) and based on its empirical findings (Chapters Six, Seven and Eight), this thesis brings forward three different types of knowledge: scientific, bureaucratic (or administrative) and lay knowledge.

Scientific knowledge—often also referred to as expert knowledge—is based on scientific models and methods, and validated by peer review processes. This knowledge comes both from natural and social sciences, although they differ in their use of premises,
methodologies, norms and values (Nowotny, Scott, & Gibbons, 2002).

Bureaucratic or administrative knowledge is intertwined with administrative and governmental practices (Edelenbos, van Buuren, & van Schie, 2011). This knowledge is used by governmental representatives—elected and non-elected—to support their arguments for decision-making. Arguably, this type of knowledge is less concerned with the intrinsic value of knowledge and more with its strategic and political potential. Furthermore, although bureaucratic knowledge can also come from professional and scientific backgrounds, it has less strict checks compared to scientific knowledge (Edelenbos et al., 2011).

Lay knowledge relates to the experiences of everyday citizens and stakeholders, to the practices in which they are involved. This knowledge is local and contextual, while scientific knowledge is institutionalised and often strives for universal prescriptions (Petts & Brooks, 2006). According to Wynne (1996), lay people frequently mistrust science and expertise because they feel betrayed by them, misinterpreted, and suppressed by the capacity of expert science to exercise decision-making authority.

In terms of politics, this research understands the concept as "the processes through which individuals and collectives cooperate and collude to order and govern everyday affairs" (Eriksen et al., 2015, p. 524). For this research, implicit in these processes, we find power or decision-making authority. Authority captures how power manifests in the exercise of specific individuals' and institutions' agendas within development planning and climate governance. These authority struggles are multiscale and intertwined with the use of different types of knowledge for adaptation (Eriksen et al., 2015).

### 1.3. The knowledge and the politics of climate change

In 1988, The United Nations Environment Programme established the IPCC to provide the world with a clear scientific view on the current state of knowledge in climate change and its potential environmental and socio-economic impacts.

In his account of the development of the IPCC, Miller (2004) describes how, when the IPCC started to operate in 1988, there was very little participation from developing countries because industrialised nations governed climate science. Nevertheless, policy-
makers from developing countries noted that many issues relevant to climate change were political. They pointed out that poverty, development, equity, and access to technological and financial resources were fundamental for any effort to respond effectively to climate change. Thus, developing country leaders were sure that the IPCC, as a scientific body, could not act as an appropriate forum for developing global responses given the highly political nature of the challenges to deal with climate change and their crucial role in advancing development (Miller, 2004). Eventually, the objections of developing countries led to the creation of the UNFCCC in 1992, as the political branch of the UN to address climate change.

In the context of the UNFCCC, countries in the Global North are held responsible for adopting significant measures to reduce GHGs emissions and for helping to finance adaptation actions in developing countries. Since developed countries have played a more substantial role in the increased concentration of GHGs emissions, their focus is on mitigation while the Global South is directing its efforts to cope with the consequences of climate change, or what the IPCC has defined as adaptation.

The politics of knowledge production within the IPCC has also been subject to criticism. Ford, Berrang-Ford, and Paterson (2011) question the transparency of the process in regards to the types and sources of literature the IPCC reviews and which ones excludes, the amount of literature reviewed and what databases use. The review process employed by the IPCC is similar to that of a systematic review, which includes the specification of exclusion criteria and attempts to cover the whole body of literature available on the subject (Ford & Pearce, 2010). However, the IPCC does not disclose its search criteria, such as search terms used, databases and search strategy, and it does not report search results either such as the number of articles reviewed (Lomborg, 2004).

This thesis argues that regardless of the creation of the UNFCCC, the IPCC continues to hold a scientific and political nature because scientists from many of the UN member countries form it, and these governments endorse the assessment reports of the panel. According to the IPCC, though, these assessment reports are policy-relevant but policy-neutral. Their role is to inform policy but not to be policy-prescriptive.

The dual nature of the IPCC as a scientific and political body is both cause and consequence of climate change actions having boundary issues between science and politics, knowledge and decision-making. At the time of its insertion in 1988, the initial
focus of the IPCC was mitigation, and the international negotiations aimed to reach a
global agreement to reduce GHGs to keep global warming at bay. Historically, the federal
government of the United States has strongly objected these negotiations even though it is the second biggest worldwide polluter with 12.8% of global GHGs emissions, behind China with 25.76% (Friedrich & Ge, 2020). In 1997, the US refused to ratify the Kyoto Protocol—the 1st global international treaty for the reduction of global GHGs—, and has decided to withdraw from the 2015 Paris agreement. For the US federal government, these agreements pose potentially unfair consequences to the US economy, such as increasing oil prices (Hovi, Sprinz, & Bang, 2012).

Nonetheless, most industrialised countries and emerging economies—including China and India—have agreed to curb their emissions, though China and India emphasise that industrialised countries must provide the financial support given their historical contributions to global warming (Farand, 2019). Despite their low emissions levels, the majority of developing countries have also committed to low-carbon development. In this way, the climate conceived as a global common is the object of a global struggle to avoid catastrophic consequences. However, while mitigation has a sound scientific track record, and the development of GHGs inventories is relatively straightforward as well as the ways to measure emission reductions, for adaptation the pathways are less clear.

While the international community has agreed for the allocation of resources to flow from developed to developing countries to further adaptation, the UNFCCC deems that is the responsibility of local stakeholders (national, sub-national/regional and urban) in low- and middle-income countries to invest these funds and act in order to avoid current and future climate-related impacts and risks. This UNFCCC posture, however, disregards the need for more than funding from rich countries. Extractive activities from developed nations such as mining continue to occur in developing ones, risking the environmental resilience of poor and middle-income countries to adapt effectively. In Colombia, international mining companies conduct their activities in areas that are key to the future of water supply for the country (Colorado, 2020). Furthermore, measures to pursue perpetual growth schemes (e.g., GDP growth) promoted by the World Bank and the International Monetary Fund threaten the inequality gap in developing nations to grow even more significantly, whereby the poor grow poorer and more vulnerable to the impacts of climate change.
The IPCC (2014) has agreed that even if GHGs emissions came to a halt today, adaptation needs to happen regardless because the effects of past emissions will continue to produce climate-related impacts for centuries ahead. When countries, regions and cities in the Global South try to contextualise the IPCC's definition of adaptation as 'the process of adjustment to actual or expected climate and its effects', the adjustments and changes take almost countless shapes and forms given the existing development challenges. Development challenges are diverse, and climate change is already exacerbating current and historical processes of environmental degradation, social segregation and inequality gaps.

According to the international policy scheme of the UN and other development agencies such as the World Bank, as a new agenda, adaptation to climate change requires the production of knowledge that is relevant for decision-makers. Terms like 'knowledge brokers' have emerged to address the need to translate scientific knowledge into policies (see Bulkeley & Castán Broto, 2013). However, according to the most recent Adaptation Gap Report of the UNEP (Neufeldt, Sanchez Martinez, Olhoff, Knudsen, & Dorkenoo, 2018), although adaptation is increasingly addressed in laws and policies, there is still a lag in these laws and policies translating into effective and efficient adaptation.

This thesis argues the divide between knowledge and politics as separate and bounded entities in the context of climate change adaptation lies at the core of the way this agenda is unfolding in the international arena and within developing countries. Confining the knowledge and the politics for climate change adaptation within boundaries creates a tendency to also circumscribe the adaptation agenda into a 'new' field of knowledge so governments can make decisions.

In Colombia, adaptation is no longer just an environmental concern. Although the hazards are environmental, climate change has now been taken out of the environmental realm because the impacts can affect individual households to whole cities to entire sectors of the economy. Therefore, central, regional and local governments are incorporating adaptation into development planning and governance. During the 2015 Paris Agreement and for the first time, the UNFCCC included adaptation goals, —alongside mitigation— as part of the commitments of the governments, mainly from developing countries (UNFCCC, 2015). However, when these governments attempt to incorporate the agenda, there is no clarity as to what adaptation means for the local context, who needs to take
responsibility for action, where is adaptation supposed to take place and how it must be carried out.

The need to adapt to the consequences of accelerated global warming is unquestionable, but since these consequences are so ubiquitous, the scope of adaptation to climate change into a single concept is then an enormous challenge. However, bounding adaptation into a set of knowledge and policy options appears to be a necessary first step to achieve the integration of adaptation concerns into all areas of development.

Nevertheless, the bounding of climate change adaptation into an agenda is problematic. As an all-encompassing task overlapping with other development actions, the question is then how or where is the agenda adding value. One of the different or innovative elements is climate-specific knowledge. Building climate change scenarios requires the expertise of climatologists, meteorologists and the works of other similar disciplines. Another innovative element is the vulnerability assessment in the face of these scenarios. Based on their extensive review of scientific knowledge, the IPPC provides guidelines for developing both climate change scenarios and vulnerability assessments.

However, both climate change scenarios and vulnerability assessments can prove to be more political than scientific tasks. Deciding at what scale to develop climate change scenarios and deciding what is at risk in the face of increasing rates of precipitation or temperature, for example, are not often based on scientific guidelines. The interests of the local stakeholders involved in promoting adaptation play a decisive role in where to focus efforts. Moreover, depending on the scale of adaptation, this mixture of interests can become a hindrance to reach agreements.

Beyond scientific knowledge—both from natural and social sciences—, local actors and the international scientific and political communities have accepted the need to promote bottom-up approaches in order to adapt to climate change (IPCC, 2014). Lay knowledge has been gradually recognised and legitimised within epistemic communities that do not conform to the scientific method of knowledge production (see Berkes, 2009; Elmhirst, 2015; Hegger & Dieperink, 2014; Hegger, Lamers, Van Zeijl-Rozema, & Dieperink, 2012; Lesnikowski et al., 2017; Pohl et al., 2010; Williams & Hardison, 2013). These epistemic communities rely on their experiential knowledge or livelihood 'expertise'. Indigenous and peasant communities, associations of informal settlements as well as the technical staff of governmental and non-governmental bodies dealing with environmental
governance and development planning, all have a great deal of experiential knowledge. These epistemic communities have dealt, first hand, with the impacts of climate extremes, and they have developed coping mechanisms that can be considered as adaptation measures.

The interaction of the authority of climate knowledge—lay and scientific—and politics has then a critical role in emerging governance schemes for climate change adaptation within the developing world. We are struggling, at the same time, to manage and to understand a global phenomenon that has different and numerous local impacts. Furthermore, the knowledge and the politics required to deal with local impacts find themselves repeatedly tied with regional, national and global scales of climate governance.

In this way, the production of knowledge can be inherently driven by existing decision-making processes as well as decision-making for adaptation cannot be devoid of scientific/experiential knowledge. This interplay between knowledge and politics is shaping adaptation approaches, and also, how these approaches influence development planning and governance. It is instrumental then to look at this interaction in order to broaden our understanding of the unfolding of climate change adaptation as a strategy to achieve sustainable development, as stated by the SDGs.

1.4. A political ecology of adaptation

Although the interaction between knowledge and politics might seem inherent to adaptation, in practice there is often an attempt to separate the two, or more explicitly, to separate science and politics by ignoring the genealogy of social and political conditions that cause environmental problems (Forsyth, 2003).

In his work on critical political ecology, Forsyth (2003, foreword) explains "how social and political factors frame environmental science, and how science, in turn, shapes politics". Forsyth does not reject the notion of a biophysically 'real world out there'. Instead, his work draws on the philosophy of science to integrate the biophysical reality with social and political constructions. Ignoring how social and political factors influence environmental science, undercuts its ability to address the biophysical causes of environmental problems. At the same time, policies based on science devoid of socio-
political concerns can produce unfair results like the penalisation of livelihoods already threatened by poverty and environmental degradation (Forsyth, 2003).

Using political ecology as a framework of analysis, Taylor (2014) challenges the ontological division between nature and society that, he argues, shapes mainstream adaptation theory and practice. For Taylor, a rigid separation between climate and society roots mainstream concepts of climate change adaptation, a separation that mirrors the ontological distinction between the social and the natural worlds typical of modernist thought (Castree, 2001). In this view, climate and society are two different systems or domains—one biophysical and natural, the other cultural and social—that relate to each other through a series of reciprocal influences.

According to Taylor (2014), this ontological separation between nature and society, or climate and society can result in the depoliticisation of climate. The climate is then an external agent to an otherwise coherent ordered society that must adapt to it. This depoliticisation ignores the history of entanglements of nature and society that have produced and reproduced an unequal distribution of benefits and burdens in the context of meteorological phenomena.

To illustrate his position, Taylor uses the case of Pakistan in 2010, when monsoon floods struck the country, causing significant loss of life and considerable damage to crops and physical infrastructure. Scientists at the World Meteorological Office, among other observers, identified a causal relationship between anthropogenic climate change and the Pakistani floods.

The 2010–11 floods catalysed the mainstreaming of climate change into the policy discourse of the Pakistani People's Party government of Asif Zardari. The immediate renaming of the Ministry of National Disaster Management as the Ministry of Climate Change reflected this shift. It instantly created an institutional body charged with incorporating climate change concerns into a broader policy strategy to promote sustainable development (Taylor, 2014).

For Pakistan, the creation of a multifaceted climate change strategy aimed at reducing vulnerability to short-term hazards and long-term environmental change seemed both necessary and, in comparison to neighbouring countries, overdue. Despite this new urgency, for Taylor (2014), how the Pakistani government approached the issue raises
several vital questions. In posing adaptation in terms of a series of technical and managerial solutions to an externally generated threat, the Pakistani approach silences the power relations that are inherent to the production of vastly unequal agrarian environments in the Indus watershed.

Taylor challenges the notion that Pakistan is facing a novel and externally generated threat. He emphasises how the Indus region comprises an intensely manufactured environment in which the vulnerability of rural populations to drought and floods remains intimately tied to the socio-ecological engineering of the Indus basin since colonial times.

In line with Forsyth's (2003) concerns that a misconstrued environmental science can produce unfair results, Taylor's post-2010 flood assessment (2014), shows that recovery from natural hazards in Pakistan develops through control over land by which dominant classes can consolidate their positions within the rural hierarchy. Despite the importance of these power relations for understanding the possibilities of and limitations to climate change adaptation strategies, the Pakistani government's technical and managerial approach to adaptation overlooks them.

The discourse of climate change adaptation in Pakistan has Malthusian terms as a struggle against natural limits and threats. This framework facilitates the conceptualisation of adaptation as a technical exercise that stands external to the processes of agrarian transformation that hinge on the exercise of power bound up with the control of land, water, labour and debt. For Taylor (2014), the vast inequities over the control of crucial productive assets remain the elephant in the room of climate change discourse and policy in Pakistan where the current federal government explicitly avoids any mention of land issues in the National Climate Change Policy. Taylor concludes that climate change is becoming a new institutional arena for political contestation in which different social agents attempt to ascribe particular visions of change, security, justice and efficiency to the idea of adaptation (2014).

D'Alisa and Kallis (2016) also observe that the problem of adaptation is a political one. Using the framework of 'Gramscian political ecology', the authors analyse the post-disaster response to a landslide in the city of Sarno (Italy) in 1998 and conclude that the
institutional response to the disaster was maladaptive\(^2\). The state focused investments on hard measures such as dams, tanks and canals, increasing landslide risk for various other municipalities in the region. The cement industry plays a crucial role in the political economy of Italy upon which political power is significant.

D'Alisa and Kallis (2016) found out that soft measures such as monitoring and early warning systems proved to be much more effective, less expensive and more democratic than hard measures. The authors contend that in Sarno, there was a lack of counter-hegemonic processes that could have otherwise promoted good adaptation. Adaptation then calls for the transformation of the state into one that prioritises welfare instead of safety and social instead of human security, so there is a more significant reduction of vulnerabilities (D'Alisa & Kallis, 2016).

For this research, acknowledging the politicisation of science, lay knowledge and decision-making, and challenging the ontological division between nature and society are instrumental in conducting a critical understanding of climate change adaptation actions. Instead of the co-production of nature and society (Taylor, 2014), this research looks at the co-production of knowledge and politics. However, the ontological division of nature and society underscores the interactions between knowledge/science and decision-making/politics by which climate change as a 'new' threat to development is demanding the production of new knowledge and new institutional arrangements to deal with the numerous vulnerabilities that are already in place and that an accelerated climate change aggravates.

This thesis argues that the unfolding of the adaptation agenda in Colombia and Capital Region, as in the case of Pakistan, is expressing itself by the government's restriction of adaptation actions to technical and managerial tasks. Authorities are purposely or not avoiding the fact that past and current development schemes have driven current vulnerabilities. While technical and managerial responses are necessary, this research argues that this limited approach to adaptation is also revealing how power and decision-making authority flow within national, regional and local governments, and how this

\(^2\) Maladaptive actions (or maladaptation) refers to actions that may lead to increased risk of adverse climate-related outcomes, increased vulnerability to climate change, or diminished welfare, now or in the future (IPCC, 2004b).
power flow influences development planning and governance at different scales.

1.5. The case study and the research questions

Similar to Pakistan, there was an institutional upturn in Colombia after a climate-related disaster devastated large parts of the country. From 2010 to 2011, La Niña, or the cold phase of the El Niño Southern Oscillation (ENSO) meteorological phenomenon, manifested itself in the Colombian territory by heavy and continuous rainfall. The President of Colombia framed it as the worst natural disaster in the history of the country (Wallace, 2011). Close to 4 million people—9% of the national population—were affected and the economic losses as of September 2011 were accounted for up to 7.8 billion USD—2% of Colombia's GDP for 2011, with significant impacts in the sectors of agriculture, housing, transport, energy, and health (Hoyos, Escobar, Restrepo, Arango, & Ortiz, 2013).

Although both el Niño and La Niña phases of the ENSO have been typical in the history of climate variability in Colombia, as far as records go, this time, the intensity of the rains surpassed every prior experience (IDEAM et al., 2014a).

Before La Niña 2010–11, Colombia restricted its actions on climate change mostly to mitigation practices and low-carbon development approaches led by the environmental sector (Lampis & Fraser, 2012). However, after the extensive disaster that the country experienced, climate change became a mandate for development planning and governance. The central government devised an institutional strategy to mainstream climate change concerns into the planning of all economic sectors (e.g. agriculture, housing, transport) and Colombian territories (municipalities, cities and regions).

Adaptation to climate change took centre stage, and the Colombian delegation to the Paris COP in 2015 led a group of representatives from developing countries lobbying for the inclusion of adaptation goals in the Intended National Determined Contributions (INDCs) to the UNFCCC. The UNFCCC created the figure of the INDCs in the context of the Paris Agreement to define the actions that the countries party to the UNFCCC commit to curbing climate change and its impacts (Forsell et al., 2016).

This research looks at the Colombian government response at national, regional and urban
scales. However, it does so in the context of the first regional or territorial initiative for mainstreaming climate change concerns into development planning and governance, which took place in Capital Region.

Capital Region started in 2001 as an agreement between the governments of Bogotá, the capital of Colombia, and Cundinamarca, its surrounding state or territory, to coordinate development planning at regional level (Figure 1). In 2009, the United Nations Development Programme (UNDP) selected Capital Region as one of ten pilot regions in the Global South for its Territorial Approach to Climate Change (TACC). TACC was a United Nations initiative to partner up with sub-national governments (regions and cities) in order to integrate climate change into territorial planning.

![Image](image.png)

**Figure 1.** Colombia and Capital Region (Bogotá–Cundinamarca). Source: Adapted from IDEAM et al. (2014)

The UNDP argues that since urban, regional and territorial governments are closer to local issues, they are better suited than national governments to mainstream climate change into development planning (UNDP, 2012).

TACC Colombia in Capital Region was an interinstitutional platform and a partnership between stakeholders from different urban, regional and national authorities and research institutions that, from 2009 to 2014, came together under the UNDP TACC scheme to develop a climate change integrated—adaptation and mitigation—plan for Capital Region.

This thesis argues that the responses of the central government and TACC Colombia to
La Niña 2010–11 reflect the separation of knowledge and politics that political ecology challenges. Framed as a 'new' threat to development in Colombia, addressing climate change required the production of new knowledge to inform decision-making. However, this research claims that such a framing is a limited approach to positively impact development planning and governance towards adaptation because it overlooks the complexity of risk, where climate change hazards are one more stressor added to a series of others that are the consequence of current and past development approaches.

Climate change and climate variability are not the main drivers of climate-related disasters. They are just exacerbating the vulnerability that is already in place. Therefore, the unfolding of the climate change adaptation agenda within urban, regional and national planning and governance uncovers the power dynamics of existing institutional arrangements.

The production of new scientific knowledge, from both natural and social sciences, and of new technical knowledge is considered in Colombia and in Capital Region as necessary to inform decision-making but at the same time, existing decision-making schemes mandate which type of knowledge to produce and who gets to participate in this production.

This research evaluates the co-production of knowledge and politics for climate change adaptation in the context of TACC Colombia in Capital Region to understand how adaptation strategies are being mainstreamed into development planning and governance at national, regional and urban scales in Colombia.

One central question guides this research:

**How do interactions between knowledge and politics in the context of climate change adaptation influence the mainstreaming of adaptation efforts into development planning and governance in Colombia's Capital Region?**

To answer this central research question, five sub-questions are posed:

1. How does scholarship across social sciences frame climate change adaptation and its mainstreaming into development planning and governance?

2. How does the framework of inherent co-production help us to better understand
the interactions of knowledge and politics—and their spatial manifestations—in the context of climate change adaptation?

3. What does the case of TACC Colombia in Capital Region reveal about the mainstreaming of adaptation into development planning and governance at national, regional and urban scales in Colombia?

4. How do multiscalar efforts for adaptation in Colombia manifest in spatial terms?

5. What does this analysis reveal, more broadly, about the intersections of knowledge and politics and the practice of development planning and governance for climate change adaptation?

This study answers these research questions throughout the following eight chapters (see Table 1).

Chapter Two addresses sub-question 1 through a review of the scholarly work on climate change adaptation. It highlights some academic frameworks for approaching adaptation: as an issue development, as a function of vulnerability reduction, as a pro-poor and urban endeavour, as a policy alternative, complementary or subordinate to mitigation, as an issue of urban governance, beyond the urban scale, as intrinsically linked to disaster risk management, as transformative, as a result of social learning and collective action, and finally, adaptation as the result of co-production. The chapter examines the adaptation literature that discusses two apparently divergent forms of co-production, and which this research terms as inherent and purposeful.

To answer sub-question 2, Chapter Three develops the analytical framework of inherent co-production to examine the case of TACC Colombia in Capital Region, framed by its partners as an initiative of purposeful co-production. Building upon the idiom of co-production—from Science and Technology Studies—and the notion of epistemic geographies—from geography and in specific political ecology, this analytical framework can offer explanations of the inherent or intrinsic co-production of knowledge and politics, and its spatial manifestations in the context of climate change adaptation.
Table 1. Answering the research questions.

<table>
<thead>
<tr>
<th>Main research question</th>
<th>Sub-questions</th>
<th>Chapters</th>
<th>Summary</th>
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<tr>
<td>How do interactions between knowledge and politics in the context of climate change adaptation influence the mainstreaming of adaptation efforts into development planning and governance in Colombia’s Capital Region?</td>
<td>1. How does adaptation scholarship frame climate change adaptation, and its mainstreaming into development planning and governance?</td>
<td>Chapter Two: Literature Review</td>
<td>As an issue development, as a function of vulnerability reduction, as a pro-poor and urban endeavour, as a policy alternative, complementary or subordinate to mitigation, as an issue of urban governance, beyond the urban scale, as intrinsically linked to disaster risk management, as transformative, as a result of social learning and collective action, and finally, adaptation as the result of co-production.</td>
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<td>2. How does the framework of inherent co-production help us to better understand the interactions of knowledge and politics—and their spatial manifestations—in the context of climate change adaptation?</td>
<td>Chapter Three: Analytical Framework</td>
<td>The framework of inherent co-production reveals that the local/contextual qualities of adaptation are not just biophysical and socio-economic, but also relate to how local actors learn about climate change, strive to govern it and develop spatial constructions for adaptation planning and action.</td>
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<td>3. What does the case of TACC Colombia in Capital Region reveal about the mainstreaming of adaptation into development planning and governance at national, regional and urban scales in Colombia?</td>
<td>Chapter Six: Co-producing knowledge and politics at a national scale</td>
<td>La Niña 2010–11 disaster triggered the making and reshaping of new identities, the emergence of discourses or framings and the emergence of institutions for development planning and governance to tackle the impacts of climate change in Colombia.</td>
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<td></td>
<td>4. How do multiscalar efforts for adaptation in Colombia manifest in spatial terms?</td>
<td>Chapter Seven: Co-producing knowledge and politics at regional and urban scale</td>
<td>The partners of TACC Colombia regarded the project as the perfect platform to advance Capital Region, an existing initiative to coordinate development efforts between Bogotá and Cundinamarca.</td>
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<td>5. What does this analysis reveal, more broadly, about the intersections of knowledge and politics and the practice of development planning and governance for climate change adaptation?</td>
<td>Chapter Eight: Territories of adaptation</td>
<td>A major entry point for adaptation in Colombia is through processes of territorial development, which produce territories of adaptation where the physical space and its governance are boundaries for rather than scales of adaptation.</td>
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<td>Chapter Nine: Discussion and conclusions</td>
<td>Purposeful processes of co-production are not ‘depoliticised’ but rather embed a politics of exclusion.</td>
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<td></td>
<td></td>
<td></td>
<td>Three entry points for adaptation in Colombia and Capital Region: territorial development, disaster risk management and water sustainability.</td>
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Source: Author
Chapter Four presents the research methodology. This research uses the case study approach. Its empirical findings are built upon 75 in-depth interviews with participants of TACC Colombia, and of the multiscalar institutional change that took place in the context of La Niña 2010–11. This study examined the qualitative data through coding and thematic analysis, systematising the findings according to the analytical framework proposed in Chapter Three and presented in Chapters Six, Seven and Eight.

Chapter Five describes the research context, following a timeline starting in 1991 (the sanctioning of a new constitution for Colombia) and ending in 2016, the year of the fieldwork. The research context explains how the coincidence of TACC Colombia and the extensive disaster of La Niña 2010–11, among other factors, framed TACC Colombia not only as a regional pilot for adaptation as defined by the UNDP, but it became a national pilot for adaptation engaging government actors from national, regional and urban levels.

Chapter Six and Chapter Seven answer sub-question 3. Chapter Six presents the findings of the co-production of knowledge and politics at a national level in Colombia. The chapter arranges the findings in three sections: the re-shaping of existing identities and the emergence of new ones, the discourses framing adaptation to climate change and the institutions that have emerged as a result of the national efforts to adapt to climate change and climate variability. Chapter Seven explains how the making of identities, discourses, institutions and representations reflect the interactions between the regional and the urban level of TACC Colombia. In addition to addressing the impacts of La Niña 2020-2011 and future climate-related challenges through an integrated plan for climate change, the partners of TACC Colombia sought to consolidate Capital Region as a platform for the coordination of development planning and governance between Bogotá and Cundinamarca.

To answer sub-question 4, Chapter Eight explains how abstract concepts such as knowledge and politics have material/spatial outputs in Colombia and Capital Region in the form of territories of adaptation. Chapter Eight asserts how a significant entry point for adaptation in Colombia is through processes of territorial development. Territorial development—a concept that in Colombia includes, but is broader than, land use planning—is a crucial pathway for mainstreaming adaptation into development planning at national, regional and local scales in Colombia. These mainstreaming processes are
producing territories of adaptation, where the physical space and its governance are boundaries for rather than scales of adaptation.

Chapter Nine answers sub-question 5 by discussing the findings of this research and drawing conclusions around two themes: the concepts of inherent and purposeful co-production and three entry points for adaptation planning and governance in Colombia and Capital Region. The former talks about how purposeful processes of co-production are not 'depoliticised' but rather embed a politics of exclusion—an exclusion of the loopholes of existing development practices that contribute to the construction of climate-related risk. The second theme discusses the opportunities and challenges of three entry points for adaptation in Colombia and Capital Region: territorial development, disaster risk management and water sustainability. Chapter Nine concludes with some policy implications of this study, and suggestions for future research.
2. Literature review

This review of climate change adaptation (CCA) literature presents some of the frameworks that the scholarly literature offers to address adaptation needs. The aim is to evaluate how different scholars frame adaptation, and its mainstreaming into development planning and governance.

First, this chapter explains how frameworks differ from definitions and how mainstream frameworks influence policies and actions for CCA.

Next, the chapter presents the findings from the literature review in ten interrelated frameworks for approaching adaptation: as an issue development, as a function of vulnerability reduction, as a pro-poor and urban endeavour, as a policy alternative, complementary or subordinate to mitigation, as an issue of urban governance, beyond the urban scale, as intrinsically linked to disaster risk management, as transformative, as a result of social learning and collective action, and finally, adaptation as the result of co-production.

Lastly, the chapter discusses how this research aims to contribute to the literature reviewed through the idiom of co-production from the field of Science and Technology Studies (STS). This research uses the idiom of co-production as an alternative pathway to understand the interactions between knowledge and politics and to broaden our understanding of the unfolding of adaptation strategies and its implications for development planning and governance.

2.1. Framing climate change adaptation

This chapter discusses the literature in terms of frameworks for adaptation rather than approaches or forms of adaptation. For this research, framing refers to how adaptation is understood in scholarly work. It relates to how scholars consider stakeholders ought to address the issue, who needs to be involved and at what level. In the case of CCA, it is not easy to discern the kind of framework used in any given case: based on scientific knowledge, seen through the light of development priorities, focused at specific risk
sectors or towards a more integrative approach (Bulkeley, 2013).

Frames are purposeful choices, underlying structures of belief that can render policy conflicts unmanageable due to the different frames of diverse stakeholders (Rein & Schön, 1994). Frames shape what political participants perceive as their interests and frames themselves can also be grounded in the institutions that sponsor the participants. Frames contain storylines that imply a normative leap from what is to what ought to be (Rein & Schön, 1994). Frames can affect decision-making and individual choices (Gray & Donnellon, 1989). Frames can be acquired or proposed by individuals, communities, institutions or cultures, and they can filter reality and limit attention to specifics of a given situation (Kaufman & Smith, 1999). Framings can either foster or discourage participation in decision-making processes. If there is a dominant framing implying that decisions are in the hands of the powerful or the experts, communities might seek political alliances elsewhere (Kaufman & Smith, 1999).

In their review of the adaptation literature, Bassett and Fogelman (2013) organise their findings inspired by Pelling's three stages of adaptation or adaptation framework: resilience, transition and transformation (Pelling, 2011). Basset and Fogelman reframe these stages, respectively, as 'adjustment adaptation', 'reformist adaptation' and 'transformative adaptation'. Adjustment adaptation frames climate impacts as the drivers of vulnerability. Reformist adaptation looks at vulnerability as driven both by biophysical and social issues, and thus puts development forward to reduce it. Transformative adaptation focuses mainly on the roots of vulnerability and advocates for the transformation of the prevailing political-economic system as the primary driver of vulnerability.

Most of the literature reviewed in this chapter falls into what Basset and Fogelman (2013) refer to as reformist adaptation and to a lesser extent, into transformative adaptation. These works stem from a wide range of disciplines: urban and regional planning, geography, urban, environmental, development and disaster studies, sociology, anthropology and political science. This wide range of disciplinary approaches reflects the overarching interest that climate change adaptation summons from social science scholars, whose research seeks to understand the implications of climate change impacts mostly in developing countries, and elucidate pathways for adaptation.

In the following sections, the findings of the literature review are organised in ten
frameworks for understanding adaptation discourse and actions to shed light on this research's sub-question 1, about how the adaptation scholarship frame CCA and its interactions with development planning and governance. These frameworks are interrelated, and several of the works examined refer to two, three or more frameworks at a time. Nevertheless, by separating the findings into frameworks, the intention is to offer a methodical way to examine some of the central discourses highlighted by the CCA literature.

2.1.1. CCA as an issue of development

The IPCC and the UNFCCC have increasingly acknowledged the ties between CCA and development, as well as the imminence of addressing climate-related risks. In 1990, the IPCC 1st AR asserted that CCA is more pertinent for developing countries since they have the most vulnerable populations, i.e. lower-income groups exposed to natural hazards (IPCC, 1990). At the same time, the report considered that developing countries should advance actions in terms of mitigation as its emissions were expected to increase with economic and population growth. The report was careful though in pointing out that mitigation or limitation activities should be done in such a way not to hinder the economic growth of the developing world. In 2001, the 7th Conference of the Parties (COP) in Morocco officially recognised the dilemmas of developing countries in terms of adaptation to climate change. In Morocco, vulnerability was recognised as a socially constructed issue entailing institutional and economic dynamics, such as the availability and access to resources (see Adger, Huq, Brown, Conway, & Hulme, 2003). Finally, as mentioned in Chapter One, the Paris Agreement of 2015 included CCA goals alongside mitigation goals in the parties' commitments to the UNFCCC, and the 2018 IPCC Special Report urged for more immediate and aggressive action.

Despite the urgency, Sanchez-Rodríguez (2009) concludes that governments and other stakeholders should resist the urge to develop fragmented responses. Instead, governments should consider adaptation as a development process aimed at creating a  

3 All the countries that are party to the UNFCCC send delegations to the Conference of the Parties (COP) to negotiate and reach agreements regarding GHGs quotas and the financing of adaptation in low- and middle-income countries (https://unfccc.int/process/bodies/supreme-bodies/conference-of-the-parties-cop).
framework for action that evolves and improves over time. Otherwise, adaptation can produce standalone actions instead of recognizing that socio-economic development policies are vital to developing adaptive capacities (Ayers & Dodman, 2010; Burton, Huq, Lim, Pilifosova, & Schipper, 2002). Adaptation needs the attention of all sectors since there are palpable linkages between CCA and other areas of development. For example, housing and infrastructure policies that provide better-quality housing, as well as water and sanitation, are essential for adaptation. Also, health policies can target environmental health hazards, thus reducing many of the risks that climate change might bring (Satterthwaite et al., 2007).

Schipper, Tanner, Dube, Adams, and Huq (2020) adhere themselves to the body of research that considers adaptation and development to be intrinsically linked (see Adger et al., 2003; Handmer, 2003; Kates, 2000; Watson & Ackermann, 2000; Yamin, Rahman, & Huq, 2005). The authors are cautious though, asserting that a pathway for adaptation through development should not ignore that development itself needs to be rethought, to account for equity, justice and principles of sustainability.

The role of development then is to make sure that it addresses the underlying causes of vulnerability instead of the pursuit of specific adaptation strategies. The latter would divert the attention of social drivers to an over-emphasis on the physical impacts of climate change (Schipper 2007). A separate policy for a CCA agenda then might prove ineffective in comparison to modifying existing development policies to address vulnerability and to revisit problems of environment and sustainable development (Schipper, 2007). Schipper (2007) also observes that there is a lack of cohesion between adaptation science and policy. She argues that scholarly work continues to focus on definitions, and the policy discourse is at pains to interpret such definitions. Schipper claims that despite efforts to bridge the gap, the adaptation discourse in practice is separate from related development frameworks that respond to risk.

Notwithstanding the opportunities of framing CCA as an issue of development, there is the risk of mainstream development approaches co-opting adaptation to prioritize economic growth over cultural, social and a more equitable economic development (Pelling, 2011). Understanding the conflicts between different development approaches can help in identifying opportunities for transforming them as well as governance structures and the development of coping strategies (Manuel-Navarrete & Pelling, 2015).
Policy-oriented research maintains that adaptation is better attained whenever is rooted in existing poverty reduction measures, as well as disaster risk reduction and food security (David Dodman, Bicknell, & Satterthwaite, 2012; Measham et al., 2011; Moser & Luers, 2008). Adaptation efforts in developing contexts need to ponder non-climatic along with climatic benefits for the agenda to be supported (Dovers, 2009). Sanchez-Rodriguez (2009) frames adaptation as a development process that improves and evolves. Adaptation as an opportunity for development functions as a process that serves to align existing approaches towards vulnerability reduction and that goes beyond climatic hazards and scenarios.

Although seemingly exclusive to developing contexts, adaptation is also taking place in developed countries, where stakeholders focus on climate-sensitive sectors instead of vulnerability reduction. However, as well as in developing countries, actions have been somewhat limited (Nightingale, 2017).

In their study of the relationship between adaptation and development, Sherman et al. (2016) conclude that most scholarly work opposes standalone adaptation and instead, argue for adaptation planning to take place alongside development. For this to happen, Lövbrand (2011) claims that social science research should not focus solely on bridging the gap between knowledge and action, but research should open up political and conceptual spaces for diverse framings of global environmental change such as adaptation. Such multiplicity of frames could stimulate more promising and innovative solutions to wicked problems such as adaptation (Lövbrand et al., 2015).

Efforts derived from framing CCA as an opportunity differ from those seeing it as a response to the threat of climate change. As the response to an imminent threat, the urgency for action might drive inadequate responses that serve neither adaptation nor development. As an opportunity, CCA is less a standalone policy agenda and more the chance to align development approaches towards a focus on vulnerability reduction that goes beyond climatic hazards.

2.1.2. CCA as a function of vulnerability reduction

A body of research has framed CCA as a function of vulnerability reduction. There can only be adaptation once vulnerability is reduced (Edmonds, Lovell, & Lovell, 2020;
Hardoy & Pandiella, 2007; Hardoy & Romero-Lankao, 2011; Kelly & Adger, 2000; Lampis & Fraser, 2012; Noble et al., 2014; Pelling, 2011; Schipper, 2007; Scoville-Simonds et al., 2020; Williams, Márñez Costa, Sutherland, Celliers, & Scheffran, 2019). These authors prioritise the vulnerability of populations in developing countries rather than biophysical systems or infrastructures. Drawing on natural hazards literature, Kelly and Adger (2000, p. 325) define social vulnerability as "the capacity of individuals and social groups to respond to, that is, to cope with, recover from or adapt to, any external stress placed on their livelihoods and well-being". The authors contend that reducing social vulnerability can be attained via a focus on poverty reduction, risk spreading, securing property rights and collective security. These measures are adequate in order to adapt as they shift the attention from the physical effects of climate change, where research has commonly focused on, to the effects on the populations that are socially vulnerable (Kelly & Adger, 2000).

The underlying causes of vulnerability or 'social vulnerability' have been explored mostly through an emphasis on poverty reduction, but there is less research for understanding vulnerability in terms of gender, age, ethnicity, health and class (Ford et al., 2011; Noble et al., 2014; Owusu, Nursey-Bray, & Rudd, 2019). However, poverty and persistent inequality may be the most relevant issues that reproduce vulnerabilities (Filho et al., 2019; Noble et al., 2014).

From the 1990s, disaster studies have transformed the concepts of vulnerability and risk from physical deterministic notions to the recognition of the social construction of risk, conditioned by societal decision-making, demands, needs, perceptions, priorities and practices (Alcántara-Ayala, 2019). The adaptation scholarship has built upon this notion. Pelling (2011) maintains that the underlying causes of vulnerability are social, political and economic, and Hardoy and Romero-Lankao (2011) remind us that unless we address such causes, adaptation policy and options cannot reduce vulnerability. When CCA plans and actions focus on increasing the robustness of infrastructures, the protective functions of ecosystems, market solutions and increasing awareness, they fail to develop a sustainable approach as they overlook the fundamental roots of vulnerability (Bulkeley, 2013).

On the other hand, Lampis and Fraser (2012) point out that vulnerability is not only a social matter. They contend that CCA must consider both biophysical and social
vulnerability. They define vulnerability at the municipal level as the result of unequal development or unequal access to goods and services.

Vulnerability assessments emerged as a way to identify the potential impacts of climate change, and other non-climatic factors, related to all kinds of natural and social systems (McCarthy, Crandall, Whitelaw, General, & Tsuji, 2011). The drivers for these assessments have not been exclusive to adaptation options, as they have also considered targets for mitigation (Füssel & Klein, 2006).

Research on vulnerability assessment has evolved from considering the potential multiple effects on a particular system to recommend policy options for minimizing these risks (Füssel & Klein, 2006). Defining what or whose vulnerability is to assess seems to be contingent on what, where, or whom we place value and the dimension of risk that is acceptable. For example, economic approaches to vulnerability assessments can bias against the adaptation of the poor, vulnerable populations and ecosystems since they would not typically assign a market value to communities' social issues or aesthetic values (Chambwera et al., 2014). These authors do not discard, however, that a broader economic approach could attach a monetary value to non-market impacts.

O'Brien, Eriksen, Nygaard, and Schjulden (2007) point out that some scholars see vulnerability as an outcome of climate change. For Eriksen et al. (2015) this approach delinks adaptation from the drivers of vulnerability, and it equates to detaching adaptation approaches from the political-economic processes (e.g., carbon emissions) that produce climate change. This separation risks compliance with, rather than the challenging of "a future determined by a high-emitting minority" (Eriksen et al., 2015, p. 526).

Although social vulnerability is also linked to dimensions of gender, ethnicity, age, health and class, CCA as a function of vulnerability reduction has focused mainly on the reduction of poverty as an effective measure to build resilience and to adapt to climate change.

### 2.1.3. CCA as a pro-poor and urban endeavour

Developing countries house a high proportion of those most at risk from climate change: the urban poor (Moser & Satterthwaite, 2008; Rosenzweig et al., 2015; Satterthwaite,
The urban growth phenomena in the Global South combined with the vulnerability to the impacts of climate change of informal urban dwellers heavily supports adaptation policy and practice as urban and pro-poor at the same time. By 2050, the less developed regions will account for 82% of the world urban population and 86% of the total world population (United Nations, Department of Economic and Social Affairs, 2015). Urban informal settlements in low- and middle-income countries house more than a fifth of the world's urban population. Therefore, urban areas are increasingly regarded as strategic spaces for climate change action (Castán Broto, 2017) and they are now the foci of adaptation literature as well as development and upgrading actions which are likely to build resilience to climate change even if unintended (Satterthwaite et al., 2020). Furthermore, because of the COVID-19 pandemic, "an estimated 71 million people are expected to be pushed back into extreme poverty in 2020, the first rise in global poverty since 1998" (United Nations Department of Economic and Social Affairs, 2020, p. 7).

Kates (2000) proposes that rather than adaptation for developing countries the focus should be on enabling adaptation for people living in conditions of poverty, "since in the interest of 'development' the poor may grow poorer" (Kates, 2000, p. 16). Kates' observation is very pertinent to the claim of low-income and middle-income countries as the most exposed or the most vulnerable to climate change.

An analysis of several case studies shows that the vulnerability of the urban poor is aggravated by the lack of a more democratic and inclusive urban governance (Lampis & Fraser, 2012). There are few, if none at all, accountability mechanisms for urban low-income dwellers in regards to local governments (Moser & Satterthwaite, 2008). At the same time, local authorities have historically seen the informal dweller as the problem rather than part of the solution and as crucial members of the urban economy (Satterthwaite et al., 2020).

Hence, increasing the capacity of the urban poor to adapt to climate change is essential to prompt development forward. However, we must recognise the differentials in vulnerability and risk amongst the population within developing cities. For Rosenzweig et al. (2015), these differences manifest across four factors: differing levels of physical exposure, access to critical infrastructure and urban services, social characteristics that influence the allocation of resources for adaptation and access to power, institutions and
In their study of two urban sites—Mombasa, Kenya and Estelí, Nicaragua—, Moser, Stein, Norton, and Georgieva (2010) found that the most significant asset of the urban poor was housing. Under conditions of weak tenure rights and asset damage limitation such as placing sandbags in the doorways of houses during floods, housing highlights a critical dimension of the vulnerability of the urban poor. Their exposure to the impacts of climate change is compounded by the fact that they usually live in the most hazardous areas of the city (Stein & Moser, 2014). Stein and Moser add, that since planners are mostly uninformed about the impacts of climate change at the household level, it is necessary for bottom-up community asset planning to be incorporated into mainstream city planning.

According to Satterthwaite et al. (2007), the vulnerability to climate change of low-income urban populations in developing countries is more the result of failures of the local governments than poverty itself. These failures are also tied to shortcomings at the national and international levels with most international agencies avoiding investing in urban initiatives. Local governments have 'more pressing' issues such as education, infrastructure, healthcare and security, and engaging with CCA does not seem the right thing to do unless it is promoting the achievement of these other development goals (Markanday, Galarraga, & Markandya, 2019; Satterthwaite et al., 2007). Municipalities in the Global South are more interested in attracting new investments, and they often lack technical and financial resources or decision-making power to tackle the risks posed by climate change (Hardoy & Romero-Lankao, 2011; Rosenzweig et al., 2015).

In the case of Latin America, with 81% of its population living in cities, urbanization trends have rendered a high number of informal settlements located in risk-prone areas, such as flood plains and mountain slopes, that can be potentially affected by climate change impacts (Duque, Lozano-Gracia, Patino, Restrepo, & Velasquez, 2019). Many of these residents lack formal tenure and are often pushed to build their houses with unsuitable materials, which increases their level of risk. Furthermore, local governments lack resources to tackle these urbanizations trends, and they often hinder citizen participation (Hardoy & Pandiella, 2009; Williams et al., 2019).
2.1.4. CCA as subordinate, complimentary, or as a policy alternative to mitigation

Parallel with increasing vulnerability for informal urban dwellers, urbanisation trends have also boosted emissions as the result of more people living and working in cities, demanding industrial services, waste, water and other services (Seto, Güneralp, & Hutyra, 2012).

As a result, cities now account for 70% of global CO2 emissions (Sharifi, 2020). Historically, mitigation actions have had more leverage than adaptation for urban authorities because mitigation addresses 'more imminent' local needs and international policy guidelines and commitments for reducing global GHGs emissions (see Bulkeley, 2010, 2013; Füssel & Klein, 2006; Hardoy & Romero-Lankao, 2011; Lampis & Fraser, 2012; Noble et al., 2014; Pielke, 2005; Roberts, 2010; Schipper, 2007). The ultimate goal of the UNFCCC is "to stabilize greenhouse gas concentrations in the atmosphere at a level that will prevent dangerous human interference with the climate system, in a time frame which allows ecosystems to adapt naturally and enables sustainable development." (UNFCCC, 2020, p. 1). In Colombia, before La Niña 2020–11, the emphasis on mitigation despite the dismal contribution of the country to global GHG emissions (less than 0.5%) illustrates "the inclination of scientific and political actors towards international diplomacy and positioning" (Lampis & Fraser, 2012, p. 30).

The distant and uncertain nature of climate change impacts, in comparison to other types of disaster risk, equates CCA to allocating resources for a threat 'not yet imminent'. The result is a lack of political will for adaptation compared to mitigation. Also, mitigation can show leadership and innovation while adaptation measures such as maintenance of drainage systems may not be as headline-worthy (Bulkeley, 2013). Political will in favour of mitigation is also associated with the fact that GHG reductions are easy to measure compared to the effectiveness of adaptation actions (Noble et al., 2014). Precise measurements are more likely to ensure additional international development aid that is exclusive for climate change purposes (Füssel & Klein, 2006). In the policy arena, co-benefits in mitigation are sought for policy agendas on climate change concerns while adaptation seems to emerge itself as a co-benefit of other policies (Bulkeley, 2013).

Still, perhaps one of the main reasons for adaptation to lag behind mitigation is the fact that development specialists, NGOs and governments have been at pains to precisely
define what constitutes adaptation in local terms, how to track implementation and how to distinguish it from sustainable development (Noble et al., 2014). Nevertheless, rather than a constraint, this can offer an opportunity to reframe CCA in several ways that promote a balance between adaptation and mitigation efforts, and that can push development forward.

Both the IPCC and the UNFCCC have gradually given more significant space to adaptation research, policy and finance, and its integration with mitigation. Under the discourses of 'low-carbon and climate-resilient development' and 'climate compatible development', the UNFCCC seeks to move beyond the traditional separation of adaptation, mitigation and development strategies (Mitchell & Maxwell, 2010). These discourses ask for policy-makers "to consider 'triple win' strategies that result in low emissions, build resilience and promote development simultaneously" (Mitchell & Maxwell, 2010, p. 1). In Durban, South Africa, adaptation has priority over mitigation as adaptation actions present co-benefits with poverty reduction, which is already at the top of the local government's main concerns for urban development (Roberts, 2010).

Overall, since the 1990s, there has been a striking increase of city governments and other stakeholders involved in reducing GHGs, and progressively on implementing adaptation (Bulkeley, 2010). Although research, in general, has focused on how governments are addressing mitigation (Betsill & Bulkeley, 2007), there is growing work on adaptation, particularly at the urban level (Bulkeley, Edwards, & Fuller, 2014; Castán Broto & Bulkeley, 2013). According to Bassett and Fogelman (2013), the increase in adaptation literature responds to two issues. First, the IPCC's recognition, mainly from the Third Assessment Report in 2001—the same year that the UNFCCC established the Adaptation Fund4 —, that the impacts of climate change are already happening. And second, the political failure of mitigation efforts such as the Kyoto Protocol. As a consequence of the latter, Schipper (2009) argues that adaptation has become a more feasible option for advancing climate change policy.

From the first Assessment Report in 1990, the IPCC concluded that mitigation (also referred to as limitation) and adaptation should be considered as an integrated package to

4 The Adaptation Fund finances projects and programmes to help developing countries adapt to the negative effects of climate change (http://www.adaptation-fund.org).
address climate change. The most recent IPCC AR adds that adaptation and mitigation are complementary, and that reduction in emissions can reduce climate risks and increase the prospects for effective adaptation (IPCC, 2014). It should not be a matter of choosing one of the other (Burton, 1994) as climate policy will necessarily require a combination of both (Pielke, 2005). Mitigation and adaptation can also be mutually reinforcing or work against each other. An example of the former is the planting of trees to provide shade in warming regions. As for the latter, adaptation can take place through increasing air conditioning powered by fossil fuels to cope with rising temperatures (Füssel, 2007).

Currently, although both mitigation and adaptation are adopted by urban governments to address the impacts of climate change, there is still a lack of understanding of the co-benefits and synergies between them, particularly in the Global South (Sharifi, 2020). For Sharifi (2020), there is also a mismatch between rhetoric and reality. Despite the growing knowledge on the co-benefits of mitigation and adaptation, and the discourses of 'climate-compatible development' and 'low-carbon climate-resilient development', urban governments tend to prioritize only one of them or to address them separately. Given the urbanization trends within developing countries, there is an imminent need for further research on adaptation-mitigation interactions (Sharifi, 2020).

### 2.1.5. CCA as an issue of urban governance

"Rather than a crisis of the environment or failure of the market, climate change may prove ultimately to be a crisis of governance" (Hulme, 2009, p. 310). Hulme's assertion comes from his analysis of the different ways that the changing nature of the climate, the largest of our commons, is framed from a wide array of perspectives: as a threat to the environment, security, economy or social justice among others. He argues that this fundamentally affects policy development, the stakeholders involved and how climate is governed (Hulme, 2009).

According to Bulkeley (2010), urban governance for climate change emerged as another governance experiment resulting from dissatisfaction with the progress at the international level. Urban climate governance takes place into a broader framework of multi-level governance, and as such, it formed by an array of public and private actors operating at different scales and through multiple networks. It is shaping what it means
to act in response to climate change and what it means to have the authority to govern (Bulkeley, 2010).

Multi-level climate governance has emerged through a range of transnational municipal climate change networks such as the Cities for Climate Protection Campaign and the C40 Climate Leadership Group, among others (Bulkeley & Castán Broto, 2013; Davidson, Coenen, Acuto, & Gleeson, 2019). National city-to-city partnerships are also emerging as a way to access resources and capacities that smaller urban settings do not have on their own (Westman & Castán-Broto, 2018). The ethos of most of these networks, though, is helping cities to improve mitigation agendas. There is much less effort for developing networks addressing CCA but generally, despite advances in urban climate governance, for most cities, climate change is not yet a significant issue and thus remains 'ungoverned' (Bulkeley, 2013).

