1. Forests, payments for environmental services and livelihoods

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INTRODUCTION

Payment for Environmental Services (PES) schemes, where the providers of environmental services receive payments for the adoption of land uses and practices that support those services, are relatively recent in the developing world. There is strong interest in PES schemes because of their potential to mobilize new resources for conservation and achieve development outcomes. This interest has increased with recent discussions under the United Nations Framework Convention on Climate Change (UNFCCC) on a mechanism for Reduced Emissions from Deforestation and forest Degradation (REDD). REDD would require the provision of financial incentives to developing countries to conserve their forests, and could possibly include payments to people with rights over the forests in question. These developments have heightened interest in learning from past and present PES schemes, matched by concerns about their impacts – and those of REDD – on the rights and livelihoods of local resource users and managers.

This book therefore addresses the following questions:

- What have been the impacts of PES schemes on livelihoods?
- What are the implications for the design of incentive mechanisms for REDD at the local level?

To address these questions, case studies of PES schemes were selected to represent implementation at a variety of scales, with different tenure structures, across Africa, Asia and Latin America. This book presents these case studies, and concludes with a comparison of the main livelihood impacts documented in these case studies and the implications for the design of incentive mechanisms for REDD at the local level.
This chapter introduces the need for research on the livelihood impacts of PES, and discusses the methodological framework guiding the research. It discusses the concept of REDD and the link with PES, reviews literature on PES and livelihoods, then presents the framework and questions guiding the individual case studies. It then provides an overview of the case studies presented in the following chapters.

REDUCED EMISSIONS FROM DEFORESTATION AND DEGRADATION AND LIVELIHOODS

Deforestation and forest degradation\(^2\) contribute about 12 per cent of global anthropogenic CO\(_2\) emissions, with peatland conversion and degradation contributing a further 3 per cent to emissions (van der Werf et al. 2009). The Copenhagen Accord on Climate Change states:

> we recognise the crucial role of reducing emissions from deforestation and forest degradation and the need to enhance removals of greenhouse gas emissions by forests and agree on the need to provide positive incentives to such actions through the immediate establishment of a mechanism including REDD-plus, to enable the mobilization of financial resources from developed countries.\(^3\)

The need to reduce emissions from the forest sector had also been stressed by the Intergovernmental Panel on Climate Change (2007) and the Stern Review (2006), which noted that reducing deforestation appeared to be a cost-effective approach to mitigating greenhouse gas emissions. Although implementing REDD may require more funds than initially estimated by the Stern Review, it still appears to be a cost-effective approach to emissions reduction (e.g. Boucher 2008; Kindermann et al. 2008).

There are a number of causes of deforestation and forest degradation (Geist and Lambin 2002), but fundamentally they occur because those who degrade and convert forests benefit from those activities. The benefits may be financial, for example, from higher returns generated by oil palm plantations compared with sustainable logging, or simply subsistence benefits, for instance, through the conversion of forest to crops for domestic consumption. Deforestation and degradation can involve actors from the local, national and even international scales, who benefit from forest transformation in different ways.

Funding is therefore needed to offset the forgone benefits of deforestation and degradation in developing countries, and to cover the costs incurred in implementing REDD policies and measures. The forgone benefits relate to the net economic benefits that would be derived, for example, from the conversion of a forest to an agricultural land use such as soy or...
oil palm cultivation. It is beyond the scope of this book to discuss various options for the design of a REDD scheme that are being considered by the Parties to the UNFCCC – for details of these proposals see Parker et al. (2008), Angelsen (2009) and Angelsen et al. (2009). It is useful, however, to outline some basic principles underpinning the design of a possible REDD scheme.

Essentially, REDD would involve: (1) setting a baseline level of emissions for a country; (2) that country implementing policies and measures to reduce emissions from deforestation and forest degradation during an agreed time frame (the so-called commitment period, expected to be about 5 years); (3) at the end of the commitment period, assessing emissions from forestry; (4) if a reduction in emissions below the baseline is achieved, issuing carbon credits to the country and possibly to sub-national and non-State entities (if a market mechanism is included in an agreement on REDD); and (5) selling carbon credits through a financial mechanism.

One of the proposed approaches to setting the emissions baseline for a country involves estimating the emissions from forestry that occurred in that country over a certain past period (for instance, 1990 to 2000). This can be seen as the business-as-usual scenario, that is, the amount of forestry emissions that would occur without a REDD mechanism. Setting the baseline and measuring emissions at the end of the commitment period is necessary to assess whether REDD policies and measures can be assumed to have resulted in additional reductions of emissions. That is, carbon credits can be considered as representing real avoided emissions. Parties to the UNFCCC seem to favour national level baselines over local level baselines in order to reduce the risk of displacement of greenhouse gas emissions from one geographic area to another, referred to as ‘leakage’. For example, this may arise if clearing for agriculture is precluded in one area and, as a result, forest clearing takes place in a different area, whether carried out either by the same stakeholders or other parties that take advantage of the market opportunity, thus partly or completely offsetting the reduction in emissions.

REDD policies refer, for example, to the reduction of incentives that lead to deforestation (for example, agricultural subsidies) and degradation (for instance, subsidized logging), adoption and enforcement of land use plans, and building state capacity to counter illegal forest activities. REDD measures refer to on-the-ground forest conservation activities (for example, the establishment of protected areas) that can be carried out by government, companies and local communities.

