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ECOSYSTEM SERVICES FOR HUMAN WELLBEING

Trade-offs and governance

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Introduction

Following the publication of the Millennium Ecosystem Assessment in 2005, the ESPA research programme was developed to address outstanding research and policy questions concerning how ecosystem services could contribute to sustainable poverty alleviation. The research programme landed on fertile ground because many researchers and policy-makers were deeply interested in and committed to finding synergies between environmental management and sustainable development. However, this interface between environment and development had traditionally been rather narrow, largely based in development science and with tensions of many kinds between addressing the needs of people, especially the poorest and most vulnerable, and addressing pressing conservation problems in biodiversity rich areas of the world. While some of the on-the-ground tensions between environmental conservation and poverty alleviation were well exposed, if not resolved, others highlighted continuing differences between the relevant research and policy communities. For example, how should environmental goods and services be prioritised in development, and how could they contribute to sustainable growth in developing countries and emerging economies? Does the commodification of nature benefit the poorest through trickle-down effects from economic growth? How do intensively and extensively managed landscapes affect the wellbeing of the poor? Are there local and regional biophysical limits and thresholds that cannot be avoided and how might they be identified? These, and a series of related questions at the intersection of the relevant environment and development science disciplines, have been the focus of much recent research including significant contributions from the ESPA programme. They have informed, and in turn have been informed by, other initiatives in science and policy, and been influenced also by events in the

wider world. In this chapter we provide an overview of this body of work, drawing extensively on the chapters in this volume. We synthesise key messages and highlight research gaps.

At the outset, it is useful to reaffirm some central ideas that have stood the test of time and are widely accepted in research and in practice. Most fundamental is the understanding that people everywhere depend ultimately upon ecosystems. Ecosystem functions and processes directly and indirectly underpin people's health and wellbeing (MA, 2005), and are called ecosystem services. However, they are not inevitable; ecosystems need to be managed for these services to be secured, shared and sustainable. Over the course of human history, the relationship between people and ecosystems has mostly been exploitative, based around food, materials and energy, but there has been increasing concern about maintaining the regulatory processes of ecosystems (for example, mitigating the impacts of climate change and natural hazards, or maintaining ecosystem functions in soils and oceans). There are also significant cultural values associated with ecosystems, which are not easily generalised across places and cultures and which are easily overlooked in dominant framings for natural resources and ecosystem service management (Chan et al., 2012; Díaz et al., 2018).

Nowadays, dominant land and sea use continue to drive the intensification of food production and wider urbanisation, and do not take account of the impact this has on the people now most directly dependent on ecosystem services (many local, poor and powerless), nor on future generations whose options will thereby be limited. At the same time, growing pressures from an ever-expanding consumer class (Putt del Pino et al., 2017), with increasing demands and global connections, place new strains on ecosystems everywhere. The trend towards urbanisation continues, with over half the world's population now living in cities, including many of the poorest and most vulnerable (UN, 2014). While in the past there was usually the option to move or seek resources elsewhere when they became limiting locally, now there are global-scale markets, pressures, and flows of materials and people that overwhelm local resource management practices and plans (Burger et al., 2012).

Recent decades have, however, seen some successes. Largely as a result of ecosystem transformation, the adoption and use of new technologies, advances in public health and global economic growth, significant improvements have been achieved and overall levels of poverty have been reduced. Nevertheless, many people still lack access to adequate food, clean drinking water and sanitation and while economic growth in countries like China and India has lifted millions out of poverty, progress has been uneven. Women are more likely to live in poverty than men due to unequal access to paid work, education and property (UN, 2015) and inequality is increasing. South Asia and sub-Saharan Africa now account for 80% of those defined as being in extreme poverty. New threats brought on by climate change, conflict and food insecurity mean that different and greater efforts will be needed to sustain and build upon recent successes, especially as ecosystem degradation and deterioration affect the poorest and most vulnerable first.