Additionally, the fact that governance for CCA is highly context-sensitive makes a 'one-size fits all' network approach inappropriate (Williams et al., 2020). For Castán-Broto (2017), the institutionalisation of urban climate change governance reflects contextual conditions such as the city's history, the way social and material relationships have been produced and the trajectories that shape people's lives. Other restrictions for CCA governance is centralized decision-making power (Ampaire et al., 2017), and that urban governance is still seen as a complement rather than a strategy to govern climate change (Castán Broto, 2017).

The cross-cutting nature of climate change can also cause problems for urban governance as there might be a lack of fit between the problem to be governed and the governing bodies (Betsill & Bulkeley, 2006). It denotes inter-institutional and inter-sectoral challenges to manage it. In the same city, there can be a wide array of government bodies and authorities that deal with adaptation planning. Without concerted planning, this can result in either inaction or the overlapping of efforts and resources (Lampis & Fraser, 2012).

The challenge then, for CCA as an urban governance issue, is still dependent upon the overall framing given to climate change as an urban concern. There are potential entry points when effective governance mechanisms are already in place. Such is the case of Manizales in Colombia that is incorporating CCA building upon its existing local environmental policy, 'Biomanizales'. The city enables this through multi-level
governance for integrating CCA alongside disaster risk reduction, land use and territorial planning within a holistic view of development that includes multiple stakeholders (Hardoy & Velasquez-Barrero, 2014).

In a similar manner to Manizales, Ilo in Peru shows successful urban initiatives to address CCA that have started as pro-development and pro-poor actions. By taking advantage of existing successful urban governance schemes, these initiatives have proven to bring adaptation benefits not initially sought for (Hardoy & Romero-Lankao, 2011).

Bulkeley and Castán-Broto (2013) argue that adaptation is taking place through experiments instead of through conventional forms of policy and practice. They define experiments as interventions in urban socio-ecological systems tailored to respond to mitigation and adaptation needs and that are critical to accomplishing governance. These experiments involve several actors from public authorities, the civil society and grassroots initiatives, all advancing different claims and values.

Climate policies should take into consideration the differences within the city concerning where the responsibilities and opportunities for action and decision-making lie (Bulkeley, 2013). This differential nature can be qualified as an issue of social justice where adaptation is fundamentally seen as an ethical issue (Hartzell-Nichols, 2011) as it concerns the distribution of costs and benefits of prevention, compensation and participation in decision-making (Grasso, 2010). An adequate urban response to climate change is not only about reducing vulnerability and GHGs, "but it is also fundamentally about recognizing the difference and marshalling this towards a collective response to the climate change challenge" (Bulkeley, 2013, p. 237).

Castán-Broto adds that urban governance is shaped by climate change approaches and, similarly, attempts to govern climate change in urban areas can alter the discourses informing the politics of climate change. The extent of the latter, according to the author, is yet to be clearly understood. Nonetheless, "the idea that a low-carbon, climate-resilient city should also be a just one may be the greatest contribution of urban governance debates to the politics of climate change" (Castán-Broto, 2017, p. 11).
2.1.6. CCA beyond the urban scale

According to Leck and Simon (2013), the impacts of climate change cannot be addressed at any single geographical scale or by one category of actor. The authors call for the need to rethink "what appropriate governance structures for climate governance in particular contexts might constitute" (Leck & Simon, 2013, p. 1235).

For Adger, Arnell, and Tompkins (2005), there are three major lessons from the literature on the cross-scale dynamics of CCA. These dynamics refer to different spatial (i.e., local to global) and societal (i.e., governance levels) scales. The first lesson is that these dynamics can add complexity to existing conflicts between private and public agents. Second, the choice of how to handle a particular environmental problem is more the reflection of the power of the actor who defines the problem. The 'appropriate' scale of action is not a random choice, but it is socially constructed. Third, cross-scalar adaptation adds complexity in ecological systems since different biological and ecosystem processes operate at different levels (Adger et al., 2005). Additionally, in terms of time scales, CCA competes heavily with more oppressing and urgent issues (A. Revi et al., 2014).

As the world—particularly the developing world—becomes increasingly urban, the literature on CCA has had a strong focus on cities and more recently, on the urban governance of climate change as an integrated approach for adaptation and mitigation policy and action. However, it is also necessary to highlight the interdependencies of cities with other administrative and geographical scales, interdependencies such as food sourcing for the city relying on regional or even international suppliers (Hunt & Watkiss, 2011). Climate change impacts on agricultural production or transport outside the city boundaries can affect the city's population and, likewise, direct impacts on cities can affect its surrounding region (Hunt & Watkiss, 2011). These kinds of interdependencies are of particular interest for this research as it focuses on the case of Capital Region (Bogotá–Cundinamarca).

Within geography and planning studies, the concept of city-region can be traced back to the early twentieth century, but more recently, it has become popularised in academic and policy circles (Rodríguez-Pose, 2008). The concept of city-region refers to nodes of human activity where the urban and its semi-urban and rural hinterland interact in terms of economic and social development (Rodríguez-Pose, 2008). In the case of Bogotá and Cundinamarca, 'city-region' has been used to refer to Bogotá's metropolitan area (i.e., the
city and its conurbations) (see Guzmán, Oviedo, & Rivera, 2017) as well as the region comprised by Bogotá and the state of Cundinamarca (see Hernández-Pinzón, 2012).

A search for the key phrases' climate change adaptation' and 'city-region' shows how some adaptation studies on metropolitan areas and city-regions in industrialized countries have explored the impacts of climate change and possible pathways for adaptation (see Kythreotis & Bristow, 2017; Stone, Hess, & Frumkin, 2010). These studies, however, do not delve into the interdependencies between the urban core and its surroundings. Similarly, some studies looking at CCA in city-regions or metropolitan areas within developing countries make a separate assessment of vulnerability to climate change of rural and urban areas within a city-region (see Roy & Sharma, 2015). Others highlight the importance of collaboration and participatory governance of the metropolitan area as a whole (see Barton, Krellenberg, & Harris, 2015).

Arguably, the vast and growing adaptation literature already discusses interdependencies between cities and their surroundings but is yet to address them in the context of the city-region.

2.1.7. CCA as intrinsically linked to disaster risk management

Disaster risk management (DRM) deals with the challenges that disasters entail for development efforts within developing countries. Likewise, CCA has become an imperative for risk reduction as climate change has modified the risk profile of nations across the world, and governments increasingly acknowledge it as a threat to development. This conjunction of DRM and CCA has called for their coordination in order to reduce disaster risk and promote development.

One of the first times the relatively novel notion for the integration of DRM and CCA took place was at the World Conference on Disaster Reduction held in Kobe, Hyogo, Japan in 2005 (Ireland, 2010). The main output of the conference was the Hyogo Framework for Action, adopted by 168 countries, which set the guidelines for nations to reduce disaster losses. The framework acknowledged disaster risk management as an entry point to deal with the threats posed by climate change (Prabhakar, Srinivasan, & Shaw, 2008). Although Colombia had adopted the Hyogo guidelines before, the need for integrating efforts arose from the disasters that followed la Niña 2010–11. In Colombia,
La Niña causes higher than average rainfall in the central Andes. This set of events evidenced the inextricable link between climate change and disaster risk in the country.

The Sendai Framework 2015-2030, the successor of the Hyogo Framework, suggests that disaster risk assessments need to include climate change scenarios. Also, it proposes that there should be collaboration across regional and global scales for the implementation of tools relevant to disaster risk reduction such as adaptation practices, and it calls for international treaties such as the UNFCCC to aid in its implementation (UNISDR, 2015).

The literature has suggested possible paths of integration, depending on the different standpoints of the experts and practitioners. First, that CCA should be integrated into DRR since the latter covers more ground and has an earlier background and well-established practices. The second suggests that DRR is the one to be embedded in CCA as disaster risk is but one of the many cross-cutting risks that can be associated with climate change. The third and more agreed upon is discussed in the IPCC SREX Report (2012), where both fields should integrate into development planning. The report considers a broader perspective, which is to target development goals through risk reduction and strengthening coping capacities.

Framed as an issue of development, CCA can be an opportunity to address existing development failures that are not necessarily related to the risks posed by climate change. Based on this understanding, novel thinking on CCA has further qualified adaptation as transformative.

**2.1.8. CCA as transformative**

As discussed in Chapter One (section 1.1), the most recent IPCC reports reflect the increasing literature on transformational adaptation because incremental adaptation might fail to keep up with the pace of climate change (Klein et al., 2014). 'Transformational' or 'transformative' adaptation highlights the non-linear change to systems in contrast to incremental adaptation, which seeks to work within the system or status-quo. This view understands systems as practices or development approaches that are drivers for risk and hence need to be transformed.

Dissatisfaction with the status quo can trigger transformation, and initiatives aimed to
trigger transformation are found in many low-income settlements (Revi et al., 2014). Community-based adaptation is one of the approaches to CCA driven by or from low-income settlements, but so far, it appears to lack the leverage to achieve transformation (Dodman & Mitlin, 2013). For transformation to happen, CBA needs the power to be transferred effectively to local communities through the interaction with different levels, from the state to international development agencies. It also needs innovative financing mechanisms to challenge the restrictions of current development assistance (Dodman & Mitlin, 2013).

For Pelling (2011), transformative adaptation must reform or replace existing social contracts—determined by the balance of power in society—to tackle the root causes of vulnerability and risk. Transformative adaptation goes beyond the local causes of vulnerability to considering broader social processes. This view changes the allocation of responsibilities and is more likely to touch those in power in the pursuit of change in political regimes and challenging the status quo.

Building on Pelling's (2011) work the resilience-transition-transformation framework for adaptation, Pelling et al. (2015) conclude that transformation as an adaptive response increases the chances of policy options to question issues of power and preference which have been poorly explored in adaptation theory and practice. Transformation pushes decision-makers to go beyond their concerns on the proximate causes or risk (e.g., dwelling quality, demographic characteristics) to its root causes (e.g., social, cultural and economic relationships, power hierarchies) (Pelling et al., 2015).

It is too early though to provide any evidence of this kind of transformation taking place. There is a need for more research on how to ensure equitable outcomes to provide decision-makers with the information necessary to plan and implement transformation as liberation (Roberts & Pelling, 2020).

2.1.9. CCA as the result of social learning and collective action

Social learning has been pointed out as a means for addressing situations that encompass uncertainty, complexity and the interdependency of multiple perspectives (Ison, Røling, & Watson, 2007; Reed et al., 2010; Steyaert & Jiggins, 2007). For Collins and Ison (2009), the term 'social learning' stems from the recognition that learning has moved
beyond individual education to learning that takes place through engagement with others (i.e., scientists engaged with policy/lay knowledge actors). Thus, social learning is necessary to achieve consensus between science and policy (Yohe, Burton, Huq, & Rosegrant, 2007). For other authors though, social learning for solving complex problems is nothing more than wishful thinking given the unequal power relations that will strive to impose some views and solutions over others (Van Bommel, Röling, Aarts, & Turnhout, 2009).

Other research highlights the relevance of participatory decision-making where there is a need for scientific understanding of policy problems with high levels of complexity and uncertainty (Funtowicz & Ravetz, 1993; Liberatore & Funtowicz, 2003). For Adger et al. (2009) social learning is the basis for CCA governance; given the diverse values coming from the diverse stakeholders involved in adaptation, social learning needs to take place in platforms where there is space for negotiating these different values.

Although social learning engages diverse stakeholders, Collins and Ison (2009) are cautious about social learning being set simplistically as a participatory agenda. They argue that participation in itself is not enough to address complexities or to realise consensus and hence propose adaptation as co-evolution. From this perspective, it is collective learning (understood as doing) rather than just participation that leads to adaptation. When Collins and Ison (2009) frame CCA as the result of social learning, they are not proposing it as an end product. Instead, they present adaptation as co-evolutionary, where there is a continuous process of reflexive awareness about what the future will bring.

Adaptation as co-evolution presents an epistemological challenge of the assumptions that are made for a predictable future because it promotes reflexive awareness on such assumptions. Social learning can emerge from this process of awareness as a policy choice for CCA (Collins & Ison, 2009). The role of social learning is complementary to existing policy mechanisms. Fixed forms of knowledge underline traditional policy mechanisms, and on the other hand, social learning shows how 'knowing' happens within the act and the process of constructing or addressing an issue which is not clearly understood. Such is the case with climate change and both response strategies: mitigation and adaptation.

Social learning, as a form of collective action, can be aligned with Adger's (2003)
approach to successful adaptation. Here, Adger frames adaptation in terms of social capital and the ability of societies to collaborate. Collaboration can enable bottom-up actions and thus change the scale of climate change actions from global to local. Top-down approaches to CCA tend to be scenario-driven or science-driven and are undertaken mainly by governments. Bottom-up approaches are needs-driven or socially driven, and they take place amongst the most vulnerable populations to climate change. Mimura et al. (2014) argue that a combination of the two approaches leads to better linkages between adaptation planning and implementation.

2.1.10. CCA as the result of co-production

The concept of co-production has become gradually prevalent in the adaptation literature. Researchers in sustainability, environmental governance, development and, more recently, climate sciences and climate change adaptation have incorporated the concept of co-production, which originates from the urban planning literature and science and technology studies (Wamsler, 2017). These scholars seem to be answering the call of Forsyth (2003), who favours the merging of political ecology with science and technology studies. Forsyth argues that new thinking in philosophy and the sociology of science can enable new understandings of the relationship between environmental science—social and natural—and politics.

The scholarly literature on CCA discusses knowledge co-production or joint knowledge production as a purposeful effort for the governing of CCA. This literature supports the interaction between scientists, policy-makers and community participants in order to reconcile the supply and demand for knowledge (Armitage, Berkes, Dale, Kocho-Schellenberg, & Patton, 2011; Lemos & Morehouse, 2005; J. Robinson & Tansey, 2006). In this sense, knowledge co-production can enable learning within governance settings. The success or failure of this process goes beyond the agency of the stakeholders involved. It has to do with the political will to engage in the issue of CCA or a specific knowledge need on behalf of the governing actors (Hegger & Dieperink, 2014).

Hegger and Dieperink (2014) identify seven success conditions for joint knowledge production in climate change adaptation projects: i) broadest possible actor coalition, ii) shared understanding of goals and problem definition, iii) recognition of differences in
actors' perspectives, iv) organised reflection on the division of tasks by participating actors, v) roles of researchers and their knowledge is clear, vi) presence of innovation in reward structures and vii) the presence of specific resources. Recognising that measuring knowledge production is a challenging task, Hegger and Dieperink's proxies for success focus on the process and less on the outcome. Hence, they recommend these success conditions to be used as a framework for ex-ante evaluation instead of ex-post summative evaluation (2014).

However, for Goldman, Turner, and Daly (2018) Hegger and Dieperink’s approach is too instrumental. Goldman et al. claim that this approach tends to ignore how knowledge, power and world-making practices reinforce each other and thus, isolate the co-production of knowledge as merely an epistemological concern. As instrumental, co-production can reinforce existing power dynamics such as extractive approaches that use local or lay knowledge to reinforce global climate governance schemes (Goldman et al., 2018).

Researchers also observe that co-production or joint knowledge production for adaptation can serve to bridge the gap between science and policy (Edelenbos, van Buuren, & van Schie, 2011; Hegger & Dieperink, 2014; Hegger et al., 2012; Pohl et al., 2010). Science and public policy have different epistemologies, time-frames, objectives, and they also differ in their criteria for judging the quality of knowledge (Hegger, van Zeijl-Rozema, & Dieperink, 2012). These differences pose a challenge for co-production, "but the need for socially robust knowledge for climate change adaptation makes the effort worthwhile" (Hegger et al., 2012, p. 62).

Revi et al. (2014) conclude that a framework for urban governance emerges from the challenges of climate change to multi-level risk governance, where stakeholders are involved in the co-production of knowledge, policy and action for adaptation, mitigation and development in urban systems. Actions are co-produced through the interaction across scales of knowledge producers, knowledge users and knowledge filters. In this way, knowledge co-production is essential to the urban governance of risk (Revi et al., 2014)

Co-production includes science-policy knowledge production but is different from public-private partnerships because it involves individual citizens in the governance of the climate. Public participation has the potential to build civic capacity in all contexts
but not before the institutional capacity to engage the private and third sectors is warranted (Sarzynski, 2015).

In their empirical study of a small municipality in South Africa, Ziervogel, Archer van Garderen, and Price (2016) found out that rather than reinforcing the science-policy interface, it is more appropriate to work on the knowledge-policy interface when adaptation planning requires an understanding of the local context as well as of global science. The co-production of multiple forms of knowledge is a pathway to scaling up adaptation in local government to build on its transformative potential (Ziervogel et al., 2016). The authors also talk about the co-production of knowledge and social processes, where both state and non-state actors are involved, as a way to ensure broader representation and support for adaptation policies.

Other authors see knowledge co-production aligned with social learning where knowledge co-production—between science and lay knowledge stakeholders—acts as a trigger for learning to truly grasp the complexity of the system that needs adapting (Olazabal et al., 2018).

Some other scholars discussing co-production in the context of climate change adaptation, draw from the idiom of co-production as framed in the field of Science and Technology Studies (STS). The idiom of co-production argues that the ways in which we know about the world are co-produced with the ways we choose to live in it. In other words, that science and society continuously co-produce each other (Jasanoff, 2004a). Although some scholars inform their approach for joint knowledge production with the idiom of co-production, they refer to a more direct and easily recognisable form of co-production, namely the dialogue between different forms of knowledge (Hegger & Dieperink, 2014; Hegger, Lamers, et al., 2012). These scholars argue that, as posed by STS, co-production mechanisms are often indirect and hard to discern.

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5 STS belongs to the wider field of the Sociology of Science, which uses co-production to describe one of the modes—or ways—that knowledge is formed. In the co-production mode, multidisciplinary teams are brought together for short periods of time to work on specific problems in the real world for knowledge production (applied research) in the knowledge society. From an STS perspective, co-production moves from extreme technological determinism and social constructivism, to a more systemic understanding of how technology and society ‘co-produce’ each other (Gibbons et al., 1994).
Similarly, the IPCC SREX Report (2012) cites insights from STS when talking about the co-production of knowledge between experts and other non-expert actors based on transdisciplinarity, but does not refer to the more complex intertwining of knowledge and politics as posed by the field of STS.

Alternatively, Miller (2004) uses the idiom of co-production as a lens to frame the IPCC as the result of the co-production of climate science and global political order. As a new institution, the IPCC offered a model of global politics in which experts and expert knowledge, as politically neutral agents, were given significant power to define problems of global policy. As mentioned in Chapter One (section 1.3), no matter its encapsulation in a scientific role, the history of the IPCC evidences that new constructions of science and politics on global scales are highly interdependent (Miller, 2004). The scientific construction of global environmental risks has helped underpin the legitimacy of claims about the need for new institutions of global political cooperation.

By representing the Earth's climate as a global concern, the IPCC paved the way of a new order of global climate governance. This scheme was further emphasized by the creation of the UNFCCC to enable global negotiations for the mitigation of GHGs. Later on, the UNFCCC also served as a site to negotiate the allocation of responsibilities and financial resources for adaptation to climate change, primarily in developing countries (Miller, 2004).

Grundmann (2007) builds on co-production theories—among others—to challenge the belief that climate change knowledge is objective and that it can be directly translated into political action. Grundman claims that there is a need for better accounts of the relationship between science and public policy in modern society. He proposes a framework of 'politics of knowledge' to interpret knowledge-based policy decisions and to examine the instrumental use of knowledge claims for political goals.

In her work on rethinking urban risk and adaptation in Bogotá, Fraser (2014) uses the framework of co-production as part of her conceptual framework to question how knowledge is constituted beyond the accounts of the urban risk literature. Fraser concludes that in Bogotá, knowledge about risk influences and is influenced by governmental practices that contribute to reconfiguring vulnerability and disasters.

Other research on adaptation builds upon the broader work of Jasanoff (2004a) and other
scholars in STS to examine the politics of knowledge production. Carmin and Dodman (2013) maintain that an emphasis on scientific assessments for adaptation planning is limited. The authors argue that such an emphasis assumes that scientific data guide decision-makers towards the best possible action. This assumption ignores that scientific assessments are the product of social and political processes which shape both the type of assessments conducted and their findings. Eriksen et al. (2015) observe that power struggles are multiscalar, and intertwined in the way different knowledges are used in adaptation. They propose that interrogating the politics of adaptation opens up pathways for a more fundamental change in system attributes (i.e., transformational adaptation).

In conclusion, there are two approaches to the concept of co-production in CCA literature. According to van Kerkhoff and Lebel (2015), on one side co-production is seen as an active, prescriptive, normative approach that refers to shared knowledge production between experts and users, research and society, to support global sustainability. On the other side, co-production highlights interactions embedded in social, cultural and political contexts where decision-making and knowledge-making are intrinsically connected across a range of socio-political scales.

Similarly, Goldman et al. (2018) talk about two different approaches to co-production. One instrumental, as discussed earlier and reflected in Hegger and Dieperink’s proxies for successful joint knowledge production, and one critical. A critical co-production that moves beyond epistemology and which recognises that knowledge-making is intrinsically tied to forms of world-making, with its material, structural, political, economic and social processes.

Other authors conclude that exercises of co-production for environmental governance and knowledge production often fail to achieve their goals because they are depoliticised, dominated by a discourse that uses rational and scientific arguments, and that ignores political differences between participants (Turnhout, Metze, Wyborn, Klenk, & Louder, 2020). Thus, Turnhout et al. argue for (re) politicising co-production by recognising unequal power relations so that non-elite participants can contest scientifically sanctioned rationalities, and allowing for exercises of co-production to achieve empowerment and societal transformation.
2.2. Adding to co-production

The adaptation scholarship discusses two apparently divergent forms of co-production. On the one hand, a type of knowledge co-production or joint knowledge production that brings together different epistemic communities to produce climate knowledge that is relevant for decision-making. This thesis refers to this type of co-production as 'purposeful'. On the other hand, and from a more critical stance, some scholars talk about a form of co-production that moves beyond epistemological concerns because as such, it risks becoming instrumental, an extractive approach towards lay knowledge that reinforces existing power dynamics. Thus, these scholars advocate for a form of co-production that recognises that knowledge-making is always entangled with forms of world-making. This thesis refers to the latter as 'inherent' co-production.

This research argues that the inherent co-production of knowledge and politics is always part of 'purposeful', 'instrumental' or 'prescriptive' types of co-production. Hence, these two types of co-production are distinguishable from each other but not separate because the decision to keep co-production as an exclusively epistemic exercise is a political act in itself. Therefore, this research argues that it is not possible to have depoliticised processes of co-production as argued by Turnhout et al. (2020) because even rational and scientific arguments that arguably ignore political differences have an embedded politics of knowledge production as concluded by Miller (2004) in the case of the IPCC.

This thesis aims to add to the growing adaptation literature that discusses both purposeful and inherent co-production. As purposeful, this research contextualises its empirical findings through the case of TACC Colombia Capital Region; a multi-stakeholder and interdisciplinary platform that set out to produce knowledge for decision-making towards an integrated approach for climate change adaptation and mitigation. On the other hand, this study puts forward inherent co-production as an analytical framework to understand the interactions between knowledge and politics—and its spatial manifestations—that took place in TACC Colombia Capital Region, and their implications for development planning and climate governance.

Climate change adaptation has stimulated a broad assortment of research in order to understand the challenges it poses and to develop responses that go beyond climatic stimuli to encompass the multiple social, political and economic dimensions of vulnerability, development planning and climate governance. Although there is ample
analysis in the CCA literature of the politics of adaptation, less is explored about the production of science and lay knowledge and its interdependencies with decision-making power for adaptation. The concept of co-production has tried to bridge this gap, but a systematised exploration of these interdependencies can broaden our understanding of co-production as the inherent dynamics between knowledge and politics for adaptation.

By looking at a case study of purposeful co-production for adaptation through the lens of inherent co-production, this research aims to contribute to the concept of co-production in the adaptation literature. Co-production as contextual and as an analytical framework can help to expand our understanding of how adaptation efforts are unfolding in developing countries and how this unfolding is revealing changes, as well as previous conditions, in approaches to development planning and governance at urban, regional and national scales.

### 2.3. Conclusions

This chapter argues that framings or frameworks are more encompassing than definitions. The same definition can produce different frameworks for action or inaction. Also, the frameworks described in this chapter are not standalone approaches. They combine or interact with each other, depending on the research context where they emerge. This literature review presents ten framings to explore how scholarship discusses adaptation research, planning and action.

As an issue of development, some scholars frame CCA both as an opportunity to reconsider current development approaches and as the response to the threats for sustainable development posed by climate change. Other authors look at CCA in terms of vulnerability reduction, with a focus on social vulnerability. Poverty, as the most pervasive issue of vulnerability, has promoted pro-poor approaches to CCA. An increasingly urbanised world has placed the focus of CCA on cities, either considering them as victims or as culprits of climate change. Other CCA literature increasingly perceives it as an issue of governance where action at different levels and scales is necessary to realise effective action. CCA measures as responses to climate change have lagged behind mitigation or reduction of GHGs emissions. International efforts and policies have focused on mitigation, influencing action at the local scale and framing
CCA as subordinate or complementary to mitigation, and as a policy alternative. The linkage with the field of disaster risk management has brought attention to CCA as an urgent policy agenda given the continuous increase of climate change-related disasters.

More recently, some literature has qualified CCA as transformative with the capacity to alter the status quo that reproduce vulnerabilities and pervasive cycles of risk. Lastly, an increasing body of work looks at co-production, joint knowledge production and social learning in the context of CCA as purposeful efforts to bring together different types of knowledge and a diverse array of actors to coordinate efforts for adaptation as a way to bridge the gap between science and policy. A smaller body of work looks at co-production as the inherent interdependencies between the knowledge and the politics of adaptation.

This research attempts to contribute to the adaptation literature by expanding on co-production both as purposeful and as inherent. The former, through the context of this research's empirical findings, the multi-stakeholder platform of TACC Colombia Capital Region. The latter, by placing inherent co-production within this work's analytical framework.
3. Analytical framework

The findings of the literature review reveal a preoccupation among scholars with the socio-political nature of adaptation. Some researchers discuss the need of comprehensive policies (i.e., poverty reduction, urban and multi-level governance, disaster risk management) that address the social, economic and political roots of vulnerability—including but not exclusive—to the impacts of climate change, and to recognise the intertwining of this vulnerability with other development and governance challenges. More recent research argues for the need to co-produce knowledge (i.e., bringing together different types of knowledge from the science and the policy realms as well as lay knowledge) for adaptation to be successful. Lastly, some scholars argue for a co-production that goes beyond epistemology. Rather than the co-production of different types of knowledge, they highlight the need to understand how these knowledges are intrinsically linked to issues of power and authority.

This thesis addresses the science/policy divide in broader terms, explicitly knowledge/politics. It acknowledges that non-scientific knowledge also plays a role within the power dynamics of knowledge production and that these power dynamics go beyond policymaking.

Building upon research from STS and political ecology, this chapter develops an analytical framework for inherent co-production (i.e., knowledge-making is always entangled with forms of world-making). Two analytical lenses form this framework: the idiom of co-production—derived from STS—and epistemic geographies, which addresses the concerns of place-based political ecology.

3.1. Linkages between STS and political ecology

The field of Science & Technology Studies (STS) is concerned with the investigation of knowledge societies, and with the place of science and technology in society. It has an array of disciplinary roots: history, philosophy, sociology, politics, law, economics and anthropology (Jasanoff, Markle, Peterson, & Pinch, 1995), and it has various subfields as well: the history of science, technology studies, sociology of scientific knowledge,
feminist and cultural studies of science and technology, science and law, and science policy studies (Jasanoff, 2004b).

According to Jasanoff (2004b), STS research is essential for the analysis of culture and social change, and the relationships between knowledge and social order. Among these relationships, the idea that social practices constitute knowledge. The idiom of co-production takes the idea further and claims that natural order (our ways of knowing the natural and the social world) and social order (our ways of dealing with the world) are always produced together. The concept of co-production reflects Foucauldian insights underpinning STS research: "the exercise of power perpetually creates knowledge and, conversely, knowledge constantly induces effects of power" (Foucault, 1980, p. 52)

STS also turns to Bruno Latour's work to assert that science and society are co-produced as much as nature and culture or nature and society. Latour (1993) challenges the nature-culture divide as a creation of Western ingenuity by which Western societies organise their existence—and indeed all their grasping of the world—into bounded worlds of nature and culture: "But Society, as we now know, is no less constructed than Nature, since it is the dual result of one single stabilisation process" (1993, p. 94). For Latour, there are no a priori demarcations of the world before the world is worked upon by human imagination and labour (Jasanoff, 2004a).

As a branch of human geography, political ecology studies the relationships between society and nature in contexts of power. Political ecology scholars also draw from Latour to reject the nature-culture divide (see Taylor 2014), and according to Bryant and Bailey (1997), these scholars share three fundamental assumptions: first, environmental costs and benefits are not equally distributed across society as they are influenced by political, social and economic differences; second, this unequal distribution reinforces inequalities as environmental change affects the political and economic status quo; and third, the unequal distribution of benefits and burdens and the reinforcing of inequalities result in altered power relations.

Foucault has influenced work towards a post-structuralist political ecology that goes beyond the idea of 'nature as socially constructed' to "include a consideration of the discourses and practices through which nature is historically produced and known" (Escobar, 1996, p. 325). Political ecologists have also dismantled ontological binaries such as nature/culture (Latour, 1993), human/non-human, subject/object, and fact/fiction
Political ecology challenges two of the mainstream assumptions supported by the UNFCCC. First, that biophysical hazards combined with marginalisation creates vulnerability to climate change. Second, the belief that the best way to adapt is through a variety of technical and institutional measures (Nightingale, 2017). While Nightingale claims these assumptions are not inherently wrong, they promote templates for action in developing countries that misread political realities. These templates start with vulnerability assessments to biophysical hazards to identify who/what is most at risk. They follow with technical measures and the creation of new bodies for the coordination of national and regional efforts (Nightingale, 2017).

Instead, political ecology shows that biophysical change is mediated through social and political mechanisms (see Forsyth, 2014; Swyngedouw, 2010; Taylor, 2014). Therefore, there is a need to focus on how people gain access to and control over resources. As for institutional and technical measures, research within political ecology finds that their success relies less on their design principles and more on their inherent socio-political struggles (Nightingale, 2017).

Forsyth released his work "Critical political ecology. The politics of environmental science" (2003) to challenge existing beliefs about the separation of environmental science and politics (e.g., science inform politics in a linear, unidirectional way). In this book, Forsyth claims that there is an increasing need to understand the politics of environmental science, and thus calls for the merging of political ecology with science studies. Forsyth argues particularly for insights from the field of STS to integrate social and biophysical explanations of environmental problems.

Forsyth (2003) identifies two key aspects that illustrate the relationship between STS and political ecology. First, STS is concerned with the drawing of boundaries in social discourse to indicate domains of explanation or causality, boundaries such as nature/society, men/women and scientific/lay knowledge. Second, STS looks at the hybrid blending of facts and norms which may elucidate the institutional factors and biophysical processes that define environmental problems such as desertification or deforestation.

The incorporation of STS into debates about political ecology supports an analytical
approach that is biophysically grounded and, at the same time, mindful of social and political constructions. A conventional separation of facts and norms informs the belief that science produces facts, and that politics develops norms based on those facts (Forsyth, 2003). Alternative approaches see facts and norms as interdependent. Here, facts become meaningful only in the light of specific discourses and, in turn, facts identified as meaningful give rise to other associated discourses. Therefore, environmental discourses based on the historical facts and norms of one society might produce environmental knowledge in other societies for which it may not be as factual (Forsyth, 2003).

Forsyth (2003) concludes that environmental science and politics must be seen as co-produced. Politics are not just a response to scientific findings. Politics also play a vital role in the production, dissemination and legitimisation of environmental science.

Goldman et al. (2018) maintain that an STS perspective on co-production can gain a lot from political ecology's focus on place-based ecologies, historical approaches to relations of power, and emphasis on social justice. Likewise, political ecologists also have a lot to benefit from engaging with the co-production idiom, particularly for its place-based work which is connected to more extensive networks of political-economy, historical relations and ethical concerns. This critical approach to co-production is fundamental to challenge instrumental co-production (Chapter Two, section 2.1.10), as well as market-based approaches for the production of scientific knowledge for adaptation (Goldman et al., 2018).

Goldman et al. (2018) conclude that research linking STS and political ecology (see Adger, 2016; Jasanoff, 2010; Jasanoff & Martello, 2004; Lövbrand et al., 2015) has challenged a globalised representation of climate change and its impacts. This research has emphasised the various ways in which climate change has come to be known and experienced across scales and how these ways ought to inform decision-making for adaptation (Goldman et al., 2018). Some scholars have sought to integrate human geography and science studies and others, within critical social science, propose to be more engaged in climate change knowledge politics (see Demeritt, 2001; Hulme, 2008; Hulme & Mahony, 2010).

However, and despite its support of epistemological pluralism and the co-production of nature and society, there is scarce research within political ecology—save for Forsyth and
Levidow (2015) and Meek (2015)—explicitly engaged with the idiom of co-production (Goldman et al., 2018). Thus, Goldman et al. call for a critical political ecology informed by STS research to further advance literature in knowledge politics and the human dimensions of climate change.

### 3.2. Analytical lenses

STS and political ecology see nature and science/knowledge as permanently co-produced with politics and culture. This view does not imply that there is no 'external reality' or a biophysical world beyond human experience, nor that science is a by-product of social and political interests. Instead, research in both fields understands that science and our constructions of nature are not simple reflections of the truth but that political, economic and cultural dimensions influence their production and uptake.

The analytical framework of inherent co-production is informed by two analytical lenses that draw from research in STS and political ecology: the idiom of co-production and the notion of epistemic geographies. The idiom of co-production and its four co-productive pathways, as proposed by STS, serve to present a systematised understanding of the empirical findings of this research. The concept of epistemic geographies aligns itself with political ecology and its concerns with place-based ecologies, cross-scalar politics, and their materialisation in unique geographies. In this way, it serves to examine the spatial manifestations of the co-production of knowledge and politics.

#### 3.2.1. The idiom of co-production

From the perspective of political ecology as discussed in Chapter One (section 1.4.), Taylor (2014) maintains that there is an ontological division between nature and society at the very core of the adaptation agenda. This division is problematic because it disregards the fact that nature and society have historically co-produced each other whereby the construction of vulnerability to climate change started far before science and politics framed global warming as a new hazard for development.

This ontological division between nature and society underscores the idiom of co-production, as advanced and examined by Jasanoff and other STS scholars in "States of
knowledge: the co-production of science and social order" (2004a). For Jasanoff (2004a, p. 2), "the ways in which we know and represent the world (both nature and society) are inseparable from the ways we choose to live in it". Nature is 'ordered' through knowledge and technology, and the ordering of society happens through power and culture (Jasanoff, 2004a). Jasanoff argues that the production of order in nature and society must be discussed through an idiom that does not give primacy to either. Instead, there is parallelism or symmetry between the production of science and social order. In this way, the term co-production reflects a self-conscious desire to avoid both social and technoscientific determinism in STS' explanations of the world.

Rather than a theory, Jasanoff (2004b) advances co-production as an idiom or a framework, a way of interpreting and accounting for complex phenomena. It helps to explore how knowledge production is incorporated into practices of state-making or governance more broadly, and in reverse, how practices of governance influence the making and use of knowledge.

For this research, the idiom of co-production is instrumental for explaining how the international framing of climate change adaptation as a new mandate for sustainable development is the consequence of the increasing risk of climate-related disasters, mostly in developing countries, and of the increasing body of scientific knowledge that correlates this risk with accelerated global warming. At the same time, the adaptation responses of developing countries are calling for the production of new knowledge in order to understand how the progression of global warming is manifesting itself in local terms.

As an interpretative framework, co-production begs for illustration rather than proof (Jasanoff, 2004b). In Jasanoff's view, co-production occurs neither at random nor contingently but along specific pathways. In "States of knowledge: the co-production of science and social order" (2004a), Jasanoff and her colleagues (Thompson, Miller, Waterton & Wynne, Storey, Ezrah, among others) examine four pathways by which co-production most often occurs: the making of identities, the making of discourses, the making of institutions and the making of representations. Jasanoff (2004b) regards these pathways of co-production as instruments of co-production or as ordering instruments because they can serve varied functions in maintaining order. They aim to make the idiom of co-production more tractable to encourage conversation with other approaches to political and social enquiry.
**The making of identities.** The making of identities or the redefinition of new ones is a way of putting things back into familiar places when the world is in disarray. Identity is of particular interest to co-productionist accounts because, whether human or non-human, individual or collective, it is one of the most potent resources with which people restore sense out of disorder (Jasanoff, 2004b). By analysing the making of identities, we can discover how knowledge and its production play out in shaping and sustaining these social roles, and in giving them power and meaning.

In her accounts of the co-production of the African elephant and CITES (The Convention on International Trade in Endangered Species of Fauna and Flora), Thompson (2004) describes a transition in the status of the African elephant, from a universal species of charismatic megafauna endangered enough to need protection, to a regionally differentiated species needing absolute protection in some areas but susceptible to regulated practices in other locations. For this transition to occur, CITES also had to change. This co-production of an evolving African elephant, and an evolving treaty, reflected intense efforts by African conservationists and other stakeholders not just to intensify, but also to indigenise biodiversity conservation and its associated tourist economies in line with African regional and local perceptions about development, land use, wildlife, and local people (Thompson, 2004).

The identity of the expert makes a prominent appearance in processes of identity-making. 'Universal' scientific knowledge is subject to different interpretations in the design and management of national expert advisory systems (Brickmann, Jasanoff, & Ilgen, 1985; Jasanoff, 1986). As Miller (2004) illustrates in the case of the IPCC (Chapter Two, section 2.1.10.), what counts as good science in global contexts will depend on political institutions for support and legitimacy. This dynamic of co-production reinforces the observation that securing the credibility of policy-relevant science in global contexts may well result not only from seeking better science but also, and simultaneously, from constructing more morally authoritative institutions of global governance (Jasanoff, 1997).

**The making of discourses.** Solving problems of order frequently produces new languages or modifies old ones to find words for novel phenomena, give accounts of experiments, persuade sceptical audiences, link knowledge to practise or action, provide reassurance to various publics, and so forth. Such strategies often involve the appropriation of existing
discourses (legal, medical, ethical) to suit new needs (Jasanoff, 2004b).

The making of appropriate vocabulary and identity for the European Environmental Agency (EEA) in the pressured world of European environmental policymaking was one of the most challenging tasks this agency had to undertake at the time of its inception in 1993. The EEA's mission statement specified that "through the provision of timely, targeted, relevant and reliable information to policymaking agents and the public, the EEA aims to help achieve significant and measurable improvement in Europe's environment" (Waterton & Wynne, 2004, p. 94). Many of the adjectives describing the EEA's mission statement do not include the kind of universalistic, neutral image generally associated with scientific knowledge. Instead, an explicitly normative and even political vocabulary was incorporated. By using vocabularies of adequacy and relevance at the same time as talking about 'objective information', the EEA was creating an independent entity for itself, among pre-existing structures, institutions and beliefs.

Waterton and Wynne (2004) argue that discursive choices also form an essential element in most institutional efforts to create new structures of scientific authority. Both the European Environmental Agency and the IPCC had to develop compelling ways of speaking about the problems over which they exercised jurisdiction. Thompson's accounts on the substitution of a loosely managed, variably threatened African elephant for a globally threatened endangered species illustrates how institutional discourses may enable reasoned action by defining the boundary between the promising (natural or safe) and the fearsome (unnatural or unsafe) aspects of nature.

_The making of institutions._ Similar to identities and discourses acting like ordering instruments and stable depositories of knowledge and power, institutions offer ready-made instruments for putting things in their places at times of uncertainty and disorder. Institutions become vehicles through which the validity of new knowledge can be accredited and accepted rules of behaviour written. Successful institutions classify, confer identity, act as repositories of memory and forgetting, and make life-death decisions for society. Institutions such as legal systems and laboratories provide repertoires of problem-solving.

With the foundation of the Imperial Department of Agriculture of the West Indies in 1880, Britain institutionalised a new form of intervention and called it 'development' (Storey, 2004). Development entailed a new way of thinking about the Empire's social
responsibilities, quite different from the laissez-faire approach that preceded it. At the same time, it made British knowledge more readily available to the farmers in the West Indies colonies that were struggling with a sugar crisis to which the Empire itself contributed. Britain's free-trade policies had the islands' sugar cane produce competing with the European sugar beet industry that, different from the colonies, was supported by state subsidies and scientific research. Thus, the sugar crisis was simultaneously natural and political (Storey, 2004).

Institutions can also be understood as institutionalised ways of knowing that are reproduced in new contexts because it would be too disruptive to re-examine them openly. In market capitalism, the human subject's failure to behave as predicted is usually attributed to the market's failings and not to deficiencies in the underlying model of individual agency (Jasanoff, 2004b).

When environmental knowledge changes, new institutions emerge to provide the web of normative and social understandings within which accurate characterisations of nature (e.g., agricultural science and climate change) can be recognised and given political effect.

**The making of representations.** The fourth pathway of co-production proposed by Jasanoff is the making of representations. The nature of representation has been a core concern of STS to understand scientific knowledge in social terms (Jasanoff, 2004b). Three aspects of representation have begun to receive attention in from scholars working in the co-productionist idiom: historical, political and cultural influences on representational practices in science; models of human agency and behaviour that inform representation, especially in the human and biological sciences; and the uptake of scientific representations by other social actors (Jasanoff 2004b).

Ezrahi (2004) discusses representations as 'outformations'. From knowledge followed by information—knowledge stripped from its theoretical layers—, politics now has come to be mediated in most contemporary democracies by what he describes as outformations. For Ezrahi, outformations are the fabric of cheap, low-entry reality constructs, seem particularly compatible with politics, which is characteristically inclusive, high-speed and sustainable with minimal citizens' attention.

Looking at the extensive commercialisation of mass media, Ezrahi (2004) supports that
the supply and demand of low-cost, low entry threshold realities have become perhaps the most critical feature of our culture and politics. Representations, or production of political realities that are cheap for consumers, constitute a profound break with the Enlightenment vision of democratic politics or self-government by educated and knowledgeable citizens (Ezrahi, 2004).

In practical terms, representations refer to the means, both human and material, by which scientific representations are produced and made intelligible in diverse communities of practice (Jasanoff, 2004b). Knowledge becomes information (or representations) by stripping it of its scientific and technical language so it can be understood and contextualised in political decision-making settings.

3.2.2. Epistemic geographies

In their paper titled "Epistemic geographies of climate change: science, space and politics", Mahony and Hulme (2018) review how social sciences scholarship share the concerns of geographers with the spatialities of scientific knowledge on climate change. As a result of their review, Mahony and Hulme (2018) develop the notion of epistemic geographies, meaning: "the spatialities of the techno-scientific knowledges which underpin understandings of human-induced climate change" (p. 396). Drawing from Foucault's notion of the episteme as an apparatus for legitimising a truth claim (1980), and from Peter Hass' notion of epistemic community as a network of authoritative experts on a particular topic (1992), epistemic geographies examine the spatialities of the co-production of knowledge and social order (Mahony & Hulme, 2018).

Mahony and Hulme (2018) discuss three types of spaces for knowledge production and circulation: the field (e.g., the glacier, the Tarfala Valley in Swedish Lapland, the Amazon rainforest), the knowledge assessment (e.g., the IPCC) and the conference (e.g., the COPs). The authors argue that co-production—as proposed by STS—is significantly absent from geographical work on climate change. However, it has the potential to encourage reflection on the spatialities of knowledge and the role of science in the (re)making of common cultural, political and material worlds (Mahony & Hulme, 2018). Co-production then can bring attention to how social representations of the natural world attain stability and persuasive power through mutually sustaining interactions between
our sense of how things are and how they ought to be (Mahony & Hulme, 2018).

This research is mainly concerned with what Mahony and Hulme deem as the field, and with examining how specific ontologies (views of reality) for adaptation to climate change interact with local political projects, such as reforestation projects, the forced resettlement of farmers in Rwanda and 'best practice' adaptation in the Pacific Islands (Mahony & Hulme, 2018).

Political ecology scholars have engaged with STS research to examine the spatialisation of a specific ontology of adaptation and its enrolment in local politics. Looking at the case of a World Bank-led adaptation project in the Solomon Islands, Webber (2015) finds that there are risks in trying to mobilise knowledge and policies based on 'best practices' across different sites without accounting for a contextual examination of situated policy practices and outcomes. One critical risk is that this decontextualised mobilisation furthers expansionary tendencies such as those of the World Bank (Webber, 2015).

Research working towards an integrative approach of political ecology and environmental studies demonstrates how cultural constructs are the result of interactions among peoples and between people and their environments. These cultural constructs have become entrenched ideologies, and are part of a process of simultaneous social and spatial or biophysical change. Sluyter (2003) concludes that in the Veracruz lowlands in Mexico, the land use categories created by the Spanish colonisers became taken-for-granted measures of productive land use that continue to hinder effective development policy. In British-ruled Tanzania (then Tanganyika), Neumann (2003) shows how European ideals of Africa as a wilderness continent led to the creation of Serengeti, the first national park in Africa under colonial Britain. For Neumann, this was a project of nature production rather than nature preservation whereby the European ideals of a pristine empty landscape led to the eviction and relocation of thousands of Africans and "denying millennia of human agency in shaping the landscape" (Neumann, 2003, p. 240).

In the case of the Solomon Islands, Veracruz lowlands and British-ruled Tanzania, the notion of epistemic geographies highlights what Mahoney and Hulme (2018) describe as the uneven geographies of scientific authority, the spatial boundaries drawn between science and policy, and the contextualised co-production of epistemic and normative commitments. Thus, the goal of 'epistemic geographies' is to offer a new approach to the intersections of space, scientific knowledge and power to contribute to geography's
understandings of the politics of climate change (Mahony & Hulme, 2018).

For this research, the notion of epistemic geographies serves to identify and understand the spatial manifestation of the co-production of knowledge and politics in the context of climate change adaptation. This study argues that in Colombia and Capital Region, these spatial manifestations are defined by processes of territorial development, by political-administrative, jurisdictional and ecological narratives, and by efforts to integrate adaptation planning and governance between the city and its surroundings.

3.3. The analytical framework of inherent co-production

The shared space of STS and political ecology is rooted in two principles: the challenge of the nature/culture divide, and the recognition that our understandings of nature and the power at play in shaping and legitimising such understandings are always co-produced. These shared principles underpin the two analytical lenses (the idiom of co-production and the notion of epistemic geographies) of this study's analytical framework: inherent co-production (Figure 2).

Figure 2. The analytical framework of inherent co-production. Source: Author
Although the idiom of co-production and the notion of epistemic geographies focus on the role of scientific knowledge in processes of co-production, the findings of this thesis demonstrate that the framework of inherent co-production is also suited to examine bureaucratic (or administrative) and lay knowledge. This research's findings mostly account for the role of bureaucratic/technocratic knowledge in processes of co-production for climate change adaptation at national, regional and urban scales in the context of Colombia's Capital Region. These co-production processes—catalysed by the extensive disaster triggered by La Niña 2010–11—are manifest in approaches to development planning, climate governance, and the spatialities of adaptation planning and governance.

The idiom of co-production as proposed by Jasanoff (2004b) and supported by other STS scholars (e.g., Ezrahi, 2004; Miller, 2004; Storey, 2004; Waterton & Wynne, 2004) enables a systematised examination of this research' findings. Using the four pathways of co-production—the making of identities, discourses, identities and representations—as organising themes, Chapters Six and Seven examine the co-production of knowledge and politics for adaptation in building novel approaches or reinforcing existing ones, for development planning and climate governance.

In the context of Colombia's Capital Region, the making of identities helps to explore how current planning and governance stakeholders are reshaping their social roles in order to deal with climate change as a new threat to development, and also how expert identities are emerging to help in the production of relevant knowledge to inform decision-making. The making of discourses shows how different framings of adaptation respond not only to different knowledge backgrounds but also to the decision-making authority of the actors presently involved in developing the adaptation agenda. The making of institutions helps to understand the creation of new schemes of governance as well as new normative frameworks and new organisations that intend to tackle the planning and the governance of climate change adaptation. Finally, the making of representations supports understandings of the transitions from knowledge to information that occur during the production of policy documents informed by science. Climate change scenarios and vulnerability assessments presented in lay knowledge serve to aid processes of decision-making that are carried out by non-scientific actors.

The notion of epistemic geographies informs Chapter Eight, which reveals how the ordering of the territory or 'territorial development', has become the entry point for
incorporating adaptation planning and governance in Colombia. Some of the territories to be adapted are politically bounded such as cities, municipalities and regions. Nonetheless, additional territories are emerging as objects of adaptation that go beyond political boundaries. Schemes of association for regional integration and ecological infrastructures are also constituting what this research calls territories of adaptation.

Lastly, the framework of inherent co-production underscores one of the central premises of this research: that the local/contextual qualities of adaptation are not just biophysical and socio-economic, but also relate to how local actors learn about climate change, strive to govern it and develop spatial constructions for adaptation planning and action.

3.4. Conclusions

This chapter develops the framework of inherent co-production to address the scholarly concerns with the socio-political nature of adaptation discourse and practice. Two related analytical lenses form this framework: the idiom of co-production from STS research, and the notion of epistemic geographies from human geography and political ecology. Although mostly concerned with scientific knowledge, the findings of this research demonstrate how these two lenses also help to understand the role of bureaucratic/technocratic and lay knowledge in a co-productive framework of knowledge, power and space.

The purpose of the framework of inherent co-production is to enable a systematic analysis of the co-production of knowledge, politics and the spatialities of adaptation. In the context of Colombia's Capital Region, the making of identities, discourses, institutions and representations illustrates how decision-making and the legitimisation of knowledge for adaptation are reshaping, and sometimes reinforcing, approaches for development planning and climate governance at urban, regional and national scales.

This analytical framework also evidences how adaptation approaches are spatialised as 'territories of adaptation', whereby the territory becomes the entry point to deal with climate change impacts in Colombia.
4. Research methodology

This chapter outlines the methodological approach to answer the research questions guiding this research:

**How do interactions between knowledge and politics in the context of climate change adaptation influence the mainstreaming of adaptation efforts into development planning and governance in Colombia's Capital Region?**

1. How does scholarship across social sciences frame climate change adaptation, and its mainstreaming into development planning and governance?

2. How does the framework of inherent co-production help us to better understand the interactions of knowledge and politics—and their spatial manifestations—in the context of climate change adaptation?

3. What does the case of TACC Colombia in Capital Region reveal about the mainstreaming of adaptation into development planning and governance at national, regional and urban scales in Colombia?

4. How do multiscalar efforts for adaptation in Colombia manifest in spatial terms?

5. What does this analysis reveal, more broadly, about the intersections of knowledge and politics and the practice of development planning and governance for climate change adaptation?

Section 4.1. explains the ontological and epistemological perspectives underlying this research. Section 4.2. presents the research design and case selection. Section 4.3. discusses the methods of data elicitation and analysis and, to end this chapter, Section 4.4. discusses the challenges encountered during the research, some limitations and ethical concerns. Section 4.5 offers some concluding remarks.
4.1. Ontological and epistemological perspectives

This research is built upon an interpretive-constructionist view of reality (ontology) and the ways of knowing about it (epistemology), which is a common theoretical framework for most qualitative research in the social sciences (Tuli, 2010). From this perspective, the world is constructed, interpreted and experienced by people through interactions with each other and with broader societal systems (Maxwell, 2012).

Echoing the ontological and epistemological perspectives of STS and political ecology (Chapter Three, section 3.2.), this research views reality as mediated through social constructs whereby science, knowledge and our constructions of nature are not simple reflections of the truth but are influenced by political, economic and cultural dimensions. In the interpretive research paradigm, both reality and meaning-making are socially constructed, whereby people make their sense of social realities (Tuli, 2010). This shared understanding of reality and ways of knowing with research in STS and political ecology is the reason why arguments drawn from these two disciplinary approaches underline this research's analytical framework.