Funding for REDD could take three forms, not necessarily mutually exclusive, as noted by Angelsen et al. (2009). The first type of mechanism is a fund to be created with contributions from developed countries that
commit to supporting the reduction of forestry emissions in developing countries. This fund could be used to build capacity for the implementation of REDD in individual countries and to prepare them for a market-based approach. The second type of mechanism is funding that is partially linked to the market: the carbon credits from REDD obtained by developing countries could be sold at auctions to interested parties, which could include countries and private companies, but these REDD carbon credits would not be exchangeable on carbon markets (that is, not fungible), such as the European Union Emissions Trading Scheme. The third type of mechanism involves REDD carbon credits being sold on carbon markets and being fully fungible with other carbon credits.

There is currently limited support for the third type of mechanism because of concerns that REDD carbon credits could flood the market as well as concerns about the permanence of REDD carbon credits. Market flooding could occur if a REDD mechanism generated a large supply of REDD carbon credits that would lower the average price of all carbon credits, thus resulting in lower incentives to reduce carbon emissions in developed countries. Permanence refers to whether the reduced emissions for which the REDD credits are issued will be reversed in the future, that is, whether a developing country that receives REDD carbon credits will experience emissions above the baseline in future commitment periods. At a local level, this can be visualized as a forest area being set aside to sequester carbon in one commitment period, but being cleared in the following one, thus resulting in emissions. Proposals for dealing with this issue include making REDD credits temporary, establishing REDD carbon credit reserves at the national level (for example, a certain percentage of the credits would not be sold), and making developing countries liable for the REDD carbon credits in case of non-permanence.

To implement REDD policies and measures within countries effectively and sustainably, there seems to be a need to link national with sub-national initiatives (Angelsen et al. 2008), which would involve the distribution of (some of) the revenues from the sale of REDD credits. The crucial question, therefore, is whether governments should provide incentives to individuals, communities and companies to reduce emissions from deforestation and forest degradation. It could be expected that governments would provide incentives if reductions in emissions took place on private or community lands, linked to the amount of carbon conserved by these stakeholders, possibly using a PES mechanism.

The situation is less clear for measures that address deforestation on government land, particularly in those countries where ownership is contested by local communities, and in countries where some publicly owned forest is allocated for community use or management (Table 1.1). The lack
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Table 1.1 Land tenure and governance in 20 countries with highest deforestation rates

<table>
<thead>
<tr>
<th>Country</th>
<th>Deforestation 2000–05 km²a</th>
<th>Contribution to global deforestation 2000–05 (%)</th>
<th>Ownership of forest (%)b</th>
<th>Freedom index 2000–05c</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>Public, government managed</td>
<td>Public, community managed</td>
</tr>
<tr>
<td>Brazil</td>
<td>155150</td>
<td>24.1</td>
<td>21.0</td>
<td>6.1</td>
</tr>
<tr>
<td>Indonesia</td>
<td>93570</td>
<td>14.5</td>
<td>98.4</td>
<td>0.2</td>
</tr>
<tr>
<td>Sudan</td>
<td>29450</td>
<td>4.6</td>
<td>95.8</td>
<td>4.2</td>
</tr>
<tr>
<td>Myanmar</td>
<td>23320</td>
<td>3.6</td>
<td>99.9</td>
<td>0.1</td>
</tr>
<tr>
<td>Zambia</td>
<td>22240</td>
<td>3.4</td>
<td>99.8</td>
<td>0.2</td>
</tr>
<tr>
<td>Tanzania</td>
<td>20610</td>
<td>3.2</td>
<td>89.6</td>
<td>4.5</td>
</tr>
<tr>
<td>Nigeria</td>
<td>20480</td>
<td>3.2</td>
<td>na</td>
<td>na</td>
</tr>
<tr>
<td>Congo</td>
<td>15970</td>
<td>2.5</td>
<td>100.0</td>
<td>0.0</td>
</tr>
<tr>
<td>Zimbabwe</td>
<td>15650</td>
<td>2.4</td>
<td>na</td>
<td>na</td>
</tr>
<tr>
<td>Venezuela</td>
<td>14380</td>
<td>2.2</td>
<td>100.0</td>
<td>0.0</td>
</tr>
<tr>
<td>Bolivia</td>
<td>13510</td>
<td>2.1</td>
<td>43.5</td>
<td>37.2</td>
</tr>
<tr>
<td>Mexico</td>
<td>13020</td>
<td>2.0</td>
<td>5.0</td>
<td>0.0</td>
</tr>
<tr>
<td>Cameroon</td>
<td>11000</td>
<td>1.7</td>
<td>94.6</td>
<td>5.4</td>
</tr>
<tr>
<td>Cambodia</td>
<td>10940</td>
<td>1.7</td>
<td>100.0</td>
<td>0.0</td>
</tr>
<tr>
<td>Ecuador#</td>
<td>9880</td>
<td>1.5</td>
<td>77.1</td>
<td>22.9</td>
</tr>
<tr>
<td>Australia</td>
<td>9670</td>
<td>1.5</td>
<td>74.2</td>
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</tr>
<tr>
<td>Paraguay</td>
<td>8930</td>
<td>1.4</td>
<td>na</td>
<td>na</td>
</tr>
<tr>
<td>Philippines#</td>
<td>7870</td>
<td>1.2</td>
<td>89.5</td>
<td>10.5</td>
</tr>
<tr>
<td>Honduras#</td>
<td>7820</td>
<td>1.2</td>
<td>75.0</td>
<td>25.0</td>
</tr>
<tr>
<td>Argentina</td>
<td>7490</td>
<td>1.2</td>
<td>20.4</td>
<td>0.0</td>
</tr>
</tbody>
</table>

Notes:
(b) Data from Sunderlin et al. (2008) for year 2008, except for: Mexico with data for 2002, and countries marked with # data from FAO (2006)
(c) Freedom House (www.freedomhouse.org)
NF: not free
PF: partly free
F: free; reported ranking indicates the dominant governance classification during the period.