The development and environment agendas have also shifted and evolved, most notably with the agreement on the UN SDGs that apply across developed and developing countries, and are a shared commitment for societies, economy and the environment. Considerations of the many linkages involved have highlighted the overall complexity across scales of both ecosystems and relevant governance systems (Carpenter et al., 2009), interdependencies and complex interactions between people and ecosystems (Geijzendorffer et al., 2017; Reyers et al., 2013) and the significant governance challenges that are implicit in the SDG framework (Waage et al., 2015). Over recent decades, two strong trends have converged. On the one hand, earth system scientists have highlighted the risks from transgressing ‘safe operating spaces’ for major systems such as climate, water and the biosphere (Steffen et al., 2015). On the other, the global environmental justice movement has developed and highlighted a suite of concepts and persistent issues including the environmentalism of the poor, climate justice, food sovereignty, land-grabs and water justice (Martinez–Alier, 2002). There are many ways in which these concepts of environmental boundaries, environmental justice and ecosystem services converge, especially considering the priorities for development and environment in the global South (Lele et al., 2013; Raworth, 2012; Sikor, 2013a).

This is the context for the research relating to ecosystem services and wellbeing which we consider here. Referring back to the original ESPA framework (Figure 0.1 in the Preface), it is clear that while much work has focused on unpacking the central core of ‘wellbeing’, relatively little dealt with the surrounding ‘ecosystems’ circle. By far the largest component tackled the outer ‘enabling conditions’ circle, highlighting the overriding importance of external drivers, the political economy and governance systems in determining how ecosystem services contribute to human wellbeing.

Key findings

The complexity of the social-ecological system

Links between ecosystem services and poverty are just one element of the social-ecological system. This is a complex system with multiple interactions across scales of space and time. It is difficult, or even impossible, to predict the consequences of actions across scales and sectors (DeFries and Nagendra, 2017). The complex system is characterised by feedback loops, non-linearities and alternative states, which means that apparently straightforward interventions nearly always have unintended consequences (Dearing; Reyers and Selomane, both this volume). Specifically, in many contexts, there is clear evidence that even well-intentioned and well-designed interventions for ecosystem services can fail the poorest, most vulnerable and powerless (Adger and Fortnam; Dawson et al.; Marshall et al.; Martin et al.; Whittaker et al., all this volume), leading to a bad situation persisting or worsening. Poverty traps are one consequence.

A related conclusion applies to protected areas. These are potentially a significant tool for securing biodiversity and they may have many potential benefits for enhancing ecosystem services. Protected areas are a major focus of intergovernmental environmental commitments such as the CBD. However, there are continuing tensions when restrictive practices conflict with the rights and livelihoods of local communities (Woodhouse et al., this volume). Similarly, there are few quick and easy fixes to ecosystem degradation; restoration is difficult, costly and time-consuming, and may not simply reverse the loss of ecosystem services or the associated wellbeing outcomes (Cameron, this volume).

The cross-scale, cross-system features of the social-ecological system enhance the likelihood of unanticipated outcomes and are likely to be a persistent feature, making ecosystem management a wicked problem. But this is no justification for inaction or adopting only simple policies and interventions. Embracing the complexity and working with it will not only limit unforeseen consequences but may also suggest useful new approaches (DeFries and Nagendra, 2017; Reyers and Selomane, this volume).

Trade-offs

In fact, we find that trade-offs are a ubiquitous outcome affecting many different parts of the system. Trade-offs should not be a surprise – they are inevitable. Preparing and planning for trade-offs is necessary and not just a way to avoid undesirable outcomes; exploring trade-offs, especially with respect to poverty and environmental resources, can reveal many potential opportunities.

Trade-offs of many kinds are evident in theory and in practice. At a fundamental level there are trade-offs within ecosystems whereby the ecological processes enhanced by one kind of management necessarily place constraints on what can be delivered overall (Dearing, this volume). Among other consequences, enhancement of one kind of ecosystem service will have consequences for others that were not the object of management. For example, actions to enhance or improve productivity usually do provide improved yields in agricultural landscapes, fisheries and peri-urban areas, but almost always to the detriment of regulating services such as air, water and soil quality, climate regulation and biodiversity conservation (Dearing; Marshall et al.; Martin et al., all this volume). The detrimental effects may quickly become evident, but may also accumulate only slowly over time (for example, biodiversity losses in harvested areas; Cameron; Diz and Morgera, both this volume), lead to abrupt shifts or even be experienced in other places or by future generations (Dearing; Reyers and Selomane, both this volume). These off-site impacts of ecosystem services management plans are both pervasive and poorly understood (Pascual et al., 2017).