This interpretive-constructivist position also influences what this research understands as 'politics' and 'knowledge' (see Chapter One, section 1.2.). Politics is understood less like an arena than a process. As an arena, politics is confined to public administration, but as a process, politics reflects the idea that power is inscribed in all social processes such as the family and the schoolroom (Lowndes, Marsh, & Stoker, 2017). An interpretive view of politics sees politics as a process through which individuals and collectives go about governing everyday affairs (see Eriksen et al., 2015). On the other hand, 'knowledge' for this research is not limited to the output of scientific methods but is tied with different ontologies or visions of reality. This study acknowledges scientific, bureaucratic and lay stakeholders as all having a role, though mediated by power imbalances, in processes of knowledge production and decision-making.

Finally, the interpretive-constructivist perspective is aligned with this research's qualitative approach, with the assumption that meaning is embedded in the research participants' experiences, and that this meaning is mediated through this researcher's perceptions (see Merriam, 1998). Therefore, this research seeks to answer the central research question through a case study—TACC Colombia in Capital Region—and the narrated experiences of 75 of its direct participants and associated stakeholders, analysed...
in the light of what this researcher has developed and termed as the framework of inherent co-production.

This study was conducted in Colombia because, as a Colombian national, this researcher is concerned with how the country is striving to govern a changing climate when climate-related impacts are contributing to generate extensive disasters such as La Niña 2010-2011 (see Chapter One, section 1.5.). Later on, this chapter explains how and why this researcher had to change case studies during the fieldwork: from the South Pacific Node to TACC Colombia. For now, it is important to mention that while the former case encompasses the region were this researcher was born, raised and had contacts with, TACC Colombia operated in Bogotá. Although from Colombia, this researcher was aware but not particularly cognisant of how the central, regional and urban governments function in Bogotá. Born and raised in a different Colombian city, it was striking for this researcher to come close to the high level of centralisation, not only of the government but of knowledge production, economic and cultural activities. This likened Bogotá to 'a country within a country' and, at the same time, enriched the fieldwork experience by forcing this researcher to come out of her comfort zone to rapidly build a network of contacts within unexplored territory.

Additionally, the positionality of this researcher conducting a study in her home country from the context of a UK university, was somewhat challenged. Since the Bartlett Development Planning Unit has consistently worked towards the decolonisation of urban development research and practice, this enticed a self-assessment on studying Colombia from abroad. This self-assessment is still in the making, but two discernments have come afloat so far. A more pragmatic one, that prospective PhD students from developing countries are more likely to find grants overseas. Knowledge production takes a step back for governments in developing countries, where large portions of the population are yet to meet their basic needs. Despite this, a second and more introspective discernment, it was enlightening to witness the advanced level of research and practice in development planning that surfaced during the interviews with the research participants—from governmental and research institutions—who shared their experiences about TACC Colombia and La Niña 2010–11. This experience confirmed the DPU approach to research and practice, recognising a relationship of equivalence with partners in developing countries around the globe. Perhaps, this approach could not have been experienced unless this research was conducted from within the DPU.
Before the fieldwork, this researcher was sceptical of the work of Colombian government bodies and institutions. It is commonplace in Colombia to equate all government-related activities to partisan politics but, through the interviews, this researcher could see that there is more nuance to it. Many government staff are left in their positions despite changes in administration and their political affiliation, and some have amassed several years of experience dealing with the impacts of climate change even before these impacts were acknowledged as so. After witnessing this level of experience and the level of progression of the planning practice in Colombia, this researcher put stronger emphasis on the background of the interviewees and of the case study. The interviews revealed important antecedents in the tradition of development planning and environmental governance in Colombia (presented in the following section) that this researcher considered were key to analyse TACC Colombia through the lens of inherent co-production.

4.2. Research method and case selection

This research uses an explanatory case study method. According to Yin (2009), 'how' questions are likely to lead to explanatory case study methods because 'how' questions "deal with operational links needing to be traced over time, rather than mere frequencies or incidence" (p. 9). The temporal pattern, whether is the direct object of inquiry or if it is somewhat short, creates a continual flow of events that occur at different points in time, and that may be crucial to understanding the case (Yin, 2012).

Additionally, Yin (2009) argues that the case study method seeks an in-depth understanding of a real-life phenomenon. An in-depth inquiry may focus on individuals, organisations or other entities, and leads to a significant number of variables (Yin, 2012). For Yin, in-depth understanding incorporates contextual conditions because they are highly relevant to the phenomenon of study. Indeed, an essential strength of the case study is its ability to examine relevant contextual conditions thoroughly. Contextual issues such as cultural, economic, social and political data elucidate the blurriness of the boundaries between phenomenon and context that characterises real-world affairs (Yin, 2012).

Other authors highlight the case study as a manageable opportunity for a single researcher to achieve in-depth understanding of one aspect of a problem within a limited budget and
time-scale (see Bell, 2005; Blaxter, Hughes, & Tight, 2002). Arguably, this is the case for most doctoral students conducting individual research.

For Blaikie (2010), rather than a research design, case studies are a method for selecting the source of data. Blaikie agrees with Stake (2005) in that the case study is not a methodological choice but a choice of what is to be studied. Regardless of the methods—qualitative or quantitative—, what we choose to study and focus on is the case (Stake, 2005).

In order to answer the central research question and the five subsidiary questions, this study finds in the case of TACC Colombia in Capital Region a promising framework to find explanations for the knowledge/politics interface, and its influence in development planning and climate governance. The partners of TACC Colombia defined the initiative as "a platform for interinstitutional association that seeks to generate applied research and scientific knowledge for decision-making to deal with climate change, and to support the implementation of mitigation and adaptation measures advanced by the governmental institutions of Capital Region" (IDEAM et al., 2014a, p. 11).

The case of TACC Colombia was chosen once in the field, as an alternative to the case of the South Pacific Node as initially intended by this researcher. The South Pacific Node is one of nine nodes of action in which Colombia’s Ministry of Environment subdivided the Colombian territory in the follow-up of La Niña 2010–11. Under the leadership of the regional environmental authorities, the South Pacific node brought together representatives from local authorities, private sector, academia, NGOs and local communities to develop regional actions to mitigate and to adapt to climate change (the figure of the nodes will be discussed further in Chapter Six, section 6.1.1).

In March 2016, once in the field, it became clear that the activities of the South Pacific Node and of the other eight nodes were halted because they were in the middle of a reorganisation process following the decree that sanctioned the creation of The National Climate Change System (SISCLIMA) in February 2016. Therefore, this research’s data collection had to either be halted as well or change case studies. Given time constraints and the need to complete the fieldwork by July 2016, it was then imperative to change course.
The case of TACC Colombia was referred to by one of the first interviewees in the South Pacific region of Colombia, who provided detailed information including the contact details of the leader of the coordination team of the partnership of TACC Colombia from 2009 to 2010.

The choice of a climate change-focused project as a case study responds to the current challenges that developing countries face concerning climate governance. Limited financial resources also mean that climate science, deemed as essential for decision-making, is underfunded and understudied in developing countries (IPCC, 2014). However, TACC Colombia shows that despite the lack of sophisticated climate analysis, urban, regional and national authorities can also make decisions based on their knowledge and experiences within current governance arrangements, not just for environmental issues but for other sectors and territory-specific needs identified by the multiplicity of actors that are part of said governance arrangements.

Given that TACC Colombia and La Niña 2020–11 coincided in time, this research examines the impacts of La Niña as a critical contextual condition of the case study because these impacts acted as a catalyst to strengthen the partnership of TACC Colombia, whereby more resources and new actors joined the initiative.

Although TACC Colombia and La Niña took place between 2009 and 2014, the timeline proposed to analyse the case study goes further back 18 years and two years forward: from 1991 to 2016. In addition to La Niña 2010–11, other contextual events are necessary to understand the case of TACC Colombia in the light of the analytical lenses proposed. This timeline (Figure 3) starts in 1991 when a constituent assembly created a new constitution for Colombia, and it ends in 2016 with the fieldwork. The timeline includes three more landmarks besides TACC Colombia and La Niña 2010–11: 1993, when the institutionalisation of environmental governance in Colombia started, and when the Colombian government created various of the institutions that were later part of TACC Colombia in Capital Region; the year 2000, the beginning of Capital Region as an initiative for the coordination of regional planning and governance between Bogotá and Cundinamarca; and 2012 to 2015 when a new administration for Bogotá—Bogotá Humana (Bogotá Humane)—changed the course of TACC Colombia.
While TACC Colombia was a regional initiative focusing on the territory of Capital Region (Figure 4), it offers the opportunity to answer the research questions at national and at urban scales as well. The initiative took place in Bogotá, where the central government of Colombia, the regional government of Cundinamarca and Bogotá's Mayor Office are headquartered. The partners of TACC Colombia were representatives of governmental bodies at national, regional and urban scales. TACC Colombia was a pioneering initiative for the implementation of climate change concerns in development panning and governance in Colombia; thus, it was relevant for stakeholders at the three scales. As explained earlier, the nation-wide impacts of La Niña 2010–11 beckoned further interest and engagement. The government of Bogotá itself played a decisive leading role, among other things, because of its substantial financial and technical resources compared to Cundinamarca and indeed, to any other city or state in the country.

**4.3. Information elicitation, data analysis and research questions.**

In addition to conducting case study research over time, in-depth and in context, case studies rely on multiple sources of evidence that converge thus can be triangulated, and benefit from existing theoretical positions to guide the data collection and analysis (Yin, 2009).

Although this research used one method of data collection, it relied on multiple sources. The study conducted 75 in-depth interviews. According to the records of TACC Colombia (IDEAM et al., 2014a), there were a total of 243 stakeholders who participated...
in the project in different capacities: members of the coordinating team, members of the technical team, members of the leadership or decision-making team, members of consulting organisations from the public and private sectors, academia, interns and researchers. This study contacted and interviewed 59 of these stakeholders. The selection of interviewees started by identifying and contacting the leader of the coordination team of TACC Colombia. From then on, each interviewee was asked to provide details of other partners that worked alongside them during the project. The other 16 interviewees were referred by members of the former group when asked about actors who participated indirectly in TACC Colombia or who could expand on potential themes brought up during the interview. This latter group included academics, policy-makers and staff from different ministries and other governmental institutions involved with adaptation planning and governance in Capital Region and Colombia (see Appendix One for a list of all of the interviewees/research participants).

Figure 4. Capital Region (Bogotá–Cundinamarca). Source: Adapted from UNDP Colombia (2013).
As mentioned earlier, the fieldwork took place in 2016, two years after TACC Colombia ended. Hence, participant observation was not possible. Nonetheless, according to Blaikie (2010), the in-depth interview is a useful alternative to participant observation because it gets close to the meanings and interpretations of social actors and their descriptions of the social interactions in which they were involved.

This study collected the data between April and July 2016. All of the interviews took place in Bogotá, except for one that was conducted in a municipality of Cundinamarca. The majority of interviews were in-person except for five that took place via Skype because some participants were not in the city at the time, and others preferred it this way.

The in-depth interviews allowed the interviewees to relate their experiences before, during and after TACC Colombia and La Niña 2010–11. These interviews were open-ended and based on the participants' background, their reasons and motivations for participating in TACC Colombia or other adaptation projects, the inputs/knowledge they and their institutions contributed to these projects, their learning experiences from these projects and La Niña 2010–11, and the outcomes for policy and practice. Whenever something mentioned by a previous interviewee emerged, there were follow up questions to focus on that particular point. For example, the concepts of 'territory' and 'territorial development' appeared 377 and 178 times, respectively, in the transcript of the 75 interviews that totalled 235,000 words.

The interviews, their transcription and the analysis of the data were all conducted in Spanish. It made sense to use Spanish throughout as it facilitated the process, not only because Spanish is this researcher's native language but also because there were particular concepts characteristic of the jargon of research and practice for development planning in Colombia. One of such concepts is ordenamiento territorial, and for which this study uses 'territorial development' as the English translation. Other authors have translated it as 'territorial zoning' (Asher & Ojeda, 2009). 'land use plan planning' (Hardoy & Velasquez-Barrero, 2014) and 'territorial ordinance' (Piña & Martinez, 2013). This study chose 'territorial development', a translation by Ortiz (2012), because it best encapsulates the purpose of ordenamiento territorial when the new Constitution introduced it in 1991:

6 Not to be confused with the development plans of Colombian territories. Territorial development and its derived instruments are embedded in processes of development planning and governance at urban, regional and national scale in Colombia.
a policy and planning instrument designed to organise not just the physical space but the political administration of Colombian territories. The concept will be discussed further in the following chapter.

The average length of the in-depth interviews was one hour. They were all audio-recorded and transcribed in full (except for two participants who found the recording device intimidating), and the coding of the transcripts produced 54 themes. These themes were grouped following the four pathways of co-production (the making of institutions, identities, discourses and representations) and the notion of epistemic geographies. In this way, the analysis reveals the evolution, changes and emergence of institutions, identities, discourses and representations at national, regional and urban scales in Colombia. As a result of the ubiquity of the notion of territory, a fifth theme emerged which this research calls territories of adaptation.

This study contrasted the data from the interviews with plans, policies and other grey literature referenced by the research participants (see Table 2 for a list of these documents). The references made were explored further in these documents to expand on the interviewees' testimonies, as well as to look for particular details (i.e., dates, statistics, formal language used).

Before changing case studies from the South Pacific Node to TACC Colombia, this research intended to collect data through participant observation and focus groups in addition to in-depth interviews. Different from TACC Colombia, the South Pacific Node was supposed to be active at the time of the fieldwork, and it involved a wider range of stakeholders. However, as explained earlier in his chapter, their activities were halted at the time of the fieldwork and this researcher chose to focus on TACC Colombia.

The change of case studies also required rethinking the analytical framework. For the case of the South Pacific Node, this research intended to utilise Participatory Action Research (PAR) to evaluate processes of knowledge co-production. PAR seeks to democratise knowledge production by engaging actors otherwise neglected (Kindon, Pain & Kesby, 2008). This researcher saw fit to use this approach as the South Pacific Node involved community representatives in the processes of knowledge production, recognising that communities’ knowledge is vital to understand and to deal with the challenges that climate change poses for the territory.
Table 2. Grey literature referenced by the research participants

<table>
<thead>
<tr>
<th>Document</th>
<th>Responsible body and date</th>
</tr>
</thead>
<tbody>
<tr>
<td>National Climate Change Adaptation Plan</td>
<td>National Planning Department (2011-2016)</td>
</tr>
<tr>
<td>Pilot Project for Climate Change Adaptation in Colombia</td>
<td>National Institute of Hidrology, Meteorology and Environmental Studies (2011)</td>
</tr>
<tr>
<td>BOGOTÁ HUMANA Development Plan</td>
<td>Bogotá’s Secretary of Planning (2012)</td>
</tr>
<tr>
<td>BOGOTÁ HUMANA District Plan for Disaster Risk Management and Climate Change Adaptation</td>
<td>Bogotá's Secretary of Environment and Bogota's Institute for Risk Management and Climate Change (2012)</td>
</tr>
<tr>
<td>National Climate Change Policy</td>
<td>Ministry of Environment (2014-2016)</td>
</tr>
<tr>
<td>TACC Colombia Final Report: Regional Integrated Climate Change Plan for Capital Region</td>
<td>The Partnership of TACC Colombia (2014)</td>
</tr>
<tr>
<td>TACC Colombia Policy Brief: Territorial Approach to Climate Change</td>
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<tr>
<td>TACC Colombia Policy Brief: Evolution of El Niño and La Niña Phenomena in Bogotá–Cundinamarca</td>
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<td>TACC Colombia Policy Brief: Mainstreaming Hydroclimatic Risk Management into Territorial Development</td>
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<tr>
<td>TACC Colombia Policy Brief: Climate Change Mitigation in Capital Region</td>
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<td>TACC Colombia Policy Brief: The Vulnerability of Capital Region to the Impacts of Climate Change</td>
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<td>TACC Colombia Policy Brief: Climate Change in Capital Region and its Implications for Regional Development</td>
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<tr>
<td>TACC Colombia Policy Brief: Regional Strategy for Climate Change Mitigation and Adaptation for Bogotá and Cundinamarca</td>
<td></td>
</tr>
<tr>
<td>Third National Communication to the UNFCCC</td>
<td>National Institute of Hidrology, Meteorology and Environmental Studies (2017)</td>
</tr>
</tbody>
</table>

Source: Author

Once the decision to change case studies was made, PAR was discarded. This is because the partnership of TACC Colombia was formed exclusively by governmental organisations, and also because TACC Colombia had ended two years prior to the fieldwork. These two conditions prevented an action research approach. Later in this chapter, the section on limitations explains the reasoning behind TACC Colombia’s arrangement and the implications it had for this study.
Without a prior analytical framework, the in-depth interviews with the stakeholders who participated in TACC Colombia had an open-ended approach with the prospect that the analytical framework would reveal itself (inductive approach) during the process of data analysis. Mid-way through the fieldwork, in May 2016, a partial analysis of the data—through coding and indexing—incited a new dialogue with the literature review, particularly with the idiom of co-production proposed by Jasanoff (2004). The findings were showing that the framework of knowledge co-production by itself was limited. Jasanoff’s arguments on the co-production of science (or knowledge) and social order became evident in TACC Colombia because processes of knowledge production were clearly intertwined with politics in various forms: politics within technical teams for deciding knowledge outputs, partisan politics causing disruption in the process, the politics involved in the selection of partners itself, changes in direction or social roles of the partners and associated stakeholders, the emergence of a technocracy of adaptation, among others.

In accordance to this dialogue between the empirical findings and the literature reviewed, this thesis analyses and systematises the empirical findings using the four recurrent themes or pathways of co-production: the making of institutions, identities, discourses and representations. The pathways of co-production entail a process over time, throughout which knowledge and politics intermingle at different points in time. This is another reason way, the timeline used to look at the case study extends 18 years before and two years after TACC Colombia. The initial interviewees offered their accounts of events relevant to the case of TACC Colombia and La Niña 2010–11 (i.e., the emergence of the new Constitution of 1991, the emergence of an environmental institutionalism in 1993) as part of their own process of recollection. Later on, this researcher started to prompt other interviewees to talk about the events that were emerging from previous conversations to add depth to the analysis.

The indexing of the interview transcripts started by organising the data by event, and then the coding focused on identifying the making of institutions, identities, discourses and representations in the context of said events as follows:

**Understanding the making of institutions.** This research understands institutions as synonymous with organisations or entities with legal status (i.e., the Ministry of Environment), and it also sees them as mechanisms of social order (i.e., the new
constitution of 1991). The coding of the interviews and the document analysis allowed for the identification of both forms of institution making. The analysis builds upon the interviewees' responses which mentioned either or both types of institution. This study identified some of the grey literature on said institutions before the interviews, and the interviewees themselves provided other references. The grey literature thus provided a background for presenting the findings by its connections with the interviewees' accounts. Through the latter, it was possible then to identify the knowledge and the politics that where in place at the time these different institutions emerged, and how this interaction influenced TACC Colombia and the national-level frameworks for adapting to climate change.

**Understanding the making of discourses.** Following the idiom of co-production, this research understands discourses as frameworks of analysis, new languages and new definitions to tackle the 'novel' phenomena of climate change adaptation. Each interviewee discussed her/his understanding of adaptation both explicitly and implicitly. The analysis revealed implicit discourses underpinning the emergence of adaptation projects and institutions. By comparing these discourses with the grey literature, this research identified 14 discourses or frameworks of analysis at a national level, and three at regional and urban scales. Various of these discourses or frameworks of understanding and action coincided with the frameworks presented in the literature review (Chapter Two).

**Understanding the making of identities.** Identities are understood as new social roles or as current ones that adjust to accommodate the production and validation of new knowledge. To understand existing or new identities, the interviewees talked about the evolution of the social roles of their parent institutions as well as their perceptions of the other partner institutions. The grey literature from before and after TACC Colombia and La Niña 2010–11 also reveals the evolution of these identities or social roles over time. The identity of the expert, similar to the accounts of Jasanoff and colleagues (2004) was predominant within the empirical findings of this research. Experts outside and within governmental institutions form, what this thesis calls, a technocracy of adaptation.

**Understanding the making of representations.** This research frames the making of representations as forms to convey scientific knowledge in lay terms or for policy-making purposes. In comparison to the other three pathways of co-production (institutions,
discourses and identities), representations were easily identified but more challenging for non-scientific actors to engage with. This study reveals that the translation from science to policy is still an effort in the making. Both scientific and non-scientific interviewees talked about these representations, namely three outputs of TACC Colombia: climate change scenarios, vulnerability assessments and the portfolio of adaptation projects.

As mentioned earlier in this chapter, a fifth category of findings emerged as a result of the plentiful use of the term ‘territory’ and the phrase ‘territorial ordering’ by the research participants. The coding then focused on pinpointing these concepts and the context in which they emerged. The data analysis revealed that space was a defining element in the co-production of knowledge and politics as this co-production had clear spatial manifestations.

However, the idiom of co-production within the field of S&TS does not discuss space. There was then a gap in the analytical framework that was not addressed up until 2018—two years after the fieldwork—with the concept of *epistemic geographies* proposed by Mahoney and Hulme and discussed in Chapter Three. For this research, the idea of epistemic geographies helps to understand the notion of territories of adaptation as the spatial manifestation of processes of knowledge production and political projects at play in the making of institutions, discourses, identities and representations for climate change adaptation. Based on the empirical findings, and on the cartography by which identities, institutions, discourses and representations come to manifest spatially, this study identifies three instances that materialise the notion of territories of adaptation: territorial development as a starting point for adaptation, territories as political, ecological and jurisdictional boundaries, and as the efforts to mainstream adaptation planning and governance into projects of regional integration.

The change of case studies not only required revisiting the analytical framework but the research questions themselves. The pre-fieldwork research question:

**How does knowledge co-production influence climate governance in Colombia’s South Pacific Node?**

changed to
How do interactions between knowledge and politics in the context of climate change adaptation influence the mainstreaming of adaptation efforts into development planning and governance in Colombia’s Capital Region?

The post-fieldwork research question reflects the change of case study and analytical framework, together with development planning theory and practice being at the root of the work and the goals of the partnership of TACC Colombia. Different from the South Pacific Node, the partnership of TACC Colombia was built upon an existing scheme for regional integration between Bogotá and Cundinamarca. As it will be later explained in Chapter Seven this condition, in parallel to La Niña 2010–11, made adaptation to climate change a mandate for development planning in TACC Colombia as well as at a national level. See Figure 5 for a timeline showing the evolution of the research questions and the research methodology.

Figure 5. Timeline of this research. Source: Author.

4.4. Research limitations, challenges and ethics

A limitation of the case study that influenced the research is the lack of involvement of lay stakeholders. TACC Colombia was set up to kick-start a process of inclusive climate governance in Capital Region, but it only engaged governmental practices and stakeholders. This process was different from the other TACC pilot projects with which
TACC Colombia had some interaction in Uruguay, Uganda, Perú and Nicaragua. All of these TACC pilots involved local communities alongside local authorities. However, the coordination team of TACC Colombia saw fit to include just governmental authorities and institutions in the first stage of the process given the scale of the initiative—the population of Capital Region being close to ten million—, and it also saw fit for these authorities to be the first in line to learn about climate change as they see themselves as responsible for guiding lay stakeholders in their efforts to deal with climate change.

Although the partnership of TACC Colombia aimed to involve actors from the private sector, the academia and local communities in a second stage, the project did not continue as intended. The coordination team of TACC Colombia failed to secure resources for the second stage of the project when the UNDP ceased its engagement with it. Additionally, Capital Region ended as a regional partnership, and it morphed into a broader one that did not take on board the Regional Integrated Climate Change Plan for Capital Region that TACC Colombia developed. The outcomes of TACC Colombia (e.g., documents, institutional and individual learnings, policy guidance) are now scattered amongst the partner institutions.

Nevertheless, and acknowledging the limitation of building a picture of climate governance with only governmental stakeholders, this study reveals that for now, the efforts to deal with a changing climate in Colombia—at least the ones accounted for as 'adaptation'—are mostly top-down approaches. The term 'adaptation' remains alien and even counterproductive in some cases to lay publics. The academia took distance from TACC Colombia, regarding it as an intensely politicised endeavour. Hence it limited its contribution to that of a consultant instead of a partner. This reticence unveils that in Colombia, participatory development practices are seldom achieved in emerging processes of climate governance at urban, regional and national scales.

A second limitation of this study is the lack of insight that a method of participant observation could have added to the research. One of this research's interviewees, also looking at TACC Colombia as a case study, used participant observation as a method for data collection for her master's degree. Although from a different analytical perspective, this interviewee collected valuable insights from some of the meetings of the partners of TACC Colombia. These insights, included in this research's findings, were shared during the interview and through the participant's master's thesis.
Given that the fieldwork took place in 2016, two years after TACC Colombia finished, this study was more of an 'autopsy' that had to rely on somewhat 'cold evidence'. Also, by 2016 many of the interviewees representing the governmental bodies that partnered up in TACC Colombia had moved on to other organisations. Nevertheless, the two-year gap allowed the research participants time to reflect on the process. This advantage added to the explicit confluence of knowledge and politics, and the multiscalar implications in the context of TACC Colombia make it a compelling case study.

At the beginning of the interview, each participant received an information sheet and a consent form, both approved by UCL Research Ethics Committee. The information sheet contained details of the study, including disclaimers of data protection. The in-person interviewees signed the consent form agreeing to participate, have their testimonies audio-recorded and used anonymously and exclusively for this study. The Skype interviewees agreed via verbal consent.

An unexpected challenge arose when two of the in-person interviewees rejected the recording of the sessions. Both of them manifested that it was because the recording device intimidated them, not because of the possible sensitivity of their answers. Hence, this researcher took notes as thoroughly as possible, but some information was missing regardless. The rest of interviewees had no objection to the recording, except for one participant who asked to interrupt the recording for three minutes to voice some opinions off the record. In this case, it was the sensitivity of the answer that prompted the interviewee to ask for the interruption. Arguably then, although anonymous, other participants may have refrained from voicing their opinions in full because they were being recorded.

In general, though, the interviewees were eager to participate, and several asked for a copy of this thesis after completion. None of the participants asked for anything in return. They were willing to relate their experiences as stakeholders in the context of TACC Colombia and La Niña 2010–11.

Finally, the mobility and time constraints in Bogotá were a significant challenge. Bogotá’s traffic is very chaotic, and many of the interviews took place during rush hours. Cars and

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7 See Appendix Two for a copy on the Information Sheet (English and Spanish), and Appendix Three for a copy of the Consent Form (English and Spanish).
motorcycles account for 17% of the daily trips in the city, compared to 43% in public transport and 23% pedestrian (Bogotá's Secretary of Urban Mobility, 2017). Still so, cars and motorcycles overcrowd the streets due to Bogotá's high density: close to eight million people living in an urban area of 380 square kilometres (147 square miles) (Bogotá's Secretary of Urban Mobility, 2017). This researcher had to rely on multiple taxi rides instead of public transport to secure arriving on time to the appointments with the interviewees. Conducting a study on climate change while contributing so significantly to carbon emissions was indeed an ethical predicament.

4.5. Conclusions

This study is based on an interpretive-constructionist view of reality and of the ways of knowing about it. In this way, reality and knowledge are mediated through social constructs and influenced by political, economic and cultural dimensions. Therefore, principles drawn from STS and political ecology are at the core of this study's analytical framework.

This chapter highlights how the case of TACC Colombia in Capital Region renders an exceptional opportunity to deepen our understanding of how the dynamics between knowledge and politics—understood through the four pathways of co-production (institutions, identities, discourses and representations)—and the notion of epistemic geographies, can shed light on broader processes of multiscalar climate governance.

A sample of 59 out of the 243 people engaged with TACC Colombia in different capacities, and 16 stakeholders involved in adaptation planning and governance in Capital Region and Colombia, make up a solid analytical base from where themes were drawn to consolidate the findings of this research. Despite the challenge of exploring processes of governance from just looking at governmental actions and stakeholders, this is telling in itself of how climate governance is emerging as a top-down approach in Capital Region and Colombia, and in processes of development planning.
5. Research context and background

Chapter Four presented TACC Colombia in Capital Region as a compelling a fruitful case study to understand how interactions between knowledge and politics for adaptation underscore how adaptation planning and governance are developing at national, regional and urban scales in Colombia.

This chapter follows the timeline presented in Chapter Four (Figure 3), to explain the context and the background of TACC Colombia through eight moments/periods in time: i) 1991, a new Colombian constitution; ii) 1993, the beginning of environmental governance in Colombia; iii) 2000, the beginning of Capital Region; iv) 2009, the start of TACC Colombia; v) 2010–11, La Niña phenomenon; vi) 2012, the beginning of Bogotá Humana; vii) 2014, the end of TACC Colombia and Capital Region; and viii) 2016, the end of Bogotá Humana and the fieldwork.

5.1. 1991, A new Colombian constitution

On 04 July 1991, a constituent assembly sanctioned a new Constitution for Colombia. This new constitution replaced the 1886 political chart that had governed Colombia until then. The constituent assembly was formed by 74 delegates democratically elected, representing different political parties, indigenous and student movements, and union leaders. Although there had been previous attempts to reform the constitution, with a country affected for years by drug cartels' terrorist attacks and armed conflict with various guerrilla movements, in 1988, it was clear for the government of President Virgilio Barco that more than a reform the country needed an entirely new constitution that could deal with a wave of extreme violence (Cardona Alzate, 2011).

Aside from the development of political mechanisms to face the terrorist threat, the Constitution of 1991 ruled the decentralisation of political and administrative power in Colombia in pursue of a modern state, able to engage itself in national, regional and global matters. Chief among the decentralisation measures was the concept of territorial development. The Constitution of 1991 framed territorial development as the restructuring of the physical and the social space, defining it as:
"a state policy and planning instrument that allows for an appropriate political-administrative organisation of the Nation, and the spatial projection of the social development, economic, environmental and cultural policies of [Colombian] society, [that] guarantees an adequate quality of life for the people and the conservation of the environment" (Asher & Ojeda, 2009, p. 293).

By this definition, territorial development was not only about land-use planning or organising the physical space, but it was about restructuring the state's administrative authority and functions and giving political and administrative autonomy to Colombian territorial entities. This restructuring process set the municipality as the primary administrative unit. Additionally, territorial development opened the doors for alternative associative schemes such as Capital Region, and it also acknowledged that Colombia's environmental management and that of its territories was vital for the country's development. The Constitution of 1991 issued more than 50 articles on environment and sustainable development (Rodríguez Becerra, 2009).

5.2. 1993, Institutionalising environmental governance in Colombia

Before 1993, the National Planning Department led the management of environmental issues in Colombia. It coordinated the activities of 18 regional authorities that followed the model of the Tennessee Valley Authority (TVA) in the United States (Rodríguez Becerra, 2009). The TVA, a federally owned corporation, was founded in 1933 to manage the overall development of the Tennessee Valley, which had been significantly affected by The Great Depression (Ekbladh, 2002). The TVA managed flood control, power generation, the manufacture of fertilisers and the economic development of the Tennessee Valley that spans over seven states. Colombia's 16 regional authorities promoted environmental management as well as social and economic development in their areas of jurisdiction. Their areas of influence were following regions with similar socio-economic and ecosystem characteristics such as watersheds and coastal areas (Rodríguez Becerra, 2009). Before 1993, neither global warming nor climate change was amongst the concerns of these regional authorities, nor did Colombia have an environmental authority per se.

Following the 1992 United Nations Conference on Environment and Development in Rio de Janeiro, the UN member states agreed on the need to work collaborative in addressing climate change and environmental degradation to achieve sustainability (Meakin, 1992).
The Rio summit opened up the ratification process for the UNFCCC that finally entered into force by 1994. Colombia, as a member state, responded to the call of the Rio summit with Law 99 in 1993 (Rodríguez Becerra, 2009). Law 99 prompted a new scheme for environmental governance in Colombia, and for the first time in its history, the Colombian government created a Ministry of Environment (MADS). As the leading environmental authority, this ministry was tasked with the development of environmental policies and with the creation and leadership of a National Environmental System (SINA). SINA aimed to integrate the work of the different actors at the public, private and non-governmental level that dealt with environmental issues in Colombia.

To carry out its new role, the MADS saw the need for the advancement of environmental science and research in Colombia. Hence, in 1993 and within the framework of the SINA, the MADS created two national research institutes: The National Institute of Hydrology, Meteorology and Environmental Studies and the Humboldt Institute (Rodríguez Becerra, 2009). The former's role was to produce knowledge and information in regards to the state and the dynamics of Colombia's natural resources. The latter's, to produce knowledge to inform decision-making concerning the biodiversity in Colombia. Additionally, the SINA created three other research institutes to conduct environmental science studies for Colombia's Pacific region, the Amazon region and the country's coastal and marine areas.

In administrative terms, the SINA transformed the existing 18 regional authorities into 34 regional environmental authorities (CARs) to coincide closer with Colombia's 32 political subdivisions or states. Law 99 of 1993 designated the CARs as the chief authorities at the regional level to manage natural resources and to execute the policies and planning issued by the MADS.

Law 99 designated two new institutions to complete the scope of the MADS as the leading environmental authority in Colombia. The first, National Natural Parks, an administrative body in charge of the management and the coordination of Colombia's 59 conservation areas that encompass more than 14 million hectares (Rodríguez Becerra, 2009). The second, six urban environmental authorities. Given the impact of urban settings on environmental sustainability, Law 99 of 1993 created these bodies for each of the six cities in Colombia with populations over one million: Bogotá, Medellín, Cali, Barranquilla, Cartagena and Santa Marta.
5.3. 2000, The beginning of Capital Region

In 2000, the governments of Bogotá and Cundinamarca (located at the centre of Colombia) started Capital Region as a space for regional coordination of the planning and development of the capital and its surrounding region. Cundinamarca is the leading strategic partner of the capital. This state has a very close relationship with Bogotá in social, economic, cultural, political and ecological terms. This closeness is explicit by the exchange of raw materials, food provision and the daily commuting of the population. Bogotá is the primary market for all the agricultural and industrial production that takes place in the rest of Cundinamarca. Likewise, Cundinamarca is the primary source of food and raw materials for the capital (IDEAM et al., 2014a).

Capital Region concentrates over 20% (almost 10 million people) of Colombia's population, a population size above countries like Switzerland and Austria (IDEAM et al., 2014a). However, while the density in Bogotá is 4,270 people per square kilometre, in the rest of Cundinamarca—with 116 municipalities—is 101/km2. This stark difference has ignited debates on whether the capital should keep growing (Ardila, 2003). In recent years, the municipalities in the vicinity of Bogotá have absorbed the population growth of the capital, which has accentuated a conurbation process and with it, issues of mobility, environment and the quality of livelihoods. As a consequence, both the regional and urban governments are facing increasing challenges to accommodate the rising demand for services.

Capital Region has a great variety of thermal zones or elevations, ranging from 300 metres above sea level—the River Magdalena Valley—to areas over 4,000 Mts above sea level such as the Páramo of Sumapaz. Bogotá, at 2,630 Mts, is located on a savannah close to the foothills of the Colombian oriental flatlands and the River Magdalena Valley (Figure 6).

8 Páramos are high mountain ecosystems that are essential for the regulation of the water cycle in the Northern Andes.
The Spanish took the variety of thermal zones and elevations into account when they established Santa Fé (Bogotá) as the capital of the colony (IDEAM et al., 2014a). The favourable characteristics of the regional climate for food production coupled with an abundance of water resources were and have been fundamental for the concentration of money and power in the capital. However, this situation and the increasing concentration of population places the region in the threshold of sustainability as a suitable environment.

Figure 6. Map of elevations in the territory of Capital Region. Source: Adapted from Agustin Codazzi Geographic Institute (2011)
for human life.

In the face of all these interdependencies between the capital and the region, it was clear for both governments that there was an impending need to coordinate planning and development, and to establish a regional governance scheme consolidated in the form of Capital Region. In 2008 and after eight years of negotiations, the Mayor of Bogotá and the Governor of Cundinamarca finally signed the agreement.

5.4. 2009, The start of TACC Colombia

During the Copenhagen COP in 2009 Helen Clark, the then UNDP Administrator, addressed keynote remarks for 200 local authority leaders and private sector representatives during the opening ceremony of the Climate Leaders' Summit. (UNDP, 2012). Clark declared that the international community recognised the role of sub-national leaders in achieving common climate goals. According to the UNDP (2012), sub-national governments—cities and regions—will end up implementing most of the low-carbon practices and policies necessary to curb global warming. Sub-national governments are close to the people and places where projects will be implemented, and they are sufficiently elevated to integrate these projects into public policies and planning processes to ensure broader development impacts on their territories (UNDP, 2012).

Set up in 2009 by the UNDP, Down to Earth: Territorial Approach to Climate Change (TACC) was an assistance programme launched to support sub-national authorities to identify and develop projects to meet local needs while building climate resilience and the infrastructure needed for low-carbon growth. Despite the potential of addressing climate change at the sub-national level and the success demonstrated in industrialised countries, UNDP's research at the time showed that only a minimal number of integrated (mitigation and adaptation) climate policies existed at the sub-national level in developing countries. The vast majority of climate action was limited to individual mitigation or adaptation projects.

Down to Earth TACC encouraged sub-national governments to prepare integrated territorial climate change plans by:

1. Putting in place a partnership and governance framework to address the cross-
nature of climate change by fostering the identification of common ground among all partners

2. Developing climate change profiles to assess the present and future climate-risks and GHG emissions scenarios

3. Identifying priorities for mitigation and adaptation

4. Assessing priority financing needs and the most appropriate mix of policy and financial instruments to fund mitigation and adaptation measures

5. Accessing different sources of climate change funding to finance the activities

The five-step component of Down to Earth TACC was spearheaded in pilot programme-countries by the respective national and sub-national governments with support from the UNDP country offices. The selection of the ten pilot countries was based on the request of the national governments, and the dialogue between the national counterparts, the UNDP country office, the implementing sub-national governments and the funding partners.

In 2009, the political will of the governments of Bogotá and Cundinamarca to push Capital Region forward was the main driver to present its candidacy to the programme. Down to Earth TACC selected Capital Region as one of ten pilot projects worldwide, all in developing countries. The other nine pilot projects took place in Nicaragua, Peru, Uruguay, Senegal, Nigeria, Uganda, Argelia, Egypt and Albania.

By the end of 2009, UNDP Colombia appointed a coordination team to oversee the development of TACC Colombia. This group managed the communications between the technical and the decision-making level. Once appointed, the first task of the coordination team was to identify the potential partners for the project. Colombia's National Institute of Hydrology, Meteorology and Environmental Studies, Bogotá Mayor's office, the Government of Cundinamarca, the Ministry of Environment and the National Planning Department were already very much engaged as they supported the candidacy of Capital Region for the TACC pilot. The coordination group then reached out to the regional environmental authorities with jurisdictions in Capital Region, the Humboldt Institute
and National Natural Parks, requesting their engagement in both technical and financial terms. With an overall investment of 1,5 million USD, the local partners funded 50%, and the governments of Spain and Quebec funded the other 50% through UNDP Colombia.

Eleven governmental institutions, with a stake in the political, administrative and territorial development of Capital Region, formed the partnership of TACC Colombia (Figure 7). Six of the partners were national-level institutions: UNDP Colombia, the National Planning Department, the Ministry of Environment, the National Institute of Hydrology, Meteorology and Environmental Studies, the Humboldt Institute and National Natural Parks. The latter four were all created by Law 99 of 1993, as explained earlier in this section. Four other partners were regional-level: The Government of Cundinamarca and three regional environmental authorities—CAR Cundinamarca, Corpoguavio and Corporinoquía—with jurisdiction in the territory of Capital Region. These three regional environmental authorities were also created or reformed after Law 99 of 1993. Lastly, Bogotá Mayor's Office represented the urban scale. Given their size and the stake they had in the partnership, the governments of Bogotá and Cundinamarca participated through various of its subdivisions.

![Figure 7. The eleven partners of TACC Colombia in Capital Region. Source: Author](image)
The international partner

1. **UNDP Colombia** was the link between Down to Earth TACC and TACC Colombia. UNDP Colombia managed the budget and the recruitment processes of the coordination team and the consultants of TACC Colombia. The broader role of the UNDP in Colombia is that of influencing public policy and promoting the SDGs. Up until TACC Colombia, UNDP had worked in rural Colombia, promoting projects and programmes for poverty reduction, economic development, education, environmental sustainability, among others (UNDP Colombia, 2013).

The national-level partners

2. **Department of National Planning (DNP).** Created in 1958, the DNP is the administrative agency of Colombia in charge of defining, recommending and promoting public and economic policy. As a technical branch of the executive power in Colombia, DNP defines and promotes the establishment of a strategic vision of the country in the social, economic and environmental sectors through the design, orientation and evaluation of public policies. DNP coordinates the National Council for Political and Social Policy (CONPES). Also created in 1958, the CONPES is formed by the heads of all of Colombia's national ministries. The CONPES is the supreme authority for national planning, coordinating and approving the baseline for policy development.

3. **The Ministry of Environment (MADS).** Created in 1993 to lead the SINA, the MADS is responsible for defining national environmental policies, and it oversees the management of Colombia's natural resources. Before La Niña 2010–11, the work of MADS had mainly focused on mitigation. The reduction and capture of GHGs emissions were framed as much an environmental as a political task. The MADS, alongside Colombia's Ministry of Foreign Relations, is a member of the national commission that attends the annual COPs to prepare and deploy Colombia's position in the international negotiations of the UNFCCC.

4. **The National Institute of Hydrology, Meteorology and Environmental Studies (IDEAM)** is one of the five national research institutes that provide scientific support to the SINA. Also founded in 1993, IDEAM is in charge of the production of knowledge
and information in regards to the state and the dynamics of Colombia's natural resources, including climate and weather. This knowledge intends to inform environmental policies and decision-making for the public, the private sector and citizens in general. Amongst its tasks, the IDEAM prepares inventories of GHGs emissions and climate change scenarios as part of the National Communications that Colombia is required to submit to the UNFCCC as one of its parties. The National Communications are periodic reports describing the national advancements in mitigation, adaptation, financing, research, education and public communication regarding climate change. So far, Colombia has submitted three: the first in 2001, the second in 2010 and the third in 2017 (Table 3).

Table 3 shows a significant increase in adaptation actions from the year 2010 (3rd National Communication) compared to the 1st and the 2nd National Communications. Detailed information on the impacts of climate change has also increased throughout the communications. The 3rd National Communication included the INDCs that Colombia presented to the UNFCCC in terms of adaptation goals. The páramo ecosystems are consistently identified as one of the most vulnerable areas to the impacts of climate change. Increases in temperature and reduction in rainfall threaten the capacity of these ecosystems to guarantee water availability in Colombia.

Previous to La Niña 2010–11, IDEAM was among a few institutions that had officially developed adaptation projects in Colombia. It did so from 2006 to 2011, through the National Pilot Project for Climate Change Adaptation in Colombia (INAP), the 1st of its kind in Colombia. Colombia's 1st National Communication concluded that high mountain ecosystems, coastal and island regions and human health were the most vulnerable areas to climate change in the country. INAP targeted these four areas. The high mountain component of INAP set a significant precedent for TACC Colombia because it focused actions on the Páramo of Chingaza, a critical ecosystem for the provision of water in Capital Region (Figure 8).
<table>
<thead>
<tr>
<th>Table 3. Colombia’s 1st, 2nd and 3rd National Communications to the UNFCCC</th>
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<tr>
<td>Contribution to global GHGs emissions</td>
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<td>Climate change scenarios</td>
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<td>Changes in temperature (increases)</td>
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<tr>
<td>Changes in precipitation (decreases)</td>
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<tr>
<td>Sea level rise</td>
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<td>Reduction of islands and coastal areas</td>
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<tr>
<td>Most vulnerable areas</td>
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<tr>
<td>Recommended adaptation measures</td>
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<tr>
<td>Adaptation actions to date</td>
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Figure 8. INAP in the Páramo of Chingaza (territory of Capital Region). Source: Adapted from Agustín Codazzi Geographic Institute (2011) and World Bank et al. (2011)

5. The Humboldt Institute is another one of the five national research institutes that are part of SINA. Created also in 1993 by Law 99, the institute produces knowledge to inform decision-making concerning biodiversity in Colombia. According to the IPCC (2014) and the UN Convention on Biological Diversity (2019), surges in temperature, changes in precipitation patterns and droughts have shifted the spatial distribution of ecosystems, mainly in the tropics. Additionally, climatic changes alter the regulation and procurement of ecosystem services (Locatelli, 2016). Because most flora and fauna species rely on a specific thermal and humidity range, there is an imminent threat of extinction—between 20% and 30%—if the global temperature increases 2.5°C above pre-industrial levels (Locatelli, 2016). However, phenomena like ENSO facilitate the propagation of other species; hence, the effects on biodiversity can be harmful to some species and positive for others.
6. National Natural Parks (NNP) is an administrative body in charge of the management and the coordination of the Colombian System of Conservation, established by Law 99 of 1993. NNP answers to the MADS and carries out activities of conservation in-situ to promote and protect Colombia's biological, ecosystem and cultural diversity in 59 conservation areas (or parks) that form close to 11% of the Colombian territory. These 59 areas are outside the jurisdiction of the CARs, but there is often confusion on whether a given issue corresponds to one or the other authority in the buffer areas between jurisdictions.

NNP manages the national natural parks of Chingaza and Sumapaz. Capital Region covers most of the area of Chingaza, with seven municipalities of Cundinamarca located in the area of the park. The additional four municipalities of the park correspond to the neighbouring state of Meta, outside the area of Capital Region. In the case of Sumapaz, Cundinamarca has four municipalities in its area.

The regional-level partners

7. The Government of Cundinamarca. After Bogotá, The Government of Cundinamarca was the second-largest sponsor of TACC Colombia in terms of financial and technical resources. It contributed 25% of the local funding, and it joined the project's team under the leadership of the Secretary of Regional Integration. This secretary called representatives from other secretaries to collaborate as well: environment, agriculture, planning and from the DRM unit. Although the second most prominent sponsor, the operational budget of the Government of Cundinamarca is far below Bogotá’s, which made Cundinamarca's contribution quite considerable. Additionally, it was the Government of Cundinamarca rather than Bogotá Mayor's Office that pulled more strings to present the candidacy of Capital Region to the UNDP TACC programme.

In 1988, the Government of Cundinamarca and the UNDP worked together developing COL88, a project for poverty eradication in Cundinamarca. Disaster risk management was among the components of the project, which gathered data on environmental susceptibility and geological and hydrological hazards. In the same year, the overflow of River Negro provoked an avalanche in the municipality of Útica in Cundinamarca, the biggest after the Armero disaster in 1985. Útica is a low-income municipality where most
of the population, approximately 5,000, depends on agricultural activities. The muds of the avalanche averaged between 1 and 2 meters high, directly affecting the population (lost dwellings) and other considerable material damages. During La Niña 2010–11, a new avalanche hit Útica, resulting in two deaths, and the loss and damage of 468 dwellings (Útica's Municipal Council for Disaster Risk Management, 2012). However, thanks to an early warning, the impacts of the disaster were not worse. In 1988, after the refusal of the local people to resettle elsewhere, COL88 set early warning systems as well as reforestation actions alongside the river's watershed (Figure 9).

Figure 9. Impacts of La Niña 2010-11 in Útica, Cundinamarca. Source: map adapted from Creative Commons (2012) and photo adapted from EL TIEMPO.COM (2015)

With an increasing number of climate-related events in Cundinamarca such as the case of Útica, in 2009 the DRM staff of the government of Cundinamarca saw in UNDP TACC programme the possibility of building a database for climate-related vulnerability and hazards. Additionally, for the Government of Cundinamarca, with the process of
expansion of Bogotá and its conurbation with neighbouring municipalities, the
development agendas of the state and the capital needed to go hand in hand, and
Cundinamarca regarded TACC Colombia as an exceptional platform for its negotiation.

8, 9 and 10. CAR Cundinamarca, Corpoguavio and Corporinoquía: the regional
environmental authorities. In Colombia, there are 34 Regional Environmental
Authorities (CAR), and their jurisdiction mostly coincides with the political division of
the country in 32 departments or states. Law 99 of 1993 designated the CARs as the
leading authorities to manage regional natural resources and to execute the policies and
planning issued by the MADS. Different from the MADS and IDEAM, the CARs
appeared earlier in Colombia, in 1954, following the model of the Tennessee Valley
Authority in the United States (section 5.2.).

The regional environmental authority with jurisdiction over most of Cundinamarca's
territory is CAR Cundinamarca. Summoned by the coordination team of TACC
Colombia, CAR Cundinamarca participated in technical and financial terms. This
regional environmental authority had recently created an internal division for climate
change, and the project appeared as the opportunity to learn about the topic. CAR
Cundinamarca did not have the technical knowledge on climate change issues, but it had
a lot of information and knowledge in regards to watershed management, and they
contributed significantly with their inputs in this area.

The jurisdiction of Corporinoquía extends well beyond the territory of Capital Region,
encompassing three other states to the east of Colombia: Arauca, Casanare and Vichada
(Figure 10). Hence, the interest and the role of Corporinoquía in TACC Colombia was
minimal at the beginning and none by the end of the project. Although Corporinoquía
appears as a partner in the official documents of TACC Colombia, this study did not find
any relevant information in regards to its participation in the project.

Alongside CAR Cundinamarca and Corporinoquía, Corpoguavio is another regional
environmental authority with jurisdiction in the geographical area of Capital Region.
However, the operational budget of Corpoguavio is smaller than CAR Cundinamarca.
Thus its participation in TACC Colombia was limited in technical and financial terms.
Compared to CAR Cundinamarca, its jurisdiction is relatively small covering only eight
municipalities located to the east of Cundinamarca. Regardless of the size, this area is affluent in water resources comprising rivers, dams and lagoons. These resources include The Guavio Dam, a hydroelectric power plant that supplies close to 20% of Colombia's electricity demand, and part of the Chingaza National Natural Park, with the páramo ecosystem that supplies over 70% of Bogotá's water demand.

Due to the characteristics of its area of influence, Corpoguavio interacts with national-level stakeholders such as the Ministry of Energy and National Natural Parks, the latter also partner in TACC Colombia. When it became a partner of the project, Corpoguavio had the opportunity to interact with other national and regional stakeholders, which provided opportunities to create alliances outside the context of the project.

Figure 10. Jurisdiction of Corpoguavio and the other three environmental authorities in Capital Region. Source: Adapted from Creative Commons (2012), Corpoguavio (2007) and CAR Cundinamarca (2015).
The urban-level partners

11. Bogotá Mayor's Office. To manage a city of more than eight million people, Bogotá Mayor's Office is organised into fifteen sectors: public management, government, finance, planning, economic development, education, health, social integration, culture, environment, transport, habitat, security, legal and women issues. Each sector is led by secretaries—each with their respective subdivisions—and also institutes, all of which total approximately 50,000 employees between permanent and temporary staff.

For the partnership with TACC Colombia, the Mayor's office participated with representatives from four city entities: The Secretary of Planning (planning sector), the Secretary of Environment and the Institute for Risk Management and Climate Change IDIGER (environment sector) and Acueducto, the city's water utility. There was also a representative of the Mayor in the directive committee of the project. With an operational budget far above that of the other ten partners of TACC Colombia, Bogotá Mayor's Office supplied over 30% of the local funding for the project.

These four entities engaged with the project at different times during the process. When TACC Colombia started in 2010, the city's agenda for climate change was regarded as an environmental matter; thus, the Secretary of Environment was already engaged with the project. However, in 2012 under Bogotá Humana (Bogotá's administration between 2012–16), climate change became a determinant for development planning in Bogotá. It was then that the other three local entities became partners. First, the Secretary of Planning and the IDIGER joined, and later Acueducto.