Of clarity about local entitlements to benefit from REDD schemes in countries with poor governance has led community and indigenous advocacy organizations to express concern about REDD. Griffiths (2007) states that the implementation of REDD schemes without due regard to rights, social and livelihood issues could increase the risks of:
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- renewed and even increased state and ‘expert’ control over forests to protect lucrative forest carbon reservoirs;
- unjust targeting of indigenous people as the drivers of deforestation;
- violations of customary land and territorial rights;
- zoning of forest lands without the informed participation of forest dwellers by the state and/or non-government organizations;
- unequal imposition of the costs of forest protection on indigenous peoples and local communities;
- unequal and abusive community contracts;
- land speculation, land grabbing and land conflicts;
- corruption and embezzlement of international funds by national elites; and
- increasing inequality and potential conflict between recipients and non-recipients of funds.

Some of these had already been noted in the Stern Review (2006), which highlighted the risks of perverse incentives created through incorrectly set baselines, rent-seeking behaviour, the capture of benefits by national elites and corruption. It also stressed the need to clarify land and forest boundaries and ownership, and ensure any allocation of property rights is regarded as just by local communities (see also Cotula and Mayers 2009).

The foregoing concerns highlight the need to consider the impacts of REDD activities on individuals and communities, even when those activities might take place on state land. Apart from understanding social risks, this is important because if individuals and communities contribute to reducing emissions from deforestation and degradation on state lands, consideration should be given to rewarding them for their efforts. PES mechanisms could be used for that purpose.

PAYMENTS FOR ENVIRONMENTAL SERVICES
AND LIVELIHOODS

A PES system is designed to provide payments to those who contribute to the provision of environmental services. Payments are aimed at changing resource use practices from those with negative economic impacts for society or for the ‘buyer’ (the party that purchases the environmental service) to those that are perceived to be beneficial. From an economic efficiency perspective, to make the implementation of a PES scheme worthwhile for society or the buyer, the value of the payment must be equal to, or lower than, the value of the avoided environmental change – the value of the environmental service provided. To be attractive to the seller,
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the value of the payment should be higher than (or at least equal to) her opportunity cost – the value of the benefits derived from the activities that would have been undertaken in the absence of the PES system.

A PES system is commonly defined as involving:

1. a voluntary transaction where
2. a well-defined ES [environmental service] (or a land-use likely to secure that service)
3. is being ‘bought’ by a (minimum one) ES buyer
4. from a (minimum one) ES provider
5. if and only if the ES provider secures ES provision (conditionality) (Wunder 2005, p. 3).

This definition is relevant to a market with active demand for, and supply of, an environmental service (Corbera et al. 2007a; 2007b). In practice, many PES schemes have been implemented in situations where there is no functioning market for these environmental services; and the existing literature uses the term ‘market-based instruments’ to refer to PES schemes across a spectrum from ideal market situations to those involving a hybrid of regulatory approaches with financial incentives, as well as development initiatives with financial incentives (Pagiola et al. 2002).

It is worth noting that Wunder’s definition underplays the role of intermediaries in the transactions (Vatn 2010). Because environmental services are normally ill-defined and have the characteristics of public goods, they often require the intervention of an intermediary to regulate use, establish prices that are not set by markets and coordinate transactions between buyers and sellers. Basing PES only on buyer–seller interactions without recognizing the role of intermediaries restricts the application of the concept to a few peculiar cases, because most of the real-world situations do not in fact conform to the definition (Vatn 2010). While the foregoing definition of PES does not sufficiently stress the role of intermediaries, it needs to be recognized that the authors who have developed and used it acknowledge that many PES schemes have been financed by governments or non-government organizations who act as the intermediary for end users of the environmental service (Engel et al. 2008).

The research reported in this book worked with the definition outlined above in order to have an agreed benchmark for the case studies, primarily because it is widely accepted, and there was a need to maintain consistency across case studies. The problems arising from the strict adoption of this definition, however, cannot be discounted and are commented upon in the concluding chapter, which compares the case studies and draws lessons for the design of PES schemes for REDD activities.
Payments for environmental services

Although PES was not developed as an instrument to improve livelihoods, there has been an increasing interest in the possible impacts of PES on participants (that is, sellers) and non-participants, particularly in relation to their impacts on poverty (e.g. Grieg-Gran et al. 2005; Pagiola et al. 2005; Porras et al. 2008), an interest that has grown further as a result of the concerns about the potential impacts of REDD on livelihoods and rights over land and resources.

We use the term livelihoods to refer broadly to ‘the capabilities, assets (stores, resources, claims and access) and activities required for a means of living’ (Chambers and Conway 1991). Livelihoods are dynamic, involving continuous management and modification of assets, as well as choices to trade off and draw down on natural, financial, human, physical and social-political assets (Scoones 1998; Bebbington 1999). A livelihoods approach has informed some key analyses of the impacts of PES (Landell-Mills and Porras 2002; Miranda et al. 2003; Grieg-Gran et al. 2005), which have examined how PES interventions have interacted with different livelihood assets over time. Recent research has also emphasized issues of access and power in PES schemes, so that impacts are considered within a wider social and political context (Corbera et al. 2007a; Pagiola et al. 2008; Wunder 2008), which was a gap in early livelihoods research (de Haan and Zoomers 2005).

Much of the PES and livelihoods research has focused on impacts on ‘the poor’ (typically defined according to national poverty line benchmarks), in part because of the strong overlap between the resources and environmental services targeted by PES schemes and areas of high poverty incidence.