A more recent realisation that is especially relevant to the management of ecosystem services for poverty alleviation concerns the trade-offs among different groups of people, even within the same ecosystem and concerning the same proposed benefits. A particular problem is that it is the poor and the powerless who

tend to be the losers, even when there seemed to be good reasons to believe that they would benefit, and examples are many. Within communities there are some people who benefit, while others lose out (Brown and Fortnam; Coulthard et al.; Dawson et al.; Marshall et al.; Woodhouse et al., all this volume). Even within a household, men, women and children vary in how they access and benefit from different ecosystem services and are affected by ecosystem management (Daw et al., 2011). Finally there are trade-offs as well as important synergies among different wellbeing components (Coulthard et al., this volume), and these multi-dimensional interactions across wellbeing components and groups of people mean that aggregate estimates may be especially misleading (Daw et al., 2011, 2015).

Exploring the likely consequences of interventions and policies for ecosystem services can expose the winners and losers, but needs to be done carefully, using participatory approaches that ensure that all stakeholders really are explicitly considered. One of the ways to reveal trade-offs (hidden or otherwise) and perceptions about trade-offs among different actors could be the use of knowledge co-production processes, by bringing together scientists with governance actors and local stakeholders, to explore and understand complex social-ecological dynamics and potential outcomes of different management actions (Galafassi et al., 2017). Due consideration, however, must be given to individuals and groups that are likely to be marginalised or lack representation in such participatory processes, as recognition of such groups and their proper participation in the process are crucial in ensuring just outcomes.

Environmental justice

Concerns over environmental justice first arose primarily over rights to natural resources, especially forestry, minerals and water (Martinez-Alier, 2002), and relate to how differences in power, wealth, identity or status can limit people's just claims over environmental resources. This is a broad issue in the political economy, but has a central role in ecosystem services debates (Sikor, 2013b) and is a significant factor in the face of the inevitable trade-offs just described (Brown and Fortnam; Coulthard et al.; Pascual and Howe; Szaboova et al., all this volume). In practice, a consequence of the existence of trade-offs and the way in which decisions are negotiated and agreed is that decisions will almost inevitably be inequitable and often unsustainable (Whittaker et al., this volume), and are likely to benefit the powerful at a cost to the poor and powerless. There is an inescapable link between environmental degradation and considerations of equity and justice that requires the 'justice gap' to be closed if environmental resources are to be sustainably managed to benefit the poor (Dawson et al., this volume). A first step is to recognise this issue in order to put in place mechanisms and processes to ensure that decisions are just and equitable. Dawson and colleagues (this volume) describe three broad areas of concern that dominate theories of social justice: recognition, procedure and distribution. Exploring the environmental policy literature shows that while each of these dimensions may sometimes at least be referenced in environmental

policy, it is never the case that all are included. In practice, the implementation is weak – and mostly with inadequate inputs from the groups of people concerned. Bridging this justice gap is not only important for moral reasons; there is also increasing acknowledgement and evidence to suggest that equitable governance is instrumental to achieving environmental policy goals, rather than contrary to them (Dawson et al.; Nunan et al., both this volume). More explicit framings of justice or equity will be needed, such as those outlined by McDermott et al. (2013) for Payments for Ecosystem Services and that by Schreckenberg et al. (2016) for protected area conservation, which could be adapted for wider ecosystem management.