Due to the size of the city, Bogotá does not fall under the jurisdiction of any regional environmental authority; hence, the Secretary of Environment is the urban authority in charge of managing all environmental issues in Bogotá. The budget of this secretary alone is equal to or above some of the largest regional environmental authorities in Colombia. Initially, the Secretary of Environment participated with the staff that formed its internal climate change group, and there was a permanent representative in the directive committee of TACC Colombia. Later, staff from other dependencies joined when, under Bogotá Humana, the Secretary of Environment initiated the development of Bogotá's District Plan for Risk Management and Climate Change.
To define the operation and the goals of TACC Colombia, the eleven partners agreed on a governance structure for the project (Figure 11).

![Governance structure of TACC Colombia](source: Author)

**Figure 11.** The governance structure of TACC Colombia. Source: Author

There was a directive committee formed by the heads, or their representatives, of each of the eleven partner institutions. This committee was in charge of the ultimate decision-making, acting as the political body of the project. TACC Colombia also defined a technical body, formed by six working groups with the voluntary participation of technical staff from all the partner institutions: climate change scenarios, regional dynamics, GHGs inventories, vulnerability assessment, planning and territorial development and a group for education and knowledge management. These six working groups organised around the four guiding questions of TACC Colombia (IDEAM et al., 2014a):

1. What is the current and the future climate in the Bogotá-Cundinamarca region? (working groups for climate change scenarios and regional dynamics)

2. What are the regional dynamics and the vulnerability to climate change of the Bogotá- Cundinamarca region? (working groups for regional dynamics, vulnerability assessment and GHGs)

3. How to transfer the knowledge to decision-makers? (working group for
education and knowledge management)

4. How to deal with the territorial challenges posed by climate change? (working group for planning and territorial development)

5.5. 2010–11, La Niña: a turning point in Colombia's planning and governance

"A foretold tragedy. In Colombia all tragedies are foretold" (P12, personal communication, 22 April 2016)

By the beginning of 2010, Colombia's National Institute of Hydrology, Meteorology and Environmental Studies (IDEAM) had predicted an abnormal increase in the intensity of La Niña, that along with the warm phase of ENSO or El Niño has alternated over, what is thought, thousands of years (CEPAL, DNP, BID, & IDEAM, 2014). However, in the last several decades, the intensity and frequency of the ENSO phenomena have rapidly increased worldwide (IPCC, 2014). Currently, it is very likely to have both El Niño and La Niña in the same year. Such was the case in Colombia in 2010. From decreased rainfall during the first quarter of the year due to El Niño, there was a rapid rise in precipitation up until May 2011 due to La Niña. More recently, in 2015, during a severe El Niño, more than 200 of Colombia's 1,122 municipalities struggled with water provision (El Tiempo, 2016).

In 2010, and despite the alarms raised by IDEAM, Colombia's regions were ill-prepared to deal with La Niña. According to IDEAM's records, La Niña 2010–11 was the strongest in Colombia's history, surpassing the registers of the same phenomena in 1973 and 1988 (CEPAL et al., 2014). With an estimated national population of over 46 million, two million people were affected in one way or another.

Although Colombia has been a pioneer in Latin America for developing a comprehensive vision of disaster management that has resulted in decreased life losses, the losses in infrastructure continue to increase as revealed by the impacts of La Niña 2010–11 (Campos et al., 2011). As mentioned in Chapter One (section 1.5.), there were economic losses of up to 7.8 billion USD with agriculture, housing, transport, energy, and health as the most affected sectors (Hoyos et al., 2013).
Colombia's central government framed the impacts of La Niña as the leading cause of the disaster and the natural increase in the intensity of the phenomenon as a consequence of global warming. This position prompted the government to seek 'new' climate change knowledge and with it, a whole new institutionality. This framing responded more to political than scientific reasons. Whereas before La Niña 2010–11 this type of phenomena was expected as a regular feature of Colombia's weather patterns, the drastic and extensive impacts of La Niña 2010–11 revealed severe gaps in Colombia's risk management, development planning and governance. Key among them, as pointed out by the interviewee below, the continuous occupation of risk-prone areas to respond to increasing urbanisation trends:

"The dynamics of population growth are changing, and people are moving to cities and occupying spaces on the river watersheds, but rivers have memory. What is at fault here are the planning systems and then we blame local authorities. When there is flooding, then the regional environmental authority is to blame, but the thing is that we are invading the ecosystems" (P67, personal communication, 16 June 2016).

In light of this institutional overturn, a local researcher that followed the case of TACC Colombia concludes that Colombia has been rather reactive and less strategic, for there is a culture to wait for the worst to happen in order to act:

"I feel that from disaster risk management, there were good attempts, but I do not think that it is a strategic way of planning but post-event planning. It was also an opportunity because the funding was available for disaster recovery and humanitarian aid, but I think there is still a long way to go" (P56, personal communication, 07 June 2016).

Others see this change in institutionality as insufficient:

"Our normative frameworks and our institutionality are not made to deal with climate change. We are moving forward, but it is not enough. The national climate change policies are fragile, even worldwide. That is why agreements are not met. There is an absolute need to change the economic model" (P12, personal communication, 22 April 2016).

Although TACC Colombia started before La Niña 2010–11, the disastrous consequences of the phenomenon acted as a catalyst to leverage the political will of regional planning and environmental authorities to join the partnership of TACC Colombia. During La Niña 2010–11, the territory of Capital Region underwent the overflow of The River Bogotá which flooded more than ten municipalities in Cundinamarca. There were more than 13 landslides across the region that caused the displacement of close to 2,000 people, 789 of
whom were underage. Various municipalities had precipitation indexes 200%, 300% and 350% times higher than the average and the regional economic losses reached 100 million USD. There were more than 9,000 hectares of crops affected, as well as forests and grassland for cattle, and close to 6,000 dwellings were destroyed and other 40,000 buildings were affected (IDEAM et al., 2014a).

The first official meeting of all the partners of TACC Colombia took place by the end of 2010. By then, the impacts of La Niña 2010–11 in the territory of Capital Region served as the ultimate catalyst for the political will of the partners:

"By that time, La Niña 2010–11 was fundamental for the activity of TACC Colombia […] we (the coordination team) benefited in terms of the calamities that were taking place because the institutions opened up their doors. I think La Niña was our greatest ally" (P2, personal communication, 01 April 2016).

TACC Colombia concluded that, in Capital Region, possible increases in temperature and decreased precipitation could intensify immigration from areas with less attractive climates. At the same time, these climatic tendencies can diminish water availability and the upsurge of plagues and diseases common to warmer areas (IDEAM et al., 2014a).

At national level, the President led an institutional change through the supreme authority for policy development in Colombia, the National Council for Social and Economic Policy CONPES. The CONPES is coordinated by The National Planning Department and all Colombian ministries under the leadership of the President are part of it. During La Niña 2010–11, the CONPES developed an institutional strategy for the articulation of policies and actions in climate change, document CONPES 3700 (see DNP, 2011). Approved in July 2011, the CONPES 3700 officially endorsed that climate change management had a crucial stance in Colombia's national development plan. CONPES 3700 recommended the development a national plan for CCA, a national policy for climate change, and it regarded TACC Colombia as an initiative for other regions in Colombia to model after for mainstreaming climate change into development planning.

5.6. 2012, The start of Bogotá Humana

When TACC Colombia started in 2009, the coordination team and the city government saw fit that the natural partner had to be Bogotá's Secretary of Environment. At that time,
the Mayor of Bogotá was Samuel Moreno, and within his agenda climate change was considered as an environmental matter. Later in 2012, Gustavo Petro succeeded Moreno with an administration that was called Bogotá Humana. With a more progressive agenda and in the face of the impacts of La Niña 2010–11, climate change became a determinant for planning the sustainable development of Bogotá (Bogotá’s Secretary of Planning, 2015). Adapting to climate change meant for Bogotá Humana the challenging of existing power structures and prioritising the low-income population who are the most affected by climate change impacts.

5.7. 2014, The culmination of TACC Colombia and Capital Region

By the end of 2014, TACC Colombia had concluded with three instances meant to wrap-up and consolidate almost five years of work. First, TACC Colombia established a collaboration with a local university to develop a training programme for the technical staff of the partner institutions. The training programme focused on climate change management at the regional level. The goal of the programme was to strengthen the institutional capacities of the technical staff of TACC Colombia that deal with climate change hazards, territorial development, water resources management and disaster risk management. Instead of teaching what climate change adaptation was about, the training programme emphasised the need to derive decision-making for climate change based on the understanding and shared experiences of the work that the technical staff carried out from their different disciplines and institutions.

As a second instance, TACC Colombia developed a portfolio of project profiles for mitigation and adaptation. For this, the partnership formed two groups with the technical staff of TACC Colombia that at the time were involved in the training programme mentioned above. The partnership assembled the portfolio with the outputs of this programme following a methodology developed by a consulting organisation.

Third, besides Cundinamarca, Bogotá Humana was focusing on its interdependencies with other three neighbouring states: Boyacá, Meta and Tolima. In this context, the governments of Bogotá and Cundinamarca ended Capital Region alongside TACC Colombia and created a new regional partnership with their three neighbouring states. The partners of this associative scheme called it Central Region, and it was the first of its
type in Colombia. Different from Capital Region, Central Region was formed under the auspices of Law 1454 of 2011, a new normative framework for territorial development in Colombia that allowed for the development of associative schemes to decentralise public administration in the country further. TACC Colombia then passed on all of its outputs to the new administration of Central Region.

5.8. 2016, The fieldwork and the end of Bogotá Humana
The timing of the fieldwork allowed for assessing the outcomes of TACC Colombia passed its culmination date. By the time of the fieldwork, the staff from Central Region manifested that they were using a few independent outputs of TACC Colombia. However, Central Region did not adopt the portfolio of projects, nor did any of the partner institutions. The Bogotá Humana administration ended on 31 December 2015, and it was succeeded by an administration which did not include adaptation concerns at its core. This will be explored further in Chapter Seven, where this study discusses the urban scale of the co-production of knowledge and politics for adaptation.

5.9. Conclusions
Following a timeline, from 1991 to 2016, this chapter presents the context and the background of TACC Colombia through eight moments/periods in time: i) In 1991, a new Colombian constitution started a process of decentralisation to grant Colombian territories (states, cities, municipalities, indigenous lands) political and administrative autonomy through a novel approach for development planning and governance: territorial development. The new constitution also opened the path for environmental governance in Colombia; ii) In 1993, Law 99 created Colombia's National Environmental System (SINA) and with it, a new set of research and policy institutions, among them several of the partners of TACC Colombia. iii) In 2000, given the interdependencies between Bogotá and Cundinamarca, Capital Region started as an agreement between the governments of the city and the state to coordinate planning and governance; iv) In 2009, TACC Colombia started as Capital Region's most promising attempt to consolidate itself through an interinstitutional platform to develop knowledge and policies to deal with climate change; v) Between 2010–11, the devastating consequences of La Niña
phenomenon in Colombia and Capital Region catalysed the political will of science and
government stakeholders to join the partnership of TACC Colombia; vi) In 2012, a new
city administration, Bogotá Humana, saw in TACC Colombia a productive ally to push
its development agenda forward. A development agenda that had climate change
adaptation at its core; vii) In 2014, both TACC Colombia and Capital Region ended to
give way for a new and figure of regional partnership for development planning and
governance: Central Region; viii) The timeline ends in 2016, when the fieldwork was
conducted, and when a new city administration took over from Bogotá Humana.
6. The co-production of knowledge and politics for climate change adaptation in Colombia: the national scale

The timeline used in Chapter Five to contextualise this study and the case of TACC Colombia explains how development planning and the governance of Colombian territories shifted direction at different points in time. These stepping stones also marked the emergence of several government institutions (normative frameworks and organisations) that shaped the partnership of TACC Colombia in Capital Region. One event in particular prompted a critical assessment of development planning and governance at national, regional and urban scales: La Niña 2010–11.

This chapter explains how the devastating impacts of La Niña 2010–11 shaped and reshaped identities, discourses and institutions at a national scale. Section 6.1 identifies three forms of identity-making: the reshaping of existing identities, the development of a technocracy of adaptation and the dichotomy between the identity or social roles of disaster risk management and CCA. Section 6.2 presents fourteen of the discourses the interviewees and the grey literature use to frame adaptation. Section 6.3 describes three instances of institution-making. First, the adjustment and development of three separate systems for the governance of risk, climate change and the environment; second, the emergence of new normative frameworks; and third, the onset of three different models for the incorporation of CCA into development planning. Finally, Section 6.4 offers some conclusions.

6.1. The making of identities

Chapter Three explains how, faced with the emergence of novel phenomena, social actors create new identities or social roles, and also adjust existing ones to accommodate the production and validation of new knowledge and social orders. In the case of Colombia, during and after La Niña 2010–11, we can explore the making of identities by looking at the national partners of TACC Colombia and other relevant entities in three interrelated moments: the reshaping of existing identities, the emergence of a technocracy of adaptation, and the identity conflict between climate change adaptation and disaster management policies and practices.
6.1.1. Reshaping existing identities

Chapter Five explains how Law 99 of 1993 developed a new scheme for environmental management in Colombia through which the environmental sector gained more status and resources than ever before. Law 99 gave life to the National Environmental System (SINA) as a governance scheme to deal with environmental issues in Colombia. Led by the Ministry of Environment, the SINA is formed by 34 regional environmental authorities, five national research institutes that provide technical and scientific support, an authority that oversees national conservation areas, the environmental offices of all regions and major cities in the country, the environmental divisions of all other ministries and sectors, NGOs, community organisations, ethnic groups, universities, institutes of scientific and technological research and environmental initiatives from the private sector. In summary, all of the stakeholders involved in environmental activities in Colombia. Following, this section examines the reshaping of the identities of the members of the SINA that participated in TACC Colombia.

The Ministry of Environment (MADS). After La Niña 2010–11 and given the presidential call for a restructuring of Colombia's institutionality, the MADS started to push forward the adaptation agenda in the international negotiations. As a result, Colombia led a group of developing countries lobbying for the UNFCCC to include adaptation goals in the national positions or INDC's (Intended Nationally Determined Contributions).

Parallel to its increasing role in the international negotiations of the UNFCCC, the role of the MADS also gained relevance concerning the other 15 national ministries in Colombia. The MADS was now in charge of overseeing the formulation of the climate change policy, and it participated in the formulation of the National Plan for Climate Change Adaptation. These mandates required for the other ministries or sectors to develop their sectoral plans for adaptation which had to be approved by the MADS. This new role of the MADS called for the creation of a new department tasked explicitly with climate change matters. Non-surprisingly, this new office has very young staff in comparison to the other offices within MADS. New professionals that seek to specialise in the subject of adaptation are undertaking a significant part in producing the knowledge required to deal with climate change in Colombia.
MADS had a dual role in TACC Colombia. It was a consultant, but it was also an eager learner wishing to gain insight into what was needed to deal with climate change, specifically in terms of adaptation. The staff who attended the meetings of TACC Colombia came from the new department tasked with climate change, including its director. They saw TACC Colombia as a potential scheme to be replicated in other Colombian regions.

However, this novel, arguably more important role in Colombia's institutionality has not translated into budget allocation. The MADS remains one the ministries with the lowest operational budgets in the country, and hence its level of influence is limited to the paper and seldom translates into action. This limitation is because the MADS area of action for adaptation is more regional (through the regional environmental authorities) than sectoral. A member of staff from the MADS climate change division explains that:

"It is difficult that the other sectors (ministries) see MADS in the way one wishes, and I think what has allowed us to reach beyond is whenever the sectors are affected by some kind of climate-related event. Everybody started to think about climate change because of La Niña. As MADS, we can push the agenda forward, but we only can reach some measure of technical support. Moreover, if within any given sector, there are no political will, technical or financial resources, then nothing happens" (P7, personal communication, 14 April 2016).

The reshaping of the MADS' social role displays how the impacts of La Niña, framed as an environmental matter, required that the national authority in environment escalated its position and knowledge production to meet the task. However, at the same time, given its lesser social or political role in the overall scheme of the sectoral division of Colombia's government, the MADS struggles with meeting these demands. This challenge reveals how, a changing climate that on paper is gaining recognition as a significant development threat, in practice has not defied the status quo.

The National Institute of Hydrology, Meteorology and Environmental Studies (IDEAM). Given its experience with the National Pilot Project for Climate Change Adaptation, INAP, and with Colombia's National Communications, it felt natural then for the governments of Bogotá and Cundinamarca to ask IDEAM to support their candidacy for TACC Colombia. Indeed, IDEAM became the technical leader of the partnership.
The combination of its technical role along with its pioneering role in adaptation tacitly designated IDEAM as the most 'knowledgeable' institute in Colombia to deal with climate change, both for adaptation and mitigation. Although IDEAM's role is to produce policy-relevant knowledge, its director has a seat at the IPCC, the annual COPs and a seat at the table where the President of Colombia and its ministries hold meetings when dealing with environmental issues. Through the results of National Pilot Project for Climate Change Adaptation, IDEAM aided the Ministry of Environment in strengthening Colombia's international position when lobbying for adaptation to be more forcefully included in the international negotiations of the UNFCCC. IDEAM also had an active role in the creation of the climate change office within the Ministry of Environment. So, although this ministry formulates the policies, it is IDEAM as a technical advisor that has gained a more visible role in CCA, and it contributed to its designation as the leader of TACC Colombia. Chapter Seven explores this role thoroughly.

The reshaping of IDEAM's identity evidences the framing of adaptation as a technical and scientific enterprise which is being incorporated as so into development policies and planning.

*The Humboldt Institute.* In Colombia, during La Niña 2010–11, floods allowed some fish species to come back to areas where they were no longer present. However, floods also cause terrestrial biodiversity to decrease because of the loss of dry land. In general, The Humboldt Institute fell short in evaluating the impacts of La Niña 2010–11. Colombia does not have a monitoring system for biodiversity in contrast with the several stations that IDEAM has in place to monitor patterns of precipitation and temperature across the country.

As one of the central research bodies and member of the National Environmental System, the Humboldt Institute is an essential stakeholder for the development of environmental policies and plans, such as the National Policy for Climate Change. For these reasons, the coordinating team of TACC Colombia requested The Humboldt to be part of the partnership in Capital Region. As a result of its participation in TACC Colombia and the impacts of La Niña, The Humboldt created a climate change office within the institute. The new office was a strategic move to reach out for international funding while it was less concerned with producing new knowledge. Although the Humboldt recognises
climate change as a threat to biodiversity, is but one of several others, such as the loss of natural habitats. According to a staff member of the Humboldt, the institute frames biodiversity as a response to climate change. Regardless of the impacts of climate change, both the functionality and the structure of species and ecosystems can optimise their resilience capacity in the territory, thus promoting human wellbeing. Such is the case of ecological restoration, which provides tools to understand and to deal with the degradation of ecosystems (P58, personal communication, 08 June 2016).

While IDEAM looks up to the IPCC as the leading research body, the Humboldt is part of a different epistemic community with a different approach to adaptation. The framing of biodiversity as a response to climate change is more aligned with the international treaties on biodiversity under the UN Convention on Biological Diversity and less with the agenda of the UNFCCC. For one staff member of the Humboldt, the label of 'adaptation' for many of the institute's projects, aims to take advantage of the international funding because, in their view, projects of ecological restoration have long contributed to the resilience of ecosystems before adaptation became mainstream (P58, personal communication, 08 June 2016). Not surprisingly, the Humboldt's members of staff that participated in TACC Colombia had much scepticism about the project's objectives.

The influence of the international agendas on the national research bodies exhibits the politics of science/knowledge production. The decision to label adaptation as a threat or ecosystem conservation as an adaptation response becomes, ultimately, a political decision; in this case, to take advantage of international funding.

**Regional Environmental Authorities (CARs).** During La Niña 2010–11, the President of Colombia made a call for governors, mayors, and regional environmental authorities to contribute more effectively to respond to the disaster. President Santos declared that it was not just up to the central government, but to local authorities and the CARs—responsible for the local investment of resources—"to avoid foretold tragedies" (El Colombiano, 2011). Dissatisfied mainly with the CARs' performance, the central government put forward a bill to reform the 34 CARs and to go back to the original model of 16 entities with areas of influence corresponding to ecosystems rather than political divisions. According to President Santos' government, a jurisdiction based on political divisions was inadequate for the environmental management of the country (Forero,
Whole ecosystems and the people governing them expand beyond political boundaries.

Although ultimately the Colombian Constitutional Court\(^9\) did not sanction the bill, the CARs did create internal divisions to learn about and to deal with climate change. Additionally, the climate change office of the MADS created the figure of nine Regional Nodes for Climate Change, subdividing the Colombian territory into nine regions by similar socio-economic and environmental characteristics: Caribbean, North Pacific, South Pacific, Antioquia, Andean North, Andean Centre East, Coffee Region, Orinoquia and Amazon (Figure 12). Each regional node groups three to four CARs at the time to join efforts for incorporating climate change in the planning instruments of their corresponding regions.

\[\text{Figure 12. The nine Climate Change Nodes. Source: Adapted from IDEAM et al. (2017)}\]

\(^9\) The new Constitution of 1991 created the Colombian Constitutional Court as the maximum authority to oversee its compliance.
While the impacts of La Niña 2010–11 made the central government question the work of the CARs, this critique was preceded by a long history of distrust. The CARs answer administratively to the Ministry of Environment but are autonomous in their funding. Their budget comes from regional environmental surcharges included in property tax, the royalties paid by the regional public and private power companies, licensing and other instruments regarding the use of the natural resources and charges for environmental infringements. More than 20 CARs have been investigated over the last years due to alleged misuse of their budget. Some CARs have hired studies that never reach practice; others have allowed illegal activities like mining and drying of wetlands, among a series of other accusations (Montes Cortés, 2018). Although in essence, the CARs' ethos is technical, many within the central and local governments regard them as political plunders. The CARs directors are often political instead of technical figures, and "if there are two political parties in the department, one gets the office of the Governor and the other the direction of the corresponding CAR" (P37, personal communication, 19 May 2016).

Arguably, the responsibility placed on the CARs during La Niña 2010–11 and the bill proposed by the central government, was an attempt to hold back the reigns that it had lost after the decentralisation process enabled by the Constitution of 1991. The co-production of knowledge and politics is evidenced here through the disputed identity of a regional institution that holds a decentralised authority to procure the sustainability of natural resources but that at the same time, it has agency (via financial muscle) of such a scale that is source of much distrust within the central government and the civil society. The CARs are meant to be the 'voice of the region' and the regional leaders for climate change management. They have gathered years of invaluable technical knowledge and expertise to achieve resilient ecosystems, a knowledge that is critical to deal with a changing climate. Regardless, there continues to be uncertainty regarding their operation because of their significant political leverage.

**National Natural Parks (NNP).** Similar to the other institutions discussed so far in this section, after La Niña 2010–11 NNP created an internal group of climate change. However, there is no real measurement of the impacts of climate change on conservations areas. Most of the reports of impacts focus on people and infrastructure, but the impacts
on biodiversity, both species and ecosystems, are not measured. Regardless, the NNP has observed changes such as the displacement of some species, and according to their records, more than La Niña is El Niño or the dry phase of ENSO that causes significant damages in Colombia's conservation areas. Droughts can easily promote forest fires and massive displacement of species in search of water. In the case of increased rainfall, although the National Parks are populated, there is far less density compared to cities and municipalities; thus, there is less exposure to floods and landslides.

For the NNP, the interaction with the other national and regional stakeholders in the context of post-La Niña 2010–11 has given the institution the insight necessary to shift its institutional architecture to accommodate the new agenda of climate change. The participation of the NNP in the development of national policies for climate change and TACC Colombia has contributed to this learning process. Nevertheless, in comparison to the CARs, NNP has a much smaller budget as they rely heavily on the central government, and their ethos is more technical than political. The head of the NNP, as well as the heads of the 59 parks, are technical staff. This scheme means that the incorporation of an adaptation agenda within NNP is taking place at a slower pace, with less political and financial resources for the recently created climate change group. Coupled with the lack of a monitoring system to account for the impacts of climate change on biodiversity, the NPP leaves the climate change agenda behind other more pressuring issues such as the long-awaited agrarian reform in Colombia10.

**Urban Environmental Authorities.** Given the impact of urban populations on environmental sustainability, Law 99 of 1993 created urban environmental authorities for cities with populations of more than one million people. In Colombia, the cities with urban environmental authorities are Bogotá, Medellín, Cali, Barranquilla, Cartagena and Santa Marta. The environmental concerns of the rest of Colombia’s 1,122 municipalities are under the authority of the corresponding CAR.

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10 The Colombian agrarian reform has been a much contested and strategic issue for the solution of problems affecting the country for years such as rural violence, forced displacement, unemployment, poverty and drug trafficking (Franco Cañas & De los Ríos Carmenado, 2011, p. 93) The protected areas under the jurisdiction of NNP have been primary sites for many of these conflicts, long before the creation of NNP itself.
After La Niña 2010–11, the Ministry of Environment requested the six urban environmental authorities to incorporate climate change into development planning. This measure was part of the ministry's effort to territorialise climate change actions. To have these local plans developed would be an indicator of success, as established by Colombia's commitments with its INDCs. However, the management capacity and resources of the local authorities are varied. Bogotá's local authority, the Secretary of Environment (partner in TACC Colombia), has a far larger budget than CAR Cundinamarca, the regional environmental authority (also a partner in TACC Colombia). By 2014 when TACC Colombia ended, Cundinamarca had an estimated population of 2.7 million while Bogotá's population was estimated over eight million (IDEAM et al., 2014a).

The urban environmental authorities also have jurisdictional conflicts with the CARs and the NNP, and their boundaries of action are often blurred. In the same way as the CARs, the directors of these urban authorities are political figures, and they are struggling to meet the requirements of the new agenda of climate change for which they have had to hire consultants. Usually, "public officials and bureaucrats do not have the time to learn, and their day to day is spent on the doing" (P7, personal communication, 14 April 2016). Within urban environmental authorities, research consultants are in charge of knowledge production as the politics of their corresponding administrations seize all the time of internal staff members.

Two other stakeholders that are not part of the SINA but that hold a significant stake in Colombia's efforts for dealing with climate change are the Department of National Planning and the National Unit for Disaster Risk Management. The latter emerged as a response to La Niña 2010–11; thus, it will be discussed in section 6.3.

**Department of National Planning (DNP).** Chapter Five explains how during La Niña 2010–11, with substantial impacts on many of Colombia's economic sectors—transport, housing, energy, health and agriculture—the National Council for Social and Economic Policy (CONPES) developed an institutional strategy for the articulation of policies and actions for climate change in Colombia. This strategy was CONPES 3700, with the
primary goal of framing climate change as a matter of social and economic development. As the coordinator of CONPES, DNP strengthened its identity as the leader of the economic and social components of the triad of sustainable development: social, economic and environmental. This renewed leadership role gave the DNP more agency for changing Colombia's institutional architecture. DNP has a sub direction for sustainable environmental development. After la Niña 2010–11, it was this division the one in charge of leading the development of Colombia's National Plan for Adaptation while the National Policy for Adaptation was assigned to the MADS. The National Plan for Adaptation was the first official instrument in Colombia to deal with climate change at a national level, which gave DNP agency to be the first official body to frame climate change as a matter of development.

Through the reshaping of DNP's identity, Colombia's central government officialised the framing of climate change, specifically adaptation, as an essential component of development. Having the technical branch of the national government for policy development lead the institutional strategy for the articulation of climate change efforts in Colombia, consolidated the establishment of climate change management as a new mandate for development.

6.1.2. A technocracy of adaptation

The previous section explains how, with the framing of climate change adaptation as a response to La Niña 2010–11, Colombia's governmental institutions for environment and development ought to start internal processes of learning and knowledge production in regards to this 'new' phenomenon. Although the ENSO phenomena have been a constant in the history of climate variability in Colombia, it was not until the scale, and the impacts of La Niña stirred the country that Colombia's institutionality and governance schemes acknowledged that beyond an environmental issue, climate change entailed a hazard for development as a whole. However, this is a relatively small group of institutions. Not surprisingly, several of the 75 interviewees have worked in more than one of these organisations now dealing formally with climate change.

These government bodies have the authority for developing and incorporating the CCA agenda in Colombia. This authority also puts them in charge of knowledge production for
adaptation. Discussing this authority in terms of a technocracy of adaptation serves to point out that the production of knowledge is entangled with decision-making authority. This co-production is a particular feature of CCA in Colombia. As mentioned earlier in the chapter, Colombia's role in the international negotiations of the UNFCCC is that of a leader for incorporating adaptation into the national commitments and, additionally, for financial sources to be available for developing countries.

However, while it has been up to governmental bodies to lead the production of knowledge for adaptation, government officials are mostly engaged with managerial activities. Hence, the time for research and (scientific and technical) knowledge production is limited if at all. As a result, there has been a surge of consultants or experts for adaptation. Often, the international funding available for adaptation actions reaches these experts first, for purposes of knowledge development and planning, but adaptation actions are seldom achieved:

"We need to reduce the corruption in regards to the funding from international cooperation to deal with climate change because it is not reaching the territories. They (the funds) are in the hands of experts who charge substantial sums. However, what they deliver are workshops, and that is not adaptation. We have to understand that we cannot achieve adaptation unless the regions undertake long-term policies towards organising their territories, so climate change does not have that great an impact" (P57, personal communication, 07 June 2016).

Former government staff are starting many of these new consultancies. In the case of the national policy for climate change, the MADS had to issue a request for proposal in order for a third party to conduct the research to draft the policy. The MADS's climate change office is not only new but understaffed, and none of the professionals has the time to carry out this type of work. Most of them are young and have degrees related to climate change issues, but the day-to-day of the division ties their hands. The consultancy firms are also relatively new but with experience in policy-making and engaging with the international policy guidance for climate change (i.e., the IPCC ARs). Thus, the role of the expert is emerging from a policy background instead of an academic or scientific field.

In this process of knowledge production, it is noteworthy to observe the dynamics between the academia and the research community that produce knowledge to inform policy and the government bodies that filter that knowledge to shape policies. Some of this study's interviewees, working in the fields of meteorology and climatology, emphasised how it is problematic, mostly among policymakers, the confusion between
climate change and climate variability because the latter requires immediate action. For meteorologists, La Niña is an event of climate variability, not climate change. While climate change requires the statistical study of weather patterns over long periods (30-years the shortest possible), climate variability, like the ENSO phenomena, is measured over shorter periods (IPCC, 2018a). However, on the other hand, when questioned about the difference between climate change and climate variability, policymakers point out that the difference does not matter, as the responses are the same. It is about dealing with climate-related hazards, and the IPCC defines adaptation as a response to both (IPCC, 2018a).

According to one of the meteorologists interviewed by this study, it is evident that there is a technocratic elite that has privileged access to the sources of funding and the routes to get to them (P57, personal communication, 07 June 2016). Regardless, in 2010 the Department of National Planning (DNP) had to turn to the academia (social sciences scholars instead of natural sciences) for guidance to develop the National Adaptation Plan as the first official instrument for adaptation in Colombia. The DNP hired academics as consultants to draft the conceptual framework of the National Adaptation Plan.

The field of climatology and meteorology is yet to advance in Colombia. There are few professionals qualified to run climate models following the methodologies suggested by the IPCC. As mentioned earlier in the chapter, one of the goals of the National Institute of Hydrology, Meteorology and Environmental Studies (IDEAM), through their pioneering project INAP, was to provide scholarships for postgraduate meteorology studies in Colombia.

Climate change scenarios are generally used as the primary tool to build a knowledge base to assess vulnerability to climate change. In Colombia, only IDEAM and the National University of Colombia (UNAL) have the equipment and the professionals trained to run climatic models. However, and specifically with the case of TACC Colombia, it is mainly the outputs of IDEAM that government authorities regard as the most reliable to serve as the basis for adaptation. The position of IDEAM as the official advisor of the central government sets the institution on a privileged position from which to produce knowledge. Although both IDEAM and UNAL have representatives in the IPCC, IDEAM is the country's official delegate for the IPCC. Meanwhile, the head of the meteorological research at UNAL is part of the body of national researchers producing
knowledge in the different components of the IPCC assessment reports.

A significant amount of outputs from the co-production of knowledge and politics in the context of the governmental bodies are normative frameworks for adaptation: policies, plans, and manuals of implementation. Rather than actions, the expert role is for now limited to the planning and thinking of adaptation, and there are far fewer examples of actual adaptation practices.

Although the government has led the production of expert knowledge, government bodies also acknowledge the value of experiential knowledge coming from the ground, from the communities that for years have experienced the effects of climate-related events. Nonetheless, the process is top-down in the sense that government staff are in charge of extracting this knowledge from the communities instead of engaging with them for decision-making. Furthermore, planning in Colombia tends to be short-term as the periods of elected mayors and governors are four years long, and they cannot be immediately re-elected. However, much technical staff remain in their posts regardless of the changes in administration. Therefore, it is the technical more than the political level that holds a better ground for the incorporation of adaptation into planning instruments.

6.1.3. CCA vis-à-vis DRM

Perhaps the central debate in the making of identities for CCA in Colombia is that of defining the role of adaptation vis-à-vis the field of Disaster Risk Management (DRM). DRM in Colombia, as already mentioned, has had a leading position in Latin America. Over the last 30 years, the Colombian government has enabled significant changes in the normative and institutional frameworks for managing disasters following the tragedy of the town of Armero in 1985 (Campos Garcia et al., 2011). In that year, the eruption of a nearby volcano produced enormous lahars that destroyed the town of Armero along with more than 25,000 of its inhabitants. Besides volcanic hazards, the DRM bodies in Colombia have also dealt with weather-related events, mostly flooding and landslides during periods of heavy rains. However, disaster risk bodies rarely linked these series of events to climate change. It was not until La Niña 2010–11 that the Colombian government and the media attributed the extensive disaster to climate change and its influence on ENSO phenomena (i.e., increased intensity and frequency).
Therefore, with the development of new normative and institutional frameworks for climate change adaptation parallel to those of DRM, there seems to be a clash of social roles: what is it that CCA does differently or in addition to DRM? Although it would seem evident that they should work together, there are barriers to action.

Although the President of Colombia defined La Niña 2010–11 as "the worst disaster in the history of the country", it was not the National System for Disaster Preparedness and Response that received the brunt of his criticisms but the regional environmental authorities (CARs). In addition to the central government's discontent with the CARs, discussed earlier, the positioning of the CARs as the primary culprits also shows the framing of climate change, in the first instance, as an environmental issue. Environmental hazards were amongst other hazards dealt with by the DRM system, such as those of technological origin or human non-intentional origin. Despite the existence of a National System for Disaster Preparedness and Response, there was no national law in place nor a specific entity or institution to be held accountable for disaster management.

Therefore, after La Niña 2010–11, the central government hastened to materialise an existing initiative that allowed advancing from a focus on disaster preparedness and response to a more holistic conceptualisation of disaster risk. It was then that the principles of risk knowledge and risk reduction entered the scheme of DRM. Risk knowledge, based on the lessons learnt from La Niña 2010–11, aims to develop systems for the evaluation and analysis of risk while risk reduction focuses on the mainstreaming of risk management into territorial and development planning.

Before La Niña 2010–11, because of the long history of DRM in Colombia, most municipalities had already included risk management into their planning instruments, as it is legally binding to do so. Colombian professionals working in the field of DRM argue that municipalities already have the experience of dealing with risk. These professionals regard this experience as a necessary starting point to develop climate change policies. In other words, CCA must learn from DRM. After La Niña, there were more resources allocated to DRM, and the Colombian government developed a new National Policy for Disaster Risk Management alongside new institutions. Under the new principles of risk knowledge and risk reduction, the idea is that CCA can share with DRM its knowledge on climate change hazards. For other disaster risk professionals, the issue is about managing climate-related risks, whether attributed to climate change or not:
"I started to work with adaptation issues six or seven years ago. From then on, I have had it clear: the thing is about climatic risks, the rest is redundant, unfortunately" (P75, personal communication, 07 July 2016).

Although the Colombian government recognises that there should be synergies between DRM and CCA, there are different institutional and normative arrangements for each field. To propose a policy for climate change that interferes in the terrains of DRM is a bold attempt. CONPES 3700, the institutional strategy for the articulation of policies and actions for climate change in Colombia, states that there should be synergies not only with disaster risk but also with environmental management and land use planning (DNP, 2011). However, this can render a separate climate change agenda redundant. One staff member of the Ministry of Environment offered:

"There is a climate change office and a climate change group within the ministry, but a big part of what we do is to strengthen land-use planning, disaster risk management, sustainable production, conservation of protected areas, watersheds, water resources […] we do not do anything climatic in the end, and that is a bit confusing" (P20, personal communication, 03 May 2016).

The conception of risk is another way to see co-production in action. For a researcher working at a local university, there is a big mistake in trying to apply the equation of risk from the DRM field (Risk = Hazard x Vulnerability) to climate change adaptation. This scholar states that this equation is for extreme events, and climate change is also about slow, gradual change. While resilience is for extreme events, adaptation entails long-term changes. This academic is working on a research project, drawing from the fields of meteorology and sociology, evaluating the connection between communities, their territories and the climate as an alternative approach to adaptation:

"I propose that we re-evaluate all those adaptation plans that have been developed. There is activism related to climate change that has prompted the creation of instruments so that governments can be seen as active. But this activism is motivated not by real and conscious knowledge of the problem but for the interest in the abundant funding that is now available" (P57, personal communication, 07 June 2016).

For other interviewees, working in the field of DRM, there is no real difference between CCA and DRM. Risk related to extreme weather events might make adaptation seem like a separate agenda. However, if an expected reduction of coral reefs is also perceived as a risk that ultimately affects human populations, then DRM and CCA are aiming for the same thing. According to these professionals, the best way to approach adaptation is from DRM. When the latter is framed as anticipated and strategic practices based on a sound
understanding of risk, then it is very much like adaptation. According to one of the interviewed DRM professionals, the 2012 IPCC Special Report on Managing the Risks of Extreme Events and Disasters to Advance Climate Change Adaptation (SREX) states that the problem is risk. Similar to the IPCC AR5, the SREX states that both CCA and DRM can reduce exposure and vulnerability to weather and climate events:

"SREX is an attempt to join two communities, DRM and CCA. The SREX states that risk is the determinant factor. Even though we can more or less know what is going to happen with the hazards, the focus has to be on vulnerability, and that was clearly stated in the AR5. The idea was to try and ground the IPCC's approach to public policy and decision-making. If risk is understood not only in terms of disasters but as cross-cutting to development, then there is no sustainability if we do not manage risk effectively" (P53, personal communication, 02 June 2016).

As the concept of disaster management has evolved and developed focusing on disaster risk reduction, the shift from emergency response to a matter of development has placed it very close and in parallel with adaptation:

"Adaptation can be seen as sustainable risk reduction. Risk reduction is about reducing the possible impacts, but if I also focus on a development approach that manages to avoid those risks, then I am talking about adaptation" (P17, personal communication, 28 April 2018).

6.2. The making of discourses

Climate change as a policy agenda is a novel phenomenon. As such, it has called for the production of new languages and definitions to tackle the problem. These new languages and definitions enable new discourses that, exercised in practice, can lead to new structures of scientific and social authority. The mainstream discourse of climate change as the biggest threat to humanity introduced by international bodies such as the UN has prompted the creation of an international agenda that relies on new scientific knowledge and innovative policy solutions.

In Colombia, it was the influence of international agendas and Colombia's diplomacy efforts that enabled the framing of La Niña within the realm of climate change. Due to the considerable losses in livelihoods and infrastructure, the Colombian government had to make a statement placing climate change management as a mandate for sustainable development, following the recommendations of the UN.
These discourses or frameworks provide a persuasive argument for action (or inaction). Currently, climate change management in Colombia—whether through CCA or mitigation—remains very much the discourse of development professionals, not of everyday citizens. The CCA discourse has many forms depending on the sector or institution in charge of adaptation. It also depends on where, when and how adaptation actions are developed. Various of the discourses drawn from this study's primary data coincide with the scholarly work reviewed in Chapter Two. In Colombia, CCA can be framed as abidance or conformity, as a global/local/urban, as ecosystem-based or community-based, as vulnerability reduction, as transformative, as an issue of development, as a matter of social learning, as territorial or sectorial, and as intrinsic to water security.

6.2.1. CCA as conformism

Often, when development professionals intend to work with communities under the label of adaptation, the response is a negative one. The word adaptation can imply abidance or conformity to the status quo. The leader of an adaptation project in a Colombian rural area stated:

"Coming with the word adaptation can be counterproductive because people interpret adaptation as resignation or conformism, and we have had that reaction in many places. They claim, 'What do you mean adapting if we are not responsible for this!'" (P59, personal communication, 08 June 2016).

The member of a research institute working with communities in a northern area of Colombia offered:

"The local community is rooted in the land. In my perception, adaptation sounds as rootlessness. When you tell me that I have to adapt, you immediately take me out of my comfort zone. Currently, we are working on a project of wetlands restoration in La Mojana, the area with the largest concentration of wetlands in Colombia. They lost everything during La Niña 2010–11. They remained underwater for three years because the National Adaptation Fund came and built three dams as an adaptation measure. So, for them, adaptation is associated with infrastructures made out of concrete that they deeply despise" (P58, personal communication, 08 June 2016).

There is increasing awareness amongst Colombian development professionals that, for now, the word adaptation remains consigned exclusively in the discourses of
development planning and its related bureaucracy. They know that in order to tackle problems locally, the entry point is through the day to day priorities, ranging from watershed management to food security, including all of those areas where climate change poses risks to livelihoods. However, for funding purposes, the term adaptation must remain. Most funding sources, both local and international, respond to the ethos of the international agenda. In this way, adaptation has become a 'label' for many development efforts advanced under different discourses.

6.2.2. CCA as a label

 Colombian development professionals are increasingly using adaptation as an umbrella term for a vast array of initiatives. A conservation project for an endangered species in the Colombian Andes can be purposely framed under the umbrella of adaptation through a persuasive discourse. The ecosystem where a particular species lives is going through a process of degradation to which climate change is adding pressure. Long-standing practices such as watershed management and land use planning begin to fall under the umbrella of CCA because climate change is framed as an imminent stressor for water availability and the provision of adequate land for development. Regarding the National Pilot Project for Climate Change Adaptation (INAP), one of the park managers stated that:

"I saw a presentation made by the project that mentioned climate change components affecting the community. It sounded like all the problems were due to climate change, and I think that is not the case. They exaggerated. They wanted for the community to engage with the concept, but it was more of an imposition" (P21, personal communication, 04 May 2016)

Despite the UN discourse on climate change as the biggest threat to development, this is not how it is perceived on the ground. Communities and citizens everywhere that have suffered historical environmental degradation are more concerned with other historical stressors such as lack of land titles, struggles with housing and service provision. Climate change, though an imminent stressor, is hardly materialised in their everyday struggles. Whether heavy rain periods or watershed degradation are consequences of climate change, climate variability or of climatic factors in general, it does not represent any difference to what people have to do to deal with it. After all, people have already been adapting to these and other hazards:
"CCA is structured around other approaches: ecological restoration, environmental education and water governance. The thing is that now you include the element of climate and it gives it strength because it is like the missing link of the argument. I have been relating to it in terms of water governance, and in that way, it concerns current issues" (P24, personal communication, 06 May 2016).

The discourses, result of labelling adaptation for initiatives not previously known as such, are then serving to accommodate projects under CCA to appeal for international or local funding. The co-production of knowledge and politics through the making of discourses is explicit here when existing technical knowledge on environmental issues and its derived projects are lodged under the umbrella of CCA, which holds a strong backbone for local and global policymaking.

6.2.3. CCA as global/local/urban

While top-down CCA approaches follow the global guidelines of the IPCC and the UNFCCC, these guidelines state that adaptation is mainly local (see Chapter One). The effects of global warming are felt locally, and hence responses lie on local actors. This requirement of being local by a global discourse poses a challenge to framing CCA into a discourse of locality. As explained in the previous section, it is the pressure of an international agenda what is prompting local actions. However, in practice, the discourse of the global threat of climate change does not reach local actors beyond the people working in development. Even within development professionals, it remains a confusing topic:

"Initially, it was about mitigation because it is clearer than adaptation, and the drivers are easier to identify. Understanding mitigation is easy. Adaptation is complicated; for me, it has always been a fuzzy topic. It is difficult to assign a certain issue to a climatic hazard because many hazards and variables are crossing at all times" (P70, personal communication, 21 June 2016)

Although the actions are local, Colombia's INDCs (Intended Nationally Determined Contributions), the main instrument for the UNFCCC agreements in terms of mitigation, include adaptation goals. One of them is to develop adaptation plans for 100% of Colombian territories by 2030. The inclusion of adaption goals into the INDCs is a result of Colombia's advocacy efforts, among other countries, for an increasing role of CCA into the global discussions, mainly after La Niña 2010–11. During COP21 in Paris, adaptation finally made its way into the agreement as opposed to the previous one, the
Kyoto protocol, that focused entirely on mitigation. However, there is disbelief in setting up this kind of local goals derived from a global frame:

"Many of the goals of the national development plan respond to international goals that are as absurd as assigning an x number to a topic: I want to protect 15,000 hectares of forests. Behind that, are the leading international goals, the SDGs. Hence in the national scale, it is about decision-making in the face of international challenges" (P58, personal communication, 08 June 2016).

A researcher in Colombia's policy development field regards the country's diplomacy efforts in climate change as a way to appeal to international funding, such as when gender became an international agenda put forward by the UN and the World Bank:

"I felt that because they (UNFCCC) created the Climate Change Fund and prioritised developing countries, there was going to be a lot of development funding available under climate change. So, policymakers saw it as an opportunity to focus on development projects towards climate change, just as was the case with gender. I think public policy in Colombia has been opportunistic rather than based on local needs." (P56, personal communication, 07 June 2016)

The discourse of CCA jumps between global precepts and local realities. Through the international CCA agenda, there is an attempt to define a global solution to a global threat. However, it remains a global solution that is struggling to find echo locally beyond the planning field because it does not reach the realities on the ground. Such is the case in Colombia where, despite some attempts to materialise CCA projects, it remains a discourse of planning rather than practice.

The discourse of adaptation as a local concern ties itself with the discourse of adaptation as urban. The literature review explains how cities rather than countries are taking climate change agendas forward. It was this trend that in 2008 had the United Nations Development Program UNDP established a partnership with sub-national governments (regions and cities) in developing countries for the project Territorial Approach to Climate Change TACC. The UNDP recognised that cities, regions and states have shown leadership and that they represent a link sufficiently close to people to integrate climate change projects into policy and planning.

In Colombia, sub-national governments did not play a significant role until after the Constitution of 1991. After this reform, the country initiated a process of decentralisation. Governors and city mayors were democratically elected. Before the new constitution, it was up to the governors—appointed by the central government—to designate mayors.
Main Colombian cities such as Bogotá, Medellín, Cali, Barranquilla, Cartagena and others have already taken steps forward in the development of climate change initiatives. In the case of Bogotá and Cundinamarca, this was under TACC Colombia.

6.2.4. Ecosystem-Based Adaptation

As mentioned earlier, there is a significant number of conservation and other ecosystem-related projects placed under the umbrella of adaptation. The adaptation literature refers to some of these as Ecosystem-Based Adaptation (EBA), that seeks to increase resilience and reduce vulnerability to help people adapt to climate change through ecosystem management activities (Mercer, Kelman, Alfthan, & Kurvits, 2012).

In Colombia, National Natural Parks (NNP) is one of the leading institutions for EBA. After the institutional change due to La Niña 2010–11, NNP had to change its discourse to frame some of their conservation actions as adaptation. When asked what the added value of the CCA agenda to the work of NNP is, a member of the institution stated that it has allowed them to learn more about the climate and its influence in their jurisdiction areas. Also, it has allowed them to monitor climatic events and their effects closer so NNP can develop vulnerability analyses and change their management plans accordingly. In Colombia, water provision is one of the central drivers for the definition of an area of conservation. A healthy ecosystem has increased probabilities to supply critical ecosystem services such as water provision.

The Humboldt Institute, another leader for EBA in Colombia, has also made changes to their research to accommodate CCA:

"We have just presented a project with some colleagues from Peru to evaluate whether some restoration projects that have already been implemented are responding to climate change. For example, to see if, after several years, there is enough carbon sequestration. Depending on that, we could say that restoration can be an adequate response" (P58, personal communication, 08 June 2016).

Another staff member of the Humboldt Institute, dealing directly with policy instead of research offers:

"We think that there is a need for the articulation of the IPCC with the IPBES (The Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services). We have an innovative vision where we see biodiversity as a solution,
as a response to climate change. We see the topic of adaptation in terms of socio-ecosystems. If we think about the solutions from the territory outwards, we think we can have results" (P40, personal communication, 20 May 2016).

Colombia's branch of Conservation International (CI) has been very active in promoting the CCA agenda, ever since it was part of the National Pilot Project for Climate Change Adaptation. For CI, the most vulnerable ecosystems in Colombia are high mountains, coastal and marine ecosystems.

The discourse of Ecosystem-Based Adaptation as a response to climate change shows how the authorities and researchers for conservation actions in Colombia have had to 'adapt' their language to one that follows an international discourse. Past and existing projects and practices are now under the umbrella of adaptation. However, the discourse of EBA has also increased awareness that reducing the vulnerability of ecosystems has a close tie to CCA and that services such as water provision are now even more at risk due to global warming.

6.2.5. CCA as vulnerability reduction

In Colombia, vulnerability reduction is one of the central discourses in CCA research and policy. After La Niña 2010–11, the discourse of vulnerability reduction became mainstream as necessary to adapt to climate change. Whether ecosystems, people or economic sectors, practically every adaptation effort requires a vulnerability analysis so actions can target its reduction.

Although there is general agreement in regards to the need for vulnerability analysis, it is also highly contested in terms of what it entails and the methodologies used to develop it. For some of the interviewees, following the IPCC's methodologies is very confusing, and it requires hiring experts or consultants to translate them in lay terms. Deciding the object of analysis is also not straightforward. At times it depends on the stakeholders and their primary concerns, or on the methodology that the consultant uses. Meanwhile, for a disaster risk professional, the emphasis on vulnerability analyses is highly overestimated:

"For me, it is a cliché; it has never been the real question. Now everybody is talking about resilience. They changed clichés without knowing precisely what is it that they are talking about. Vulnerability analysis is but one way to get the answers, and I am very critical of it. There are other ways. You do not have to do
a vulnerability analysis in the Colombian Pacific coast to know that coastal erosion is a critical issue" (P75, personal communication, 07 July 2016).

The co-production of knowledge and politics is materialised here in a tool called vulnerability analysis. The discourse for the need of vulnerability assessments comes from the international CCA agenda, and although there is no question on the fact that vulnerability needs targeting, as much as the term adaptation itself, the concept and its identification— as presented by the tools offered by the IPCC—is not easily grasped.

6.2.6. CCA as an issue of development

Looking at the many different accounts of the agenda of CCA, and the discourse of the need to incorporate it in all areas of development, adaptation holds strong parallelisms with sustainable development. In Colombia, after La Niña 2010–11, adaptation began to be incorporated in policy and planning. The central and local governments, as well as the sectors, began to include it on their planning tools.

In the case of Bogotá during TACC Colombia, Bogotá Humana included adaptation concerns in the city's development plan. This development plan had 'A territory that deals with climate change and organises itself around water' as one of its three main guidelines (Bogotá's Secretary of Planning, 2015). A former staff of this administration commented:

"Our discussion focused on the city model. What kind of city do we want? Where should the city grow? What has to be avoided in the city? Where is not suitable to develop? If we continue to constrain the river watersheds, which are the natural flooding areas, no technology can deal with that. Nature has memory, and that leads you to think that the strongest point of integration is the territory and the way to occupy it. If the poorest continue to move towards the most vulnerable areas, as it happened in 2011 on the west bank of Bogotá River, those are adaptation challenges. If we know we are going to have flooding, either we change the infrastructure, we relocate, or maybe we need both" (P65, personal communication, 15 June 2016).