However, this overlap does not necessarily equate with high rates of participation by poor households in PES schemes, because of a number of ‘participation filters’ (Wunder 2008). The poor may be ineligible to participate for a number of reasons, including weak or unrecognized resource rights, because of a lack of awareness, or if the perceived costs (for instance, investment or opportunity costs) relative to the benefits of participation are too high (Pagiola et al. 2008; Wunder 2008). Yet despite their non-participation, these households may still experience impacts from PES schemes and therefore need to be considered when analyzing impacts (Wunder 2008).

The idea that the poor are, in fact, a diverse group has been recognized in some PES research (Pagiola et al. 2005; Corbera et al. 2007a; Wunder 2008), though the evidence on how impacts vary according to people’s different resources and capacities remains limited. Lee and Mahanty (2009), drawing on experiences in community-based forest management (CBFM) suggest that, without active intervention, the poorest households are less
likely to benefit from CBFM schemes than those those with a minimal level of assets and resource security. Corbera et al. (2007a) add that the equity of PES impacts depends upon the social context. The existence of collective resource ownership with strong institutions has supported collective welfare improvements, but without these conditions the landless and poor can be excluded (Corbera et al. 2007b). For those concerned with distribution and equity, the relationship between PES, livelihoods and different types of poverty needs to be better understood.

Once households do gain access to a PES scheme, the question remains of how much and in what way they may benefit from participation, in either financial or non-financial terms (Wunder 2008). Analyses applying a livelihoods framework have made the useful contribution of directing attention away from a focus on income, to consider how PES schemes interact with a wider set of assets including natural, financial, human, physical and social-political assets. Given the diversity of PES schemes, as well as the environmental service sellers and buyers associated with them, a range of risks and opportunities can be shown to exist across the full spectrum of livelihood assets (Table 1.2).

A number of critical factors have been identified that influence whether the risks or opportunities outlined above are realized in practice, including (Landell-Mills and Porras 2003; Pagiola et al. 2005; Corbera et al. 2007a; Wunder 2008; Pagiola 2008):

- the nature and location of the environmental service, for instance, the percentage of poor households tends to be higher in remote areas where forests are often located;
- whether people have the recognized and secure resource rights generally needed to enable entry into PES agreements;
- whether workable regulatory frameworks exist for a specific environmental service;
- how many PES participants are poor, and their ability to participate;
- the size of the payment provided for the provision of the environmental service;
- finance and credit availability for sellers to cover their up-front costs of participation;
- the skills, education, power and negotiating capacity of environmental service sellers;
- availability of good market information and linkages related to communication infrastructure; and
- the existence of mechanisms to reduce transaction costs, for example, collective action institutions that facilitate coordination amongst environmental service sellers.
### Table 1.2 Livelihood risks and opportunities in PES

<table>
<thead>
<tr>
<th>Assets</th>
<th>Risks</th>
<th>Opportunities</th>
</tr>
</thead>
</table>
| Financial | - PES income may be concentrated amongst those who are able to participate  
           | - Benefits delivered at the community level may be distributed inequitably    | - Additional income to participating households                                 |
|         | - Restrictions on agricultural expansion and resource use may reduce income from these sources | - PES income may be relatively stable provided the scheme continues            |
|         | - Potential increases in cost of living because of increased income to PES participants and increased land value | - Improved access to cash for investing in rejuvenating marginal/low productivity lands |
|         | - Reduced income for particular social groups (for example, women, informal settlers) if restrictions to marketable non-timber forest products apply |                                                                             |
| Human  | - Limited opportunities for the poor to capture capacity development opportunities  
          | - Reduced health if loss of access to non-timber forest products for direct use | - Many examples of education and training associated with PES initiatives       |
|         |                                                                       | - Improved health through improvements to water supply and air quality         |
|         |                                                                       | - Education and health could improve if PES income is invested in these       |
Natural
- Access to common lands for grazing, resource collection and swidden agriculture by marginal groups may be restricted
- Increase in value of currently marginal land may increase incentive for powerful groups to take control of it
- Strengthened tenure security in some cases:
  - Land under PES agreement is not ‘idle’ and therefore prevents encroachment
  - Tenure security used as a reward for ES provision
  - Improvement in the status/value of natural resources

Social and political
- If collective decision-making processes are weak (lack of transparency, accountability), costs and benefits of PES may be distributed inequitably
- Erosion of social cooperation if conflict amongst participants or between participants and non-participants
- Cultural impact of monetizing ES
- Strengthening/creating institutions to negotiate agreements can build or strengthen social capital in communities
- Greater visibility and ability to attract funds for some activities
- Protection of natural and cultural heritage improves recreation and cultural opportunities
- Potential to incorporate and ‘certify’ traditional (sustainable) forms of production

Physical
- Dismantling of local infrastructure for example, roads, to secure environmental services
- Inequality in infrastructure development so that only market participants benefit
- Infrastructure development with community level payments/rewards – transport, market infrastructure, research, health care, housing, water supply, communications

The empirical evidence regarding the impacts of PES on livelihoods is still limited (Wunder et al. 2008), but it shows the following. PES schemes appear to have generated small gains above the opportunity costs faced by participants (Wunder et al. 2008), gains which, given the nature of the schemes, normally involve increased income. The poor have been able to participate in PES schemes, even when they were not directly targeted (Grieg-Gran et al. 2005; Asquith et al. 2008; Engel and Palmer 2008), but high transaction costs are a significant threat to their participation (Grieg-Gran et al. 2005; Pagiola et al. 2008). Participants’ non-income benefits include increased tenure security (Grieg-Gran et al. 2005; Asquith et al. 2008; Engel and Palmer 2008) and increased social capital. Some indirect negative impacts may also occur, such as reduced quality of roads (due to increased transport of produce) and of water (due to establishment of timber plantations) (Grieg-Gran et al. 2005). Limited knowledge exists about impacts on non-participants who – depending on the type of scheme and the changes it brings about – could benefit (for example, from improved water quality from watershed schemes) (Wunder 2008), or be negatively affected (for example, by lower labour demand and higher food prices possibly brought about by forest conservation PES schemes) (Grieg-Gran et al. 2005).