Wellbeing

A further important perspective related to trade-offs concerns the measurement of poverty, and highlights the many benefits of moving away from one-dimensional poverty, as measured by an absence of wealth or material goods, and towards the assessment of multi-dimensional wellbeing (Coulthard et al.; Szaboova et al., both this volume). Coulthard et al. (this volume) summarise many of the developing ideas to conceptualise wellbeing, and they point to the hazards of assuming that poverty and wellbeing are simply opposite ends of a single spectrum. Measures of poverty, especially if they are limited to income or material wealth, fail to recognise the multi-dimensional, relative and relational aspects of wellbeing and so may miss many people's needs and desires. This risks stigmatising the poor as 'hapless victims', whereas wellbeing recognises them as active agents capable of change. Wellbeing is a broader concept that can be developed in context and with metrics that are sensitive to local needs, customs and demands. Disaggregation of wellbeing metrics according to income or societal status, gender, age-class is also necessary as aggregate or average values can obscure groups that are being failed or excluded, or whose needs are different, and hide the gaps that keep the poor and marginalised away from benefits (Brown and Fortnam; Coulthard et al.; Szaboova et al., all this volume). Wellbeing has many advantages as a concept and as a means to frame significant factors in development other than wealth, including the emerging priorities for increased resilience. Resilience implies that wellbeing is a process and not simply an outcome, and poor people's wellbeing over time will be governed by their dynamic responses to changes in society and the environment (Szaboova et al., this volume).

Pitfalls with payments

Payments and compensation schemes hold obvious attraction. The simple idea is that ecosystem services have a value (by definition) and therefore a buyer can compensate or reward an environmental manager for specific ecosystem services. In practice it is not so simple, and there is a complex history of efforts to formalise a system of Payments for Ecosystem Services (PES). As Menton and Bennett (this

volume) describe, this led initially to a focus on determining the monetary value of ecosystem services and the opportunity costs of stewardship, in order to guide compensation payments. Over time, the focus has shifted increasingly towards social issues beyond monetary value and markets, but there are many ways that they fail and in doing so it is the poor, landless and powerless that suffer most (McDermott et al., 2013).

Many examples show that payments for ecosystem services or compensation schemes rarely work to reduce poverty sustainably or for multiple ecosystem services. In certain cases they further disbenefit the poor especially where the benefits can be captured by others (e.g. Menton and Bennett, this volume), where payments are conditional on environmental conditions that are difficult to measure or to achieve reliably (Porras and Asquith; Whittaker et al., both this volume), and where the ‘valued’ services are at odds with local needs and demands (Whittaker et al., this volume). PES is better considered not as a conditional agreement based around payments, which can often be imposed externally, but rather as a reward for environmental stewardship. It is important to include the modes and institutional arrangements (formal and informal) for negotiating the agreements, noting that lasting and effective motivations may be culturally driven.

Two approaches are promising: first, unconditional payments whereby custodians of ecosystem services or those disproportionately affected by conservation restrictions are paid using secure sustained financing, in a way that is analogous to social protection schemes (see Porras and Asquith, this volume). Second, negotiated agreements between beneficiaries of ecosystem services and those conserving or altering their land-use behaviour to protect the ecosystems, based in reciprocity and consensus rather than markets, and often mediated informally, have been shown to have longer-lasting benefits (Asquith, 2016). In both cases it is necessary that both social (i.e. pro-poor) and environmental outcomes are considered in the payments (cash or in-kind), even if they are not explicitly linked (Porras and Asquith; Whittaker et al., both this volume).

On occasion, local peoples’ motivations for conservation might be crowded out by PES schemes (Muradian et al., 2013), or cash payments for environmental goods and services that are supposed to be ‘public goods’ may not be politically palatable. So, while valuation of ecosystem services might be considered useful in designing PES schemes, designing effective and equitable schemes for incentivising environmental stewardship requires an understanding of local social-ecological system dynamics, including potential winners and losers, trade-offs and existing institutional arrangements and governance.

Governance and institutions for ecosystem services

The relationships between ecosystem services and wellbeing, including payments, are ultimately mediated by governance systems and relevant institutions that determine how decisions are taken over what issues and by whom. The centrality of governance is fundamental to enhancing wellbeing through ecosystem services

as is increasingly recognised in the evolving frameworks (Pascual and Howe, this volume), and indeed it is central in the IPBES conceptual framework that now serves as the organising basis for the forthcoming global synthesis on ecosystem services and nature's contributions to people (Díaz et al., 2015, 2018).