In advancing CCA as a development path, some warn of the dangers of it being permeated by 'environmentalism'. The criticism being that environmental policies lack leverage as compared to other development policies. However, at the same time, "adaptation is about identifying the environmental liabilities that result from development" (P43, personal communication, 23 May 2016).
Hoyos et al. (2013) estimated the economic impact from La Niña 2010–11 in Colombia to be up to US$7.8 billion. Transport, housing, energy, health and agriculture were the sectors that had the highest losses. After La Niña, Colombia's Department of National Planning (DNP) implemented an economic study that followed the Stern Review (2006) closely. DNP's economic study (CEPAL et al., 2014) worked with scenarios and envisioned how rural poverty could increase if adaptation actions are overstepped. More than defining the trajectory of the country's GDP, the study used scenarios to provide informed possibilities from which to develop public policies. By acknowledging climate change as an economic concern and not merely an environmental issue, the DNP defined its discourse for dealing with climate change. Namely, "adaptation must be integral and transversal in development planning, facing the challenge of producing knowledge that enables informed decision-making to achieve planned and cost-effective adaptation" (CEPAL et al., 2014, p. 7).

The Ministry of Environment concludes that in order to deal with climate change, there needs to be a coordinated effort between sectors and territories. When a specific region is advancing planning for climate change, this needs to be in tandem with the respective economic sectors that have a stake in the region.

Adaptation as both sectorial and territorial aligns itself to the Colombian government discourse for development planning. Regardless, in practice, planning for the sectors occurs very removed from territorial or urban planning. While the ministries are in charge of policy development, it is up to the regions to implement them or to act accordingly. These are not only two different moments but also two different scales of action. The sectorial actions remain very distant from the realities on the ground because their primary objective is the sustainability of an economic sector at a national scale.

As mentioned earlier in his chapter, out of the 16 Colombian ministries or sectors, the MADS holds one of the smallest budgets. Therefore, there is little leverage for this ministry to influence the actions of Colombian territories through the regional environmental authorities, and even less the sectors. Adaptation as sectorial and territorial reveals a social order in Colombia characterised by an administrative scheme that divides the country into sectors and territories. Even after the decentralisation process initiated in 1991 through the new constitution, policy development remains a task of the central government.
After La Niña 2020-2011, the new framing of the impacts of climate change as a threat to development reveals a change in the co-production of discourses. Knowledge previously tied to international discourses had now the power to frame the responses of national governments in the face of weather-related disasters. Therefore, there is a new social order that puts CCA as a critical task to achieve sustainable development.

6.2.7. CCA as transformation

In contrast with adaptation understood as submitting to the status quo within local communities, some scholars and policymakers see adaptation as a way to challenge it. The anthropogenic nature of global warming is a clear call to transform the economic model. This call must be accompanied by a cultural transformation as well, acknowledging the responsibilities of our current actions and its consequences for the future. In regards to the development model that Mayor Gustavo Petro proposed for Bogotá (Bogotá's Secretary of Planning, 2015), one of his collaborators offered:

"We have to have political commitments because climate change is a political issue. Hence the political agenda has to change, but it does not change due to the prevailing economic model. What Petro was doing was very interesting, but nobody understood it. Politically he was buried, but his agenda had international recognition: zero waste, moving away from fossil fuels [...] but if the media, the politicians and the society are not convinced, then there is sabotage. Industrialised countries forget that the comfort they live in is the product of the immigrants that are ill-regarded. And if that model does not change and the civilisation does not evolve, then we cannot talk about adaptation or mitigation" (P12, personal communication, 22 April 2016).

6.2.8. Community-Based Adaptation

While in Colombia, most initiatives for adaptation remain at the government and planning level there is recognition of the need for learning from the ground, from experiential rather than expert knowledge. The staff and professionals that work closer to the ground are very aware that although the agenda of CCA is new, the practice of adaptation has a long history amongst the people that historically have been subject to the consequences of a changing climate for their livelihoods. A member of the Humboldt Institute explains how their projects of adaptation have a knowledge management component. Recognising that communities have been adapting to climate change without labelling it as such,
knowledge management seeks to learn from these initiatives in order to strengthen them where needed and take them forward:

"The institutions have to recognise the role of the communities. That is why we do not tell them what to do; we receive the knowledge they have. I think we have to recognise the knowledge system of the communities so they can promote a more inclusive language" (P40, personal communication, 20 May 2016).

As described earlier, the office of Conservation International in Colombia works on Ecosystem-Based Adaptation, and it sees it as complementary to Community-Based Adaptation (CBA), as most of the areas destined for conservation in Colombia are populated. Moreover, the services provided by these ecosystems are intrinsic to the livelihood of these communities.

Practices for CBA in Colombia recognise the need for communities to have a more significant role in the governance of their territories. Given the short-term orientation of planning, for an effective mainstreaming of CCA to happen beyond the discourse of development, there needs to be an increased agency for communities in planning and practice. Nonetheless, the discourse of CBA is embedded in Colombian planning bureaucracy, which is trying to avoid another La Niña disaster. Although framed as a climate change consequence, weather- or climate-related events remain but another driver of risk for communities.

6.2.9. CCA as a sociological, anthropological approach

In Colombia, a sociological and anthropological approach to adaptation is far from the mainstream discourse of the government authorities and more akin to academic researchers that work closely with communities. While the central and local governments are concerned with developing instruments and guides for implementation, researchers on the ground find that such instruments are indifferent to communities that have other ways to relate to the climate. An academic researcher working with climate change from an anthropological approach offers:

"The indigenous communities have a different relationship with the climate as a baseline for their food production, and this is different for the black communities. While the indigenous people tend to live in the forests, the black communities live in coastal areas. So as a measure of adaptation, I am not going to work with them by doing workshops. We even found that they do not need our help as they are
already very aware of how to adapt to climate variability" (P57, personal communication, 07 June 2016).

In the case of cities, the same scholar states that it is necessary to question how urban settings relate to the climate. If 70% of the city relies on the service sector, then an overall look at the service sector might render boundaries beyond the city. Adaptation measures must examine these interactions in order to incorporate the whole of the territory to achieve appropriation by the locals. In this regard, the leader of a conservation project in the páramo ecosystems states that:

"The social is cross-cutting to the technical and the institutional. That is how we have developed this project, with a social appropriation approach. It is a different way to work with public funding. Most of this funding does not generate processes, but it is limited to projects. We assume the challenge of generating a process with a 30-year project. We have to look for ways so it can continue. Many governmental institutions do not generate processes but projects because they have to meet the timeline of a specific government period" (P50, personal communication, 01 June 2016).

Another scholar working in the field of adaptation from a sociological perspective talks of the reluctance within Colombia's planning and policy institutionality to acknowledge how climate change risks are tied to the overall construction of risk:

"We have to recognise that there is homeostasis between development and adaptation and this implies acknowledging that risk accumulation in the territories is based on political factors: conflict, illegal mining and other violent activities, not only in physical terms but also in a cultural and economic sense. However, this would imply very high costs and logistic problems, so they (the planning authorities) prefer to circumscribe adaptation to a technical issue" (P3, personal communication, 05 April 2016).

At the same time that the institutionality in Colombia has engaged in a most needed effort to mainstream adaptation concerns into development planning, the institutional discourse rejects the political drivers of adaptation risk. As the scholar above argued, ignoring these drivers render its solutions as technical. Looking at the role of climate change in the construction of risk alongside other deterrents to sustainable development can offer a more holistic and promising approach to adaptation.

6.2.10. Climate change or climate variability?

Scientific arguments increasingly favour the influence of climate change on the frequency
and intensity of extreme weather events such as those experienced during ENSO phenomena. However, the decision to frame La Niña 2010–11 as a consequence of climate change was political. The extensive disaster that Colombia experienced called for an institutional overturn that found in the climate change agenda the best ally. Events such as La Niña 2010–11 demonstrate painfully and in an escalating fashion, the chronic faults in development planning (or lack of) at national, regional and urban scales: large numbers of people living in flood-prone areas urbanised despite risk assessments; high poverty levels and risk exposure in rural areas; institutions created as political bounties that neglect their ethos as environmental authorities; increasing poverty in urban areas; inefficient service infrastructures, among others.

Except for the meteorologists interviewed for this study, there is general agreement among the interviewees that the difference between climate change and climate variability does not influence policy development. Solutions to either aim for the same thing: reducing risk in the face of weather-related hazards, and this involves a thorough evaluation of the approach to development.

Nonetheless, framing climate change as climate variability aids in bringing to the present the uncertainty of the future. Climate change scenarios are calculated for 30-year periods at a time, and no scale of governance in Colombia plans development for such a long term. However, when talking about extreme weather events such as La Niña 2010–11, the effects are felt and suffered in the present, urging the need to address the liabilities of development.

### 6.2.11. CCA as water sustainability

According to the IPCC (2014), changes in precipitation and melting snow and ice are altering hydrological systems and affecting water resources in terms of quantity and quality. While Colombia is awash with water resources, these are unequally distributed, and over 35% of the population is exposed to water vulnerability. This vulnerability is composed of several factors such as decreased precipitation, water pollution, ecosystem degradation and lack of adequate service infrastructure.

During the El Niño phase of the ENSO phenomena, Colombia faces water shortages. Decreased precipitation brings the country's natural and artificial storage infrastructures
to critically low levels. These shortages affect not only water provision for household and industry consumption but also energy supply, which Colombia mostly produces through hydro generation plants. On the other hand, during La Niña, flooding and landslides become the most significant threats.

In terms of natural or green infrastructures for water provision, the páramo ecosystems are responsible for capturing, storing and providing water for a high percentage of Colombians and most of Capital Region. Páramos are mountainous regions located between the permanent snowline and the forest line. They act as sponges that capture rain and atmospheric water, store it and then release it into the water streams. In short, páramos are responsible for regulating the country's water cycle. Colombia has half of the world's páramos, occupying 1.4% of the country's total area (Ministry of Environment, 2020) (Figure 13). As high mountainous ecosystems, páramos are negatively affected by increases in temperature and decreased precipitation, and both expected to become more severe as a consequence of global warming (see Table 3, Chapter Five).

In Bogotá, *Acueducto*—the city-run water utility company—is running *Páramos*, a 30-year project for the páramos of Chingaza, Sumapaz and Guerrero, the three páramos with areas in the territory of Capital Region. The project aims to guarantee the sustainability of water provision for the city and its surrounding region. Besides climate change impacts, páramos are also exposed to deforestation, land-use change and illegal mining, among others. Hence, this project is not labelled as an adaptation initiative. Instead, it is defined as a project for the conservation and management of strategic ecosystems to guarantee water sustainability in the region.

*Acueducto*’s project is but one of several others working in these ecosystems. One of them is a project run by the climate change division of the Ministry of Environment. This project is framed as a CCA initiative to guarantee the water provision for Bogotá. Another project, run by Conservation International, also works towards adaptation in the páramos of Chingaza, Sumapaz and Guerrero. This páramo complex provides water for Bogotá as well as for a considerable portion of its surrounding regions.
In these three projects, the activities are very similar, even though not all of them are 'adaptation' initiatives. Acknowledging that climate change is but another stressor for the páramo ecosystem, these projects intend to trigger long-term change by co-producing knowledge with the local communities on land use planning, sustainable agriculture, ecosystem conservation and capacity building.

The use of the discourse of water sustainability as a measure of adaptation depends on the stakeholders involved. While there is no doubt that climate change is exacerbating water vulnerability in Colombia, framing water security projects as measures of adaptation is ultimately a political decision. The making of a discourse of adaptation as water sustainability presents itself following the funding sources, the projects' goals and the roles assigned to the leaders of the projects.

**Figure 13.** Páramo areas in Colombia and in Capital Region. Source: Adapted from UNDP Colombia (2013) and the Ministry of Environment (2020)
6.3. The making of institutions

This research understands institutions both as synonymous with organisations or entities with legal status and as mechanisms of social order. In Colombia, La Niña 2010–11 prompted the reshaping of existing identities, and the emergence of discourses to deal with a ‘new’ phenomenon. Before la Niña, Colombia's commitment to mitigation actions and international agendas had already been in place since 1997 with the country's adherence to the Kyoto Protocol. However, as it has been discussed so far, it was La Niña 2010–11 that turn adaptation into a critical concern for Colombia's development planning.

6.3.1. Colombia's national systems for environment, risk and climate change management

Colombia's national systems can be understood as organisations and as codes of conduct. These systems are spaces or frameworks for the coordination of activities of the various organisations, public and private, that share common goals and that work with similar issues of development. The systems also embody the normative and legislative frameworks that apply for the corresponding field of action. In Colombia, three systems deal directly or indirectly with climate change: The National Environmental System (SINA), the National System for Disaster Risk Management (SNGRD) and the National System for Climate Change (SISCLIMA). The SINA, created in 1993 with Law 99, embodies a new environmental institutionality in Colombia. The SNGRD and the SISCLIMA were created as part of the state's response to La Niña 2010–11 (Figure 14).

Although their internal governance structures and membership differ, the three systems have representatives from all the 16 ministries or sectors in Colombia and representatives from all the Colombian territories or local governments. They also have representatives from the National Planning Department. All of these representatives come from the corresponding sectorial or territorial subdivisions. For the SINA, the environmental secretaries or departments; for the SNGRD, the sub-divisions that deal with risk management; and for the SISCLIMA, the ones that explicitly deal with climate change. The number of delegates depends on the technical and financial resources of each entity. Following, we take a closer look at the way each system approaches climate change.
The National Environmental System, SINA. Section 6.1. explains how La Niña 2010–11 incited the reshaping of the social roles of the members of the SINA that participated in TACC Colombia. The SINA integrates the work of the different actors at the public, private and non-governmental level that deal with environmental issues in Colombia. Before La Niña, adaptation concerns were not mainstream within the system. Climate change activities were practically limited to one of the members of SINA, the National Institute of Hydrology, Meteorology and Environmental Studies. The institute prepares Colombia's national communications to the UNFCCC, and by the time of La Niña, it had also developed some adaptation pilots. After La Niña, all member organisations of SINA, starting by its leader the Ministry of Environment, responded with the creation of internal divisions or departments specifically created to deal with climate change.

Currently, the bulk of the responsibility for climate change actions is on the regional environmental authorities also members of the SINA. They are responsible for ensuring that the territories adhere to the national climate change policy and for the mainstreaming of climate change in territorial development and land use planning.

All other members of SINA, as environmental entities, are looking at how to incorporate adaptation through the reframing of existing and future projects such as ecosystem conservation, water management and sustainable agriculture under the umbrella of
The National System for Disaster Risk Management, SNGRD. Created by Law 1523 of 2012, the SNGRD aims to develop processes of risk management so it can offer protection to the population to improve the livelihoods, the safety and the wellbeing of all Colombian communities (see National Congress, 2012). Law 1523 also led the development of the National Policy for Disaster Management, which defined three principles for managing risk in Colombia: risk knowledge, risk reduction and disaster management or response. Before La Niña, there was already a national system for disaster management in place, but it focused on disaster preparedness and response, and it operated within the Ministry of Internal Affairs. The newly created SNGRD reached a similar stance to a ministry, overseen directly by the President of Colombia. For its coordination, the SNGRD created a new institution: The National Unit for Disaster Management (UNGRD).

The UNGRD manages a big budget, and it is in charge of implementing the National Policy for Disaster Management in Colombia. To do so, the UNGRD created internal divisions following the three principles for risk management outlined by the national policy: risk knowledge, risk reduction and disaster response. The mainstreaming of adaptation within the UNGRD is carried out by the divisions of risk knowledge—climate change and climate variability scenarios—and risk reduction—adaptation actions.

The internal compartmentalisation of the UNGRD as a way of implementing the National Policy for Disaster Management has ignited much scepticism among the professionals that work in the field of risk management and of planning more in general:

"They immediately tried to model the institutional structure based on a concept, and those are two completely different things. One thing is the concept of risk, and the other is to regulate human beings in public institutions. The UNGRD is responsible for coordinating the system, and it has to focus on those three elements, which is incredibly difficult. The head of the UNGRD comes from a background of disaster response, and it is challenging that he can encompass all of those development issues that are essential for risk reduction. Ultimately, the UNGRD is going to place greater focus on disaster response and less on risk knowledge and reduction because they do not have the capacity, the numbers or the budget. For example, they cannot mess it up and allow human fatalities after floods just because they are focusing on a policy for territorial development" (P49, personal communication, 27 May 2016).
Law 1523 conceptualised risk management following three principles (risk knowledge, risk reduction and disaster response), and these principles were made sub-divisions within the UNGRD. The attempt to incorporate the policy for risk management under one single institution illustrates how power is attributed within Colombia's institutional framework for development planning. While the discourse of mainstreaming climate change management into development is sound and agreed upon, the making of the UNGRD portrays how mainstreaming can be 'captured' under a single organisation that as the result of a national disaster, gained relevance for planning and development in Colombia.

The National System for Climate Change, SISCLIMA. Created by decree in 2016, the SISCLIMA coordinates, articulates, formulates, monitors and evaluates policies, rules, strategies, plans, programs, projects, actions and measures related to adaptation to climate change and mitigation of GHGs, through collaboration between public, private and non-profit entities (Colombia's Ministry of Environment, 2016).

The SISCLIMA assembles representatives from the local governments, environmental authorities and all other territorial levels under the new Climate Change Nodes (section 6.1.1.). However, actions are carried out by cities and environmental entities independently of the node, which several of the interviewees for this research perceive as a redundant figure.

Although the other two systems, SINA and SNGRD are already incorporating CCA, it is the SISCLIMA's ultimate goal to oversee the mainstreaming of climate change in Colombia's development planning. Though the goals of each system appear differentiated and precise, in practice it is difficult to discern whether an ecosystem conservation project (SINA) could at some point also be deemed as a measure of risk reduction (SNGRD) or as an adaptation effort (SISCLIMA). Additionally, the institutions within each system and the staff are often the same, frequently coinciding under the scope of the three systems:

"When they said that they had to create a SISCLIMA, I said excuse me? There is a SINA, a SNGRD and now they are going to invent another one with departmental committees and plans. If only we understood that this is multidisciplinary, inter-sectorial and cross-cutting to development […] what we see is that they want to create sectors, organisms" (P53, personal communication, 02 June 2016)
The creation of the three different systems for the governance of adaptation is a clear example of how climate risk knowledge is co-produced with elements of social order. Before La Niña 2020-2011, Colombia had the SINA for environmental management. After La Niña, two more governance schemes emerged: for risk management the SNGRD, and for climate change management the SISCLIMA. The Colombian government is trying to address the new challenges brought about by climate change through the creation of new institutions with apparently differentiated goals, but that overlap in terms of addressing adaptation.

6.3.2. Normative frameworks

In this section, institutions are understood as mechanisms of social order such as laws, policies and plans. Although before La Niña, there had been attempts for adaptation actions in Colombia, these were isolated initiatives carried out mainly by research and scientific communities in the environmental field (i.e., the INAP project). The devastating effects of La Niña manifested the many loopholes in Colombia's development model, particularly the ones related to the ways of occupying the territory. However, instead of past and current mistakes, these loopholes were attributed to climate change being a 'new' threat to development. As explained in Chapter Five, the President kick-started an institutional change through the National Council for Social and Economic Policy, CONPES.

Since its inception in 1967, the CONPES has released over 4,000 CONPES documents setting out the guidelines for policies and plans of action in regards to specific development issues. After La Niña 2010–11, the CONPES developed an institutional strategy for the articulation of policies and actions in climate change, document CONPES 3700. Approved in July 2011, the CONPES 3700 officially endorsed that climate change management was critical for Colombia's development planning. Besides the SISCLIMA, CONPES 3700 endorsed the creation of The National Climate Change Adaptation Plan, The National Policy for Disaster Risk Management and the National Climate Change Policy.

CONPES 3700. Colombia's institutional strategy for the articulation of policies and
actions on climate change, the CONPES 3700, outlined two main approaches: one institutional and one financial. The institutional aimed for the mainstreaming of climate change concerns for development planning at sectoral and at territorial level. With this in mind, it recommended the creation of a national adaptation plan and a national climate change policy to go alongside two existing mitigation initiatives: a low-carbon development strategy and a national strategy for reducing emissions from deforestation and degradation (DNP, 2011).

The CONPES 3700 financial strategy aimed to take advantage of the availability of international funding for climate change projects. It also emphasised the increasing demand of international markets for products and services with low-carbon footprints. For the coordination of all these initiatives, the CONPES 3700 sanctioned the figure of the SISCLIMA. The document emphasised the need to extend climate change concerns beyond the environmental sector (SINA) if it was to be articulated as a matter of social and economic development too.

By framing climate change as an issue of social and economic development, and not only environmental, the Colombian government moved towards a new social order that regards climate change as a threat to overall development.

National Climate Change Adaptation Plan, PNACC. From 2011 to 2016, Colombia's National Planning Department (DNP) led the development of the National Climate Change Adaptation Plan (PNACC), in coordination with the National Unit for Disaster Management, The Ministry of Environment and the National Institute of Hydrology, Meteorology and Environmental Studies. The DNP hired a scholar from the field of Sociology to develop the conceptual framework of the PNACC. Up until 2011, this academic was one of few researchers that had published on adaptation in Colombia. The framework developed by this scholar identified three essential components for climate change management: Environmental Management, Risk Management and Development Management. According to this approach, development management should aim to increase the adaptive capacities of communities to the impacts of climate change. However, the final document of the PNACC placed sustainable development at the centre, and Environmental Management, Risk Management and Climate Change Management as its supporting entities (see DNP, 2012) (Figure 15).
According to the scholar that developed the conceptual framework, this change responded to the approach of the DNP, and of most governmental institutions, that frame adaptation as an economic issue and as achieved through technical solutions (P3, personal communication, 05 April 2016). Instead, the scholar's approach highlighted the need to re-evaluate development approaches in order to achieve adaptation, and for the inclusion of community voices in the development of the PNACC and other similar instruments.

![Figure 15](image.png)

**Figure 15.** Colombia's National Climate Change Adaptation Plan: from the conceptual to the final framework. Source: Author

On the other hand, the policymakers that adjusted the framework argued that it was not possible to build a guideline for including adaptation into the planning of sectors and territories, the goal of the PNACC, following the scholar's framework (P49, personal communication, 27 May 2016). For these policymakers, the PNACC had to follow the guidelines stated in CONPES 3700 for the mainstreaming of adaptation into development. The new social order suggested by the PNACC is here in the figure of a new sustainable development model that incorporates risk, environment and climate change planning.

In practice, however, technical staff working in the three fields are finding trouble in this shared space. The three national systems discussed before, SINA (environment), SNGRD (risk) and SISCLIMA (climate change) appear, at the same time, as an expected consequence and as a contradiction of this new model that incorporates the three
elements. Ironically, it is an attempt to 'incorporate by compartmentalising' development. In bigger cities, there are considerable technical and policy discussions when trying to incorporate the three elements. While in smaller cities or towns, the lack of resources, both technical and financial, make this incorporation a burden for local planning authorities.

National Policy for Disaster Risk Management. Sanctioned by Law 1523 in 2012, the National Policy for Disaster Risk Management was conceived to advance DRM in Colombia that up until then had focused on disaster response. The central government hired a DRM scholar to draft the new policy. The idea was to emphasise risk as a driving factor for development planning. As explained earlier, the policy defined three principles or processes: risk knowledge, risk reduction and disaster response. Risk knowledge is about the identification of risk scenarios, risk analysis, evaluation, monitoring and the communication of these findings. Risk reduction is intended to diminish current risk drivers and to avoid the emergence of new risks in the territory. Disaster response is about preparedness and post-disaster recovery. These three principles come from a conception of risk beyond disasters that, as with the PNACC, demands a new development model:

"I have said many times that risk management is not an institution; it is not a discipline. Risk management is a development strategy, and in consequence, it has to be carried out by everyone involved in development. If that is not the case, then there is no risk management" (P53, personal communication, 02 June 2016).

However, as explained earlier with the case of the National Unit for Disaster Risk Management, there is an attempt to embody the three principles under one single institution. Similar to the previous case with the National Plan for CCA, this has proven to be difficult when translated into practice as development continues to be materialised in several disciplines that make the mainstreaming of development principles a problematic task.

*National Climate Change Policy, PNCC.* The Ministry of Environment led the development of Colombia's National Climate Change Policy (PNCC) from 2014 to 2016. The PNCC intends to integrate mitigation and adaptation actions through five main strategies, all of them under the principles of low-carbon and climate-resilient development: rural development, urban development, energy development, strategic
infrastructure and ecosystem conservation and management (see Ministry of Environment, 2016).

The Ministry of Environment commissioned a private consultancy firm in policymaking for the development of the PNCC as a participatory process. Both sectors and territories participated in its elaboration: representatives from the ministries, the National Planning Department, local governments, research organisations, unions and citizens in general. Under the guise of the PNCC, what were separate adaptations plans for cities or sectors, and the national initiatives for mitigation had to be integrated into coordinated proposals.

The PNCC follows the guidelines of Colombia's National Development Plan, namely the 'Green Growth' policy, which seeks to break the link between economic growth and GHGs emissions. The leader of the PNCC, the Ministry of Environment, plays a pivotal role in the UNFCCC negotiations and its role is that of bridging the international and the local climate change agendas. As a result, the development model proposed by the PNCC responds to the international agenda that advocates for integrating mitigation and adaptation: 'low-carbon and climate-resilient development' (see Chapter Two, section 2.1.4.).

6.3.3. Three different development models to incorporate adaptation

In addition to three governance schemes for adaptation, the making of institutions in Colombia has rendered different approaches for the incorporation of adaptation into development planning. The National CCA plan advocates for a model that integrates Environmental, Risk and Climate Change Management. The National Policy for Disaster Risk Management advocates for a model of development based on the principle of risk as a holistic concept to advance development. Lastly, the National Climate Change Policy promotes a development model that follows an international agenda, even though it was carried out as a participatory process with local stakeholders (Figure 16).

There is a conceptual or technical-base that underpins each approach (knowledge), and a form of delivery for each model (politics). When a municipality in Colombia is required to mainstream climate change into development planning, there is no straightforward way to do this. Local actions are more the result of the capacities and resources of the stakeholders involved that of the different models from the central government to
6.4. Conclusions

The extensive disaster that Colombia experimented with La Niña 2010–11 called for the government to adjust its institutions. Led by the President, an institutional upturn triggered the making and reshaping of new social roles or identities, the emergence of discourses or framings and the emergence of institutions to tackle this new hazard.

The making of identities in Colombia as a result of La Niña is observed in three moments. First, the reshaping of social roles within existing institutions, which had to accommodate or change their internal architectures to include climate change concerns. Second, the emergence of a technocracy of adaptation. Climate change, framed as a new threat, required the production of new knowledge that has taken place mainly at the government level and through independent consultants. Third, the debate between the social roles of CCA and DRM and how they must combine efforts or even how they are at many times, in practice, the same thing.

The making of discourses is reflected in the many framings and approaches for adaptation that populate the Colombian institutions. It depends on where, when and how adaptation actions are undertaken. CCA can then be framed as abidance or conformity, as a
global/local/urban issue, as ecosystem-based or community-based, as vulnerability reduction, as transformative, as an issue of development, as a matter of social learning, or as intrinsic to water sustainability.

The making of institutions is understood in terms of the emergence of new organisations and new codes of conduct. In the former case, three different governance schemes overlap actors and efforts to address adaptation. In the latter, the emergence of three different models for adaptation planning. All these approaches, accompanied and supported by discourses and identities, not only overlap but also reflect how existing institutional arrangements influence the mainstreaming of CCA into planning and governance in Colombia and make it a complicated task.
7. The co-production of knowledge and politics for climate change adaptation in Capital Region and Bogotá: the regional and the urban scale

The lens of inherent co-production reveals how the institutional shift triggered by La Niña 2010–11 in Colombia, also had echoes at regional and urban scales. Focusing on TACC Colombia, this chapter introduces the making of representations alongside identities, discourses and institutions, and provides empirical evidence of how this co-production manifested itself in the planning and governance of Bogotá and Capital Region.

Section 7.1 explores the making of identities through the particular roles the partners of TACC Colombia had within the project, the identity of TACC Colombia itself and the identity of the expert. Section 7.2 looks at the making of three discourses that characterised TACC Colombia: CCA as determinant for regional development, as sustainable water governance and as intrinsic to risk management. Section 7.3 explores the making of three representations or outputs of TACC Colombia: climate change scenarios, vulnerability assessments and the portfolio of adaptation projects. Section 7.4 looks exclusively at the making of institutions at urban scale during the administration of Bogotá Humana: the city's development plan, the district plan for DRM and CCA and the creation of the District Institute for Risk Management and Climate Change. The findings in this chapter together with the findings in Chapter Six, serve to offer a reflection in Section 7.5 of the role of international bodies in local (national, regional and urban) processes of co-production. Finally, section 7.6 offers some conclusions.

7.1. The making of identities

Chapter Six examines the reshaping of the identities of the national partners of TACC Colombia in the context of La Niña 2010–11. The impacts of the disaster pressed these institutions to re-evaluate their roles within and beyond Colombia's environmental institutionality created by Law 99 in 1993. This section further examines the role of these national institutions in the context of TACC Colombia, together with the regional and the urban partners, in two instances. First, the identities of the eleven partners in the broader governance scheme of Capital Region, and within TACC Colombia. Second, the making
of the identity of TACC Colombia itself as a platform for the production of scientific knowledge, and as a political stage for decision-making.

7.1.1. The identities of the partners within TACC Colombia

Between 2009 and 2014, when TACC Colombia took place, various changes influenced the development of the partnership. During this time, there were three different mayors in Bogotá, two governors in Cundinamarca and two different directors of the regional environmental authorities. The Institute of Hydrology, Meteorology and Environmental Studies (IDEAM) also had a shift in direction, and the coordination team changed entirely after its leader retired at the end of 2010. According to the concluding and final report of TACC Colombia (IDEAM et al., 2014a), the project prevailed throughout these various changes because of the technical staff, who remained in their posts committed with the project's outputs despite the changes in administration. The new heads of the city, the state and some of the other partner institutions continued the engagement with TACC Colombia, but not without changes to their approach and the level of institutional commitment.

**UNDP Colombia.** With TACC Colombia it was the first time that the UNDP country office participated in a project operating in the capital, even though its offices are located in Bogotá. As a result of the participation of UNDP Colombia in the project, and due to the novelty of working in the capital, after the culmination of TACC Colombia other local and regional stakeholders like Bogotá's Environmental Secretary and the Institute for Disaster Risk Management started to reach out to UNDP to develop other initiatives. UNDP Colombia had a representative in the directive committee of TACC Colombia, but it did not take part in the technical level. For the local partners of TACC Colombia, having the UNDP as a partner brought 'neutrality' and 'transparency' to the project. Moreover, alongside the impacts of La Niña 2010–11, the UNDP catalysed the collaboration amongst the partners. However, despite the transparency in the management of the project's resources, the UNDP's internal bureaucracy often delayed the recruitment of consultants and the approval and allocation of the budget for the different outputs of TACC Colombia.
Before TACC Colombia, UNDP Colombia had developed other adaptation initiatives in rural areas, but they did not have built-in technical expertise within the institution. The technical staff are hired according to the projects that UNDP advances at the time, and they are hired on a fixed-term contract basis. The permanent staff are kept at a minimum, and they are mainly in charge of administrative duties. Such was the case with TACC Colombia for which UNDP Colombia led the recruitment process of the members of the coordination team as well as the consultants that aided the technical staff from the partner institutions in the six working groups.

The participation of UNDP Colombia was limited to these administrative tasks, but the coordination team of TACC Colombia expected a closer collaboration in technical terms from the Down to Earth: TACC initiative. They felt they were left alone in defining the route of the project, never clearly understanding what the international initiative intended at the regional level:

"It would have been excellent to have more direct coordination from the beginning with the people within the UNDP that designed the TACC initiative. We had to have started with those people. However, we had to read everything and learn. We looked at the IPCC documents, the theory, and kind of digested the information, but it would have been better to have a strategic direction from the authors of TACC" (P5, personal communication, 07 April 2016).

The role of the UNDP Colombia in TACC Colombia as the neutral and transparent administrator resembles the public image that the UN holds in Colombia, but it also reveals a lack of trust amongst local stakeholders. As one of the key international stakeholders setting guidelines for development, there is much respect for the work of all the UN divisions. However, the experience of TACC Colombia shows how gaps can still be left behind when trying to materialise international agendas at the local level. According to the professional working in the coordination team of TACC Colombia (quoted above), the UN aims to kick-start processes in developing countries, and it was a catalyst to advance TACC Colombia. However, once the UN participation ceases, so do the projects.

According to the UNDP's 2014 final evaluation report of TACC Colombia, the project provided valuable technical information for decision-making regarding adaptation and mitigation in Capital Region, and it generated significant capacities among the participant government staff. However, the report also acknowledged that without the participation of the UNDP as a facilitator, the partnership of TACC Colombia would likely lose
momentum and thus, a lack of implementation of activities on the ground (Otter & Escobar, 2014).

The National Institute for Hydrology, Meteorology and Environmental Studies (IDEAM) was responsible for leading the technical component of TACC Colombia. All the project's outputs had to be reviewed and approved by the technical staff and the director of the IDEAM. This process was meant to guarantee that the outputs of the consultants and the working groups had scientific rigour. The director of IDEAM had a seat in the directive committee of TACC Colombia and the institute also worked in close collaboration with the coordination committee. IDEAM's staff did not take part directly in the working groups, but they provided technical advice and information.

As explained in Chapter Five and by the time TACC Colombia started, IDEAM was already a pioneer in adaptation and mitigation in Colombia. Through its previous experiences, IDEAM had consolidated its technical expertise for developing climate change scenarios and thus was regarded by the partnership as the focal point for the implementation of adaptation projects in Colombia.

Before TACC Colombia, IDEAM had already collaborated with UNDP in adaptation projects aimed at influencing the territorial development of rural areas. However, unlike the other projects where the funding came entirely from international sources, for TACC Colombia IDEAM committed both technical and financial resources.

Despite its previous experiences though, TACC Colombia was the first time that IDEAM had to think of climate change scenarios in regional terms. Before, the scenarios were built at a national scale as a requisite for the 1st and 2nd National Communications to the UNFCCC. Hence, IDEAM had to reduce the scale to Capital Region. The regional scale was a great learning laboratory for IDEAM. As a consequence, and in the context of the 3rd National Communication released in 2017, IDEAM produced, for the first time, climate change scenarios for all the 32 Colombian states, alongside regional inventories for GHGs emissions. Although the UNFCCC does not require regional but national scenarios, IDEAM was following a request from the central government to provide scientific inputs for the regions to advance climate change initiatives. It followed then that other Colombian regions started to reach out to IDEAM for assisting their regional
The making of the identity of IDEAM is here revealed as twofold. Its current role as the chief authority for climate change in Colombia made it the technical leader of TACC Colombia and for some of the interviewees, the 'owner' of the project. At the same time, IDEAM's role in TACC Colombia strengthened its expert national identity and reshaped it to that of a technical ally for regional governments.

**Bogotá Mayor's Office.** The participation of Bogotá Mayor's office in TACC Colombia, although it remained for the entire duration of the project, changed gears with Bogotá Humana. The administration of Bogotá Humana was the most powerful partner in the project in terms of resources, both technical and financial. This is why it committed four of its bodies, as explained in Chapter Five: The Secretary of Planning, the Secretary of Environment, the Institute for Risk Management and Climate Change (IDIGER) and Acueducto.

The Secretary of Planning had in TACC Colombia, a strategic ally to put forward Bogotá Humana's development model, which had a component of climate change and water security at its core. Thus, the head of the secretary was the representative of Mayor Gustavo Petro in the directive committee of TACC Colombia. For the Secretary of Environment and IDIGER, the database put together by TACC Colombia set the baseline for the District Plan for Risk Management and Climate Change. The director of the recently created IDIGER reached out to the project as an opportunity for technical and political reasons. Working with other key stakeholders in the governance of Bogotá and the region was a great platform to promote the mission of the nascent institution.

Finally, Acueducto joined the project when the former head of the coordination team of TACC Colombia accepted a position in Acueducto as the leader of its environmental management division. TACC Colombia was generating climate change scenarios for the areas of the páramos, the largest source of water for the capital and hence the largest supplier of 'raw material' for the water utility. Non-surprisingly, Acueducto is one of the principal landowners in the páramos as well as in other conservation areas. Additionally, and similar to IDIGER, Acueducto regarded TACC Colombia as a political platform to mediate existing tensions with some of the project's partners and to engage with others.
with whom it had not related in the past.

Bogotá’s partner entities in TACC Colombia reshaped their social roles under *Bogotá Humana*. These entities modified their goals towards a new and unified vision for Bogotá that put adaptation to climate change at the centre of its development model. The four participating institutions took advantage of the processes of knowledge production and the political platform of TACC Colombia to serve their own institutional needs.

**The Government of Cundinamarca.** TACC Colombia provided a space for the mediation of the tense relationships between the Mayor of Bogotá and the Governor of Cundinamarca. There were conflicts concerning water provision as most of the areas of páramos that provide water for the region are located outside Bogotá but within Cundinamarca. However, it is Bogotá that has the highest water demand while the people and the authorities in the rural areas of Cundinamarca are responsible for the conservation of these ecosystems.

During TACC Colombia, the government of Cundinamarca contributed with an extensive cartographic database as well as with inventories of climate-related disasters in the region. With the compilation of results of TACC Colombia, Cundinamarca included climate change adaptation in the development plan of the state as well as in the planning instruments for the future ordering its territory.

As mentioned in Chapter Five, a political driver more than a technical one was behind the participation of the government of Cundinamarca in TACC Colombia. Although the knowledge and the information produced by the project was essential for the planning instruments of the state, it was the need to further the process of regional integration that had the state as the leading promoter and an active participant in TACC Colombia. The government of Cundinamarca sought to strengthen its social role as the authority of the state by securing its linkages with Bogotá to guarantee an integrated regional development.

**CAR Cundinamarca.** Chapter Five explains how, after the impacts of La Niña 2010–11, the central government allocated a significant responsibility for the damages to the
regional environmental authorities. The intensified levels of precipitation that provoked the extensive flooding in Colombia were but another hazard to which watersheds are exposed. Deforestation and land-use change had already weakened the stability of the banks of the rivers and other water streams. The regional authorities are in charge of overseeing the environmental management and the territorial development of Colombia's watersheds, and for the central government, they had failed to fulfil their duties.

The platform of TACC Colombia served as a space for negotiation given that in the past, there had been clashes between the Government of Cundinamarca and CAR Cundinamarca. In addition to the political conflicts, described in Chapter Five, between the heads of the institutions coming from different political parties, the Government of Cundinamarca is in charge of aiding the municipalities in the development of their territorial development plans—POTs—but CAR Cundinamarca oversees the management of the watersheds through an instrument called POMCAs—watershed ordering and management plans. The latter have hierarchy over the POTs, as watersheds often expand beyond political boundaries. This hierarchy means that in this case, in specific, CAR Cundinamarca's decision-making authority can overrule decisions made by the government of the state.

TACC Colombia helped to include adaptation needs in the POMCAs, and it also liaised internally with the DRM staff of CAR Cundinamarca. As with the other partners, CAR Cundinamarca reshaped its social role to better prepare for the increased intensity and frequency of extreme weather phenomena. Within the jurisdiction of CAR Cundinamarca, which extends beyond the state of Cundinamarca, the component of adaptation started to be mainstreamed alongside DRM. The information produced and gathered in the context of TACC Colombia was vital to include the climate change variable in the risk management plans of the watersheds under its jurisdiction.

CAR Cundinamarca adjusted its role in the context of TACC Colombia to consolidate adaptation within its institutional architecture and its planning instruments. However, the CAR's identity in Capital Region also brought to the table historical clashes with the Government of Cundinamarca. These clashes were mainly reflected with the development of the climate change scenarios. When it joined TACC Colombia, CAR CAR Cundinamarca was already working with the National University of Colombia in the development of climate change scenarios for the region and this caused conflict with
the representatives from the Government of Cundinamarca and with the other partners of TACC Colombia. This conflict will be explained in detail later in section 7.3., the making of representations.

Corpoguavio. In technical terms, it was more what Corpoguavio had to benefit than contribute to TACC Colombia. The technical staff were particularly interested in finding out what the potential of climate change knowledge was to strengthen risk management. Corpoguavio used the findings of TACC Colombia to feed their POMCAs—watershed planning and management plans—, but it did not find the answer it was looking for in terms of an intersection between CCA and DRM. The member of staff of Corpoguavio interviewed by this study commented that there is no clarity as to where responsibilities lie in terms of disaster management and adaptation, and actions tend to overlap (P16, personal communication, 27 April 2016).

In this case, though, Corpoguavio gained relevance in the context of TACC Colombia as a small stakeholder that had the opportunity to participate in the first pilot project for a regional climate change plan in Colombia. Compared to the other partners, Corpoguavio lacked leverage, despite the importance of its jurisdiction not only for the region but for the country. The social role of Corpoguavio was that of a ‘weaker’ partner, politically and technically, but a partner nevertheless as part of the environmental governance of Capital Region.

The Humboldt Institute. The coordination team of TACC Colombia knocked on the doors of the Humboldt Institute well after the other partners. The institute is the leading authority in Colombia in terms of biodiversity research, and it develops projects throughout Colombia, including Capital Region. As such, the institute is a crucial stakeholder in the environmental governance of the region. When the Humboldt joined the project, it found, however, that the goals and objectives were already advanced and they did not have much of a say in it. This lack of participation was discouraging for the Humboldt. Thus, the institute did not commit firmly with TACC Colombia. Also, the partnership only involved government institutions in contrast to the Humboldt, which works mostly and closely with local communities.
However, some of the Humboldt's technical staff and director participated in TACC Colombia's working groups and directive committee, respectively. Moreover, the institute contributed with some funding, but its agenda on biodiversity conservation found little echo amongst the other partners for whom biodiversity concerns were not a priority. The main agenda of the project was to include climate change concerns into the development instruments of Capital Region in terms of planning and territorial development.

However, the Humboldt did benefit from the process. The institute had the opportunity to interact with the Ministry of Environment in the context of TACC Colombia. As a result, the Humboldt could channel some resources for developing a project with indigenous communities in the eastern area of Colombia. Additionally, before TACC Colombia ended, one staff from the Humboldt Institute in the working group for adaptation was hired to coordinate the adaptation component in Colombia's 3rd communication to the UNFCCC.

Although a prominent stakeholder for environmental governance in Colombia and the region, the Humboldt institute did not find space within TACC Colombia to display its social role for the conservation of biodiversity in Capital Region. However, it did benefit in the sense of the know-how on climate change and in establishing linkages with other partners for additional projects. In this case, the process of knowledge production did not leverage the political commitment of the Humboldt, but it was more the political platform what harnessed benefits for the institution.

**National Natural Parks (NNP).** The participation of NNP in TACC Colombia was a response to the call TACC Colombia's coordination team, but also because of the will of the leader of the nascent division of climate change within NNP to learn about the potential risk of climate change for the national parks. The operational budget of NNP did not allow the institution to contribute financial resources to the project, but it did contribute with the participation of technical staff.

According to one staff of NNP, the most significant benefit for the institution was that climate change became integral to its mission. Before participating in TACC Colombia, NNP saw its work as limited to the conservation of protected areas. However, the interlocution with the other partners and visions helped NNP to reinforce the role of its...
nascent division for CCA as more crosscutting to the goals of NNP.

NNP, as the environmental authority overseeing the páramo ecosystems in the parks of Chingaza and Sumapaz, needed the climate change scenarios that TACC Colombia was developing for Capital Region. For NNP, these scenarios served to understand the level of exposure of the páramos to climate change and climate variability. TACC Colombia emphasised strongly on the need for this information to influence the management of these ecosystems, strategic for water provision in Capital Region. Alongside NNP, the governance of the páramos is shared with Acueducto—Bogotá's water utility, The Government of Cundinamarca, various municipalities in Cundinamarca and CAR Cundinamarca. The confluence of these stakeholders in TACC Colombia meant that each institution had to commit current and future resources in their planning instruments to guarantee the sustainability of the páramos, regardless changes in agendas whenever the heads of the institutions changed. During TACC Colombia, there was an attempt for these stakeholders to come together under another figure, but the initiative lost strength once TACC Colombia finished.

The social role of NNP was reshaped in two ways. First, it gave the institution more relevance as a strategic stakeholder given the emphasis that TACC Colombia placed on the conservation of the páramos ecosystems in the parks of Chingaza and Sumapaz. Second, not only the knowledge produced but also the discussions taking place in the working groups of TACC Colombia gave the staff of NNP a more definite sense of the level of exposure and the possible impacts of climate change in their areas of jurisdiction.

The Ministry of Environment (MADS) and The National Planning Department (DNP). More than partners, MADS and DNP collaborated with TACC Colombia as advisors. As national-level institutions, their participation in the discussion tables of the project had two purposes. First, TACC Colombia was the first regional initiative for climate change in Colombia, and at that moment, the MADS and the DNP were working on the National Climate Change Plan. TACC Colombia then allowed both institutions to learn form a regional initiative. Second, TACC Colombia wanted to align itself with national-level processes and with the general guidelines that the MADS and the DNP were developing for dealing with climate change in Colombia.
The presence of the MADS and the DNP also gave TACC Colombia political relevance. It reinforced the role of TACC Colombia as an innovative scheme and as a strategic political platform to strengthen the governance of Capital Region, with more than 30% of Colombia's GDP (IDEAM et al., 2014a). The social role of these two national institutions was then as guarantors of the relevance of TACC Colombia not only for the region but also for Colombia more in general. The knowledge produced at a regional scale served to leverage the national initiatives to incorporate adaptation to climate change into development planning and climate governance.

7.1.2. The identity of TACC Colombia

In addition to the making of the individual identities of the partner institutions, the identity of TACC Colombia itself was two-fold. The project defined itself as a platform for political interaction and knowledge production. TACC Colombia aimed to develop a plan for climate change in Capital Region by producing relevant knowledge to inform policy-making. As such, it was an exceptional opportunity to reconcile knowledge production and policy-making under the same roof. This two-fold identity was evident in TACC Colombia's governance structure (see Figure 11, Chapter Five), with clearly defined political and technical levels.

The directive committee was the political level, formed by the leaders of the partner institutions. The working groups formed the technical level, comprised of the technical staff of the partner institutions. Finally, the coordination unit managed the relationship between these two levels and coordinated the whole process.

The two-fold identity of TACC Colombia was also evident in the leadership of the project. Although it was a UNDP-led initiative that had Capital Region as a pilot due to the lobbying efforts of the governments of Cundinamarca and Bogotá, it was IDEAM—a technical institution—that led the project in practice.

Although the partners of the project were part of the governance of Capital Region, it was the first time that all these governmental institutions came together for the same purpose. Several factors facilitated the confluence of these otherwise disengaged partners: the presence of the UNDP as a neutral and reputed institution; the impacts of La Niña 2010–11 in Capital Region; the fact that all but one of the partners had offices in Bogotá
(Corpoguavio), were most of the meetings and the work took place; and finally, the persuasive discourse of TACC Colombia's coordination team to summon the institutions.

In terms of knowledge production, TACC Colombia served two roles: as a knowledge database and as knowledge producer. In this sense, the value of TACC Colombia for Capital Region had no precedent. It was the first time that the information from risk management, water resources management, conservation initiatives and territorial development was gathered so comprehensively for a single region. This vast knowledge base was facilitated by the fact that Capital Region has the largest concentration of weather monitoring stations in all of Colombia. TACC Colombia's wide-ranging database served to build climate change scenarios and vulnerability assessments with high-quality results.

As an institutional and political platform, TACC Colombia constituted an excellent opportunity to create linkages, mediate differences and propel other collaborative schemes beyond the project. It was a space for coordination to advance sustainable governance for Capital Region, acknowledging the strategic relevance of linking the development efforts of Bogotá and Cundinamarca. TACC Colombia also served to mediate the tense relationship between the Mayor of Bogotá and Governor of Cundinamarca due to conflicts for water provision and the increasing conurbation between Bogotá and adjacent municipalities in Cundinamarca. Additionally, in the context of TACC Colombia, both CCA and DRM managed to leverage political will. Up until La Niña 2010–11, these topics were very technical. With the concurrence of La Niña and TACC Colombia, the platform gave political status to these two fields in Capital Region.

However, this dual role—technical and political—presented some issues during its operation and for the outcomes of TACC Colombia. At the end of the project, it was not clear for the partners whether the technical and the political levels integrated effectively or whether the real value of TACC Colombia lied more forcefully on one or the other. For some of the partners, the value was the platform itself, the confluence of political stakeholders:

"TACC Colombia was not a book [referring to the final and concluding report IDEAM et al. (2014)]. It was a process. If you ask me at the end of the day, what is the climate change plan for Capital Region, yes there is a strategy and a portfolio of projects, but the key was not that. The key was the platform that was created,
the process. It was a way to build institutionality. With all the partners involved, and everyone participated" (P4, personal communication, 07 April 2016).

For other partners, the value was in the knowledge component:

"The richness of TACC Colombia was in the working groups. People loved to be able to see what was going to happen according to the scenarios and then they started to see the results and how much intensification we are going to have in temperature and precipitation and to see how vulnerable the conservation areas are, and of course, it was fascinating." (P2, personal communication, 01 April 2016)

As explained earlier in this chapter, TACC Colombia managed to continue despite the changes in the administrations of Bogotá and Cundinamarca. Although this could mean the establishment of an institutional platform, for several partners, the platform could not be possible without the involvement of the UNDP. After TACC Colombia ended, the platform disappeared:

"In one way or another, the project created a knowledge network, a network of stakeholders and acquaintances for knowledge exchange. However, that network has a short circuit. Once the process did not continue, you had to reach out individually to one of those actors that ended up as a friend, and you asked for their help with the information. At least now you identify pars in the other institutions" (P20, personal communication, 03 May 2016).

Other partners think TACC Colombia was very ambitious in the sense that it pretended to build governance when it should have limited its goal to that of providing training to governmental institutions. TACC Colombia chose to work with the permanent rather than temporary staff of the partner institutions because it wanted to secure the know-how. Although once TACC Colombia ended and several participant staff remained in their posts, with the change in the leadership of some institutions, so did climate change as a priority for development planning.

Another reason for the short circuit between the technical and the political level was a technocratic approach. According to one staff within UNDP Colombia:

"There were many differences in the technical level because there was a technocratic focus. If we had placed the region at the centre and not the technical concepts, the needs and the opportunities of the region […] It was not about conceptual or methodological differences but discussions on local and territorial development. I think that was the more difficult part and it was not understood" (P48, personal communication, 26 May 2016).

Others partners attribute the lack of connection between the technical and the political
level to a tendency in Colombia to base decision-making on particular interests rather than knowledge:

"So, I have two groups of people, the decision-makers and the technical people. I feel that in the country there is still a huge distance at this level. You develop the plan, but then it is not incorporated into territorial development because it goes against the interests of some councillors that want to develop certain areas" (P2, personal communication, 01 April 2016).

The 'short circuit' between the technical and the political level of TACC Colombia resulted in the lack of a cohesive initiative for Capital Region. However, TACC Colombia did serve the purpose of leveraging changes in the planning and policies of the partners in a different manner. Some more than others. In the case of Bogotá, TACC Colombia became a strategic ally for the vision of the city. For the Government of Cundinamarca and the regional environmental authorities, it increased awareness on the need to integrate the information of the models generated by TACC Colombia in their planning instruments. Unfortunately, in Colombia, there is a considerable distance between planning and delivering, and such was the case for most of the partners.

Despite the difficulties within the process, TACC Colombia became a model from which to learn and to be replicated. Because TACC Colombia started before La Niña 2010–11, Colombia's Institutional Strategy for Climate Change CONPES 3700 included the project as a role model for other regions to engage in similar initiatives.

By the time of the fieldwork in 2016, 11 states had started the development of regional plans for climate change based on the model of TACC Colombia. Though, given the characteristics of Capital Region, a close replication of the model seems unfeasible. Although Colombia initiated a decentralization scheme with the Constitution of 1991, the economic and political power of the country is still very much concentrated in Bogotá. The fact that both national and regional institutions coincide in Bogotá was very positive for TACC Colombia:

"You have a reduced version of Colombia in Bogotá, and people see in the capital the opportunity to realise their dreams." (P54, personal communication, 02 June 2016).