In summary, the existing body of knowledge highlights that, although PES raises a range of risks and opportunities for local livelihoods, the evidence on how these play out in practice is limited. This weak evidence base is the starting point for our research, as is the desire to understand better the key factors that might determine livelihood impacts. The analytical framework discussed below takes up these issues and sets out how they are dealt with in the case studies.

METHODOLOGY

This research applied a comparative case study method. Nine PES schemes from a range of countries across Africa, Asia and Latin America were selected, with preference given to those from the 20 countries with the highest annual deforestation (Table 1.1), which accounted for approximately 80 per cent of total deforestation between 2000 and 2005. As not all case studies could be selected from this group, cases were chosen to represent as closely as possible the social and economic conditions of those countries that make the highest contributions to deforestation.

Case studies were not restricted to focusing on PES schemes that aimed to reduce deforestation or sequester carbon (though some of them do so), but were chosen to represent a range of different environmental services,
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including biodiversity conservation and watershed management. The selected case studies had preferably been implemented for long enough to allow the assessment of emerging livelihood impacts, and had to address the design features of the PES scheme that have led to positive or negative livelihood impacts. The selection of case studies was also based on a desire for them to represent a range of different implementation scales – from small-scale through to national schemes – as well as those for single services or multiple (bundled) services.

The authors of the case studies were asked to address, as far as possible, a common set of conditions and issues in their analysis which, as noted earlier, draws on the sustainable livelihoods framework, with particular attention to distributional and access issues. Accordingly, case studies start with some basic background and history on the PES scheme, the type of environmental service targeted, the background on environmental service buyers and sellers, and the role of any intermediaries and the government. The main design features of the PES scheme are outlined, including: the geographical coverage of the scheme; how the service is defined and measured/monitored, and who does that; how the price is set and by whom; how sellers are selected and their socioeconomic characteristics; whether the payments are in cash and/or in-kind; and the roles and responsibilities of buyers, sellers and intermediaries. Also discussed are the terms of the agreements (time period, fixed-term or on-going, etc.), and periodicity of payments; any sanctions for non-compliance by sellers and buyers; the transaction costs (including costs of contracting individual participants and the costs on the participants); and any technical barriers to participation as well as technical support necessary to overcome these.

The impacts of the PES scheme were analysed in relation to the biophysical environment, the livelihoods of participants, the livelihoods of non-participants, and other factors or processes beyond the PES scheme that might have had an influence. A number of specific questions were identified for each livelihood asset category (Table 1.3) and authors were asked to consider, as far as possible, different impacts on different wealth strata, for instance, the poorest versus less poor.

Individual case studies were not expected to address all of these questions, given the diversity of schemes assessed, their associated impacts and the level of available data. However, by articulating a common set of questions, we invited authors to go through a systematic process of considering which livelihood assets were affected in their case study, and how.
Table 1.3 Questions on livelihood impacts of PES schemes

<table>
<thead>
<tr>
<th>Assets</th>
<th>Key questions</th>
</tr>
</thead>
<tbody>
<tr>
<td>Financial</td>
<td>Does the PES scheme increase the overall income of participating households? (compared with opportunity costs of alternative activities, appropriately discounted)</td>
</tr>
<tr>
<td></td>
<td>Is a diversity of income sources for participants sustained?</td>
</tr>
<tr>
<td></td>
<td>Does the PES scheme contribute to increases in the cost of living?</td>
</tr>
<tr>
<td>Human</td>
<td>Does the PES scheme improve capacity, skills and knowledge, and for whom?</td>
</tr>
<tr>
<td></td>
<td>Does the PES scheme impact on health?</td>
</tr>
<tr>
<td></td>
<td>Is PES income (especially at the community level, if any) invested in education and health improvements?</td>
</tr>
<tr>
<td>Natural</td>
<td>Does the PES scheme contribute to a change in access to resources, particularly in common property regimes?</td>
</tr>
<tr>
<td></td>
<td>Does the PES scheme result in a change of the perceived status/value of natural resources?</td>
</tr>
<tr>
<td></td>
<td>Does the PES scheme affect resource tenure (that is, land tenure, access to common resources)?</td>
</tr>
<tr>
<td></td>
<td>Does the PES scheme affect cultural motivations for environmental protection?</td>
</tr>
<tr>
<td>Social/political</td>
<td>Does the PES scheme impact on the social capital of the relevant local communities?</td>
</tr>
<tr>
<td></td>
<td>Does the PES scheme impact on coordination and influence with wider institutions and decision-making processes?</td>
</tr>
<tr>
<td>Physical</td>
<td>Does the PES scheme impact on investment in local infrastructure?</td>
</tr>
</tbody>
</table>


THE STRUCTURE OF THE BOOK AND THE CASE STUDIES

The following chapters present the nine case studies (see Table 1.4), while the overall findings from the comparative analysis are presented in the concluding chapter. Five of the case studies are in countries listed in the top 20 deforesting countries (Table 1.1); three are in geographic areas that have a country in the top 20 list, and one study is a review of PES projects funded by the Global Environment Facility (GEF). The latter was not in
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Chapter 2 by Haskett and Gutman reviews 22 PES-related projects that have received funding from the GEF since 2001 – approximately US$170 million had been invested in PES and PES-related projects by 2008, with further investments made by GEF partners. The bulk of this portfolio is located in Latin America, with the remainder in Africa – no PES schemes are funded by the GEF in Asia – and most projects are relatively