Nunan et al. (this volume) highlight the gaps and frailties of existing governance systems for ecosystem services as they relate to poverty alleviation and wellbeing. Existing systems tend to be organised sectorally (e.g. food, water, timber) and be dominated by certain powerful groups, especially landowners, and be regularly subject to political pressures. Participatory approaches have had only limited success and have weak representation from poor and marginalised groups. While governance for enhanced wellbeing from ecosystem services fundamentally implies multi-sector, multi-scale governance, these barely exist and are extremely difficult to establish (Diz and Morgera; Nunan et al., both this volume).

Local-level governance of ecosystem services is also increasingly affected by external drivers from globalisation, especially international flows of materials, capital and investments (Nunan et al., this volume). This, in part, mirrors the impacts of globalisation on land use change, particularly in the Global South. A consequence is that local, regional and national-scale governance for ecosystem services must consider the impacts of these global drivers alongside specific and place-based factors (Meyfroidt et al., 2013; Nunan et al., this volume).

Governance also determines access to data and information and the potential flows of knowledge and information necessary for evidence-based decision making. Potentially transformational advances in technology and the advent of big data and machine learning tools hold huge promise for better monitoring, management and improved wellbeing from ecosystems highlighting the needs of locally dependent, poor communities (Buytaert et al., this volume). Nevertheless, such advances are easily captured by technically competent and well-connected elites and can simply become a source of power and influence that marginalises most people, but especially the poor (Pascual and Howe, this volume). This is not inevitable however, and Buytaert et al. (this volume) demonstrate that ICT advances offer the potential for polycentric governance based on open and transparent data that can be enabling and inclusive if designed with that in mind.

Lessons for the SDGs

The findings here have several implications for global ambitions to achieve the 17 SDGs. First, although the goals are stand-alone objectives it is clear that there are many interconnections between them that may suggest hopes for synergies and easy wins; but there are also many possibilities for perverse and unintended outcomes from pursuing single goals without considering the overall system of which they are a part (Stafford-Smith et al., 2017). Even in the context of ecosystem services and wellbeing, it is clear that the complexity of the system and the extent of interconnectedness means that simple and directed solutions rarely work as planned.

We recommend instead embracing the complexities, working with established and emerging participatory approaches to ensure that all stakeholders are involved, and using systems approaches to define just and safe outcomes for environmental conditions.

Second, a significant feature of the SDGs is that both developed and developing countries are included and the goals relating to poverty and wellbeing therefore apply everywhere. This raises a tension between objective (absolute) and relative approaches to measuring poverty and other components of wellbeing. However, this is well resolved by taking a capability approach which focuses on the kind of life that people have ‘reason to value’ (Sen, 1999) and on what people are able to achieve, rather than solely on what they have or what they lack (Coulthard et al., this volume).

Third, equitable and just outcomes for sustainable wellbeing will not be achieved by processes that fail to consider the different dimensions of justice (recognition, procedure, distribution) as well as the complexity of the social-ecological system. This finding has significant implications for actions designed to achieve the SDGs, and the goal of ‘leaving no one behind’.

Ecosystem service management can make an important contribution to achieving the SDG agenda (Wood et al., 2018). Doing so by 2030 requires rapid action. A clear conclusion is that, complexity notwithstanding, we have enough knowledge and understanding to design and implement environmental policies and interventions that are ‘good enough’. By embedding decisions in adaptive governance processes, these policies can be adjusted as our understanding deepens and unexpected outcomes become evident. Nevertheless, there are areas in which more research could accelerate progress towards enhancing wellbeing in an environmentally sustainable manner, such as: how can governance at local, national and international levels be better connected vertically and across sectors to ensure that decision making in one place doesn’t inadvertently close down options or impose costs on others? Can more be done to ensure accountability of current decision makers (often overly focused on short-term political cycles) to future generations? What combination of regulatory and market-based approaches is most effective in different contexts? In particular, how do we govern the commons (from our global atmosphere to trans-boundary fisheries and local pastures) and limit creeping privatisation and elite capture? To what extent can ecosystem service-based approaches be combined with more conventional technological and socio-institutional innovations? Where restoration is necessary, how do we ensure it meets the requirements of multiple stakeholders and is achieved rapidly and at scale? How do we harness the forces of globalisation and, especially, the opportunities provided by increasingly widespread information and communication technologies, as a positive factor supporting more effective and just decision making? None of these questions can easily be pigeon-holed as the domain of a single discipline. Indeed, the chapters in this book highlight the need for more co-produced and interdisciplinary research to more effectively provide implementation-ready solutions to policy-makers’ questions.