TACC Colombia was designed as the first phase of a process for strengthening the regional governance towards a sustainable future. However, the project did not consolidate a second phase, where the inclusion of other stakeholders from the public
sector and the civil society was supposed to happen. Once the project ended, it was
challenging to leverage the political will for securing technical and financial resources
for a second phase.

As both a political and as a technical initiative, TACC Colombia was an unprecedented
opportunity in the region to link knowledge and decision-making. Still, this proved to be
a dichotomy. As much as TACC Colombia provided a space of coordination, it did not
manage to serve Capital Region as a whole. The integrated plan for climate change for
Capital Region that the partnership developed was not adopted by any of the partner
institutions nor by Central Region (the new regional association scheme that replaced
Capital Region) once the project ended. It did, however, play the role of knowledge
database and political leverage for its partners but in a dispersed manner.

7.1.3. The identity of the expert

Chapter Six examines the emergence of a technocracy of adaptation where the making of
the identity of the expert is the result of framing climate change as a new threat to
development and of the framing of adaptation as a new agenda for development. Framed
in this way, adaptation planning requires the production of new knowledge; scientific
knowledge from the natural and the social sciences, but in the case of Colombia mostly
technical knowledge from professionals experienced in risk and environmental
management.

The making of the expert identity in the context of TACC Colombia can be examined in
two instances. First, the selection of the partners based not only on their strong technical
base but on their political leverage and decision-making authority for planning and
governance in Capital Region. Second, the recruitment and reinforcement of the expert
status of the consultants hired by TACC Colombia to help coordinate the partnership and
develop the products agreed by the partners.

Initially conceived as a two-stage process, TACC Colombia prioritised governmental
institutions to be first in line to learn and build up their expertise about climate change
and who, in a second stage, would share and implement this knowledge with municipal
authorities and communities in Capital Region. Consequently, the partners selected were
authorities from the environmental sector, disaster risk management and from planning
more in general.

The decision to include only government actors in the first stage of TACC Colombia contrasted with four of the other TACC pilot projects which TACC Colombia had the opportunity to share experiences with: Uruguay, Uganda, Perú and Nicaragua (Table 4).

In September 2013, the representatives from TACC Uganda travelled to Colombia to meet up with the partners of TACC Colombia and share experiences. In November of the same year, some members of TACC Colombia travelled to Uruguay to meet with the local partners, as well as with representatives from the pilots in Perú and Nicaragua. As Table 4 shows, TACC Colombia was the only pilot that included only governmental institutions. Uruguay, Uganda, Perú and Nicaragua included community participation and outputs, although Nicaragua less effectively.

**Table 4. TACC pilot projects in Colombia, Uruguay, Uganda, Perú and Nicaragua**

<table>
<thead>
<tr>
<th>Stakeholders involved in the TACC pilot</th>
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<tr>
<td>Colombia</td>
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<tr>
<td>Governmental institutions</td>
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<td>Cooperation agreements, working groups</td>
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<th>Products and Results</th>
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<tr>
<td>Colombia</td>
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<td>Technical (climate change profiles and vulnerability scenarios), and influence in territorial development and public policy.</td>
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Source: Adapted from IDEAM et al. (2014)
Notwithstanding their strong technical base, TACC Colombia recruited through UNDP Colombia—the administrative leader,—external consultants to form the coordination team and to assist each of the six working groups in developing the required outputs.

As mentioned in section 7.1.1., TACC Colombia had two different coordination teams. One from 2009 to the end of 2010, and the second one from 2012 until the end of the project in 2014. Thus, there is a gap of over a year during which TACC Colombia did not have a coordination team, but the partners kept working regardless. The leaders of the two coordination teams were selected based on their vast experience in consultancy with projects of international cooperation including the UN, experience in climate change projects at a smaller scale, and in general their knowledge of and experience with Colombia's environmental institutionality. Thus, at some point, they had previously engaged with various of the partners of TACC Colombia.

For the climate change scenarios, TACC Colombia enlisted the services of NASA, the National Aeronautics and Space Administration of the United States. Chapter Five explains how, in Colombia, there are two institutions with the technical capacity to generate climate change scenarios: IDEAM and Colombia's National University. The latter was not a partner in the project and IDEAM, the technical leader of TACC Colombia, saw the need to include NASA to guarantee scientific rigour for the regional-scale scenarios.

For the vulnerability assessment of Capital Region, TACC Colombia hired a local consultancy firm to help the working team follow the IPCC methodologies for assessing vulnerability to climate change. However, the results of this consultancy were not satisfactory for the partners, and TACC Colombia later hired the services of Colombia's branch of Conservation International. CI was selected based on its experience with the National Pilot Project for Climate Change Adaptation (INAP) (see Chapter Five, section 5.4.).

For the incorporation of climate-related hazards in the territorial development of Capital Region, TACC Colombia hired the services of a consultant with experience in policy-making for disaster risk management, and with a background from the academic and the public sector.

Regarding the portfolio of projects of adaptation and mitigation, TACC Colombia
employed professionals from an internal division of Bogotá’s Chamber of Commerce with experience in project development. This division had worked on clean energy and low-carbon initiatives with the private sector. Hence it was knowledgeable on mitigation. However, it had little knowledge on adaptation. To fill the gap, the private consultancy hired an expert in adaptation to lead the development of the adaptation portfolio. TACC Colombia considered the expertise and the position as a member of the private sector of Bogotá's Chamber of Commerce as pertinent to instil an element of neutrality and achieve agreement amongst the partners on the adaptation and mitigation measures to be prioritised for Capital Region.

Finally, towards the end of TACC Colombia in 2013, and parallel with the portfolio of projects, the partnership established a collaboration with a local university to develop a training programme. This training programme lasted four months, and TACC Colombia selected 47 of its technical staff to participate in the course. The partnership selected professionals who had permanent contracts with their institutions as a way to secure the know-how despite changes in administrations. During the course, the technical staff from TACC Colombia developed five proposals that later supported the portfolio of mitigation and adaptation projects for Capital Region.

Based on their experience with TACC Colombia and their interaction with the partners, many of these consultants went on to work with other projects for climate change in Colombia. In this sense, the consultants increased their knowledge base for climate change and reinforced their roles as experts in the field.

7.2. The making of discourses

This thesis has examined the emergence of discourses as compelling ways to frame adaptation in order to influence decision-making and knowledge production. As well as the central government approach to development and governance, La Niña 2010–11 also influenced the process of TACC Colombia by leveraging the political will of the existing partners and the participation of new ones. This increased leverage shaped the making of discourses in TACC Colombia. During the project, three core discourses dominated the discussions: adaptation as a determinant for territorial development, adaptation as sustainable water governance and adaptation as intrinsic to risk management. Although
similar discourses emerged at a national level, the process of their making was different in TACC Colombia.

7.2.1. CCA as determinant for regional development

Besides the consolidation of an institutional platform, TACC Colombia strived to produce a climate change plan for the development of Capital Region. Towards the end of TACC Colombia, though, it was clear for many partners that building a plan for the whole region, and with the sole participation of government institutions was too unlikely. Mainly for two reasons. First, the lack of other relevant stakeholders rendered many loopholes. TACC Colombia did not consider climate change impacts for the industrial activities of the region. Furthermore, there were no accounts of other adaptation practices likely happening at the time or before in Capital Region. Second, Capital Region was an abstract agreement for regional coordination. It did not have legal status or constitution; hence, a climate change plan for the region was but the sum of the separate initiatives of legally constituted institutions that tried to have some convergence but that at the end of the day, had separate interests.

When the partners started to work together, some were working simultaneously on the same issues and, in some cases, the same areas. It was a real eye-opener for the staff to learn about the duplication of efforts, but they also saw opportunities for collaboration. For one of the members of the coordination team of TACC Colombia, this was fundamental:

"TACC Colombia is interinstitutional. And not having that (interinstitutionality) is a great failure of development. One takes care of the water, others of planning, others of the territory, others deal with ecosystems, others with development planning, and that is disastrous. That is why adaptation has to do with the way we plan development as a whole" (P5, personal communication, 07 April 2016).

The presence of the Ministry of Environment (MADS) and the National Planning Department (DNP) in the discussion tables of TACC Colombia was also a driver for the discourse of adaptation as a determinant for regional development. Parallel to TACC Colombia, the DNP and the MADS were working in the development of the National Climate Change Adaptation Plan. These two national bodies advocated for the incorporation of climate change concerns within the sectors and within the regions or
territories. Conversely, TACC Colombia as a pilot for a regional effort in climate change provided the DNP and the MADS, particularly the MADS, with knowledge and experience to advance adaptation in the international negotiations within UNFCCC. The MADS included in its INDCs (Intended Nationally Determined Contributions) for Colombia, the development of regional plans for climate change in 100% of the country as a proxy for advances in adaptation.

Most of the municipalities in Cundinamarca, as well as some localities to the south of Bogotá, have high poverty levels. For TACC Colombia, climate change impacts have the potential to turn these areas into poverty traps because it causes the displacement of their active population and diminishes the opportunities for agricultural development. Therefore, TACC Colombia concluded that the climate change plan for Capital Region had to focus on these areas.

Conversely, Bogotá concentrates over 25% of Colombia's GDP, and though the capital depends on the municipalities of Cundinamarca for water and food provision, its political and economic power makes it a disproportionately influential stakeholder in Capital Region:

"Bogotá impacts its adjacent municipalities. Globally, urban centres in some cases have externalities, and in other cases, they manage to advance joint planning schemes with their surroundings. However, looking a bit further, there are great imbalances of all types. Hence, a region should be able to achieve development convergences that can be managed through the improvement of basic social services like health and education. Today Bogotá could support the improvement of health and education in some of its adjoining municipalities, like New York does with New Jersey. That is possible when you have conurbations and metropolitan areas. However, what Bogotá cannot do by itself is to solve the water problem. That has to be done with the region. Or the problem of food security. That has to be done with the region. What we have not been able to do in Colombia and many other Latin American countries is for urban development to impact the regions favourably" (P15, personal communication, 26 April 2016).

In the framework of TACC Colombia, it was Bogotá's Mayor Office, the only stakeholder that managed to realise the discourse of climate change as a determinant for planning and governance. During Bogotá Humana under Mayor Gustavo Petro, climate change and water governance were at the very heart of its urban agenda. According to a member of staff in the Secretary of Planning under this administration:

"From the beginning of Petro's administration, we were very clear and forceful in stating that one of the fundamental goals of the administration was going to be the
creation of alternatives to deal with the impacts of climate change, and therefore TACC Colombia for us was an essential partner. We were working in the development plan for Bogotá, and from that perspective, the information and the possibilities that TACC Colombia was providing were enormous” (P9, personal communication, 19 April 2016).

Bogotá's Secretary of Planning joined TACC Colombia in 2012, well after the project began. By then, Bogotá and Cundinamarca had already experienced the impacts of La Niña 2010–11; hence, the new administration of the capital was keen on addressing climate change concerns. It was the coincidence in the discourses of TACC Colombia and Bogotá’s Secretary of Planning what made their partnership possible.

The making of the discourse of adaptation as a determinant for regional planning and governance in the context of TACC Colombia had two essential and differentiated sources. First, the push to consolidate the initiative of Capital Region as a coordinated governance scheme for Bogotá and Cundinamarca. Capital Region saw in UNDP’s TACC an excellent opportunity to advance this integration, and arguably, the fact that UNDP’s programme was focusing on climate change was more of an added value than the real driver for political commitment. Nevertheless, after La Niña 2010–11, there was a much-increased awareness of the need to incorporate adaptation and mitigation into development planning.

7.2.2. CCA as sustainable water governance

The páramo ecosystems are responsible for the provision of water for 80% of Bogotá and 70% for the total population in Capital Region, an area that concentrates half of all Colombian páramos. Between 1993 and 2000, these ecosystems experienced considerable degradation due to increases in agriculture and livestock activities. However, between 2000 and 2007, this tendency slowed down as a consequence of the Colombian conflict11 which displaced large portions of the population. As a result, there was a natural recovery of the páramo ecosystems. However, according to the results of TACC Colombia, this tendency can relapse (IDEAM et al., 2014a). When the Colombian government signed a peace agreement with the FARC guerrilla in 2016, the country

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11 During the Colombian conflict or civil war between the government and various guerrillas, the lack of the presence of the state in the páramos made them a strategic location for the guerrillas’ headquarters.
entered a post-conflict era, and the possibilities for the repopulation of these spaces are rising.

According to the climate change scenarios developed by TACC Colombia (IDEAM et al., 2014a), due to temperature increases and decreased precipitation, there is a high probability that 50% of páramos could disappear along with 70% of the High Andean forests by 2050. These forests are also crucial ecosystems for the water provision in Capital Region. The scenarios (detailed later in this chapter) also showed there are areas like the municipality of Honda in Cundinamarca, currently with an average temperature of 33°C, where the temperature could increase 2 to 3°C from 2041 to 2070 and 6°C from 2071 to 2100. The communication of these results outside the context of TACC Colombia was a very delicate issue:

"The information showed that in the case of Honda, the municipality is going to have a severe water shortage in 30 years. However, XXXX said that s/he was not going to assume the responsibility for that type of communication" (P29, personal communication, 14 May 2016).

The climate change scenarios also revealed that there could be significant changes in the future distribution of ecosystems, with severe implications for conservation strategies, differences in water availability for human consumption, livestock and agriculture, among others. Additionally, by 2050 the population of Capital Region is expected to increase from ten to twenty million. Hence increases are also expected in terms of degradation and deforestation. According to staff in the Colombian branch of Conservation International:

"This is a serious issue because there is a fundamental factor here and is the short-term memory that we have. We are talking about La Niña 2010–11, and currently, there are projects to urbanise areas that we know flooded during 2010–11. And then you say, what is this? Anyways, that is our political reality" (P38, personal communication, 19 May 2016).

The vulnerability assessment of TACC Colombia (detailed later in this chapter) concluded that water availability in Capital Region was threatened by reduced storage capacity and water regulation of the soil in some areas where there are currently mining activities and projected new ones, and also areas that are targeted for exploration of hydrocarbons (IDEAM et al., 2014a). Therefore, TACC Colombia concluded that CCA is inextricably linked with water vulnerability:
"The regions have to identify the limits of its water offer and their hydrological systems. In the end, hydrological systems determine the territories. Moreover, for me, the concept of hydrological systems is about much more than territorial development. It is about the watersheds but also the built infrastructure, and that is why the territorial focus is so important" (P2, personal communication, 01 April 2016).

The TACC pilot projects in Perú and Uruguay also had a strong focus on adaptation as water sustainability. TACC Colombia focused on strengthening water governance by the development of joint programmes for the conservation, protection and water availability at urban and rural levels, as a crucial strategy for adapting to the effects of climate change.

The making of the discourse of adaptation as sustainable water governance was both a driver and a result of TACC Colombia. There was a political debate in regards to water provision in Capital Region between the governments of Bogotá and Cundinamarca. The páramo areas are shared between the city and the region because they transcend political boundaries. Moreover, after the results of the climate change scenarios and the vulnerability assessment for Capital Region, there was a clear understanding of the need to join efforts to guarantee the sustainability of water provision for the region.

### 7.2.3. CCA intrinsic to risk management

"Climate change adaptation implies a series of political decisions, decision-making and actions that lead to rethinking our models of territorial development. In the case of Latin America and Colombia, it is essential to review our territorial development in rural areas and to review the situation of communities that as a result of land speculation and violence have been forced to settle in risk-prone areas, or they have been forced to generate risk in areas that were not risk-prone before" (P9, personal communication, 19 April 2016).

This statement, from a member of staff of the Secretary of Planning in Bogotá, embodies the ethos of TACC Colombia for adaptation knowledge to be mainstreamed into processes of planning, territorial development and DRM for Capital Region.

In order to assess the territorial vulnerability to climate change, TACC Colombia considered that it was essential to develop an inventory of past emergency events and disasters from hydro-meteorological hazards in Capital Region. This inventory shed light on the more recurrent hazards and the areas with the most significant impacts. The latter mostly coincided with low-income municipalities in Cundinamarca and low-income
localities in Bogotá. The inventory (Figure 17) gathered information from 1980 to 2011 on landslides (657 events), flooding (668 events), forest fires (1236 events) and windstorms (61 events), but there was practically no information on frosts and droughts. The data on landslides, floods and windstorms peaked during La Niña 2010–11 (IDEAM et al., 2014a). Although the inventory was supported by the databases of all the partners and other urban, regional and national DRM authorities, the data available before the year 2000 was limited. During the ’80s, the technology for collecting data and communications in Colombia was substandard.

Concerning the lack of data, for some of the partners of TACC Colombia with long-term experience in DRM, much experiential knowledge in the region was overlooked. Project COL88—described earlier in this chapter—between the Government of Cundinamarca and the UNDP started a significant learning process in the region. After COL88, there was much experience acquired by the communities and the staff working in DRM for monitoring and recovering from weather-related disasters and emergencies:

"All that knowledge and experience in Cundinamarca from 1988 […] Cundinamarca was one of the first to build risk maps. We worked in the east with detailed studies on flooding, and there is a great experience acquired in the region not only for territorial development but for DRM more in general, and the same for Bogotá. Almost the entire region had it in one way or another. However, I think the project (TACC Colombia) did not take advantage of it because it was not only the data and the documents, but they had to have reached out to these teams and these people and take advantage of their direct experiences because it is what they have had to live with" (P70, personal communication, 21 June 2016).

The results of the inventory of hydro-meteorological hazards showed that disaster events had occurred mostly in Bogotá. The capital has a much higher population density compared to Cundinamarca, and large volumes of the population live in risk-prone areas. Additionally, the DRM bodies in Bogotá had a more robust database compared to the rest of the region. From 1997, when the city constituted an entity for DRM, disaster data has been systematised and closely monitored in Bogotá. The most recurrent event for the capital is flooding, with almost 170 events registered during the period assessed, 1980 to 2011.
In Bogotá, 20% of the drainage system is a mixed scheme that combines waste and rainwater. There is a series of inappropriate connections whereby wastewaters end up in rainwater collectors and vice versa. Additionally, the River Bogotá gets 12m³ of water daily from the páramo of Chingaza. The carrying capacity of the river is now deficient, as it has become increasingly sedimented. After more than 30 years of oils and detergents, the density of the river's water is much higher than rainwater. Therefore, with high rain levels during La Niña phenomenon, the river becomes a hazard. The river Bogotá also has artificial barriers downstream so the water can be sent uphill for hydro generation. When the river overflows so do its effluents, the rain collectors and as a consequence, extensive areas of the city flood.

In order to address this risk, Bogotá Humana launched an initiative to establish Sustainable Urban Drainage Systems (SUDS). This administration regarded the natural water cycle as a way to adapt to climate change and avoid disaster risk. SUDS aim to recover the natural water cycle in the city. Their task is to filter, retain, infiltrate, transport and store rainwater to get rid of the contamination that results from previous processes of

**Figure 17.** Climate-related emergency and disaster events in Capital Region (1980–2011). Source: Adapted from IDEAM et al. (2014)
urban runoffs. This filtering process can happen through the use of urban wetlands and other appropriate urban ecosystems that were part of the natural water cycle in the past (Bogotá's Secretary of Planning, 2015).

However, the development of SUDS in Bogotá encountered great difficulties. The management of the drainage of the city was in charge of Acueducto, and Petro's administration wanted to shift this responsibility to the District Institute for DRM and CCA, IDIGER. This initiative was not well received by Acueducto, as drainage management accounted for almost 20% of its income. Also, SUDS required the use of areas that were urbanised. Past processes of urbanisation in Bogotá have captured many of the spaces of the natural water cycle.

Despite this conflict of interest, the idea of SUDS was very well received by TACC Colombia. The partnership saw the potential for the project to be extended to all of Capital Region in order to manage flood risk but also to reutilise rainwater for other purposes, helping to diminish water vulnerability in the region. Unfortunately, the initiative stalled with the end of TACC Colombia in 2014.

Another initiative of TACC Colombia linking DRM and CCA was the development of a pilot project of technical assistance for the incorporation of hydro-meteorological risk management in the territorial development of Capital Region. The consultants hired for this pilot project talked directly with the authorities of many of the municipalities in Capital Region. These municipalities complained that the existing national mandate for incorporating DRM into territorial development was very demanding in terms of financial and technical resources. Thus, this pilot project emphasised the need to address the difference in resources within the municipalities in Cundinamarca and Bogotá as necessary to achieve effective risk management at the municipal level. CCA and DRM were linked through the concept of 'hydro-meteorological risk management' because it managed to align the two fields.

7.3. The making of representations

The making of representations as another pathway of the co-production of knowledge and politics can be analysed by looking at the seven policy briefs of TACC Colombia (Figure 18). These outputs can be seen as representations whereby the partnership intended to
translate scientific/technical knowledge into lay knowledge to inform decision-making in Capital Region. These policy documents summarised the work of TACC Colombia, which aimed to deliver an integrated plan for climate change in Capital Region by answering four research questions (Chapter Five, section 5.4.):

1. What is the current and the future climate in the Bogotá-Cundinamarca region?

2. What are the regional dynamics and the vulnerability to climate change of the Bogotá-Cundinamarca region?

3. How to transfer the knowledge to decision-makers?

4. How to deal with the territorial challenges posed by climate change?

The policy documents summarise the answers to questions 1, 2 and 4. To answer question 3, TACC Colombia relied on the training programme for the technical staff of the partnership (section 7.1.3.), other training workshops on leadership for the same staff, and it commissioned an independent consultant to develop a strategy for the education, training and sensitisation of the public on climate change.

Figure 18. The seven policy briefs of TACC Colombia. Source: Author (images from IDEAM et al., 2014a)
This section focuses on three of these policy documents: No. 5 'The Vulnerability of Capital Region' which presents the results of the vulnerability assessment; No. 6 'Climate Change in Capital Region', which presents the information on the climate change scenarios; and No. 7 'Regional Strategy for Climate Change Mitigation and Adaptation' which presents the portfolio of adaptation projects. Besides these being the documents dealing directly with climate change adaptation, the primary data collected from the interviewees on these three processes was rich enough to enable a comparison with the documentary evidence.

### 7.3.1. Climate change scenarios

The building of climate change scenarios at regional scale had no precedent in the country. Before, more than a baseline for decision-making, IDEAM had developed scenarios at a national scale to meet the requirements of the National Communications to the UNFCCC. With La Niña 2010–11, the analyses of regional climate variability and climate change became essential for planning and territorial development in the country.

The partners of TACC Colombia decided that the first step to understanding how to deal with climate change in Capital Region was to build climate change scenarios as well as an analysis of climate variability in the region. The technical leader of TACC Colombia, IDEAM, is the local par in Colombia of the World Meteorological Organisation, and it has representation in the IPCC; its director and some technical staff are permanent members of the panel of scientists assessing global knowledge on climate change. As such, they have the technical capacity for using the IPCC methodologies to develop the scenarios.

However, IDEAM suggested the partners request the help of NASA, the National Aeronautics and Space Administration of the United States. Because it was the first time that the scale of the scenarios was regional, IDEAM thought necessary to use the technical resources of NASA as the regional scale requires better resolution and technical expertise. When the scale is reduced, the level of uncertainty of the results increases. A staff from NASA travelled to Bogotá to provide technical assistance for the IDEAM staff, and the scenarios were built for three periods: 2011–2040, 2041–2070 and 2071–2100.

When CAR Cundinamarca joined TACC Colombia as a partner, it was already building
climate change scenarios for the same periods through a consultancy with The National University of Colombia. This overlap caused a conflict of interest, which was the object of heated discussions amongst the partners. There were both political and technical issues underpinning the dispute.

In political terms, there has been a lack of coordination between CAR Cundinamarca and the Government of Cundinamarca. As explained in Chapter Five, it is often the case that the leadership of these two institutions come from two opposing political parties. CAR Cundinamarca, as an autonomous authority in terms of operation and budget, does not respond to the regional government but the Ministry of Environment. As a result, there has been poor coordination between CAR Cundinamarca and the regional government for planning and territorial development in the region. Again, TACC Colombia served to mediate differences between some of the partners and this such a case.

In technical/scientific terms, for IDEAM there is no other organisation in Colombia capable of building climate change scenarios with high levels of certainty. However, CAR Cundinamarca was using the services of the Meteorology Department of the National University of Colombia. The head of this department is also a permanent member of the IPCC, and although the university has considerably less technical and financial resources than IDEAM, the results after running the models for the regional scenarios were very similar.

In the end, the dispute had to be resolved at the level of the directive committee of TACC Colombia because at the technical level the debate proved to be irreconcilable. According to a member of staff of CAR Cundinamarca, the directors of the IDEAM and the environmental authority decided to merge the two results, so the scenarios were completed as soon as possible for the project to move forward (P25, personal communication, 10 May 2016). However, the final policy paper produced by TACC Colombia with the climate change scenarios presents only the ones produced by IDEAM and NASA.

Regarding precipitation (Figure 19), the results of the climate change scenarios for Capital Region show a tendency to decrease by 10 to 20% (mostly between 2041-2070) to the west of Capital Region and also to the east, including areas in the páramo of Chingaza. Conversely, there are expected increases of precipitation by 20 to 30% (between 2041-2070) to the south and the centre, including Bogotá. These tendencies
mean that in 50 years, the capital and other areas in the centre of Capital Region can expect between 30 to 40% more extreme rain events compared to the current rain patterns thus increasing flood risk. The decrease precipitation to the east of Capital Region implies that, in 50 years, there will be less water to recharge rivers and streams that feed aqueducts and dams (IDEAM et al., 2014b).

**Figure 19.** Scenarios for changes in precipitation in Capital Region for the periods: 2011–2040, 2041–2070, and 2071–2100. Source: Adapted from IDEAM et al. (2014b)

The climate change scenarios for temperature (Figure 20) indicate a progressive increase for all the territory of Capital Region. In general, the scenarios show that if by the end of the century (2071-2100) the current patterns of land use and transformation, consumption and use of non-renewable energy sources continue, there could be an increase between 2 to 4°C compared to the current temperature. The most significant temperature increases are expected in the centre of Capital Region, including Bogotá, where the increase could be from 3 to 4°C. In the case of the páramos and high Andean forests, the temperature could surpass an increase of 3°C by the end of the century. These temperature increases could cause biodiversity loss and decreased soil water which in time could lead to
productivity loss in some key crops and livestock farming.

**Figure 20.** Scenarios for changes in temperature in Capital Region for the periods: 2011–2040, 2041–2070, and 2071–2100. Source: Adapted from IDEAM et al. (2014b).

For a meteorology professor, though there needs to be scientific rigour with the scenarios, sometimes in order for these to reach the decision-making level, the scientific component has to take a step back:

"I tell my students that for the scenarios, you do not need the rigour of quantum physics. This does not mean that we have to be lax; we have to be strict with the measurements and the concepts. However, just by telling the mayor of a given municipality that there is an expected increase or decrease in forest coverage, which implies the probability of certain phenomena likely to take place in this or that area of the municipality, that is enough to develop long-term policies for climate change adaptation" (P57, personal communication, 07 June 2016).

The making of climate change scenarios for Capital Region had as much a scientific component as it had a political one. A historical political dispute between the two leading authorities for environmental planning in the state of Cundinamarca, proved to be a deterrent when there was a need to produce scientific knowledge for decision-making in
the region. Likewise, IDEAM, as the central authority for meteorological studies in Colombia, does not recognise any other scientific authority in the country for the production of climate change scenarios. Despite these differences, ultimately, the scenarios are the result of technical and scientific methods that need to engage with the language of decision-makers, so there is a clear understanding of the implications of action or inaction.

7.3.2. Vulnerability assessment

Based on the challenges and priorities for regional development in the face of the climate change scenarios, TACC Colombia conducted a vulnerability assessment for Capital Region. However, the process did not go smoothly, and according to a member of the coordination team, it was the most challenging stage during the project. The partners disagreed on the methodologies used and on deciding what to reckon as 'vulnerable'. TACC Colombia ended up hiring two different consultancies because the first one, using models from the IPCC, was disappointing and confusing for the partners:

"The vulnerability assessment based on the models of the IPCC was messing with everyone's head. The formula was that vulnerability is a function of the adaptive capacity, sensitivity and exposure. I think there is an error in the formula and also, they (the consultants) misused it. I think we do have to understand exposure, sensitivity and adaptive capacity but we do not have to take everything to numbers and indexes because then the results are shown in maps where you do not know what the colour red means. Moreover, in terms of decision-making, you have to go back and check what was that influenced that red the most, whether the exposure, the sensitivity of the adaptive capacity" (P64, personal communication, 15 June 2016).

The second vulnerability assessment was prepared by the local branch of Conservation International (CI), with the principles of ecosystem-based adaptation as a compass. CI focused on understanding the level of risk considering that the impacts of climate change are not only the result of external factors but are compounded by local issues affecting the territory and territorial development. These issues range from land-use change, degradation to social and economic conditions. For CI, the vulnerability of Capital Region had to account for all the risk factors attached to the history of occupation of the territory. CI's vulnerability assessment focused on two types of vulnerability: demographic/socio-economic vulnerability and vulnerability by habitat change and biodiversity loss (IDEAM et al., 2012)
Regardless of the difficulties with the first consultancy, part of its results was included in the final policy paper on vulnerability as a third type of vulnerability: institutional. According to this consultancy, institutional vulnerability refers to how different public and private institutions organise, articulate and coordinate efforts to deal with climate change.

In terms of demographic and socio-economic vulnerability, CI found that in Capital Region there is high vulnerability due to expected population increase: by 2050 there is an expected increase of 50% in Bogotá and up to 260% in Cundinamarca. Population increase implies an increase in the demand compared to the expected offer of food and raw materials. There are high levels of poverty in most of the municipalities in Cundinamarca, the majority dedicated to agricultural activities, and in five localities to the south of Bogotá. This socio-economic vulnerability decreases response capacity in the face of climate-related events and as a consequence, reduced food supply for the rest of the region.

In general, the tendencies showed a decrease of 60% in water supply for the agricultural land of Capital Region. The highest vulnerability to flooding was found in Bogotá and the municipalities in Cundinamarca with the highest GDP. These areas coincide with most of the industrial activities of the region, rendering the infrastructure as the most exposed element. Lastly, Bogotá amasses 43% of the national demand for social housing, which is very likely to increase the pressure over water and sanitation services (IDEAM et al., 2012).

In terms of habitat change and biodiversity loss, the expected changes in water availability can produce up to a 50% loss of the distribution areas for endangered and other native species; these areas are mainly high Andean forests, wetlands and marshes. The high vulnerability of these ecosystems is compounded by the fact that they provide a great variety of ecosystem services (e.g., food, raw materials, natural water sanitation, regulation of air quality, aesthetic characteristics of natural landscapes, soil formation, provision of habitat for different species, among others) essential for the quality of life of Capital Region's population. This high vulnerability could imply that more than 60% of protected areas in Capital Region can experience up to 50% loss of distribution areas of endangered species due to the impacts of climate change. Temperature changes affect the thermal floors of the mountains causing species to move from the natural habitat or
In terms of institutional vulnerability, the first consultancy examined the financial power of the municipalities in Cundinamarca as critical to assessing their adaptive capacity. In these terms, 48% of the municipalities have a minimum response capacity; 34% were found to be sustainable, meaning they can have effective responses; 11% were classified as solvent thus able to develop preventive actions. Finally, 7% of the municipalities have deficient economic development, which deems these areas close to unfeasible to respond effectively to extreme weather events (IDEAM et al., 2012).

Figure 21 depicts a map of the municipalities of Cundinamarca and Bogotá detailing the level of integrated vulnerability: demographic and socio-economic vulnerability and vulnerability by habitat change and biodiversity loss.

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Figure 21. Integrated vulnerability levels in the municipalities of Capital Region. Source: Adapted from IDEAM et al. (2012)
Figure 21 shows that most of the municipalities in Capital Region have medium-level vulnerability. This indicates that it is necessary to advance adaptation actions in the face of the expected impacts of climate change and the findings in terms of socio-economic, demographic and biodiversity and habitat changes. The municipalities in red are the most vulnerable mainly because of the projected increases in population, changes in water availability and exposure to extreme weather events.

Based on these results, CI suggested some guidelines for adaptation. For the areas where the flood risk is expected to increase, if feasible, the consolidation of conservation areas, strategies for ecological restoration and land-use changes directed towards increasing vegetation coverage, mostly in the rural areas. In regards to the expected reduction in water availability in the recharge areas, CI suggested the linkage of territorial development actions for the conservation of the regional ecological infrastructure.

However, because the consultancy with CI was a second attempt, the schedule of TACC Colombia was already delayed, and CI had limited time and information for the vulnerability assessment. They had to rely on secondary data and could not dig deeper into socio-cultural aspects nor engage in participatory assessments with the local communities. However, by 2016, CI was working on a project in the páramos using a participatory vulnerability assessment with the local communities, focusing on socio-cultural and economic factors.

For a UNDP consultant, although the initial vulnerability assessment did not work out, it was closer to TACC Colombia's approach towards the development of territorial policies because it considered vulnerability in terms of the capacity of Capital Region's local governments. Hence, for this consultant, although CI's work was excellent, it had mostly an environmental approach which took away from TACC Colombia's initial spirit (P48, personal communication, 26 May 2016).

Despite the issues with the climate change scenarios, it was the making of the vulnerability assessment what proved to be the most challenging task for TACC Colombia. The process of decision-making for where to focus the evaluation of territorial vulnerability revealed significant conflicts of interest between the partners. This precedent reveals that political disputes influenced the production of knowledge. Moreover, though the results of the consultancy with CI were satisfactory for the partners, the time constraints limited the results and their uptake.
7.3.3. Portfolio of adaptation projects

Given the delays in the schedule, TACC Colombia initiated the making of the portfolio of projects almost at the same time that CI was working on the vulnerability assessment. Therefore, the adaptation measures did not respond to those findings.

For the portfolio of projects, TACC Colombia secured the services of a consultancy from the private sector. This firm had experience in developing environmental projects in terms of low-carbon manufacturing and mitigation actions for small, medium and large companies. It was the first time though that they were going to work with climate change adaptation.

The portfolio defined profiles for mitigation and adaptation projects. Two groups were formed accordingly, with technical staff from TACC Colombia whom at the time were also involved in the training programme for climate change management with a local university. The outputs of the training programme, coupled with some methodologies developed with the private consultant, provided inputs for the portfolio of projects.

Lacking the results of the vulnerability assessment, the adaptation group started brainstorming ideas. Initially, they were trying to define what adaptation was. The group did not agree on defining adaptation, but they pre-selected 400 alternatives for adaptation actions suitable for Capital Region and prioritised measures through the methodology used by the private consultancy. Although the technical staff of TACC Colombia defined the prioritisation criteria, the result were eleven adaptation projects (Table 5) that according to many of the partners, were not appropriated by the institutions of TACC Colombia nor they reflected the work that the project had done until then. Their reasons varied:

"I feel the partners did not do the prioritisation; it was the consultant. Probably they (the consultants) have the expertise in the methodology but not on the needs of the region" (P56, personal communication, 07 June 2016).

"The profiles of the projects were very abstract, and there was a stronger focus on mitigation and low-carbon production than in adaptation and the water cycle because that was the approach of the consultant. Bogotá has critical vulnerabilities in terms of social aspects like health, and that was not reflected by the portfolio" (P42, personal communication, 23 May 2016).
Table 5. Adaptation Projects for Capital Region Defined by TACC Colombia

<table>
<thead>
<tr>
<th>Project</th>
<th>Estimated value (USD)*</th>
<th>Prioritised areas</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Conservation of vulnerable ecosystems, strategic for water provision</td>
<td>$309,305</td>
<td>San Francisco, Zipaón, and municipalities to the west of Cundinamarca.</td>
</tr>
<tr>
<td>2. Implementation of the model of Environmental Services Bank (BanCO2)** in Capital Region</td>
<td>$298,438</td>
<td>Sumapaz and east of Cundinamarca (provinces of Oriente, Medina, Guavio y Almeidas)</td>
</tr>
<tr>
<td>3. Strengthening of potato and sugar cane production chains</td>
<td>$566,363</td>
<td>San Cayetano, Carmen de Carupa, Pasca, Guasca, Pacho, Villapinzón</td>
</tr>
<tr>
<td>4. Promotion of alternatives for water use and reuse in residential areas of Capital Region</td>
<td>$108,675</td>
<td>Mosquera, Soacha, Pasca, Supatá, Guachetá, Fúquene, Tausa, Facatativá, Subachoque, Cáqueza, Fómeque and Bogotá urban area.</td>
</tr>
<tr>
<td>5. Design and construction of an irrigation system in the Tequendama Region</td>
<td>$51,412</td>
<td>Viotá, Apulo, El Colegio, Anapoima, La Mesa, Quipile, Anolaima, Tena, San Antonio del Tequendama, Cachipay</td>
</tr>
<tr>
<td>6. Maintenance and improvement of water bodies and streams for hydric regulation and diminution of hydric stress</td>
<td>$155,906</td>
<td>Medina, Paratebueno, Soacha, Gutiérrez, Mosquera, Madrid, Gachalá, Quipile; for Bogotá in the localities of Kennedy, Bosa, Rafael Uribe, Engativá and Suba</td>
</tr>
<tr>
<td>7. Promotion of new technologies for sustainable construction</td>
<td>$388,721</td>
<td>Municipal urban areas; hotels and institutions sector in Capital Region</td>
</tr>
<tr>
<td>8. Bioengineering works for construction of terraces and slope stabilisation</td>
<td>$315,575</td>
<td>Silvania, Facatativá, Subachoque, Quipile, Viani, Villeta, Zipaquirá</td>
</tr>
<tr>
<td>9. Strengthening of early warning systems for climatic events</td>
<td>$88,612</td>
<td>Bogotá and Cundinamarca</td>
</tr>
<tr>
<td>10. Alternative uses for land classified as protection areas by risk</td>
<td>$71,893</td>
<td>Cundinamarca and localities in Bogotá classified as unmitigable high risk areas</td>
</tr>
<tr>
<td>11. Promotion of risk transfer schemes</td>
<td>$51,412</td>
<td>Small- and middle-income agricultors in Bogotá and Cundinamarca</td>
</tr>
</tbody>
</table>

Source: Author based on IDEAM, PNUD, Bogotá, et al. (2014). *Converted from Colombian Pesos using the official exchange rate USD/COP on 31/12/2014 (https://www.dolar-colombia.com/2014-12-31). ** The Environmental Services Bank (BanCO2) is a strategy developed by the Colombian environmental regional authorities and the private sector for the payment of environmental services to communities responsible for the sustainable development of key ecosystems.
"One of the main weaknesses of the portfolio of projects is that we were addressing Bogotá and Cundinamarca, the whole of Capital Region, and these projects ended up targeting the municipal scale" (P20, personal communication, 03 May 2016).

"I would have wanted that the projects were something more concrete, on how to develop actions on a smaller scale. Of course, our scale was bigger, but in order to have results, smaller projects would have been better" (P30, personal communication, 16 May 2016).

The portfolio of projects was meant to be part of the first phase of a regional strategy for the articulation of climate change actions. The partners of TACC Colombia agreed that they needed to coordinate the work of the institutions following the project. Coordination was needed to avoid overlapping initiatives, the optimisation of resources and the achievement of synergies. However, when TACC Colombia ended, so did the chance to materialise these proposals.

The making of the portfolio of projects of TACC Colombia reveals three issues. First, in the last phase of an overall plan for adaptation in Capital Region, the partners still had not agreed on what they meant by 'adaptation'. This lack of agreement sheds light on how the production of knowledge focused on the what (outputs) more than the why. Although the partners coincided in that they needed to build climate change scenarios and a vulnerability assessment, there was no agreement on the driving principles for adaptation. This gap led to a second issue, where the portfolio of projects was driven more by a methodology for project development than by the guidelines of TACC Colombia as a project for regional integration. Lastly, the adaptation projects developed by TACC Colombia were technical and administrative measures, reflecting an oversight of inputs from local communities, the private sector and other members of the civil society.

7.4. The making of institutions: TACC Colombia in Bogotá Humana

Of all the partners in TACC Colombia, Bogotá Mayor's Office was the institution that gained from and contributed the most to the project. Using the knowledge produced and the political discussions in the context of TACC Colombia as leverage, the government of Bogotá—led by Mayor Gustavo Petro—supported the making of three institutions: the city's development plan, the city plan for DRM and CCA and the IDIGER, the city's body for DRM and CCA.
7.4.1. Bogotá Humana Development Plan

Mayor Petro's agenda for Bogotá Humana, as the name suggested, declared to focus on human development. This administration wanted to move away from traditional development approaches based on economic growth and infrastructure development. Instead, this administration conceptualised development as a way to guarantee Bogotá's citizens an appropriate space to exercise their freedom and rights, promoting a better quality of life (Bogotá's Secretary of Planning, 2015).

Although this development approach was included in the principles of the Colombian Constitution of 1991, Bogotá had been a pioneer in the implementation of concrete social policies to materialise this model. Bogotá Humana aimed to reinforce this tendency by acknowledging that the high inequality levels in Colombia and Bogotá required for the public administration to challenge social segregation and discrimination and for the state to have a more vital role in promoting social development.

Bogotá Humana considered that human development is inextricably linked with environmental management. For this administration, Bogotá needs to deal with the impacts of climate change as traditional development models tend to exacerbate them. Adapting to climate change meant for Bogotá Humana the challenging of existing power structures and prioritising the low-income population who are the most affected by climate change impacts.

In this line of thought, Bogotá Humana defined three strategies as the structural guidelines for the city's development plan: first, 'a city that overcomes segregation and discrimination'; second, 'a territory that deals with climate change and organises itself around the water'; lastly, 'a Bogotá that defends and strengthens the public' (Bogotá's Secretary of Planning, 2015). The second strategy acknowledged the high vulnerability of the city to climate change due to the fragility of the ecosystems where Bogotá is located and the unsustainable model for city growth. Bogotá Humana highlighted the importance of focusing on water resources and on promoting the integration between the city and the region to coordinate and secure water availability for future generations.

When the administration of Bogotá Humana started in 2012, TACC Colombia had already been working for almost two years. The Secretary of Planning then reached out to the project as they saw it very much aligned with the principles of the city's agenda.
Although the head of The Secretary of Planning had an academic background, as a researcher and lecturer in urban studies, he regarded the institutional platform of TACC Colombia not only in terms of its research outputs but as an exceptional opportunity for political agreements towards integrated planning, mostly in terms of water management.

In 2013, the Mayor of Bogotá and the Governor of Cundinamarca had a severe disagreement. Acueducto supplies water for some municipalities in Cundinamarca where processes of urbanisation were increasing the costs for the utility to provide water for the state. The Mayor of Bogotá then threatened to stop the service if this urbanisation trend continued. In the end, the dispute was resolved between Bogotá's Secretary of Planning and the director of Acueducto. In the context of TACC Colombia, the political will of the Secretary of Planning for regional integration made the mediation possible.

With its second core strategy 'a territory that deals with climate change and organises itself around the water', Bogotá Humana wanted to establish an integrated governance scheme for water management in Capital Region. In Bogotá, one of the main projects of Bogotá Humana was the SUDS (Sustainable Urban Drainage Systems), described earlier in this chapter, to deal with the high risk of flooding in the capital. At a regional level, the most important initiative of Bogotá Humana in terms of water governance is the project Páramos (see Chapter Six, section 6.2.11.). The project's goal is the conservation, restoration and sustainable use of the ecosystem services of the páramos of Chingaza, Sumapaz and Guerrero—located in Cundinamarca—and of the Eastern Hills of Bogotá (Figure 22).

The Páramo of Chingaza meets 80% of the water demand in Bogotá and some of its adjacent municipalities. An additional 15% is sourced from the Páramo of Guerrero and 5% from the Páramo of Sumapaz (Acueducto, 2014). The páramos comprise territories that extend beyond political boundaries and that are populated by a mixture of stakeholders from the government, the private sector and the civil society. Bogotá Humana and TACC Colombia were acutely aware of the need for an integrated governance scheme in order to guarantee the water sustainability for the region. In the case of the Eastern Hills of Bogotá, there is a whole system of water streams that requires effective management in order to avoid landslides during heavy rain periods in the city.
Project *Páramos* has a total budget of over 30 million USD and a time frame of 30 years. Funded by *Acueducto*, which is one the most financially powerful entities of Bogotá's government, the project was developed with the collaboration of other regional actors that were partners of TACC Colombia: Bogotá's Secretary of Planning, the Secretary of Environment, National Natural Parks, the regional environmental authorities, among others.

At the same time that *Bogotá Humana* recognised the inextricable link between humans and their environment, it also recognised the inextricable link between the city and the

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**Figure 22.** Areas of intervention of project *Páramos*. Source: Adapted from Creative Commons (2012)
region. When one staff of the Government of Cundinamarca learnt about *Bogotá Humana* Development Plan, he directed his concerns to one staff of Bogotá’s Secretary of Planning:

"I told him that Bogotá's development plan did not consider the regional development and he categorically said that it did because the plan for the city organised itself around the water, and he was right! However, I told him, you cannot legislate in Cundinamarca through Bogotá's development plan" (P51, personal communication, 01 June 2016).

Arguably, in processes of regional integration, there can be a lack of trust because of the leverage of the most influential stakeholders to impose their agendas. However, according to one of the academic consultants of TACC Colombia, the Secretary of Planning of *Bogotá Humana* was very aware of this:

"The head of the secretary had it very clear. You cannot change the relationship scheme if you do not work with everybody. Bogotá can be massive, and Bojacá (a municipality in Cundinamarca) the smallest but both mayors have the same vote, the same weight and from there you start building trust. You build trust when you make concessions" (P74, personal communication, 07 July 2016).

The making of *Bogotá Humana* Development Plan was both a precedent and an output of TACC Colombia. The agenda of this administration found in TACC Colombia a strategic partner for its consolidation. At the same time, TACC Colombia as an initiative for regional integration found in *Bogotá Humana* Development Plan compelling arguments in terms of knowledge, environmental awareness and decision-making.

### 7.4.2. Bogotá’s District Plan for DRM and CCA

*Bogotá Humana* Development Plan was the guiding document for all of Bogotá's secretaries and entities. In the case of the Secretary of Environment, they joined TACC Colombia before *Bogotá Humana* administration and the information that TACC Colombia produced was meant to input Bogotá's climate change plan. Initially, the plan focused on mitigation, but under the new administration's strategic axis of 'a territory that deals with climate change and organises itself around the water', the secretary initiated the development of a joint plan for DRM and climate change.

The decision to join DRM and climate change was directly made by the Bogotá's mayor, who considered that there was no sense in having, on the one side, a plan to manage risks
in the city and on the other, a climate change plan. For the mayor, it was necessary to surpass the concept of risk management as disaster response and move to a risk management scheme that recognised current and past trends of territorial development as drivers for risk. Adaptation was the joining concept as the initiatives to address disaster risk and climate change impacts are very similar.

The district plan for DRM and climate change was led by the secretary of environment and the recently created IDIGER, the District's institute for DRM and CCA. The plan incorporated many other entities of the city's government, as climate change was deemed as multi-sectorial and beyond environmental issues, and the plan was meant to address current and future risks with a timeline for 2020, 2038 and 2050 (see Bogotá's Secretary of Environment & IDIGER, 2015). For the short term, the focus was on landslide and flood risk. For the medium term, the focus was on mitigation with the introduction of a transport system relying on electricity rather than fossil fuels. For the medium and the short term, the plan focused on adaptation. According to the information of TACC Colombia, by 2050 there is a high probability that large areas of the páramo ecosystems disappear along with 70% of the High Andean forests (section 7.3.1.). So, the plan was about securing water availability for Bogotá and the region.

TACC Colombia provided supporting knowledge for the plan to emphasise the protection of the páramos, the increasing risk of flooding in the watershed of River Bogotá and the conservation of wetlands as key to mitigating flood risk. The plan also addressed food security and the risks for agricultural land outside Bogotá, where TACC Colombia found that there were high levels of vulnerability to droughts (section 7.3.1.). One of the main conceptual advancements within the plan was the understanding of Bogotá's drainage system not as part of the public service infrastructure but as a strategy to manage and recycle rainwater (Bogotá's Secretary of Planning, 2015).

For TACC Colombia, Bogotá's district plan for DRM and CC was as a zoom-in of the regional plan. In short, it was the kind of plan that TACC Colombia intended for the region. However, joining the long-standing institution of DRM in Colombia and Capital Region with the emerging adaptation agenda was not easy. Even though the mayor sets the agenda for the city and all the city's entities must align its actions accordingly, there was still resistance to look at adaptation outside the environmental sector mostly among DRM staff (P65, personal communication, 15 June 2016). The shift to understanding risk
management as more than disaster preparedness was taking place at the national level as well, with the new policy for risk management in Colombia.

The making of the district's plan for DRM and CC was another one of Bogotá Humana attempts towards an integrated vision of development planning. Like TACC Colombia, Bogotá Humana concluded that the city could not develop itself without the region and vice versa. However, the vision of integrated planning also had to do with conceiving the environment as intrinsic to human development. In this context, the construction of risk can be understood as a human struggle to advance development while disregarding its linkages with the environment. These holistic visions seldom reach politics and decision-making as they prove very difficult to materialise through the existing institutional arrangements and the criteria to evaluate the performance of urban administrations.

7.4.3. IDIGER, the District Institute of Risk Management and Climate Change

The creation of IDIGER was another initiative of Bogotá Humana towards an integrated vision of development. Before Bogotá Humana, DRM in Bogotá was managed by FOPAE, the District's Fund for Emergency Preparedness and Response, which functioned under the government sector of the city's administration. In 2013 under Bogotá Humana, FOPAE moved to the environmental sector as IDIGER. Moving risk management to the city's environmental sector was a clear message in regards to a change in the understanding of risk. Beyond matters of safety, police and emergency response, it was about understanding, learning and preparing for the reduction of risks with a focus on climate change impacts and environmental management.

The move also strengthened the environmental sector led by the Secretary of Environment because IDIGER had substantial financial and technical resources to execute programmes and projects. However, besides environmental hazards, IDIGER also addressed technological, geological and human agglomeration risks. Bogotá has the most comprehensive database for disaster events and emergencies in Colombia, and through the IDIGER it feeds DesInventar, a comprehensive inventory system for disaster events in Latin America.

At the beginning of Bogotá Humana in 2012 and before the FOPAE became IDIGER,
the director of the FOPAE reached out to TACC Colombia. Given the focus of the city's administration on climate change adaptation, the director of the FOPAE considered that it was essential to join the partnership in technical and financial terms.

TACC Colombia provided the technical backing for the formulation of the new agenda of IDIGER, as one of the main objectives of the partnership was to integrate adaptation and DRM. For some of the interviewees, IDIGER was the materialisation—in the shape of public policy—of TACC Colombia. With changes at a national level in the understanding of risk management and with the guiding principle of ‘a territory that deals with climate change and organises itself around the water’, IDIGER intended to address the three components of risk management defined by the national policy for DRM: risk knowledge, risk reduction and disaster response. For IDIGER, adaptation was incorporated into the elements of knowledge risk and risk reduction, and as an entity joining DRM and CCA not only in name but also in principle, the IDIGER had no precedent in Colombia.

Dealing with climate change and organising the city around the water implied advancing risk as a wholesome and unifying concept. The IDIGER was in charge of developing and delivering the project of SUDS (Sustainable Urban Drainage Systems). As explained earlier in this chapter, the project required the acquisition of land in areas of the city already urbanised or in the process of doing so.

In this scenario and also in line with the other two strategic guidelines of Bogotá Humana—‘a city that overcomes segregation and discrimination' and 'a Bogotá that defends and strengthens the public'—Petro's administration issued a decree to modify Bogotá's existing territorial development plan. However, this reform was not approved by the city council, and according to one interviewee, it was the biggest failure of Bogotá Humana:

"Petro thought he could do everything through IDIGER, and it would have been a different thing if it had been harmonised with a reform of the territorial development of the city, but he did not manage to do so. That was the first failure in that airplane called Bogotá Humana. TACC Colombia gave the guidelines, but the idea for its materialisation was the IDIGER. Climate change and DRM encouraged Petro, but for me, it was very pretentious to aim for territorial development based on risk. Jack of all trades, master of none." (P43, personal communication, 23 May 2016).