Table 1.4 Characteristics of case studies

<table>
<thead>
<tr>
<th>Country</th>
<th>Environmental service targeted</th>
<th>Scale of scheme</th>
<th>Ownership of land</th>
</tr>
</thead>
<tbody>
<tr>
<td>Global GEF review</td>
<td>Variety of case studies including carbon, watershed protection</td>
<td>National to sub-national</td>
<td>State, common property, private</td>
</tr>
<tr>
<td>Mexico*</td>
<td>Carbon (also hydrological services and biodiversity)</td>
<td>National</td>
<td>Common property</td>
</tr>
<tr>
<td>Brazil*</td>
<td>Bundle – reduced deforestation, carbon sequestration, biodiversity conservation, hydrological functions, fire management</td>
<td>Sub-national (nine states of the Amazon region)</td>
<td>Private</td>
</tr>
<tr>
<td>Indonesia*</td>
<td>Watershed protection</td>
<td>Sub-national (watershed spanning two regencies and six sub-districts)</td>
<td>Private</td>
</tr>
<tr>
<td>Philippines*</td>
<td>Watershed protection</td>
<td>Sub-national (spanning multiple local government units)</td>
<td>State</td>
</tr>
<tr>
<td>Uganda</td>
<td>Carbon</td>
<td>Sub-national (small scale)</td>
<td>Private and state</td>
</tr>
<tr>
<td>Mozambique</td>
<td>Carbon</td>
<td>Sub-national (small scale)</td>
<td>Common property</td>
</tr>
<tr>
<td>Nicaragua and Colombia</td>
<td>Biodiversity conservation, carbon sequestration</td>
<td>Sub-national (small scale)</td>
<td>Private</td>
</tr>
</tbody>
</table>

Notes: * Country ranked amongst the top 20 deforesting countries (as listed in Table 1.1).
small-scale, although a significant number are of national scale, as well as two multinational projects and a global one. Virtually all GEF-supported PES projects aim to protect biodiversity; however, watershed management, carbon sequestration and landscape conservation for tourism are the activities that trigger payments. With the exception of the Costa Rican and Mexican national government-led PES schemes, all GEF-supported PES projects expect that the demand for ecosystem services will come, in the long term, from private buyers. However, at present, buyers are mostly national governments and donor agencies, with private buyers a distant third. Ecosystem service providers in these projects are predominantly small farmers, with only few medium and large landowners and protected area agencies as major sellers.

Haskett and Gutman go on to describe two projects in Costa Rica and Mexico in more detail. The first, in Costa Rica, is a national scheme to reduce deforestation and increase reforestation which would subsequently increase the supply of carbon sequestration, maintain forest hydrological services, biodiversity conservation, and preserve scenic beauty. Participants in this project believed that PES payments had made a significant improvement in income diversification and stabilization, and had offset start-up costs. The project is thought to have had positive environmental benefits, but has inadequately targeted the most vulnerable habitats. The Mexican scheme is a national scheme focusing on increasing fresh water availability, particularly groundwater, while having positive socioeconomic impacts on marginalized communities (particularly ejidos – rural communities on communal lands) (see also Chapter 3 by Corbera). The majority of PES payments are made to ejidos rather than individual landholders, though some ejidos have subsequently distributed income to the household level. There is evidence of strong tendencies toward equitable distribution of benefits within the communities (for example, school improvement). However, this programme appears to have been more successful in achieving social rather than environmental objectives, with overexploited aquifers under-represented in the programme.

Mexico’s PES scheme for carbon payments was established in 2004 as part of a wider PES programme which covered carbon, biodiversity and agroforestry, and watershed services, and is described by Corbera in Chapter 3. In 2006, all the schemes were merged into a single policy framework, though each sub-programme maintained its own rules and procedures. The programme was implemented on private, state and community land, and involved an initial application for funding for project design, with a requirement to prove land ownership within a deforested or degraded area of the country. Proposals were then independently assessed before successful applications proceeded to implementation. Despite
application procedures and eligibility criteria for carbon projects changing several times over the life of the programme, overall the group of PES programmes have been successful in attracting a large number of rural communities and individual landholders – over 2600 communities, associations and private right-holders on more than 1.75 million ha were receiving payments for various ecosystem services by 2008. Corbera describes how uncertain funding arrangements have meant that some approved applications have not received funding to implement their projects, and how the high rejection rates of applications highlight the need for sufficient capacity amongst both communities and intermediaries, and means of building this knowledge and capacity over time.

In terms of livelihood impacts, Corbera provides evidence that projects contribute to increased awareness of conservation and ecosystem services, and to strengthened forest management skills amongst participants, though it was felt that further capacity-building efforts were needed. Positive contributions to human capital have also been felt by intermediary organizations, who have received training to improve the assistance provided to communities. Impacts on physical capital have been uneven, depending on the way community-level income has been spent. While the primary reason for joining the PES programme was to earn additional income, the majority of participants felt that contributions to financial capital were insufficient to make a significant contribution to livelihoods in most cases. However, contributions to social capital have been made through community organization, and strengthening collective action through land use management and tree planting activities. On rare occasions, project activities have resulted in conflict within communities. The relatively high rates of participation by marginalized communities is thought to be a highlight of the programme, and the majority of participants have demonstrated a willingness to conserve land regardless of the level of PES incentives, reinforcing positive attitudes towards conservation activities.