Conclusions

It is impossible to read the chapters in this book and not detect a collective sense of frustration at the injustices that are still suffered by large segments of the population, often in the name of well-intentioned projects intended to achieve some undefined vision of ‘progress’ or mitigate against some of its negative impacts. The idea that beneficial outcomes for people can be achieved simply by managing ecosystems for ecosystem services turns out to have many pitfalls in practice, and especially so as a means for the poor to move sustainably out of poverty. Over even quite short periods the system becomes dominated by certain easy-to-achieve and profitable ecosystem services, which can readily be captured and sequestered by the most powerful sectors/elites. Privatisation of what were once public goods is increasing, especially in relation to freshwater and fisheries, but even for wildlife conservation and tourism. Provisioning services tend to dominate ecosystem decisions, commonly driven by markets that are not accessible to local communities. Regulating services tend to suffer, with more serious and lasting consequences for local communities and future generations. With the poorest and most vulnerable also being most dependent on local ecosystem goods and services, and in the absence of any effective trickle-down of wealth, simple interventions often fail the poorest and many are in any case unsustainable.

Moving away from a linear model, conceived to somehow provide a causal link between ecosystem services and wellbeing, and instead recognising the complexity of the social-ecological system provides a more realistic basis for design and planning of interventions. This approach forces a more inclusive approach and means that the feedbacks, non-linearities and threshold responses that are likely do not come as a surprise and can be built into the design. This approach is obviously more complicated, but by making the real risks, co-benefits and opportunities more obvious, and by forcing an explicit understanding of the potential winners and losers, decisions can become both more transparent and more realistic.

Ecosystem services are important – directly and indirectly – for the wellbeing of all people. Yet it is the wellbeing of the poor – the focus of this book – that is most directly dependent upon the natural environment through cultural, subsistence and income-generating activities. However, their justified aspirations for a decent life encounter externally driven obstacles and threats that are beyond the capacity of local people to tackle; their options are constrained by decisions taken elsewhere. Recognising trade-offs as conflicts between the varied wellbeing aspirations of different groups of people highlights the political nature of the associated value judgements. Taking an environmental justice approach to ecosystem governance can help resolve trade-offs by recognising the rights of the poor, women and other marginalised groups to have a voice, establishing the procedures for them to use that voice and ensuring fair distribution of benefits. Accountable and adaptive governance systems will be necessary to connect people across local to global scales, recognising joint responsibility for environmental stewardship and global wellbeing outcomes for all.

References

(ESPA outputs marked with ‘*’)