The making of IDIGER, as some interviewees put it, can be seen as the materialisation
of one of the main objectives of TACC Colombia: the integration of adaptation and DRM. It is indeed the materialisation of the discourse of adaptation being intrinsic to DRM. However, similar to the case of the National Unit for Disaster Risk Management (Chapter Six, section 6.3.2.), some policy-makers consider that it is very ambitious and counterproductive to attempt to embody in a single organisation the advancement of risk management as a strategy for development.

7.5. The role of international bodies in local processes of co-production

Together with Chapter Six, this chapter reveals how the Colombian government at national, regional and urban scales has closely followed the international guidelines of the UN associated bodies, such as the IPCC, the UNFCCC and the UNDP. These bodies are regarded as neutral, trustworthy and their direct or indirect involvement in local processes of adaptation planning and governance is seen to guarantee legitimacy and transparency. Some interviewees who contributed to this study have participated in the IPCC's reviews of climate science and the Colombian delegations to the annual COPs of the UNFCCC. Also, Colombia has ratified the 2015 Paris Agreement as it did before with the Kyoto Protocol. Other interviewees working with UNDP Colombia either as consultants or as permanent staff, recognise the relevance that this liaison represents for their CVs and future job prospects.

Colombia judiciously prepares the National Communications required by the UNFCCC as a way to monitor, primarily, its party countries' advances on GHGs reduction. Increasingly, the National Communications have also been required to provide an assessment of climate-related risks and advances in adaptation. After Colombia's first (2001) and second (2004) National Communications found that islands, coastal areas and páramos were the three ecosystems most vulnerable to climate change, IDEAM developed the first official adaptation project in Colombia, INAP, focusing on these three ecosystems. This focus reveals that by then, the international community and the Colombian government regarded climate change impacts as an environmental concern, and not yet a threat to development.

After La Niña 2010–11 and the 2015 Paris Agreement, Colombia included adaptation goals alongside mitigation in its Intended National Determined Contributions (INDCs)
which are part of the National Communications. Among these goals, the development of territorial adaptation plans for each one of Colombia's 32 states. However, the experience of TACC Colombia in Capital Region shows that plans are not a proxy for effective adaptation.

The UNFCCC discourse promoting a 'low-carbon, climate-resilient development' was taken up by Colombia's 2017 National Policy for Climate Change and the 2018 National Law of Climate Change. Both the policy and the law require the incorporation of 'low-carbon, climate-resilient development' in the planning instruments of all Colombia's sectors and territories. However, these requirements are oriented towards managerial and technical actions that can fit into the current institutional arrangements for development planning and governance in Colombia. Furthermore, these requirements could potentially challenge the local authorities of most of Colombia's municipalities that lack the technical and financial resources to fulfil them. Over 900 of 1,122 Colombian municipalities rank 6th out of 6 in the viability index. This ranking means that they are in the lowest level of socio-economic development (P53, personal communication, 02 June 2016). The result of this can prove to be counterproductive, as it was the case with the mandatory Territorial Development Plans in the early 2000s that had these municipalities produce erratic outcomes.

Both the climate change scenarios and the vulnerability assessment developed by TACC Colombia for Capital Region followed the guidelines of the IPCC. However, the IPCC's 'formula' for vulnerability assessment was too complicated and too technical to relate to the empirical/experiential understanding of vulnerability to weather-related events of the partners of TACC Colombia. The second attempt to develop a vulnerability assessment, although satisfactory for the partners, also relied on an international organisation—Conservation International—which left an imprint with its ecosystem-based approach to adaptation.

In the case of the climate change scenarios, according to various interviewees, NASA's consultancy was redundant. For these interviewees, both Colombia's National Institute of Hydrology, Meteorology and Environmental Studies and Colombia's National University already had the knowledge, the skills and the technology to reduce the scale of the scenarios from national to regional scale. Nevertheless, as aforementioned, often international bodies are guarantors for accuracy and transparency when there are rifts and
lack of trust between local organisations.

In practice, the technical groups assembled to carry out the vulnerability assessment, and the other products of TACC Colombia did not have the time to do it themselves without the help of the consultants hired by the UNDP. According to various interviewees, neither the first nor the second attempt for a vulnerability assessment of Capital Region reflected the vast amount of knowledge on vulnerability to weather-related events that the staff from the different partner organisations had amassed over many years of experience in the field. The feeling was the same in regards to the portfolio of mitigation and adaptation projects. Additionally, in the name of transparency, the UNDP's process for hiring the consultants was often delayed by the lengthy bureaucracy practices that characterise the UN divisions.

Even though all consultants were local and were hired by UNDP Colombia following the advice of the coordination team of TACC Colombia, the coordination team felt a lack of support from the people that developed the UNDP's TACC pilot programme in 2009. UNDP's TACC programme requested to put in place a partnership to prepare integrated territorial climate change plans (purposeful knowledge co-production) but set no specific guidelines for it. The partners of TACC Colombia had the opportunity to compare experiences with Uganda, Perú and Uruguay, but this was an initiative of the coordination team. The TACC pilot programme did not promote knowledge sharing between the sub-national governments.

UNDP's TACC declared to be answering the call of sub-national governments to be the direct recipients of international aid as they were closer to local realities and could act more effectively. However, according to a member of the coordination team of TACC Colombia (P4, personal communication, 07 April 2016), the territorial approach was also an attempt of the UN to look for entry points alternative to national governments, with a focus on adaptation at sub-national levels (see also Schipper, 2009 and Bulkeley, 2010) after dissatisfactions such as the failed Kyoto Protocol and its non-ratification by the United States.

Arguably, the 'hands-off', 'detached from local realities', 'we kick-start but do it yourself' approach of the UN and its associated bodies—IPCC, UNFCCC, UNDP, UNEP—responds to the 'adaptation is local' discourse. Indeed, international bodies are unaware of the local politics and practices of knowledge production but, at the same time, they
promote tools and guidelines which require 'translation' to local contexts and promote technical and managerial solutions for adaptation needs that do not address the UN's current discourse of climate change being a threat to development. As a consequence of following these guidelines, this approach is mimicked by Colombia's national policies and plans that require Colombian municipalities to follow guidelines and mandates for which they are not prepared, and that require the aid of 'expert' consultants to help in the translation of these policies to the local context.

The role or identity of the international bodies and organisations currently leading the global adaptation agenda is to keep 'business as usual', despite their discourses claiming otherwise. With a brand of transparency, pro-development and promoting the need for knowledge co-production between expert and lay knowledge, the lens of inherent co-production shows that international bodies promote adjustments that can be accommodated within the current global and national institutional landscapes for development planning and governance.

However, for this study, it is clear that organisations are made up of people. Well-intended and highly professional staff working for international scientific bodies and development agencies, as well as the staff working for national and sub-national governments and research institutions, have their hands tied by the bureaucracy of their parent institutions. In Colombia, this bureaucracy is exacerbated, among other ways, by short-term government periods with top-down and short-term development planning that fail to enact meaningful change.

During TACC Colombia, the administration of Bogotá Humana developed a bold and promising attempt to challenge the status quo. However, the findings of this research show that this attempt was the result of local championing and less of the territorial approach promoted by the UNDP.

**7.6. Conclusions**

TACC Colombia was an unprecedented attempt in Colombia for the integration of development planning and governance at a regional level. Thus, the partners regarded the project as an excellent platform to advance Capital Region.
The making of identities in the context of TACC Colombia is observed in the reshaping roles of the partners, the making of the identity of TACC Colombia itself and expert role. Before the project, the partners had been working with no coordination, and within TACC Colombia, many concessions had to be made to achieve results. The partners joined the project at different times and for different reasons. In general, the partners joined to gain understanding on climate change, to strengthen their existing social roles and to push forward a process of regional integration.

The making of discourses reflects the guiding principles of TACC Colombia whereby climate change, mainly adaptation, needs to be incorporated into development planning and integrated with sustainable water provision and disaster risk management. The making of representations is examined through the material outputs of the project. TACC Colombia gathered unprecedented volumes of data and built a solid knowledge base to develop climate change scenarios, vulnerability assessments and project profiles for adaptation and mitigation.

The making of institutions under the administration of Bogotá Humana shows how TACC Colombia became a strategic partner for a city vision that had at the centre of its agenda climate change adaptation and sustainable water management. The development plan of the city, the district plan for DRM and CC and the creation of the IDIGER are all institutions that found in the partnership and the knowledge base of TACC Colombia the political and the technical support for their making to be possible.

Finally, this chapter discusses how TACC Colombia as well as the multi-scale response of the Colombian government to La Niña evidences the influence of international research and policy bodies such as the UNFCCC and the IPCC in local processes of identity-, institution-, discourse- and representation-making. These bodies promote adaptation as a local practice and, at the same time, foster practices for local research and policy that not only require ‘translation’ by knowledge brokers but that also end up being detached from local realities.
8. Territories of adaptation

Using the analytical lens of epistemic geographies, this chapter examines how in Colombia and Capital Region, government-led depictions of the natural world attain stability and persuasive power through the spatialisation of identities, institutions, discourses and representations.

As explained in Chapter Four (section 4.2.), the ubiquitous character and the contextual use of the term 'territory' and the phrase 'territorial development' within the testimonies of the research participants, leads this study to introduce territories of adaptation as the spatialisation of knowledge/politics interactions. The empirical findings in Chapters Six and Seven, suggest that territories of adaptation manifest through instruments for territorial development, boundaries for adaptation projects and approaches, and through the regionalisation of adaption knowledge and needs.

Section 8.1 discusses territorial development as a guideline or pathway for adaptation, how it has influenced and been influenced by development planning, and how processes of territorial development portray the dynamics of power relations between the stakeholders in a given territory, at a given time and from different institutional levels.

Section 8.2 explains how, in the context of climate-related impacts, different boundaries and new governance arrangements emerge to define territories as the object of adaptation. This section also discusses how different actors understand the concept of territory.

Section 8.3 explores how climate change adaptation becomes entangled in the promotion of models of integrated development between the city and its surroundings.

Section 8.4 offers a reflection on the lack of continuity of TACC Colombia in processes of regional integration as intended by the partners.

Lastly, section 8.4 offers some conclusions.
8.1. Territorial development as a starting point for adaptation

Chapter Five explains how the Constitution of 1991 introduced the notion of territorial development as the restructuring of the physical and the social space, in an attempt to decentralise the power of the state and grant more agency for the Colombian territories (states, cities and municipalities) to plan and to develop their corresponding areas of jurisdiction.

In Colombia and Capital Region, territorial development has become a starting point for adaptation. In order to respond to the impacts of climate change, the incorporation of adaptation needs has taken place through policy and planning with a focus on territorial development instruments. In a very similar manner to DRM, the risks posed by climate change are mostly assessed at territorial levels. Identifying the areas within municipalities, cities and regions where floods, droughts, landslides and forest fires are recurring or are prone to occur becomes essential for development planning. Additional to traditional schemes of DRM, adapting the territory to climate change also involves looking at the risk of a potentially decreased water supply, food and other ecosystem services essential for human survival.

All of the interviewees who participated in this study work or have worked with governmental institutions and most of them have experience with policy and planning. In general, territorial development in Colombia embeds planning instruments that can, in theory, transcend local administration periods. However, at the same time, territorial development is very contested as it is often the materialisation of the interests of influential decision-makers.

Chapter Six explains how following the impacts of La Niña 2010–11, Colombia adopted a new normative framework for DRM through Law 1523 of 2012. In parallel, the government developed a new normative framework for territorial development with Law 1454 of 2011, which required all Colombian states, and not just municipalities, to develop territorial development plans.

In this way, the Colombian government was looking to include adaptation in the overall scheme of risk management for the country and at the same time, to incorporate it in processes of planning and territorial development. Risk, as a feature of the territory, need not be a deterrent for development, but it can serve to identify possibilities for sustainable
growth. According to a Colombian policymaker:

"Risk management teaches you that the first stage of adaptation is territorial. If you focus on the territorial dynamics of a hazard such as flooding, the first thing is the territorial development. You settle, or you do not settle there. Also, you decide whether to allow development in the area and in such a way to reduce risk, and you control that the land is not used for other purposes. Therefore, the territorial approach is absolutely strategic in the concept that you have for adaptation. If you do that, you start to talk about specific territories, or specific areas otherwise it is about general indicators that are of no use for an adaptation measure" (P49, communication via Skype, 27 May 2016).

Before La Niña, between 2006 and 2011, the first pilot project for adaptation in Colombia—INAP— (Chapter Five, section 5.4.) was already working to incorporate adaptation into territorial development, though it was not a disaster risk management approach. Collaborating with municipalities and their communities located in high mountain ecosystems, INAP had a bottom-up approach that understood territorial development as the result of a collective construction with the local communities. Using the principles of ecosystem-based adaptation and with a holistic vision of territory, INAP worked to articulate biodiversity conservation and socio-economic development, bearing in mind the social and the cultural aspects of development.

The baseline for territorial development in Colombia is the municipality, and the main instrument is the Territorial Development Plan (POT). From 1997, with Law 388, all 1,122 Colombian municipalities have to develop POTs in order to regulate the use, the occupation and the transformation of their physical urban and rural space. The POT "determines where, when, and how the spatial transformation takes place" (Ortiz, 2012, p. 86), and serves the mayor to make decisions in regards to environmental protection, to prepare for disasters, to develop housing, and to increase or decrease commercial areas among others.

The first POTs in Colombia were approved between 2000 and 2003 to guide territorial development for 12 years, equivalent to three administration periods. However, it is up to local mayors to review the POT at any point in time when a calamity or other development pressure or driver compels them to do so. By the end of 2015, 80% of Colombian municipalities were due to review their POTs, so local authorities started to work with the new approach for incorporating disaster risk management and climate change adaptation in territorial development.
Although disaster risk was already meant to be mainstreamed into territorial development, the consequences of La Niña 2010–11 evidenced failures. The first attempts for the formulation of POTs proved to be of inferior quality. The municipalities rushed to comply with the mandate to developed their POTs because the enforcement was linked to fiscal transfers from the central government (Ortiz, 2012). However, local authorities did not have clarity for their formulation, and the instrument did not promote local development. According to one of the interviewees with experience in risk management and territorial development, the inaccuracy and decontextualised character of these POTs was partly responsible for the impacts of La Niña 2010–11:

"The POTs in Colombia allowed for the legal construction of risk. Many families and households were affected by La Niña because of the lack of restrictions of the POTs for the occupation of hazardous areas, hence what we have are legal risks. The central government set the municipalities for failure because they demanded the POTs as a pre-requisite in order to allocate resources. Hence, the municipalities were careless and sloppy. It is not until now that this is changing, understanding the importance of the POTs." (P70, personal communication, 21 June 2016).

According to this interviewee, the majority of Colombian municipalities did not have the technical and financial resources to develop their POTs as required by the government. Municipal authorities ended up hiring external consultants, also not knowledgeable on this new instrument, to build the POTs just as a tick-box exercise.

Regardless, after La Niña, the POT became a strategic instrument not just for territorial development but to guarantee sustainable development more in general. Additional to the POTs, Law 388 established a planning instrument of superior hierarchy: The Watershed Development and Management Plan (POMCA), which is framed as an instrument for environmental management. Given that watersheds generally include more than one city/municipality at a time, the POMCA has pre-eminence over the territorial development of the individual municipalities. The POMCA determines the use of land, water, flora and fauna contained in the watershed. It also regulates the development of infrastructure in order to secure the equilibrium between the social and the commercial uses of the watershed's natural resources and in particular, of water resources. Consequently, in order to formulate a POT, the municipality must use the POMCA as a baseline. The POT then zooms in and works with the identification of risks at a local scale.
However, there are mismatches for the coordination of POMCAS and POTs. While the latter are valid for twelve years, the former for ten years. Additionally, the government periods of municipalities and cities do not coincide with the planning periods of the environmental authorities. While the POTs are the responsibility of the local mayors, Colombia's 34 regional environmental authorities lead the POMCAs. In order to formulate the POMCAs, the environmental authorities are responsible for identifying the watershed stakeholders and form a council, which ultimately defines the management and the ordering of the watershed. Their responsibility for the watersheds in addition to a history of political disputes with regional governments and with the central government is the main reason why the regional environmental authorities were held accountable for several of the disaster events during La Niña 2010–11. Floods and landslides were abundant in areas where watersheds had been deforested and occupied by illegal practices.

The incorporation of hydro-climatic risks or the risks posed by climate change into territorial development brings back the discourse or the debate on the understanding of risk in the context of climate change adaptation. Is adaptation achieved through the management of climate-related risks? As discussed in Chapter Six (section 6.1.3.), a conceptualisation of risk beyond that of disaster management can frame the expected disappearance of coral reefs at the end of the century as a risk. For others, adaptation goes beyond risk. It is about developing in the context of a changing climate whereby measures for ecosystems conservation are at equilibrium with economic growth and with social development. In this sense, adaptation aligns closely with sustainable development.

Territorial development in Colombia as a starting point for adaptation is very much linked with Colombia's history of incorporating disaster risk management into land-use planning. In 2011, Law 1454 set a new normative outline for territorial development. After La Niña 2010–11, it had never been more palpable the need to coordinate efforts between territorial entities to manage disaster risk and climate change impacts. Law 1454 defined new schemes or alternatives for associations between municipalities, states and territorial entities. These associations can take place when governments reach agreements for the coordination of development efforts. Law 1454 is expected to change the political-administrative division of Colombia, currently organised in 32 states and 1,122 cities and municipalities.
Even though Capital Region preceded Law 1454, TACC Colombia recognised the need to adapt to climate change through the associative scheme of Capital Region. Parallel to top-down and other conventional approaches for territorial development, initiatives like the National Pilot Project for Adaptation (INAP) project have rendered new understandings of 'territory', and with it, the ways to approach adaptation.

Territorial development as a starting point for adaptation shows how, at the same time that adaptation concerns influence territorial development, existing schemes of territorial development are paving the way for how adaptation is addressed in Colombia and Capital Region.

### 8.2. Boundaries for adaptation

More than looking at scales of adaptation, this section refers to the territory as a bounded object for adaptation: a space for knowledge production and circulation. The identities, discourses, institutions and representations, explored in Chapters Six and Seven in the context of La Niña 2010–11 and TACC Colombia, have a role in the materialisation of these territories. Namely, what the notion of epistemic geographies helps to reveal is how the interactions between specific ontologies and political projects render territories as the object of adaptation approaches.

Chapter Four explains how the word 'territory' was ever-present within the testimonies of the research participants, some of which offered definitions of it. According to a researcher working on adaptation:

"A community or a territory is related to the climate through water, food, energy, health and disasters. On the production side, through the economic infrastructure of the primary, secondary and third sectors. The most affected are agriculture, livestock farming, and mining in terms of how dependent they are on the water. We have those relationships. When I say local means to go and see at the local level how things are happening." (P57, personal communication, 07 June 2016).

The territory is also understood as the interactions of the stakeholders involved in the dynamics of the geographical space. It is the result and the process of social dynamics, cultural identities and economic activities and where power relations are continuously shaping and reshaping what the territory entails. In this way, the territory as the object of adaptation is as much about the collective appropriation by the stakeholders than it is
about the shared geographical space:

"For me, adaptation is a process of continuous learning where you mix the knowledge of all the actors that are part of the territory. When I talk about territory, I do not talk about a piece of land but about all the stakeholders that mingle in the mosaic of activities that take place in the territory." (P20, personal communication, 03 May 2016).

"So, in terms of the projects of adaptation, if you were to do a follow-up, I think in most cases, they do not exist anymore. It is not sustainable because there is not a real appropriation by the people; there is not an understanding of the territory not only as the geographical space but also about the culture and the values." (P12, personal communication, 22 April 2016).

According to the previous interviewee (P20), this lack of appropriation was also the case four years after the INAP project ended. However, what is to be appropriated is also in question:

"In general, when you talk to the people about INAP, they say that the project did not leave anything. However, when you start going into the territory, you realise that there are things that perhaps are not as tangible. Regardless, they say that the information and the measures were not appropriated because we are looking at the state or the municipality as the territory and not as the stakeholders that participate in the decision-making." (P20, personal communication, 03 May 2016).

The partnership of TACC Colombia defined territory as:

"a social, political and economic construction, result of the close and interdependent relationship between human and ecological systems through the provision of ecosystem services and their conservation, as these services are essential for human wellbeing. The outcomes of this dynamic relationship are landscapes/regions with differentiated environmental, cultural, productive, economic, political or social characteristics, which often redefine ecosystems and more in general, geographic characteristics (IDEAM et al., 2014a, p. 31).

When the Constitution of 1991 defined territorial development as the development of the physical and the social space as a decentralisation strategy, the concept became entrenched in the discourse of development planning and governance in Colombia. The concept of territory carries with it the tangible and the intangible, as evidenced in the testimonies above. However, in practice, after years of decentralisation of the power the state in Colombia, territorial development is about land-use planning. The numerous accounts of the interviewees, although acknowledging the ‘territory’ as beyond the physical space, evidence that territorial development is about policies and practices for regulating the use of the land.
Ultimately, in Colombian mainstream planning practices and in the context of TACC Colombia, territorial development is one of the main factors that determine human vulnerability to the impacts of climate change because it defines how municipalities go about using the land and defining which economic activities are possible and which are not. It deals with the use and occupation of natural and artificial resources (IDEAM et al., 2012).

The next section looks at three ways in which territories have been understood in Colombia as a result of the national mandate to incorporate climate change adaptation into development planning and governance. First, we have territories as political boundaries. Second, territories result from associative schemes between regional environmental authorities. Finally, territories of adaptation emerge as areas comprising ecological structures that are critical for the provision of ecosystem services such as water provision. These ecological structures are at risk from exposure to climate change impacts, but they can also be the solution to guarantee sustainability faced with a changing climate.

### 8.2.1. Political boundaries

Chapter Six discusses how, after La Niña, the Ministry of Environment in Colombia (MADS) adjusted its identity and discourse as the chief authority for environmental concerns in Colombia. In this process, the ministry defined that adaptation must take place at a sectorial and at a territorial scale. Although the MADS insist that the territories and the sectors must work together, the institutional arrangements prove to be a hindrance:

"One great barrier is our limited capacity to understand the territory. There is a tacit arrangement that the National Planning Department is in charge of leading the adaptation actions of the sectors and MADS of the territories, given the characteristics and the responsibilities of each of these two entities. However, like I was saying, adaptation turns out to be a heroic attempt to bring these two things together and to stop talking about territorial or sectorial but to put them together in the territory." (P13, personal communication, 22 April 2016).

For the INDC's (Intended Nationally Determined Contributions) to the UNFCCC, the MADS set as an adaptation goal that 100% of Colombian territories will have formulated and implemented adaptation plans by 2030. By territorial scale, the MADS refers to the
1,122 municipalities and 32 states in which Colombia is divided into political and administrative terms (Figure 23).

Figure 23. ‘By 2030, all Colombia territories will be adapted to climate change.’ A mapped depiction of MADS’ goal/discourse to the UNFCCC. Source: Adapted from UNDP Colombia (2013).

After La Niña 2010–11, and while the MADS was also working on a national adaptation plan, several initiatives were taking place in municipalities, cities and states. Cities like Cartagena, Cali and Barranquilla were already approaching adaptation through development planning, and six states were trying to replicate the model of TACC Colombia.

Cities have become the main agents and objects of adaptation in an increasingly urbanised world. Like UNDP's TACC programme emphasised, sub-national governments represent a link sufficiently close to the people to integrate projects into public policies and planning to ensure sustainable impacts on their territories. Cartagena, Cali and Barranquilla have different challenges in terms of climate change. Cartagena and
Barranquilla are coastal cities, so they have focused their efforts on preparing for rising sea levels. Meanwhile, Cali is located in the Valle of River Cauca, which is the primary source of water for the city but also the primary source of flood risk.

Replicating the model of TACC Colombia has been understood in terms of political divisions. Although states in Colombia have a capital city, which usually surpasses the financial and technical resources of the other cities and municipalities in the state, the dynamics are very different for each case. The interdependencies between Bogotá and Cundinamarca that characterised TACC Colombia, and the fact that Bogotá is the capital of the country, gave the project particular dynamics as explored in Chapter Seven. Additionally, Bogotá houses the headquarters of the national government and its associated institutions. Therefore, replicating this model is answering more to Colombia's political division into 32 states than to the localised dynamics of climate change impacts and climate variability within and between Colombian states.

In the production of territories of adaptation as political boundaries, the notion of epistemic geographies highlights a political project for the Ministry of Environment to embody the discourse of 'adaptation as territorial', as well as its identity as the national-level leader of adaptation actions for all of Colombia's political-administrative divisions. This political project also serves to reinforce the ministry's international commitments and diplomatic role in the negotiations of the UNFCCC.

In practice, though, as this research has pointed out, the implementation of all of these adaptation plans overlaps with various other planning and governance arrangements. The following sections explore this further.

8.2.2. Regional Climate Change Nodes

Chapter Six (section 6.1.1.) explains how, parallel to the strategy of incorporating adaptation following political-administrative boundaries, the Ministry of Environment (MADS) developed another initiative for advancing adaptation that goes beyond such boundaries: The Regional Climate Change Nodes. Although the nine nodes can be depicted in a map of Colombia as nine territories joining three to four neighbouring states at a time, they do not necessarily coincide with political divisions (Figure 24). Figure 10 (Chapter Five, section 5.4.) shows how this was the case of the three regional
environmental authorities partner in TACC Colombia and with jurisdictions overlapping the political boundaries of Capital Region. Watersheds and other vital ecological structures transcend political divisions, and so do the jurisdictions of the regional environmental authorities led by the MADS.

The Regional Climate Change Nodes are based on an associative scheme that arose in Colombia's coffee region after an earthquake in 1999. Although the city of Armenia was then most affected, the earthquake impacted the whole of the region. Five states are part of the coffee region, and it is positioned within three environmental corridors that provide ideal conditions for coffee crops, one of Colombia's main agricultural exports. In 2007, based on the principle that the natural ecosystem must support regional development, an associative scheme between the five regional environmental authorities, various regional universities and a fund created for post-disaster reconstruction created a regional climate change node.

**Figure 24.** From political boundaries to jurisdictional boundaries: the Regional Climate Change Nodes. Source: Adapted from UNDP Colombia (2013) and IDEAM et al. (2017)
With an initial focus on low-carbon development, after La Nina 2010–11 and with the support of the MADS, the Coffee Region Node (Figure 24) started to work on adaptation issues. As the head of the regional environmental authorities, the MADS then proposed the replication of the model for the rest of Colombia. However, the ministry modified the figure of the node by including more stakeholders. Joining the regional environmental authorities, as the leaders of the nodes, there were to be participants from the private sector, NGOs, research institutes, local communities and the academia. In this way, the MADS divided the Colombian territory in nine nodes, each one associating three to four regional environmental authorities and the corresponding regional stakeholders.

The nine Regional Climate Change Nodes are the territorial instances within the SISCLIMA, the National Climate Change System. Echoing the MADS, the SISCLIMA has also divided climate change actions into sectors and territories. For the SISCLIMA, the nodes are their representation at a territorial level, a regional replication of a national figure. The nodes in charge of coordinating regional climate change actions, and they are also responsible for helping with the development and the implementation of national policies and planning for climate change.

The MADS established the figure of the node as an instance of collaboration between a diversity of stakeholders, but different from political boundaries, the nodes are not legally constituted entities. If the territory is understood as the dynamics between the stakeholders within certain geographical boundaries, then the nodes can be seen indeed as territories of adaptation. Only that this time, the leadership of the figure does not lie on the regional governments but the regional environmental authorities.

However, according to one interviewee, the historical disputes between the regional governments and the regional environmental authorities, in addition to the challenges of conveying such a variety of stakeholders under a single figure, make the nodes redundant:

"It is frustrating to work with the nodes because they plan very well, but it does not transcend. In the end, the node that achieves something is because one of the regional authorities did something within itself. I would say the nodes could work as centres of information because that has a low cost, but beyond that, it is complicated because each institution is going to work on their internal agenda." (P78, personal communication, 07 July 2016).

According to a member of staff of CAR Cundinamarca, the figure of the node is also confusing in terms of accountability. Capital Region is part of the Andean Centre East
Node (Figure 24). At any given point, it is difficult to discern whether the actions of the regional authority are part of the framework of its jurisdiction, its work in Capital Region or its work as part of the node and in the broader framework of SISCLIMA (P25, personal communication, 10 May 2016).

The Regional Climate Change Nodes, as epistemic geographies or territories of adaptation, emerged to spatialise more participatory governance schemes, as well as to reinforce the identity of Colombia's 34 regional environmental authorities. On paper, the nodes seek to open spaces for knowledge production and the negotiation of interests between governmental stakeholders and voices otherwise unheard. As associative schemes, the nodes also seek to avoid the overlapping of adaptation actions. Ironically, they add confusion or redundancy to efforts for implementing adaptation on the ground.

8.2.3. Ecological structures: the ecosystem as the territory

A third figure or territory of adaptation that preceded and proceeded La Niña 2010–11 is the ecosystem or the ecological structure. In 2005, the IDEAM-led project INAP responded to Colombia's national approach to adaptation at the time. Chapter Five explains how INAP (National Pilot Project for Climate Change Adaptation) was part of the process of identity-making of IDEAM previous to La Niña and Capital Region. Back then, climate change was regarded as an environmental concern more than a threat to development.

INAP was the first adaptation project that, using the principles of ecosystem-based adaptation, focused on three vital ecosystems in Colombia that are at considerable risk due to global warming. These are high mountain ecosystems, coastal areas and islands. In the context of high mountain ecosystems and compared to the area of Capital Region, INAP worked with a much smaller area of action: the watershed of River Blanco, part of the páramo of Chingaza (Figure 25).

In order to address climate change adaptation, INAP developed the concept of Adaptive Territorial Ecological Structure (EETA). The EETA was defined as a framework to introduce aspects of the ecological structure that have a spatial dimension, and that play a fundamental role in the provision of essential ecosystem services. The primary objective of the EETA is to maintain the ecological integrity of ecosystems in the long term.
EETA includes all the structural elements relevant to secure the conservation and the restoration of the ecosystem services of high mountain and páramo areas. Among these services are the regulation of the water cycle, the maintenance of quality and quantity of water, aquifer recharge, risk and environmental hazard reduction and control of soil erosion (IDEAM, 2011).

The project defined the EETA of River Blanco in terms of physical space by mapping its three main structural elements: green areas, water streams and type of land use (urban area, agriculture, grazing areas) (Figure 25).

**Figure 25.** Adaptive Territorial Ecological Structure (EETA) of the River Blanco watershed. Source: Adapted from Creative Commons (2012) and IDEAM (2011)

With a participatory approach, INAP collaborated closely with the local stakeholders, mostly indigenous communities located in rural areas, to advance the territorial development of the watershed of River Blanco as a strategy for adaptation. According to the INAP project, our ancestors—the indigenous communities—believe that the territory is already organised from the beginning and that it is us, humans, from a western...
perspective, that have disrupted it, which seems very evident given the climate-related impacts in the areas intentionally disrupted by phenomena of urban growth and so-called development (IDEAM, 2011).

According to INAP, a participatory methodology for the territorial development of the EETA was the best way to adapt to a changing climate. Besides the indigenous communities, there were also peasant communities, local authorities, research institutions, Natural National Parks and other territorial entities. The core principle of the project was to work based on the 'natural order' of the territory, to bring back elements of the landscape lost to processes of urbanisation and other land-use changes.

INAP was an important precedent to TACC Colombia because it worked in the high mountain areas and the páramo of Chingaza, the primary source of water for Bogotá and Cundinamarca. For a member of the coordination team, if TACC Colombia had identified the EETA for the water cycle in Bogotá and Cundinamarca, it would have produced better outcomes:

"I think that we would have advanced further if we would have had a territorial approach defined by the limits of the water supply in the corresponding territories. Because then you would be better prepared to deal effectively with the vulnerability of the water cycle that nurtures industrial development, agricultural development, irrigation systems and human consumption. Moreover, I think you could achieve more qualified participation and with more knowledge from the different actors. If you see the water balance at risk, you can achieve much more effective partnerships" (P2, personal communication, 01 April 2016).

The concept of the EETA derives from the work of Thomas Van Der Hammen, a Dutch botanist who started to study the Bogotá savannah in 1951. His work is the most comprehensive analysis of the history of the climate, vegetation and the ecosystems of the Bogotá savannah. Van Der Hammen concluded that all that knowledge had to be translated into a political format where it could be the baseline for decision-making (Bogotá’s Secretary of Planning, 2015). That translation led him to create the concept of Main Ecological Structure (EEP).

Van Der Hammen defined the EEP as the network of ecosystems essential to preserve nature in a given territory (Bogotá’s Secretary of Planning, 2015). Thus, the restoration of a territory that has been disrupted requires the ecological restoration of the EEP. This restoration guarantees the conservation and the connectivity of the remaining ecosystems to secure the spatial and functional integrity of essential ecological processes such as
water regulation, biodiversity conservation and climate regulation (Bogotá’s Secretary of Planning, 2015). In this sense, the EEP becomes the framework to achieve sustainability through territorial development. For a staff in the Secretary of Planning of Bogotá Humana who worked in TACC Colombia:

"If we want to work based on the EEP, first we have to identify where it is because it can be mapped, and then achieve connectivity. For reconnecting forest areas, for example, land might have to be purchased. All of that decision-making is based on the concept of the EEP. If not for that concept, the work of Van Der Hammen would have been just one more. It would not have become all of what it entails for territorial development. The secret is in the translation capacity that you use. TACC Colombia did not do that." (P9, personal communication, 19 April 2016).

However, the Páramos project approved under the administration of Bogotá Humana places the páramo ecosystem as a critical component of the EEP of Bogotá, Cundinamarca and its surroundings. According to one of the professionals involved in Páramos, when the project started, the focus was very conservationist and less about productive activities. However, people live in the páramos, and they grow crops, keep cattle, mine and offer touristic services. There is a great diversity of stakeholders, from the peasant that grows potatoes in one hectare of land to the big potato producer with 500 hectares, and:

"If we did not have people in the páramos, these would be very poorly maintained. Without people appropriating the territory, it is easy for a big mining company or a major infrastructure development to come and operate there. If we are running out of water, what is the best answer? To guarantee that the water stays in the natural ecosystems like the páramos, or to fill them up with cement to store the water? Dams do not regulate the water cycle as ecosystems do. That is why a project for the conservation of the páramos is better than a dam. The water is stored naturally, and what we have to guarantee is that the ecosystem is not exposed to risk. It is exposed to risk when we prioritise the use of the páramo for coal mining" (P50, personal communication, 01 June 2016).

The starting position of the Páramos project as purely conservationist evokes Neumann’s (2003) accounts of the Serengeti national park in Tanzania (Chapter Three, section 3.2.2.) when British ideals of a pristine landscape led to the creation of an area emptied by eviction that denied the agency of local communities to shape the landscape. However, later for the Páramos project, it was clear that it had to involve the people living in these areas in order to guarantee the sustainability of the territory (Figure 26).

The páramos are essential for the adaptation to the impacts of climate change that threaten
the water supply of vast areas in Colombia, and thus, they are very disputed. For years, the Colombian government has tried to define the boundaries of the páramos to protect them from large-scale mining. After La Niña 2010–11, there was finally an allocation of resources to define the boundaries, but in addition to the opposing interests—conservation vs extraction—mapping the páramos as bounded territories resulted in a very problematic endeavour.

The páramo as a ‘pristine’ and empty landscape

Potato growers in the páramo area

**Figure 26.** Images of the páramo of Chingaza. Source: Above, photo by Philipp Weigel (2010). Below, photo from *Acueducto* (2014).
The Ministry of Environment reached out to the Humboldt Institute to define boundaries for the Colombian páramos. However, according to a member of staff in the Humboldt:

"We said that the páramos do not need to be bounded in order to be protected. The páramo does not need an administrative act in order to recognise its existence. What should happen is that wherever you have páramos, mining or other degrading activities should not happen. And then you go into a licensing process where you have to demonstrate whether the area is a páramo or not. Regardless, the Constitutional Court did not accept that, and they decided to bound." (P66, personal communication, 16 June 2016).

At the beginning of 2016, the Colombian Constitutional Court was reviewing a lawsuit, presented by an NGO and a political party, against Colombia's National Development Plan in regards to some of its articles on land-use that allowed oil exploration and extractive activities in areas close to the páramos (Semana, 2016). By mid-2016, the court had ruled in favour of the plaintiffs and thus, ordered the bounding of the páramos. By 2018, all of the 36 Colombian páramo complexes had been bounded (Datos Abiertos, 2020) (Figure 27).

Figure 27. A geographical vs. a political depiction of the páramo areas in Colombia. Source: Author adapted from UNDP Colombia (2013) and JUSTICIA (2017)
The political boundaries (right) defined smaller areas compared to the geographical depiction of the páramos (left). The bounding process involved the negotiation of interests between large-scale mining and agriculture activities. Also, the MADS was doubtful on whether to include populated areas within these new boundaries. Thus, the final boundaries were defined as high as possible in terms of elevation to achieve 'pristine' landscapes.

A conservation staff who works with communities in the páramo areas sees the boundary disputes as a bureaucratic stretch for the conceptualisation of the territory:

"I think they are developing a meta-territory because the thing becomes very complex and requires more technology every time, more information, more institutionality, and what we generate is a parallel managing of the territory. So, for the definition of that meta-territory the resources go to institutional meetings, consultancies, the information, all of that is for the meta-territory and they do not reach the farm, the watershed, just a minimal part" (P21, personal communication, 04 May 2016).

The Adaptive Territorial Ecological Structure (EETA), the Main Ecological Structure (EEP) and the páramo areas manifest as territories of adaptation vital for water provision. Viewed as epistemic geographies, these territories of adaptation reflect a dialogue between the discourses of ecosystem-based and community-based adaptation; knowledges that circulate within approaches to territorial development in pursuit of sustainability for both human and ecological systems.

The case of the páramos, in particular, reflects the contextualised co-production of epistemic and normative commitments that characterises epistemic geographies. A broad agreement between scientific, bureaucratic and lay knowledge, regards the páramos as critical ecosystems for water provision in Colombia and Capital Region. This knowledge intersects with disputed normative frameworks for the governance of these areas, and indeed for defining what is páramo and what is not. The current and expected impacts of climate change, compounded by other stressors (e.g., extractive activities) have compelled the bounding of these territories as a political act to protect and guarantee their sustainability.
8.3. From urban to regional planning and governance: from Bogotá to Capital Region to Central Region

The notion of territories of adaptation, as a way to explore the co-production of knowledge and politics in Colombia and Capital Region, reveals how the city as a political entity is looking outwards to establish partnerships for regional governance. Adaptation is a factor but is one more among other issues that require integrated approaches such as transport, food provision and water supply.

The city is regarded as both an agent and an object of adaptation. It is the unit for development because it is where populations and resources are concentrated. However, in Colombia, zooming into the case of Capital Region, all the partners of TACC Colombia understood that neither the city nor the state could plan for climate change by themselves.

TACC Colombia also supported the vision of Bogotá Humana for integrated development schemes, recognising the interdependencies not only between Bogotá and Cundinamarca but with other three neighbouring states: Boyacá, Meta and Tolima. Bogotá Humana promoted a new partnership between the capital and these four states. This associative scheme called Central Region (Figure 28), the first of its type in Colombia, was created under the auspices of Law 1454 of 2011 as a new associative scheme for the coordination of development planning and governance.

This section discusses how the making of Capital Region and Central Region, examined in the light of epistemic geographies, reveals the emergence of territories of adaptation through new forms of territorial development. This section also explores how territorial development was framed as critical for the incorporation of adaptation planning in Bogotá and Capital Region, and how Central Region emerged as a way to carry on the agendas of TACC Colombia and Bogotá Humana.
8.3.1. From Bogotá To Capital Region

Chapter Five explains how a lack of trust has characterised the coordination of development efforts between Bogotá and Cundinamarca due to the overwhelming political and economic leverage of Bogotá. As the capital of the country, concentrating 25% of Colombia's GDP, the negotiation terms between the municipalities of Cundinamarca and the capital are significantly unbalanced.

In 2010 and after almost ten years of trying to push Capital Region forward, UNDP's TACC programme was an opportunity to materialise efforts for integrated development under the umbrella of an integrated plan for climate change. Although in 2011 there was an attempt to consolidate Capital Region officially, the initiative was abandoned in 2012 with the end of the administrations of Bogotá and Cundinamarca at the time.

When Bogotá Humana joined TACC Colombia in 2012, the city's administration
understood the capital as part of a regional structure with strong interdependencies. *Bogotá Humana* advocated for a model of territorial development that was open and decentred. It was a multiscalar approach with three instances of regional integration: first, 'a border scale' between Bogotá and some bordering municipalities where there is a process of conurbation; second, 'a sub-regional scale' between Bogotá and the 116 municipalities of Cundinamarca; finally, a third or 'regional scale' between Bogotá, Cundinamarca and other three neighbouring states: Meta, Tolima and Boyacá (Bogotá's Secretary of Planning, 2015).

In the spirit of regional integration, *Bogotá Humana* wanted to modify Bogotá's exiting territorial development plan, that had been formulated in 2003, to reflect its new model for development planning. This revised version, the MEPOT, included regional integration as a strategic line of action to guarantee integrated governance between the different governmental levels in the region.

In 2012, recognising that urbanisation processes cannot be separated from environmental elements, the MEPOT adopted a policy of eco-urbanism to promote sustainable construction and the increase of green areas to improve the permeability of the soil and to reduce the 'heat island' effect. In terms of risk management, the MEPOT adopted a preventive approach, which was the baseline for the creation of the IDIGER, the District's Institute for Risk Management and Climate Change (Bogotá's Secretary of Planning, 2015).

The MEPOT was an attempt to materialise the development agenda of *Bogotá Humana*. In addition to incorporating climate change concerns, territorial development for *Bogotá Humana* was the way to give a spatial dimension to its three strategic lines: 'a city that overcomes segregation and discrimination'; 'a territory that deals with climate change and organises itself around the water'; and 'a Bogotá that defends and strengthens the public'.

The MEPOT intended to challenge processes of segregation by defining spaces for social housing in the centre of the city. The idea was to bring back low-income families from the periphery of the city and closer to their sources of employment. According to the development plan of *Bogotá Humana*, an expansive vision of the city was against its principle of 'organising itself around the water'. The plan argued that expansive cities tend to cover the natural spaces of water as a result of development approaches that go against nature, and that assume that human beings can dominate the ecosystem (Bogotá's
The montane savanna where Bogotá is located has a gradual inclination towards the west, so the natural drainage ends up in those areas of the city. Before 1954, there was a lagoon towards the west of Bogotá. Currently, part of that area is occupied by Bosa, a low-income area in Bogotá that often suffers from flooding. During La Niña 2010–11, more than 5,000 Bosa residents were affected due to the heavy rains that flooded their households (Forero Barón, 2011).

The most northern areas of the city are transition areas between the urban and the rural. The strategy of Bogotá Humana to contain an expansive city model advocated for the restoration of the Regional Forest Reserve Thomas Van Der Hammen, located to the north of Bogotá. The Thomas Van Der Hammen reserve is part of the main ecological structure (EEP) of the city and the region, and essential to adapt to climate change. The reserve allows for the ecological connectivity between the Eastern Hills of the city and the River Bogotá (Figure 29).

**Figure 29.** The Thomas van der Hammen Reserve, part of Bogotá’s Main Ecological Structure (EEP). Source: Adapted from Creative Commons (2012) and Observatorio De Conflictos Ambientales (2017)
Although nominally declared as a forest reserve by CAR Cundinamarca (the regional environmental authority) in 2011, the area of the reserve has been the object of diverse and unregulated land use: residential, agricultural, industrial, among others. This unplanned development has contributed to the degradation and loss of the natural ecosystems of the reserve (CAR Cundinamarca, 2013).

The Thomas Van Der Hammen reserve is part of what Bogotá Humana called 'the sub-regional scale', and which coincided with the territory of Capital Region. Under the principle of 'a territory that deals with climate change and organises itself around the water', the MEPOT sought to declare the 1,395 hectares of the reserve as conservation areas. However, The MEPOT was void by the city council. According to a member of staff of Bogotá Humana:

"The MEPOT is the most advanced approach ever done in terms of territorial development for a city, including climate change. Unfortunately, there were economic interests that caused its suspension. The MEPOT was explicitly associated with climate change, and there was a lot of what TACC Colombia produced included in the document" (P17, personal communication, 28 April 2016).

Although Bogotá cannot legislate in the territorial development plans (POTs) of Cundinamarca's municipalities, this did not deter the city for looking towards the coordination of the municipal POTs as a way to support sustainable development at a regional level. This coordination was achieved at the 'border scale' with the municipalities where Bogotá has a more direct influence. However, the fact that Bogotá Humana had a vision for a city organised around the natural spaces of water gave rise to initiatives with broader regional impact such as the Páramos project.

The approach of TACC Colombia for the municipalities in Cundinamarca was to incorporate the management of hydroclimatic risks in the territorial development of cities and municipalities to build resilient territories. As discussed earlier in section 8.1, the existing POTs at the time of TACC Colombia were the first ones ever developed, and they had proven to be more than inadequate when La Niña 2010–11 hit the region. For TACC Colombia though, it was an excellent opportunity to influence planning in Cundinamarca effectively.

Seen through the light of epistemic geographies Capital Region, before and in the context of TACC Colombia and Bogotá Humana, was an attempt to spatialise a
knowledge/politics scheme for planning and governance. The technical knowledge produced by TACC Colombia raised awareness on the shared concerns between Bogotá and Cundinamarca in the context of a changing climate. Understanding the need to govern adaptation in Capital Region beyond the political boundaries of the capital and the state, was one of the most important outputs of the project according to the partners of TACC Colombia. However, the lack of legal status or an official figure kept Capital Region at the expense of the political will of the changing administrations. The MEPOT of Bogotá was a bold bid to give the shared visions of TACC Colombia and Bogotá Humana leverage for long-term planning.

8.3.2. From Capital Region to Central Region

After the suspension of the MEPOT, Bogotá Humana sought for an alternative to promote its agenda and the outputs of TACC Colombia beyond its four-year term. Bogotá Humana then saw in Central Region, the third and most comprehensive level for regional integration conceived in the city's development plan, as the best way to achieve it. The idea was for Central Region to execute the second phase of TACC Colombia. Various of the stakeholders and individuals that took part in TACC Colombia, participated in the formulation of Central Region and others were working directly for Central Region at the time of this research's fieldwork.

During the creation of Central Region, technical committees defined that the environmental focus of Central Region had to rely on what TACC Colombia was doing for Capital Region. At the time, Central Region had different working groups, and for its environmental component, it reached out to the partners of TACC Colombia for assistance. The stakeholders were very similar to the ones that participated in Capital Region: regional environmental authorities, local governments, Bogotá's Chamber of Commerce and national actors like IDEAM and the Humboldt Institute. According to a professional working in the formulation of Central Region:

"TACC Colombia in Capital Region resolved the issue of where to focus the environmental strategies of Central Region because it focused on climate change, which includes many variables not only environmental but also social, and that helps to have more impact and coverage" (P11, personal communication, 21 April 2016).
Central Region was declared as an associative scheme in 2014, the first official associative scheme for planning and governance in Colombia. Although the political and administrative boundaries of its partners remain, Central Region looks to materialise the efforts for regional integration that had taken place for over ten years through Capital Region. However, different from Capital Region, Central Region has legal status, a director, staff, headquarters and a board formed by the heads of the governments of Bogotá, Cundinamarca, Meta, Tolima and Boyacá.

The goal of Central Region is to consolidate a development model characterised by social inclusion, knowledge, the recognition of population differences in terms of gender, ethnicity and territory, and that moves forward in poverty reduction and the reparation of the victims of the armed conflict as a way to contribute to the construction of peace. The board of Central Region defined five strategic lines of action: i) Sustainable Ecosystems and Risk Management; ii) Infrastructure and Public Services; iii) Food security and Rural Economy; iv) Competitiveness and International Projection; and lastly, v) Governance and Good Government (Región Central, 2020).

The environmental strategy took up some of the guidelines of TACC Colombia, mostly in terms of the conservation of strategic ecosystems and here again, the páramo ecosystem had the principal role. Out of 36 páramo complexes in Colombia, and Central Region contains 15 of them within its boundaries. Considering that Colombia has half of the páramo ecosystems worldwide, Central Region then harbours 25% of the world's páramos (Figure 30). Colombia's primary hydro generation power plants are located in these páramos, and there are projections for building further dams to supply water to other areas of the country. The páramo areas in the state of Meta supply water for the largest agricultural area in Colombia. Therefore, Central Region is now in charge of executing the second phase of the Páramos project, initially led by Acueducto.
At the time that TACC Colombia was trying to negotiate a second phase with Central Region, there were disagreements. Each state had different interests, and in the case of Meta, they had already advanced climate change scenarios and vulnerability assessments with other methodologies, so they were reticent to change what was already done (P11, personal communication, 21 April 2016). The Regional Climate Change Nodes within Central Region had other partnerships, and different messages were coming from various sources and levels. In terms of the other outputs and the portfolio of projects developed by TACC Colombia, the issue was that they had a smaller scale—Capital Region—and Central Region wanted projects to cover the entire region. For the other two states in Central Region (Boyacá and Tolima) that were not as advanced as the state of Meta, it was about bringing those results to their scale, so the knowledge was levelled.

The partners of Central Region (Bogotá, Cundinamarca, Meta, Tolima and Boyacá) wanted three things: first, to build climate change scenarios, vulnerability assessments and GHGs inventories as TACC Colombia did for Bogotá and Cundinamarca; second, to

**Figure 30. Páramo areas in Central Region. Source: Adapted from Semana (2016) and UNDP Colombia (2013).**
provide technical assistance and training to the corresponding staff in these three states so they could learn more about climate change; and third, to develop adaptation and mitigation actions for the whole of Central Region and in line with the national policies.

To address these goals, Central Region proposed the development of an interinstitutional platform to manage climate change knowledge. To have a unified database with the information from Bogotá and the four states of Central Region so it could read itself as a territory. In a way, Central Region followed the model of TACC Colombia but not as intended by the latter. Besides the different scales of information and outputs, TACC Colombia took place during the previous administrations of Bogotá and Cundinamarca. By the beginning of 2016, all of the 1,122 Colombian municipalities and 32 states had elected new Mayors and Governors, and governmental administrations in Colombia tend to brand themselves by clearly taking a distance from the previous administrations.

The reasons TACC Colombia survived changes in local and regional administrations were first, the presence of the UNDP and second, the fact that there were budgetary commitments already acquired and passed on to the successive administrations. However, when the outputs of TACC Colombia was passed on to Central Region, all it was delivered was the knowledge but not the political will.

Similar to Bogotá Humana, For Central Region urban development ought to positively impact regional development in order to reduce inequalities. However, although Central Region was promoted and sanctioned under the administration of Bogotá Humana, the visions for territorial development and coordinated planning changed at the beginning of 2016 with a new city administration. While for Bogotá Humana and Capital Region, densification and respecting environmental dynamics were crucial to achieving a more equal and inclusive region, for Central Region this is achieved through the expansion of the urban. Central Region promotes the current expansive tendency not only of Bogotá but of other cities in the region in order to form a 'lineal macro metropolis' (P15, personal communication, 26 April 2016). Although the environmental component within Central Region is working to guarantee the conservation of vital ecosystem services and addressing the impacts of climate change, the priority is economic growth to build a 'competitive' region.
Throughout the shifting regional arrangements for planning and governance between the capital of Colombia and its surroundings, it is clear the enormous leverage of Bogotá's local government. The notion of epistemic geographies helps to reveal how Bogotá's political projects for territorial development have influenced the regional scale despite changes in the city's administration. Different visions for the city and the region (ontologies) have become entrenched in processes of simultaneous social and spatial change.