In Chapter 4, Bartels et al. describe Proambiente, a programme implemented across nine states in the Amazon region of Brazil, though the chapter focuses on sites within Acre state. The programme provides (financial) rewards to smallholders for developing and implementing long-term, sustainable land management plans – over land that can be used for cultivation, livestock rearing and/or forest extractive activities – which is assumed to deliver a bundle of environmental services including reduced deforestation, carbon sequestration, biodiversity conservation, the restoration of hydrological functions and a reduction in uncontrolled use of fire. Additional benefits provided to smallholders by the programme include technical assistance, credit and participation in local and regional planning processes – it was never intended that the payments would
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provide the main incentive for family participation. Starting in 2003, *Proambiente* was designed to be implemented over 15 years, in a phased approach starting with the creation of regional sustainable development plans, then the development of management plans for each family, with these plans subsequently implemented. The establishment of community agreements and certification plans, audit and certification of activities and payment for environmental services would then follow.

In terms of impacts on households, Bartels et al. describe how the programme has affected financial capital minimally (though indirect impacts may have been quite strong – in terms of linking producers with specialized markets), the technical capacity of smallholders (and extension agents) has been strengthened, and the use of use of community agents (that is, local farmers trained to become trainers) has helped build both human and social capital. Some of the introduced practices have raised farm labour requirements (as yet uncompensated), and there remains some confusion about them. Social capital has also been built through the provision of information about, and the development of partnerships with, other organizations. The development of the programme and influence at the state and federal level have raised political capital, and have helped lay the groundwork for the establishment of true PES programmes in Brazil.

Indirect positive environmental impacts of *Proambiente* include the reforestation of riparian zones, and perhaps most prominently, the success in promoting controlled-burn techniques and reducing the use of fire for shifting agriculture. However, the fragmented nature of the smallholdings means that the programme cannot guarantee the provision of environmental services (for example, where fire from an adjacent non-participating property escapes onto *Proambiente* farms).

In Chapter 5, Leimona et al. describe an Indonesian PES scheme in the Cidanau watershed, one of the most important watersheds for supplying domestic and industrial water needs of Banten Province, Java. The watershed also has a biodiversity protection role, containing the only remaining lowland swamp forest in Java. Participating villages were selected based on mapping of critical areas (for example, steep slopes and erosion-prone soil) and participating farmers in each village were selected on the basis of their private land ownership and involvement in farmer groups. Contracts were offered to farmer groups to implement forest rehabilitation activities. Each group member was responsible for his or her own area, but the members were jointly responsible for meeting group commitments. Leimona et al. describe how the scheme had only one private-sector buyer of environmental services, with a multi-stakeholder forum playing an intermediary role between buyers and sellers in managing PES payments; supporting activities on relevant farms; encouraging potential buyers to
join the scheme; and liaising between provincial and district government levels. The small scale of the PES scheme means that it may have limited positive environmental impacts – it covers only 100 ha of a 22,260 ha watershed – and there are uncertain relationships between the land use practices and water quality and quantity in the watershed.

In terms of livelihood impacts, Leimona et al. note that while there were no significant changes in income sources resulting from the PES scheme, the tree species planted were selected based on commodity prices and market demand to enable participants to build their production base for valuable tree crops, though some participants lost income-earning opportunities from activities no longer allowed under the scheme. One important impact of the PES scheme has been the stimulation of local business as an alternative to the agricultural sector, mostly because of additional business development support from government and non-government agencies involved in the PES scheme. Human capital had been built, with improved knowledge of environmental issues, although confusion about the details of PES contracts remained amongst a majority of participants. Leimona et al. also describe improvements in social capital, and the investments in physical capital that have been made in some villages, based on collective decisions taken by participants (and sometimes also with non-participants).

Soriaga and Annawi in Chapter 6 analyse the ‘No-Fire Bonus’ (NFB) scheme, launched in 1996 in the fire-prone pine forests of Mountain Province, Cordillera Administrative Region in the northern Philippines. While the scheme involved payments for fire protection, it was not developed with attention to PES principles, but did aim to contribute to national watershed management objectives by reducing uncontrolled fires, contributing to rainwater infiltration, soil fertility, natural regeneration and enhancing wildlife habitats. The scheme was a break from the command-and-control methods of the past, offering financial incentives to change the behaviour of those residing on the land within the scheme, much of which fell under the ancestral domain of several indigenous groups.

The scheme ran for only one monitoring and payment cycle, between 1996 and 1998, but reportedly gained wide recognition, appears to have had long-term social and environmental impacts well beyond its funding cycle, and offers important lessons about the role of government actors and about sustainability issues in such schemes. The project is a good example of the complexities resulting from informal arrangements governing such programmes – the agreement between the government department involved the Congressman and Governor of the province (who had agreed to be the buyers of the ES), was never formalized, and one of the
buyers subsequently failed to deliver payments. The sellers in the NFB scheme were barangay (village) governments on behalf of their residents, who controlled their use of fire in return for (funding for) an infrastructure project, as chosen by the barangay government.

The most immediate and direct impact of the NFB scheme was the financial benefit obtained by households that provided labour, materials and services during construction of the infrastructure projects such as drainage canals, erosion prevention works and water tanks. The drainage canals constructed have remained operational and in use 10 years later. The sense of ownership of the project was gained in large part from efforts to control fire and from their choice of infrastructure project, which has subsequently led to better maintenance of that infrastructure. The boost to traditional methods of fire prevention was also of significant benefit, as was the social capital built between barangay governments and their residents.

In Chapter 7, German et al. present a case study on the Trees for Global Benefits Programme in Bushenyi District, Uganda, which aims to develop and implement a carbon trading model which could be replicated in other parts of the country, by paying smallholders for carbon credits associated with tree planting.