- Asquith N. (2016) Watershared: adaptation, mitigation, watershed protection and economic development in Latin America. *Inside Stories on Climate Compatible Development*. Climate & Development Knowledge Network (CDKN).
- Burger JR, Allen CD, Brown JH, et al. (2012) The macroecology of sustainability. *PLoS Biology* 10: e1001345.
- Carpenter SR, Mooney HA, Agard J, et al. (2009) Science for managing ecosystem services: beyond the Millennium Ecosystem Assessment. *Proceedings of the National Academy of Sciences* 106: 1305–1312.
- Chan KM, Guerry AD, Balvanera P, et al. (2012) Where are cultural and social in ecosystem services? A framework for constructive engagement. *BioScience* 62: 744–756.
- *Daw T, Brown K, Rosendo S, et al. (2011) Applying the ecosystem services concept to poverty alleviation: the need to disaggregate human well-being. *Environmental Conservation* 38: 370–379.
- *Daw TM, Coulthard S, Cheung WWL, et al. (2015) Evaluating taboo trade-offs in ecosystems services and human well-being. *Proceedings of the National Academy of Sciences* 112: 6949–6954.
- DeFries R and Nagendra H. (2017) Ecosystem management as a wicked problem. *Science* 356: 265–270.
- *Díaz S, Demissew S, Carabias J, et al. (2015) The IPBES conceptual framework – connecting nature and people. *Current Opinion in Environmental Sustainability* 14: 1–16.
- Díaz S, Pascual U, Stenseke M, et al. (2018) Assessing nature’s contributions to people. *Science* 359: 270–272.
- *Galafassi D, Daw TM, Munyi L, et al. (2017) Learning about social-ecological trade-offs. *Ecology and Society* 22: 2.
- Geizendorffer IR, Cohen-Shacham E, Cord AF, et al. (2017) Ecosystem services in global sustainability policies. *Environmental Science & Policy* 74: 40–48.
- *Lele S, Springate-Baginski O, Lakerveld R, et al. (2013) Ecosystem services: origins, contributions, pitfalls, and alternatives. *Conservation and Society* 11: 343.
- MA. (2005) *Millennium Ecosystem Assessment, 2005. Ecosystems and Human Well-Being: Synthesis*. Washington, DC: Island Press.
- *McDermott M, Mahanty S and Schreckenberg K. (2013) Examining equity: a multidimensional framework for assessing equity in payments for ecosystem services. *Environmental Science and Policy* 33: 416–427.
- Martinez-Alier J. (2002) *The Environmentalism of the Poor*. Cheltenham, UK: Edward Elgar.
- Meyfroidt P, Lambin EF, Erb K-H, et al. (2013) Globalization of land use: distant drivers of land change and geographic displacement of land use. *Current Opinion in Environmental Sustainability* 5: 438–444.
- *Muradian R, Arsel M, Pellegrini L, et al. (2013) Payments for ecosystem services and the fatal attraction of win-win solutions. *Conservation Letters* 6: 274–279.
- *Pascual U, Palomo I, Adams WM, et al. (2017) Off-stage ecosystem service burdens: a blind spot for global sustainability. *Environmental Research Letters* 12: 075001.
- Putt del Pino S, Metzger E, Drew D, et al. (2017) The Elephant in the Boardroom: Why Unchecked Consumption Is Not an Option in Tomorrow’s Markets. *WRI Working Paper, March 2017*. Washington, DC: World Resources Institute.
- Raworth K. (2012) A safe and just space for humanity: can we live within the doughnut? *Oxfam Policy and Practice: Climate Change and Resilience* 8: 1–26.

- Reyers B, Biggs R, Cumming GS, et al. (2013) Getting the measure of ecosystem services: a social-ecological approach. *Frontiers in Ecology and the Environment* 11: 268–273.
- *Schreckenberg K, Franks P, Martin A, et al. (2016) Unpacking equity for protected area conservation. *Parks* 22: 11–26.
- Sen A. (1999) *Development as Freedom*. Oxford: Oxford University Press.
- *Sikor T. (2013a) Introduction: linking ecosystem services with environmental justice. In Sikor T (ed.) *The Justices and Injustices of Ecosystem Services*. Abingdon, UK: Routledge.
- *Sikor T, ed. (2013b) *The Justices and Injustices of Ecosystem Services*. Abingdon, UK: Routledge.
- Stafford-Smith M, Griggs D, Gaffney O, et al. (2017) Integration: the key to implementing the Sustainable Development Goals. *Sustainability Science* 12: 911–919.
- *Steffen W, Richardson K, Rockström J, et al. (2015) Planetary boundaries: guiding human development on a changing planet. *Science* 347: 1259855.
- UN. (2014) *World Urbanization Prospects: The 2014 Revision*. New York: United Nations, Department of Economic and Social Affairs, Population Division.
- UN. (2015) *The World's Women 2015: Trends and Statistics*. New York: United Nations, Department of Economic and Social Affairs, Statistics Division.
- Waage J, Yap C, Bell S, et al. (2015) Governing the UN Sustainable Development Goals: interactions, infrastructures, and institutions. *Lancet Global Health* 3: E251–E252.
- Wood SLR, Jones SK, Johnson JA, et al. (2018) Distilling the role of ecosystem services in the Sustainable Development Goals. *Ecosystem Services* 29: 70–82.