First, despite the political will of Cundinamarca and TACC Colombia, Capital Region never managed to consolidate its project for regional integrated planning and governance. It was not until *Bogotá Humana* that the knowledge produced by TACC Colombia served to justify further the need for regional integration and urban densification. Eventually, this led to the creation of Central Region, a broader political and geographical arrangement compared to Capital Region. However, by the time of the fieldwork in 2016, Central Region had changed approaches towards an expanding urban core, following the political will of the administration that followed *Bogotá Humana*.

### 8.4. Did TACC Colombia in Capital Region fail as an exercise of purposeful co-production?

Together with Chapter Seven the previous section explains how, after TACC Colombia ended, none of the projects was adopted by any of the partners or by Central Region. The projects put forward by TACC Colombia in Capital Region illustrate a 'business as usual' approach with technical and managerial proposals which did not transcend into action. The partners almost unanimously considered the portfolio of adaptation and mitigation projects of TACC Colombia as an unfortunate resemblance of the level of knowledge production that the partnership developed. Besides being of technical/managerial nature, the portfolio consisted of scattered projects instead of an integrated plan for climate change management in Capital Region as intended by TACC Colombia and the UNDP's TACC pilot guidelines. Does this mean that TACC Colombia failed as an exercise of purposeful co-production, or were its technical/managerial outputs and lack of action the natural consequence of a 'depoliticised' initiative as some adaptation scholarship argues?

This section aims to answer this question by using Hegger and Dieperink’s (2014) seven success conditions for joint knowledge production discussed in Chapter Two (section
2.1.10): i) broadest possible actor coalition, ii) shared understanding of goals and problem definition, iii) recognition of differences in actors' perspectives, iv) organised reflection on the division of tasks by participating actors, v) roles of researchers and their knowledge is clear, vi) presence of innovation in reward structures and vii) the presence of specific resources.

i) **Broader possible actor coalition.** Although TACC Colombia only involved government institutions, it did bring them together to work towards a common goal for the first time. National, regional and urban institutions joined the partnership via two main catalysts: the presence of UNDP Colombia as co-leader of the project and the impacts of La Niña 2010–11. The lack of involvement—as partners—of the civil society, the private sector, the academy and grassroots institutions reflects the top-down and technocratic approach for development planning in Colombia and its regions. However, in practice, it would have been almost impossible to achieve such a coalition given the scope of the project with the resources at hand: a region of more than 10 million people, concentrating more than 30% of Colombia's GDP.

ii) **Shared understanding of goals and problem definition.** In terms of shared understanding of goals and problem definition, the latter proved to be more challenging. TACC Colombia alternated its focus between two goals. On the one hand, the consolidation of an institutional platform with the government authorities in charge of development planning and governance of climate change in Capital Region. On the other, the development of an integrated plan for climate change management in Capital Region. For some interviewees, the focus should have been on the partnership, and the opportunity to consolidate permanent structures of collaboration.

iii) **Recognition of differences in actors' perspectives.** The partners regarded TACC Colombia as a unique inter-institutional platform that showed that it is possible to reach agreements despite conflicts of interest. The political rift between Bogotá and Cundinamarca for water management, between the Government of Cundinamarca and the Regional Environmental Authority in terms of jurisdiction, and the parallel climate change scenarios, were successfully negotiated in favour of the project. Although some of these interviewees attribute this effective negotiation of differences to the presence of UNDP Colombia.

iv) **Organized reflection on the division of tasks by participating actors and v) Roles**
of researchers and their knowledge is clear. The role of researchers/consultants, the technical government staff and the heads of the partner institutions were defined since the beginning. The operational structure of TACC Colombia reflected a political decision-making level—formed by the heads of the institutions—, a technical level with government staff organised in working groups and aided by researchers and consultants, and a coordination team to function as a mediator between the 'politics' and the 'knowledge production' levels.

vi) Presence of innovation in reward structures. The training programme for the technical government staff was an innovative element and reward structure put forward by the coordination team of TACC Colombia. The training programme served to further work in conflict negotiation, it increased the motivation of the technical staff, it provided network opportunities, it added value to their curriculums, and it contributed to developing the portfolio of projects.

vii) The presence of specific resources. Though with funding channelled through the UNDP, the partnership had a 50%/50% funding structure. It was not only the first time that the partners worked together but also the first time they committed funding from their operational budgets. The coordination team of TACC Colombia regards this as a significant achievement.

Hegger and Dieperink's categories give an idea of what some adaptation literature regards as relevant factors for successful knowledge co-production. Except for category ii) on problem definition, TACC Colombia met all the conditions. So, why did TACC Colombia not meet its goals to consolidate an institutional partnership and to move from planning to action (i.e., implementation of the projects in the planning instruments of the partner institutions)? The lens of inherent co-production serves to answer this question, but it also reveals ways in which the project encouraged and served as a model for other (mostly unintended) outcomes and initiatives.

First, Capital Region was never more than an abstract statement of intent. Different from Central Region, it never managed to configure itself as an institution and as a territory for coordinating development between the capital and the region. Second, the presence of the UNDP as a guarantor of transparency implies that these type of partnerships in Colombia cannot thrive because of the lack of trust among government institutions. This lack of trust is a bad precedent for successful regional governance considering that UNDP kick
starts processes, but it does not follow-up the results nor, as in the case of TACC Colombia, pushed for a second stage of the project as the partners proposed. Third, although technical/managerial adaptation projects would, in theory, fit well with Colombia's technocratic approach towards adaptation, the projects of TACC Colombia were the result of a rushed and uninformed process that did not use the second vulnerability assessment developed by Conservation International.

Moreover, at the time the project ended, the projects were handed over to new urban and regional administrations that, in Colombia, tend to start from scratch to clear the path for their agendas and their own identity. Finally, TACC Colombia lost the opportunity to have the heads of the partner institutions make political decisions. Except for major Gustavo Petro, head of Bogotá Humana administration, none of the other members of the directive committee implemented the knowledge and the outputs of TACC Colombia within their institutions. Their role in the project was limited to administrative decisions within the project's boundaries.

However, despite these failures, the lens of inherent co-production shows that TACC Colombia managed to have a positive impact in various other ways.

Arguably, the most relevant development in the context of TACC Colombia was the bold attempt of Bogotá Humana to challenge historical and current development models. With a focus, at the very core of its development agenda, on human and environmental wellbeing as inextricably linked, and moving away from expanding trends of urbanisation, this administration challenged mainstream practices of city-making with a innovative model for urban and regional development. To frame climate change adaptation and sustainable water governance as intrinsic to human wellbeing was a revolutionary concept, to say the least, for development planning in Colombia.

TACC Colombia also strengthened the concept of territorial development, and the reality of the region or the capital being unable to adapt by themselves without coordinating efforts with the other. The partnership was referenced as such in national normative frameworks for adaptation. The Ministry of Environment and the governments of many other Colombian regions started to emulate the experience of Capital Region. Although these initiatives are likely taking a technical/managerial approach, they might find useful entry points for influencing regional practices of development planning.
The third Colombian National Communication to the UNFCCC (2017) included, for the first time, climate change scenarios at a regional scale. While the UNFCCC does not require anything beyond national scale, the experience of TACC Colombia served to recognise that Colombian climatologists and meteorologists are sufficiently skilled to lower the scale, not only of the climate change scenarios but also of the GHGs inventories. Moreover, three members of TACC Colombia participated in the leading team of the 3rd National Communication.

The government staff who continued in their positions after TACC Colombia ended, had the opportunity to learn not only about climate change but about how and why there are barriers for the incorporation of adaptation into development planning and governance. Their testimonies contain reflections about the lack of coordination between institutions resulting in overlapping efforts, the top-down approach for planning and governance of their parent institutions, and the consequent lack of involvement of the very communities that are suffering the most but who also have a useful and practical knowledge to engage—with agency for policy-making—in participatory process for adaptation and sustainable development.

Not only the government staff and the coordination team but also the consultants of TACC Colombia learnt valuable lessons. At the time of the fieldwork, the Colombian branch of Conservation International was engaged in project Páramos. Building upon their work for TACC Colombia and its gaps, they were conducting a vulnerability assessment in social and cultural terms, using primary data and engaging directly with the communities living in the páramo areas. One other consultant hired by UNDP during TACC Colombia, working with a different international agency at the time of the interview, expressed that TACC Colombia lost the territorial focus along the way and it became too technical. This consultant believes adaptation must focus on territorial development and that it has to be simple, practical and relatable to the day-to-day of the most vulnerable communities. For her, expensive and technically sophisticated projects do not tend to offer these type of solutions (P48, personal communication, 26 May 2016).

Finally, even though project Páramos was not an output of TACC Colombia, and it was not framed as an adaptation action, Bogotá Humana developed it in the context of the partnership. The first head of the coordination team of TACC Colombia, and who later worked for Bogotá’s water utility—leader of Páramos—envisioned for the partnership to
focus on the issue of water sustainability in Capital Region as a pathway for adaptation. With a timeframe of almost 30 years, and ratified by the administration that followed Bogotá Humana, Páramos is now the only initiative with a long-term approach towards adaptation.

8.5. Conclusions

This chapter explores territories of adaptation through three instances: i) the spatial manifestations of territorial development, namely territorial development plans (POTs) and watershed development and management plans (POMCAs); ii) territories of adaptation as the spatial manifestations of adaptation discourses; and iii) the regionalisation of adaption knowledge and needs through Capital Region and Central Region.

Because of the robust institutionality for disaster risk management that preceded La Niña 2010–11, climate change adaptation is being mainstreamed into development planning through forms of territorial development that aim to identify risk exposure. The territorial development plans of municipalities (POTs) and the watershed development and management plans (POMCAs) are set to spatialise national policies to address existing disaster risks and avoid the creation of new ones.

With the mainstreaming of climate change concerns, these instruments are contributing to the emergence of territories of adaptation. These territories are formed via political boundaries, associative schemes or jurisdictions, and via ecological structures, all of them with spatial and social dimensions. The case of TACC Colombia shows how the city cannot plan for adaptation without looking at the surrounding region and vice versa. There are many interdependencies in terms of economic, social and environmental infrastructures, all vulnerable in the face of climate change impacts.

Bogotá's political projects for regional integration have manifested in the development of Capital Region and later, Central Region. The platform of TACC Colombia and Bogotá Humana managed to embed adaptation needs in discourses for regional planning and governance, together with a vision for a densified urban core that respects the spaces of water and adapts to climate change. Although this vision ended with Bogotá Humana, Central Region continues to have climate change adaptation embedded within its strategic
line of action for sustainable ecosystems and risk management.

In spite of this, the lack of continuity of the adaptation projects developed by TACC Colombia begs the question whether the partnership failed as an exercise of purposeful co-production. On paper, TACC Colombia met all the success conditions according to the lens of purposeful or ‘instrumental’ co-production. Thus, it is the lens of inherent co-production that help us to better understand what worked and what didn’t work, and why.
9. Discussion and conclusions

This thesis argues that it is useful to look at the interplay of knowledge, politics and its spatial manifestations in the context of climate change adaptation to better understand how new adaptation approaches and existing practices of development planning and governance shape and re-shape each other in Colombia and in Capital Region. Thus, the central question and five sub-questions that guide this research are:

**How do interactions between knowledge and politics in the context of climate change adaptation influence the mainstreaming of adaptation efforts into development planning and governance in Colombia's Capital Region?**

1. How does scholarship across social sciences frame climate change adaptation, and its mainstreaming into development planning and governance?

2. How does the framework of inherent co-production help us to better understand the interactions of knowledge and politics—and their spatial manifestations—in the context of climate change adaptation?

3. What does the case of TACC Colombia in Capital Region reveal about the mainstreaming of adaptation into development planning and governance at national, regional and urban scales in Colombia?

4. How do multiscalar efforts for adaptation in Colombia manifest in spatial terms?

5. What does this analysis reveal, more broadly, about the intersections of knowledge and politics and the practice of development planning and governance for climate change adaptation?

This chapter discusses and gathers conclusions from the answers to sub-question 1 (Chapter Two, literature review), sub-question 2 (Chapter Three, analytical framework), sub-question 3 (Chapters Six and Seven, national/regional/urban scales) and sub-question 4 (Chapter Eight, territories of adaptation) to address sub-question 5. The answer to the central question is divided into four themes that aim to contribute to the adaptation
literature, particularly the increasing work discussing co-production:

i) the analytical framework of inherent co-production

ii) territories of adaptation

iii) a technocracy of adaptation

iv) three entry points for adaptation planning and governance

Section 9.1. discusses the analytical framework of inherent co-production as a contribution this research puts forward to understand the interactions between knowledge, politics and space. Sections 9.2. and 9.3. look at territories of adaptation and the technocracy of adaptation, respectively, as agents as well as manifestations of the inherent co-production of knowledge, politics and space for adaptation in Colombia and in Capital Region. Section 9.4. follows, by discussing three main findings in the form of entry points for adaptation into development planning and governance in Colombia and Capital Region: territorial development, disaster risk management and water sustainability. Section 9.5. discusses policy implications for adaptation planning and governance in Colombia. Finally, section 9.6. ends this chapter and this thesis with some suggestions for future research.

9.1. The analytical framework of inherent co-production

As mentioned in Chapter Four, the analytical framework of inherent co-production (Figure 31) was informed by findings at two points in time during this research. First, a preliminary analysis of the data during the fieldwork in 2016 showed strong connections with Jasanoff’s idiom of co-production of natural order (our ways of knowing about the world) and social order (our ways of governing the world). This finding allowed for the analysis and systematisation of the empirical data following the four pathways of co-production: the making of identities, institutions, discourses and representations.

In 2018, the work published that year by Mahoney and Hulme on epistemic geographies served to complement the analytical framework of inherent co-production by introducing ‘space’ in the equation together with knowledge and politics. Derived from the fields of Geography and Political Ecology, the notion of epistemic geographies gives the analytical
framework of inherent co-production a useful lens to understand how the making of identities, institutions, discourses and representations render spatial manifestations.

Figure 31. The analytical framework of inherent co-production put forward by this research. Source: Author.

This thesis examines an initiative of purposeful (knowledge) co-production—TACC Colombia in Capital Region—through the analytical framework of inherent co-production (of knowledge, politics and its spatial manifestations). In Chapter Two (section 6.3.), this study refers to purposeful co-production as processes where stakeholders with different knowledges work together to produce knowledge relevant for decision-making. On the other hand, inherent co-production indicates that knowledge-making is always entangled with forms of world-making. Thus, these two types of co-production are distinguishable but not separate from each other.

A still emergent policy agenda, climate change adaptation needs a great deal of purposeful knowledge co-production. For this research, this implies not only the sharing and negotiation of different types of knowledge for the production of new knowledge. It should also be about lessons learnt from the past through the experiential knowledge of lay publics, scientists and government staff in their research/dealings with climate-related events and disasters.

This thesis argues that adaptation action is also dependent upon the politics embedded in these processes of purposeful knowledge co-production. The framework of inherent co-
production, proposed and understood by this research as the inextricable interactions between knowledge, politics and its spatial manifestations helps to understand the politics that are intrinsic in purposeful and multiscalar efforts for adaptation knowledge and practice.

The discussion of the literature review in Chapter Two explains how this research does not see purposeful and inherent co-production as divergent approaches. There is always an inherent co-production of knowledge and politics in purposeful processes of knowledge co-production. Therefore, it is not possible to have 'depoliticised' purposeful knowledge co-production, because the decision to keep it as an exclusively scientific-based or knowledge-based approach, is a political one in itself. The fact that some policies based on science are devoid of socio-political concerns (Forsyth, 2003) does not equate to them being depoliticised. Instead, in the case of Colombia and Capital Region, they entail a politics of exclusion whereby the construction of risk by political factors such as armed conflict and illegal mining is intentionally excluded from vulnerability assessments because it would otherwise imply very high costs and logistic problems. Thus, adaptation is circumscribed as a technical issue (P3, personal communication, 05 April 2016). The field of STS, concerned with the relationships between knowledge and social order, persuasively reminds us that our ways of knowing the world are inextricably tied to our ways of governing it.

However, from a global perspective, the knowledge and the politics of adaptation are treated as separate entities to pursue 'policy-relevant' instead of 'policy-prescriptive' knowledge. The IPCC and the UNFCCC embody the separation of science and politics respectively and set the tone for the international adaptation agenda. Chapter One explains how, with the creation of the IPCC and the UNFCCC, adaptation was set out to offset the unequal distribution of climate change impacts between industrialised and developing countries.

Although offering some form of aid in technical and financial terms, with the discourse' adaptation is local', the UNFCCC and the IPCC regard developing countries, regions and cities responsible for adaptation. The 'local' discourse is supported by the acknowledgement of the historical construction of risk that somehow diverts the blame from industrialised nations to local processes of unplanned urbanisation and development that have placed some populations more at risk than others within developing countries.
The 'local' discourse also ignores the implications that failed adaptation in developing countries can have internationally in terms of food security and mass migration (P7, personal communication, 14 April 2016).

Despite this acknowledgement, most adaptation actions do not address this historical construction of risk. Scholarship across social sciences addressing adaptation points out that adaptation actions continue to be restricted within the technical/managerial realm, or 'end of tunnel' approach in the best-case scenario, and very often they do not even move from planning to action (Roberts & Pelling, 2020; Scoville-Simonds et al., 2020; Sharifi, 2020). As well as at a global level, local adaptation practices do not address the root causes of vulnerability (e.g., the unequal distribution of wealth) because this would entail not just 'adjustments' but the transformation of 'business as usual' development planning and governance. The lens of inherent co-production helps us to understand how and why adaptation practices are kept within the status quo but also, the unusual cases where these practices aim to go beyond towards transformation.

Seen through the lens of the idiom of co-production, the case of TACC Colombia in Capital Region offers an understanding of the making of identities discourses, institutions and representations at national, regional and urban scales. The making of identities has been outlined as the reshaping and reinforcing of the social roles government actors responsible for dealing with adaptation. This study has also referred to the identity of the expert, the identity/role of CCA within existing governance arrangements, and the identity of TACC Colombia as a knowledge/policy platform. Discourses have been explored as the persuasive arguments that governmental institutions have used to support the materialisation of different approaches for adaptation. The making of institutions is explored through the development of new normative frameworks and of new organisations and governance schemes to adjust national and regional development agendas to the threat posed by climate change impacts. Lastly, the making of representations examines the policy documents of TACC Colombia as attempts to translate science into policy-relevant knowledge: climate change scenarios, vulnerability assessments and a portfolio of adaptation projects.
9.2. Territories of adaptation

The lens of epistemic geographies helps to reveal what this research refers to as territories of adaptation—where knowledge/politics interactions manifest in spatial terms—through instruments for territorial development, through political-administrative, jurisdictional and ecological narratives, and through efforts for mainstreaming adaptation planning and governance into regional planning and governance. The spatial/cartographic analysis of the making of identities, discourses, institutions and representations reveals territories of adaptation, mapped forms of the political/knowledge projects that pursue adaptation to climate change in Colombia and Capital Region. Thus, more than scales of adaptation, these territories are bounded by adaptation approaches resulting from specific discourses that reinforce identities and institutional arrangements.

Adapting the city and the region—political/administrative boundaries—aligns itself with local government arrangements but also with international forums such as the UNFCCC. The commitments of the Ministry of Environment to the UNFCCC entail adaptation plans for all Colombian cities and regions as a proxy for adaptation success. However, as the case of TACC Colombia shows, planning does not equate to implementation.

Approaches to adaptation that follow jurisdictions, in the case of Colombia those of the regional environmental authorities, juxtapose themselves to political boundaries. The shifting boundaries reveal a struggle, between local and regional governments and environmental authorities, to reinforce social roles and establish the authority to govern adaptation.

Finally, adaptation projects that follow ecological narratives seek to bound ecosystem services at risk from expected changes in precipitation and temperature such as water supply (páramos and watershed areas). Others seek to protect conservation areas, such as the Regional Forest Reserve Thomas Van Der Hammen, in an effort to deter expansionary urban development models.

The notion of territories of adaptation materialises the analytical framework of inherent co-production by making visible the interactions between knowledge, politics and space. In Colombia and Capital Region, knowledge, politics and the territory become entangled in the efforts of the national, regional and local governments to adapt to a changing climate.
9.3. A technocracy of adaptation

In Colombia "disasters are situated in a common technocratic domain, within which political authority is linked to the state's responsibility to generate knowledge about the future and to govern accordingly" (Zeiderman, 2016, p. 164).

Instead of a 'depoliticised' knowledge co-production promoted by the international organisations leading the climate change agenda, mainstream adaptation approaches purposely avoid the factors intrinsic to the historical construction of risk and the root causes of vulnerability to render adaptation as a new agenda, whereby adaptation responses are circumscribed as technical and managerial actions. The case of TACC Colombia reveals how this technocratic approach is replicated at local levels.

Chapter Six talks about a technocracy of adaptation, referring to the co-opting of adaptation planning and action by the identity of the 'expert' consultant and its association with government bodies that gave leeway to technical/managerial responses to the impacts of La Niña 2010–11. This section expands on this technocracy to reflect on various ways in which a technocratic approach to adaptation manifested itself at national and regional levels in the context of TACC Colombia and La Niña 2010–11.

The devastating impacts of La Niña 2010–11 in Colombia's GDP, distributed in damages to various sectors of the economy, had the central government extricate climate change impacts from the environmental sector and framed them as a 'new' threat to overall development. As such, it needed 'new' knowledge and the adjustment/creation of identities, discourses, institutions and representations to face a new threat. Adding to Zeiderman's quote, these adjustments and new arrangements, instead of prompting a rethinking of development, ended up fitting adaptation responses within existing practices of development planning and governance.

At a national level, there was a rift between science producers and policy-makers in the making of two new institutions or normative frameworks: The National Climate Change Adaptation Plan and the National Policy for Disaster Risk Management. The rift started with the effort of science producers, in this case, social science scholars, to produce normative frameworks oriented to rethinking development. Meanwhile, policy-makers filtered this knowledge to accommodate existing practices of development planning.

Chapter Six (Section 6.3.2.) explains how, in the case of the National Climate Change Adaptation Plan, a conceptual framework that put climate change adaptation at the centre
as equivalent to sustainable development was modified by policy-makers from the National Planning Department to put adaptation, besides environmental and risk management, as a way to achieve sustainable development. For these policy-makers, plans and policies cannot be academic documents. They have to lead to action plans. Otherwise, they are detached from the realities of public policy.

Similarly, the conceptual framework of the National Policy for Disaster Risk Management promoted risk management as a pathway for development through the incorporation of three components into overall development: risk knowledge, risk reduction and disaster response. However, the materialisation of this policy was the creation of a single institution, the National Unit for Disaster Risk Management, in charge of developing and promoting these three components. With such a broad scope, this national unit can now be equated to yet another sector of development among the existing Colombian ministries.

For current national institutional arrangements, to equate either adaptation or risk management to sustainable development would entail not only a drastic modification of such arrangements but to shift the authority for development planning from the National Planning Department to the hands of specific epistemic and policy communities. In practice, the discourse claiming CCA and DRM need to be incorporated or mainstreamed into overall development, renders them as technical tasks.

Three national systems of governance, two of which emerged as part of the response to La Niña, reflect approaches for CCA and DRM as technocratic/managerial arrangements like those for housing, transport and other development sectors. The National Environmental System, The National System for Disaster Risk Management and The National Climate Change System further compartmentalise adaptation, revealing an institutionality based on sectors rather than development processes.

At a regional level, and as discussed in Chapter Seven, the portfolio of adaptation and mitigation projects of TACC Colombia consisted of technical/managerial measures. In this case government staff, although with a vast knowledge on dealing with weather-related events, engaged in a very managerial process of knowledge production with a private consultant that focused more on the outcome and less on the process itself. However, according to most of the interviewees that participated in the process, even if these projects were executed in full, it would not render Capital Region as a territory
prepared to deal with the impacts of climate change nor to follow a pathway of low-carbon development. Furthermore, this process exposed existing rifts between the partner institutions in terms of their jurisdictional authority, their institutional agendas, their priorities for adaptation and the conceptualisation of adaptation itself.

The framing of adaptation as a technocratic and siloed approach is also received with scepticism by science producers from different epistemic communities (i.e., different for risk management and adaptation). When researchers at Colombia's Humboldt Institute, whose equivalent to the IPCC is the Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services, use adaptation as a label to apply for international funding, they do not recognise climate change as a separate overarching concern. For these researchers, climate change is but one of five causes of biodiversity and ecosystem services loss together with land-use changes, overexploitation of species, water/soil pollution and the expansion of urbanisation. For example, in the case of watersheds, although there can be increased rainfall due to climate change, flooding and landslides can be closer to anthropogenic processes of degradation, deforestation and soil instability. Thus, in the opinion of researchers at the Humboldt Institute, their work has long been addressing the risks associated with the impacts of climate change without calling it 'adaptation'.

For lay knowledge or grassroots communities, the scepticism towards technocratic approaches is due at best, to equating adaptation to 'submission' or 'abiding' to the status quo, and at worst, to hard measures in the form of infrastructures that have damaged their livelihoods more than the climatic impacts themselves.

The lens of inherent co-production serves to reveal barriers for change embedded in processes of knowledge co-production for adaptation, and that compound into a technocracy of adaptation. In Colombia and Capital Region, despite the mainstreaming discourse, the compartmentalisation of development and the struggles for authority between the different sectors of development are helping to keep climate change adaptation as a standalone, technical agenda. As such, it is received with scepticism by scientists and lay publics, and it renders normative frameworks and the institutionality ineffective to deal with the impacts of climate change in a holistic manner. Not surprisingly, as examined in Chapter Seven, by the time of the fieldwork in 2016, there were urbanisation projects in areas of Capital Region that flooded during La Niña 2010–
9.4. Three entry points for adaptation planning and governance in Colombia and Central Region

Chapter Eight refers to territorial development as a starting point for adaptation. However, the findings of this research reveal how, intrinsic in the current and novel identities, discourses, institutions and representations adjusted and created following La Niña 2010–11, there are two other starting or entry points for adaptation into development planning and governance in Colombia and in Central Region (which replaced Capital Region): disaster risk management and water sustainability. Although these entry points are not challenge-free, they trace promising pathways to move from adaptation planning to action.

Section 9.4.1 discusses how the planning instruments for territorial development materialise the territorial approach that TACC Colombia helped to consolidate as a strategy for adaptation not only in Capital Region but for all other Colombian territories.

Section 9.4.2 talks about why, despite the identity or social role dilemma between disaster risk management and climate change adaptation, the long-standing research, practice and experience on risk management in Colombia and Capital Region offers a way to incorporate adaptation needs into the planning for and the governance of risk.

Although the focus of TACC Colombia was not water sustainability as a pathway for adaptation, section 9.4.3 explains how, in practice, planning and governance to guarantee water availability is one of the top priorities, if not the top one, for Central Region to face the exacerbation of risks that climate change poses to sustainable water provision. Some conclusions follow this section.

9.4.1. Territorial Development

In Colombia, with the issue of the compartmentalisation of development into sectors,
territorial development has become a more promising option for incorporating adaptation into development planning and governance. The territorial approach of TACC Colombia had more to do with the history of decentralisation in Colombia and less with the territorial approach of UNDP's pilot programme.

Chapters Five and Eight discuss how territorial development emerged in Colombia, with the Constitution of 1991—a new framework of social order—as a way of restructuring, not just the physical space but its social components at sub-national levels. Thus, various testimonies offered by the interviewees as well as the final document of TACC Colombia, reveal a conceptualisation of ‘territory’ beyond the physical space. In this way, the territory is also about the people living in that space, their culture and values, all of which play a role in its governance.

The partners of TACC Colombia fully embraced this concept, though in theory not in practice. Besides being technocratic, the outputs of the partnership leaned towards an environmental approach (e.g., the vulnerability assessment by Conservation International). Furthermore, with a failed attempt for a second stage, the partnership did not engage with the productive sectors of the economy, local authorities or local communities across Cundinamarca’s 116 municipalities.

The planning instruments that are—in theory—expected to embed a holistic conceptualisation of territory have also failed to do so. In practice, the territorial development plans (POTs) and the watershed development plans (POMCAs) are mostly top-down, technocratic instruments that focus on the territory as a physical space for land use planning. Although the formulation and revision of POTs and POMCAs require the conformation of territorial councils to gather representation from all the actors with a stake in the territory, they have often favoured the interests of few elite actors/sectors (Vega, 2017).

Furthermore, as explained in Chapter Eight, the 2018 Climate Change Law requires the incorporation adaptation needs in the POTs, and the formulation of climate change managements plans, inspired by TACC Colombia's approach. Both measures will likely become a burden for the authorities of most Colombian municipalities and various regions, under-resourced and lacking skilled staff.

Regardless, almost 20 years after the construction of risk was enabled through the failure
of the first POTs—developed in the early 2000s—to prevent the occupation of hazardous areas, local authorities and the civil society alike now acknowledge that the POTs and the POMCAs are essential for sustainable territorial development in Colombia.

TACC Colombia wanted Capital Region's regional integrated climate change plan to be incorporated in the POTs of all the municipalities of Cundinamarca and the capital—that at the time were being revised—and in the POMCAs of all the watersheds of Capital Region. As discussed in Chapter Eight, different from urban and municipal development plans, the POTs and the POMCAs are meant to guide territorial development beyond local administrations (4 years), with a duration of 12 years. Also, by granting superior hierarchy to watershed planning (POMCAs) over political boundaries (POTs), the Colombian government established a strategic and visionary approach for territorial development. This approach recognises that there are strong interdependencies whereby the municipalities cannot develop without coordinating efforts with the region and vice versa.

The bid of Bogotá Humana with the reform the city's POT (MEPOT) was to reflect Bogotá's interdependencies with the region. The MEPOT, focusing on adaptation and water sustainability to guarantee human wellbeing, advocated for the coordination of efforts with the actors that live in, plan for and manage the watersheds that extend beyond Bogotá's political boundaries but that are essential to guarantee the city's sustainable water management.

Two interrelated questions arise through the examination of these findings: How to guarantee adaptation and sustainable development through territorial development? Can POTs and POMCAs be considered as adaptation measures?

The answers to these questions have policy implications, not just for territorial development in Colombia but to approach adaptation more broadly. The discourse goes that adaptation needs to be mainstreamed into territorial development through POTs and POMCAs, which also involve environmental and risk management for the use and occupation of the land. The conclusions of this study argue that a less managerial and technical approach to adaptation could render the chief instruments for territorial development in Colombia—POTs and POMCAs—as adaptation measures in themselves. This approach would be adaptation taken to the level of transition as proposed by Pelling (2011), where the impacts of climate change are attributed to environmental hazards in
tandem with existing vulnerability compounded by socio-economic conditions. As long as knowledge and agency build up within grassroots communities, participatory spaces like the territorial councils have the potential to shield territorial development against corporate interests. An antecedent of this is the POMCA or River Blanco watershed developed by INAP, the first official adaptation project in Colombia back in 2005 (P42, personal communication, 23 May 2016). This approach to territorial development avoids the occupation and concentration of vulnerable populations in hazardous areas and, at the same time, guarantees the preservation of resources (environmental, economic, cultural) essential for improved wellbeing and sustainable livelihoods.

9.4.2. Disaster risk management

Earlier in this chapter, section 9.3. explains how DRM and CCA are perceived in Colombia as separate policy agendas, a framing that aligns itself with the compartmentalisation of development in Colombia. However, DRM and CCA are also perceived as two different epistemic communities. Chapter Six examines how one of the identity issues between DRM and CCA lies in the conceptualisation of risk. DRM scholars deem all the current and future implications of climate change impacts as risks. For scholars working on CCA and interviewed for this research, risk—as understood in the equation risk = hazard x vulnerability—can only be applied to climate-extremes. For these scholars, the ubiquitous implications of CCA for development should be addressed through social learning and the consequent modification of societal structures to adapt to a changing environment.

Colombian professionals working on risk management claim that they have been long dealing with climate-related risks. The impacts of la Niña 2010–11 proved that perhaps these efforts were not enough. However, more than that, they proved that risk management in Colombia was not mainstreamed into territorial development. When the central government sanctioned Law 388 in 1997, it required the incorporation of risk management in the POTs of all Colombian cities and municipalities (see Chapter Eight). Nevertheless, as this thesis has thoroughly discussed, Law 388 indirectly enabled the construction of risk by having local authorities developed sloppy and decontextualised POTs that allowed for the urbanisation of hazardous areas.
More recently, with the materialisation of the 2012 National Policy for Disaster Risk Management into a single body—The National Unit for Disaster Risk Management—instead of a framework for mainstreaming risk management as a strategy for development, Colombia took a step back in its tradition of significant advancements on risk management. A tradition that started forcefully in the 1980s and that has witnessed the creation of numerous policies, laws, planning instruments and actions to address disaster risk.

Despite these challenges, and the policy and epistemic differences between DRM and CCA, both communities recognise the impending need to coordinate efforts—in Colombia and internationally (e.g., the Hyogo/Sendai frameworks and the SREX report). Chapter Seven describes how, during TACC Colombia, the partnership had a consultant developed a framework for incorporating 'hydroclimatic risk management' into the territorial development of Cundinamarca's municipalities. Additionally, the administration Bogotá Humana compiled the city's risk management plan and the climate change adaptation plan into a single document. Moreover, it materialised the integration of the two communities through the creation of IDIGER, the District's Institute for Risk Management and Climate Change. Although none of these initiatives continued after the end of TACC Colombia and Bogotá Humana—except for IDIGER, which just kept the name—, they did set a precedent to understanding the need to synchronise DRM and CCA in Colombia.

With the antecedent of Law 388 of 1997 and the 2012 National Policy for DRM, the Climate Change Law of 2018 requires the incorporation of adaptation actions into the POTs and POMCAs through risk knowledge and risk reduction, the two new components that the National Policy for DRM added to disaster response. Although the measure is challenging for under sourced municipalities, it is an attempt to plan development beyond political administrations. Additionally, and despite its criticised nature, the National Unit for Disaster Risk Management has brought in CCA academics and practitioners to share their knowledge and experience (e.g., climate change scenarios, vulnerability assessments, differences between climate variability and climate change) with the professionals working on risk knowledge and risk reduction. Also, the Ministry of Environment included these professionals in the formulation process of the National Policy for Climate Change (PNCC) from 2014 to 2016. In the long-term, the PNCC envisions adaptation as a component of risk management.
Although this research agrees with CCA scholars on addressing the ubiquitous implications of climate change impacts beyond the concept of risk and the need to examine the relationship climate-society, pragmatically and for the case of Colombia in particular, the country's framework for DRM offers the opportunity to build upon a pathway for adaptation. It offers the opportunity to ground the 'fuzzy' topic of adaptation by opening space for it within exiting planning and governance schemes where DRM has already a long- and solid-established position.

### 9.4.3. Water sustainability

The third entry point for adaptation into development planning and governance is through water sustainability. TACC Colombia's climate change scenarios projected reduced precipitation and increased temperatures in páramo areas, which threatens their capacity to function as natural water factories. This chapter has highlighted four relevant aspects. First, the interdependencies between Bogotá and Cundinamarca regarding water provision were both a source of conflict as well as an opportunity to coordinate regional planning and governance in Capital Region. Second, *Bogotá Humana* had a revolutionary approach to development planning by framing adaptation to climate change and water sustainability as intrinsic to human wellbeing. Third, project *Páramos*—although not framed as an adaptation project—is perhaps the most promising initiative towards long-term adaptation. Fourth, the hierarchy of the Watershed Development and Management Plans (POMCAs) over the Territorial Development Plans (POTs) is a strategic and visionary approach that recognises the water interdependencies between Colombian municipalities and their surrounding regions, and the importance of coordinating planning and governance efforts towards water sustainability.

However, the coordination of efforts has jurisdictional challenges to which project *Páramos* has not been exempt. In Colombia, numerous river watersheds are governed in sections: the high watershed by the National Natural Parks—responsible for the conservation areas that contain most páramo complexes and other ecosystems for water provision; the middle watershed by the Regional Environmental Authorities through the POMCAs; and the low watershed by Municipal Environmental Authorities. Furthermore, the boundaries within these sections are often blurred, and jurisdictional conflicts arise. In the case of project *Páramos*, Bogotá's water utility—*Acueducto*—often found its hands
tied or actions delayed because the corresponding regional environmental authorities were still working on the POMCA.

The high and the middle watershed are regularly located in rural areas and the low watershed in municipal/urban areas. Thus, coordinating efforts to guarantee water sustainability requires for entities and activities with higher water demand such as mid-size and big urban areas, electricity generation, industries and agriculture to compensate communities in rural areas. Within these communities, those under the poverty line and with no other viable sources of income, often engage in unsustainable practices such as illegal mining, deforestation for agriculture and cattle purposes and discharge of wastewater in the river streams. One of Páramos goals is to work with these rural communities to transition into sustainable practices, financed through payments from the most prominent water consumers.

However, impacts from the activities of rural communities pale beside the impacts of corporate-led, legal mass practices of mining and deforestation (Semana, 2016). Chapter Eight explains how the Ministry of Environment had to politically bound the páramos to avoid these types of activities in the portion of the páramo areas that are crucial for water sustainability. Nevertheless, similar to the watersheds, ecosystems like the páramos cannot be bounded by lines which show very clearly in maps but that in reality are too blurred. Political boundaries cannot define the capacity of the páramo ecosystem to guarantee water sustainability.

Like in the case of territorial development and disaster risk management, water sustainability is a strong entry point for adaptation to climate change regardless of its inherent challenges. Project Páramos evidences that water sustainability can catalyse immense political will and financial leverage. Every economic sector and every territory are highly vulnerable in a scenario of water scarcity. Thus, it is in the interest of everyone to keep the water running. This interest is why project Páramos could set a long-term timeline and was the only initiative of Bogotá Humana that transcended the change of administration and Capital Region. The city administration that followed continued its budgetary commitment to the project, and Central Region is now the leader of the project. With a much stronger political footing that Capital Region, Central Region has the potential to see the project through as a way to guarantee water sustainability, endangered by a future of increased temperatures and decreased precipitation.
9.5. Policy implications

Colombia has had significant legislative developments towards a comprehensive vision for sustainable development and more recently, climate change adaptation. The new Constitution of 1991, which arose amid a conflict-ridden country, initiated a process of decentralisation of development planning and governance. The new constitution consolidated the concept of territory and the mandate for territorial development, which are not only manifest in spatial terms but are intrinsic to the making of identities, discourses, institutions and representations for development planning and governance in Colombia. Law 99 of 1993 institutionalised environmental planning and governance, and Law 388 of 1997 declared risk management as a mandate for territorial development. After La Niña 2010–11, Law 1523 of 2012 created the National System for Disaster Risk Management that framed DRM beyond disaster response, and Law 1931 of 2018 made climate change adaptation, together with mitigation, a mandate for development.

Although Colombia's legislation is not flawless, there seems to be a misalignment with the executive branch of the state; and within the executive branch, between policy and practice. Development planning and governance in Colombia are tied to short-term (4 years) government administrations at national, regional and urban/municipal levels. In the context of DRM and CCA, only POTs and POMCAs, with 12 and 10 years respectively, go beyond government administrations. These timelines mean that development plans and governance schemes start from scratch every 4 to 12 years, with top-down agendas that favour the interests of few, thus challenging the long-term planning that adapting to climate change requires. Policy-making, also the responsibility of the executive, is set to promote guidelines for long-term development. However, the materialisation of these policies is tied to the will of short-term government administrations. Furthermore, in the case of DRM and CCA, they favour technical-managerial responses or 'end of tunnel' approaches which do not challenge the loopholes of development that contribute to the construction of risk and vulnerability to climate change impacts.

Hence adaptation, as framed by the scholars who participated in this research, has barriers towards transforming the status quo. Pelling's (2011) three stages of adaptation—resilience, transition and transformation—serve to frame what this research finds as entry points for adaptation into development planning and governance in Colombia. Territorial development and DRM, as currently approached by governmental authorities, fit into the
resilience stage (i.e., the impacts of climate change are perceived as the drivers of vulnerability). Water sustainability fits as transition, where vulnerability is seen as driven by both biophysical and social issues. These three entry points offer possibilities to bridge the prominent gap between planning and practice for adaptation in Colombia, although they are likely to move slower than the accelerated impacts of climate change. Adaptation as transformation is for now confined in the discourse of adaptation scholars and as an addendum in the IPCC’s definition of adaptation. In Colombia, the attempts of adaptation scholars to develop policy frameworks for adaptation as a strategy for development are 'sanitised' by policy-makers because the latter conceive adaptation as a technical agenda.

The misalignment between the legislative and the executive branches of the state, suggests that if adaptation to climate change in Colombia is to move beyond a standalone and technical agenda, it has to reach out beyond government actions. It requires broader forms of governance where not only technical/governmental knowledge but science and lay knowledge have agency for decision-making. It needs for science and lay knowledge to stop being used in an 'extractive' fashion for policy development. It needs for spaces of negotiation where adaptation sceptics are heard, as often this scepticism highlights governmental frameworks for adaptation as a standalone agenda. Like the scholarship discussing adaptation as an issue of development argues (see Chapter Two, section 2.1.1.), policies that promote adaptation should help us modify current approaches to sustainable development. Whether these policies label measures as adaptation, disaster risk management, water sustainability, ecosystem conservation or any other, the imperative is to address the short-, medium- and long-term implications that climate change impacts have on human wellbeing and survival.

### 9.6. Suggestions for future research

To further contribute to the scholarship on co-production towards adaptation, this study advocates for the potential of an ethnographic approach to elucidate pathways as well as hindrances for community-based initiatives and lay knowledge to leverage decision-making power for adaptation. Either by using the idiom of co-production or another analytical lens to examine the dynamics of knowledge and power, ethnographic research on a purposeful process of knowledge co-production for adaptation within a more grassroots scheme can render much-needed answers to the general queries in
development studies concerned with advancing bottom-up sustainable development.

This study also sees the notion of territories of adaptation as a promising area for further research within the adaptation scholarship. Although the notion of 'territory' is specific to the case of Colombia and its principles for territorial development, territories of adaptation can be explored further as social constructions of nature and the built environment bounded by political, ecosystem, jurisdictional or other place-specific priorities for adaptation. Such constructions reveal the local character of adaptation and the co-production of knowledge and power at play in their making.

Finally, because this thesis is submitted for examination amid an unprecedented global pandemic, this section unavoidably begs the question: what does adaptation look like in a post-Covid-19 world? The impacts of a global economic recession, as well as the impacts of climate change, are and will continue to be unevenly distributed. Vulnerability to climate change is already compounded by a global economic system that chastises the poor, depletes the environment and rewards a small elite. This scenario calls for more research on transformational adaptation to identify pathways to debunk the political economy and ecology of the status quo (i.e., the unequal distribution of wealth, environmental benefits and burdens). What used to be wishful thinking is now slowly starting to materialise into civic movements which demand that unless the change is profound, the Anthropocene will be the last geological epoch to witness the existence of humankind.
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Espectador.


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## Appendix One: List of interviewees/research participants

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<th>Interviewee code</th>
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<th>Affiliation at the time of the interview</th>
<th>Interview date (2016)</th>
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<td>01-Apr</td>
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Appendix Two: Information Sheet

UCL DEVELOPMENT PLANNING UNIT

Information Letter to Research Participants

PhD Research Project:
“The role of knowledge co-production for climate change adaptation. The case of TACC Colombia, Regional Integrated Climate Change Plan for Capital Region”

University and Department:
University College London, The Bartlett Faculty of the Built Environment, Development Planning Unit (DPU)

Researcher/interviewer and contact details:
Monica Bernal Llanos (monica.llanos.11@ucl.ac.uk)
34 Tavistock Square, The Bartlett Development Planning Unit, UCL, London WC1H 9EZ, UK

Invitation and Details of Study: Date: ____________

Dear ______________:

We would like to invite you to participate in this research project through an interview. Please, read carefully the information below, describing this research and for which we consider your participation as extremely valuable. Your participation is entirely voluntary.

This project is part of a PhD study focusing on the case of TACC Colombia, Regional Integrated Climate Change Plan for Capital Region. Between 2009-2014, TACC Colombia brought together a diverse array of stakeholders (environmental authorities, local and regional governments, unions, NGOs, scientific and research bodies, representatives from the private sector, universities and other academic organisations) to identify and prioritise adaptation and mitigation measures to address the impacts of climate change and climate variability in Capital Region (Bogotá and Cundinamarca).

This project, which will take place between March and July of 2016, seeks to understand the potential of knowledge co-production amongst this diverse array of stakeholders to develop a framework of action for climate change adaptation. With this goal in mind, the project is requesting the collaboration of the partners of TACC Colombia as well as other stakeholders dealing with climate change in Colombia. These stakeholders will share their testimonies via interviews, which is the chosen method of data collection for this study.

If you decide to participate in this interview, the time and place of the interview will be of your choice. Ideally the interview will be recorded but only if you agree to it. If you don’t agree, we will only take notes. We will give you a copy of the recording if you wish to. You will also receive a copy of the completed doctoral thesis at the end of this research in 2018. Although we will use your testimony for this research, the interview will not be published and we will not use your name unless you prefer otherwise.

If you experience any discomfort during the interview, you should let us know immediately and you will be free to stop your participation at any moment. You can also choose to remove any information we might have collected from you.

Finally, please let us know if you need any additional information before agreeing to participate. Thank you for reading this invitation letter and for considering your participation in this project.

Please do contact us in case you need more information before you agree to participate.

Important Notice: All data will be collected and stored in accordance with the UK Data Protection Act 1998.
Carta de información/invitación para participantes

Proyecto de investigación:
“El Rol de la Coproducción del Conocimiento para la Adaptación al Cambio Climático Caso Plan Regional Integral de Cambio Climático Región Capital, Bogotá-Cundinamarca PRICC”

Universidad y Departamento:
Universidad de Londres, Facultad del Ambiente Construido Bartlett / Unidad de Planeación para el Desarrollo

Datos de contacto entrevistadora:
Mónica Bernal Llanos (monica.llanos.11@ucl.ac.uk)
34 Tavistock Square, The Bartlett Development Planning Unit, UCL, London WC1H 9EZ, UK

Invitación y detalles del estudio:

Fecha: ____________________

Apreciado(a) ____________________:

Cordialmente

Nos permitimos invitarlo(a) a participar en este estudio por medio de una entrevista. Por favor lea cuidadosamente la información abajo, que describe esta investigación y para la cual consideramos su participación sumamente valiosa. Su colaboración es completamente voluntaria.

Este proyecto es parte de un doctorado (en curso) cuyo caso de estudio es el Plan Regional Integral de Cambio Climático Región Capital, Bogotá-Cundinamarca PRICC. En el periodo de 2009-2014, el PRICC agrupó diversos actores (autoridades ambientales, gobiernos locales y regionales, gremios, ONGs, entidades científicas y de investigación, representantes del sector privado, universidades y otros entes académicos) con el fin de identificar y priorizar medidas de adaptación y mitigación frente a la variabilidad y el cambio climático en el territorio de la denominada Región Capital (Bogotá y Cundinamarca).

Este proyecto de investigación, que se llevará a cabo entre Marzo y Julio de 2016, busca entender el potencial de la coproducción del conocimiento entre estos diversos actores para el desarrollo conjunto de un marco de acción con miras a la adaptación al cambio climático. Para ello, este trabajo invitará a participar a los colaboradores del PRICC así como a otros actores institucionales involucrados con el cambio climático en Colombia. Estos participantes tomarán parte en entrevistas, que son los métodos de investigación utilizados en este proyecto.

Si decide participar en esta entrevista, usted define la fecha y el lugar. Idealmente usaremos una grabadora de voz previo consentimiento de su parte. O si lo prefiere, sólo tomaremos notas. En el primero caso le entregaremos una copia de la grabación si así lo desea. También podrá tener acceso a una copia de la tesis doctoral que se producirá al final de este estudio en 2018. Sus opiniones serán anónimas y se guardarán en los archivos confidenciales de esta investigación. Aunque usaremos sus aportes en el desarrollo de este proyecto, los resultados de la entrevista no serán publicados y no usaremos su nombre a menos que usted lo prefiera.

Si experimenta alguna inconformidad durante la entrevista le solicitamos nos lo haga saber de inmediato. Usted podrá interrumpir su participación en cualquier momento y podrá solicitaros retirar cualquier información que nos haya facilitado.

Finalmente, quedamos atentos por si usted necesita información adicional antes de acceder a participar en este proyecto. Gracias por leer esta carta de información/invitación y por considerar su colaboración en este estudio.

Nota importante: toda la información será recolectada y archivada de acuerdo con la Ley de Protección de Datos de 1998 del Reino Unido.
Appendix Three: Consent Form

UCL DEVELOPMENT PLANNING UNIT

Interview / Workshop Consent Sheet

PhD Research Project:
“The role of knowledge co-production for climate change adaptation. The case of TACC Colombia, Regional Integrated Climate Change Plan for Capital Region”

University and Department:
University College London, The Bartlett Faculty of the Built Environment, Development Planning Unit (DPU)

Researcher/interviewer and contact details:
Monica Bernal Llanos (monica.llanos.11@ucl.ac.uk)
34 Tavistock Square, The Bartlett Development Planning Unit, UCL, London MC1H 9EZ, UK

After reading the information sheet, please go through the following. Check if in agreement:

__ I agree to take part in this interview.

__ I confirm that I have read and understood the information letter dated _______________ for the above study. I have had the opportunity to consider the information, ask questions, and have these answered satisfactorily.

__ I understand that my participation is voluntary and that I am free to withdraw at any time without giving any reason, without my rights being affected.

__ I understand that under the Data Protection Act, I can at any time ask for access to the information I provide and I can also request the destruction of that information if I wish.

__ I give permission for the transcript of my interview / workshop minutes to be used for research purposes only (include research publications and reports).

__ I understand that such information will be treated as strictly confidential. I understand that I have the right to anonymity. I assign copyright of my transcript to Monica Bernal Llanos, who may quote the transcript either with strict preservation of anonymity.

Participant Name: __________________
Date: __________________
Signature: __________________

Researcher(s) Name: Monica Bernal Llanos
Date: __________________
Signature: __________________
Carta de Consentimiento

Proyecto de investigación:
“El Rol de la Coproducción del Conocimiento para la Adaptación al Cambio Climático Caso Plan Regional Integral de Cambio Climático Región Capital, Bogotá-Cundinamarca PRICC”

Universidad y Departamento: Universidad de Londres, Facultad del Ambiente Construido Bartlett / Unidad de Planeación para el Desarrollo

Datos de contacto entrevistadora: Mónica Bernal Llanos (monica.llanos.11@ucl.ac.uk)
34 Tavistock Square, The Bartlett Development Planning Unit, UCL, London WC1H 9EZ, UK

Después de leer la carta de información, por favor revise lo siguiente. Marque ✓ si está de acuerdo:

__ Accedo a participar en esta entrevista

__ Confirmo que he leído y comprendido la carta de información con fecha ___________ para el proyecto en cuestión. He tenido la oportunidad de considerar la información, hacer preguntas al respecto y obtener respuestas satisfactorias.

__ Entiendo que mi participación es voluntaria y que puedo retirarme en cualquier momento sin justificación alguna y sin que se vulneren mis derechos.

__ Entiendo que bajo la Ley de Protección de Datos puedo pedir acceso a la información en cualquier momento y solicitar la destrucción de la misma si así lo deseo.

__ Otorgo permiso para que la transcripción de la entrevista sea usada exclusivamente para efectos de esta investigación.

__ Entiendo que esta información será tratada estrictamente en forma confidencial. Otorgo derechos de autor a Mónica Bernal Llanos, quien podrá citar la transcripción de la entrevista en forma estrictamente anónima.

Nombre participante: __________________________
Fecha: __________________________
Firma: __________________________

Nombre investigadora: Mónica Bernal Llanos
Fecha: __________________________
Firma: __________________________