Participants are individual farmers or farmer groups that own, or have user rights over, a minimum area of land (often leases over private or state land) who are contracted to grow trees on their land for 25 or 50 years. Since its establishment in 2003, the programme has grown to involve around 200 farmers, with more applications in process – additional ES sellers are not accepted until buyers have been found. Participants are selected on a first-come first-served basis, but only if they have tenure security (though this does not require a title deed8), while those living close to protected areas are given priority. Though contracts are signed with individual farmers, they then form groups in order to minimize the costs associated with training and monitoring. A number of intermediaries are involved in the programme – providing capacity building, administrative support, etc. – which receive almost 30 per cent of revenue generated. However, these funds are insufficient to meet all operating costs, so the sustainability of the project is questionable. Of the remaining revenue, the majority is paid to individual households, and a Carbon Community Fund has recently been established to act as a form of insurance for use by farmers in case of accidents.

German et al. describe the impacts of the programme as being variable. The financial capital of carbon sellers has increased as a result of the payments, the lump sum nature of which enables sizable purchases or investments, in addition to indirect benefits (for example, increased
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availability of firewood and fruit). Increases in human and social capital were also reported by participants, though considerable confusion regarding the details of the contracts remains. German et al. report some reduction in agricultural productivity as reported by participants, and the reduced availability under informal arrangements of agricultural land for non-participants.

The Nhambita Community Carbon Project is the subject of Chapter 8 by Jindal. It is located in Sofala Province, Mozambique, in the buffer zone of Gorongosa National Park. The project began in 2003 and pays local smallholders to undertake agroforestry for carbon sequestration on their farms (covering approximately 1000 ha) and to conserve an area of communally owned miombo woodland (in excess of 11 000 ha). The project also promotes micro-enterprise development and undertakes research, extension and capacity building. Farmers can choose the agroforestry activities that most suit them from a ‘menu’ including horticulture, planting woodlots and intercropping, and all households are expected to refrain from burning forested areas for new farmlands. Contracts are offered to households for one or more activities for 100 years, though all payments are made within the first 7 years, after which it is hoped that the benefits arising from the agroforestry systems will provide sufficient incentive to continue. Payments are also made to the community for the successful protection of an area of communal woodland from any kind of harvesting and fire. The project also developed and supports a number of micro-enterprises (for instance, plant nurseries, a community saw mill and carpentry shops).

The project has a high penetration rate, with about 80 per cent of the local households already enrolled in different agroforestry contracts. Direct financial benefits are felt either as payments for agroforestry contracts (much of which was spent on consumer goods, education expenses or investments in agriculture), and/or as wages for employment with micro-enterprises. Jindal’s evidence suggests that households receiving wages appear to be better off, though the same does not yet apply to households that receive only carbon payments (which are insufficient to significantly affect household financial capital). Significant contributions to human capital are thought to be the result of the training provided to smallholders, as well as on-the-job training of micro-enterprise employees; however, the project may have inadvertently increased women’s work-load. The project worked with local institutions, enabling better coverage of remote members of the community whilst strengthening these institutions and contributing to an increase in social capital. Educational and other physical infrastructure have also witnessed an impressive growth in the area.
Rios and Pagiola describe the Regional Integrated Silvopastoral Ecosystem Management Project, which was implemented in Colombia, Nicaragua and Costa Rica from 2003 to 2008, though Chapter 9 deals only with the project as implemented at sites in Colombia and Nicaragua. This project paid participating farmers to adopt a range of silvopastoral practices in degraded pastures in order to deliver biodiversity conservation and carbon sequestration services. Indirect benefits of these practices are anticipated to be additional production and diversification (for example, fruit, fuelwood, fodder and timber) and the improvement and/or maintenance of pasture productivity. A series of indices was developed to measure the biodiversity conservation and carbon sequestration services provided, which were then aggregated into an ‘environmental services index’; payments were based on the change in this index. Payments were made annually for 4 years, with a one-off payment at the beginning of the project (in recognition of the environmental services households already provided), starting in 2004, and continuing until 2008. Participants were selected on a first-come basis in each of the areas, until the available funding was exhausted.

Rather than taking a strict livelihoods approach to determining the household-level impacts of this programme, Rios and Pagiola focus on the extent to which poor households were able to participate in the programme – in order to determine whether it was possible for poorer households to receive any benefits delivered by the project. The authors describe the examination of factors likely to affect participation and how, at both sites, poorer households have accounted for a substantial share of land use changes, which were not limited to the adoption of simpler and cheaper practices, and how across a number of different measures, it appears that poorer households were able to participate quite extensively in the PES scheme.

The impacts of the PES schemes on livelihoods are compared in Chapter 10, which uses the foregoing findings to derive lessons for the design of REDD schemes.

NOTES

1. The term used for REDD in the UNFCCC is REDD-plus, which includes deforestation, forest degradation and enhancement of carbon stocks. In this book, REDD is used for simplicity to refer to REDD-plus.
2. Deforestation refers to human-induced conversion of forest to non-forest cover. Forest degradation refers to negative changes in carbon density of the forest.
4. Carbon credit is used here to refer to the certified units of greenhouse gases that have not been emitted as a result of REDD policies and measures, also referred to as REDD units; one unit being one ton of carbon dioxide equivalent.
5. It cannot be proven with certainty that the reduction in emissions is due solely to REDD policies and measures.
6. Concern about leakage to other countries has resulted in proposals that suggest setting global baselines (e.g. Mollicone et al. 2007).
7. This approach implies that reduced deforestation involve a geographically referenced approach that would earmark specific forest areas for carbon conservation.
8. Local authorities assist with the verification of ownership, through records of prior land purchase agreements and wills.

REFERENCES

Angelsen, A. (2008), Moving Ahead with REDD: Issues, Options and Implications, Bogor: Center for International Forestry Research.
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