Markets & Payments for Ecosystem Services: Engaging REDD+ on Peru's Amazonian Frontier

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ABSTRACT

The impacts of tropical deforestation and forest degradation are felt at multiple levels, bringing about local ecosystem degradation, regional biome fragmentation and global contributions of 12-15% of anthropogenic greenhouse gas emissions. In response to this, markets and payments for ecosystem services have emerged to financially value the services forests provide, most notably in the form of mechanisms to reduce deforestation and enhance forest conservation (REDD+). REDD+ has received much attention at the international level, but the pressing contemporary challenge is its engagement at the local scale.

This thesis examines the potential local-level engagement of REDD+ on the Amazon frontier as an approach to altering patterns of anthropogenic encroachment on the world's greatest expanse of tropical forest. Case studies are taken from the buffer zones of protected areas along Peru's Amazonian frontier, Yanachaga-Chemillen National Park (YChNP) in central Peru and Manu National Park (MNP) in the SE of the country. A political ecology approach is taken to examine the influences and implications of existing land use governance structures, local livelihoods and preferences, and smallholder production and land economy, in the context of REDD+. Adopting mixed methods comprising semi-structured interviewing and land user surveys, data were collected between July 2008 and September 2009.

I show that the two sites' histories and geographies have shaped distinct challenges for REDD+. The proximity of YChNP to Lima has fuelled agricultural expansion and higher land use incomes, yet institutions – particularly those belonging to the state – are exceedingly weak. The pace of land use change here obliges certain urgency for REDD+ interventions to provide livelihood alternatives, divert the current development path and restore the landscape. MNP's rurality has protected it to date from expansive deforestation, yet weak institutions, poverty and increasing threats from national development processes highlight the importance of REDD+ interventions. In an analysis of land economy, an innovative conceptual framework is presented, the '3Rs' (rewarding, regulating and reshaping) to tackle local heterogeneity in REDD+ engagement. This thesis contributes knowledge to the practical and theoretical advancement of REDD+, and proposes the mechanism as an important new arena for academic investigation.

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List of Acronyms

AA	*Agencia Agraria* (Agrarian Agency)
ACCA	*Asociacion para la Conservación de la Cuenca Amazonica* (Association for the Conservation of the Amazon Basin)
ACA	Amazon Conservation Association
ACR	Amarakaeri Communal Reserve
AD	Avoided Deforestation
amsl	Above Mean Sea Level
C	Carbon
CBD	United Nations Convention on Biological Diversity
CDM	Clean Development Mechanism
CIFOR	Center for International Forestry Research
CO_2	Carbon Dioxide
COFOPRI	*Organismo de la Formalización de la Propiedad Informal* (Institute for the Formalisation of Informal Property)
COHARYIMA	*Consejo Harakmbut,Yine y Machiguenga* (Harakmbut, Yine and Machiguenga Council)
CoP	Conference of the Parties
CR	Compensated Reductions
CTAR	*Consejo Transitorio de Administración Regional* (Transitory Council of Regional Administration)
DGFFS	*Dirección General Forestal y Fauna Silvestre* (General Directory of Forestry and Wildlife)
DRIS	*Desarrollo Rural Sustentable* (Sustainable Rural Development)
ECA	*Ejecutor del Contrato de Administración* (Contract Administration Officer)
ES	Ecosystem Service
EU ETS	European Union Emissions Trading Scheme
ESRC	Economic and Social Research Council
FAO	Food and Agriculture Organisation of the United Nations
FCPF	Forest Carbon Partnership Facility
FENAMAD	*Federación Nativa del Rio Madre de Dios y Afluentes* (Native Federation of the Madre de Dios River and its Tributaries)
FSC	Forest Stewardship Council
FZS	Frankfurt Zoological Society
G-77	Group of 77
GHG	Greenhouse Gas
GtC	Gigatonne of Carbon
ha	Hectare
HQWCC	Haramba Queros Wachiperi Conservation Concession
IANP	*Intendencia* de *Áreas Naturales Protegidas* (Natural Protected Areas Administrative Body)
INRENA	*Instituto Nacional de Recursos Naturales* (National Institute for Natural Resources)
IPCC	Intergovernmental Panel on Climate Change

IUCN	International Union for the Conservation of Nature
JRC	Joint Research Centre of the European Commission
LACC	Los Amigos Conservation Concession
LULUCF	Land Use, Land Use Change and Forestry
MA	Millennium Ecosystem Assessment
MDD	Madre de Dios
MES	Markets for Ecosystem Services
MINAG	*Ministerio de Agricultura* (Ministry for Agriculture)
MINAM	*Ministerio del Ambiente* (Peruvian Environment Ministry)
MNP	Manu National Park
MtC	Million Metric Tonnes of Carbon
NGO	Non-Governmental Organisation
NERC	Natural Environment Research Council, UK
PA	Protected Area
PES	Payments for Ecosystem Services
PgC	Petagram of Carbon
ProNaturaleza	*Fundación Peruana para la Conservación de la Naturaleza* (Peruvian Foundation for Nature Conservation)
PSA	Pagos por Servicios Ambientales, Costa Rica
REDD	Reduced Emissions from Deforestation and forest Degradation
REDD+	Reduced Emissions from Deforestation and forest Degradation, and the role of conservation, sustainable management of forests, and enhancement of carbon stocks
R-PIN	Readiness Plan Idea Note
SERNANP	*Servicio Nacional de Areas Naturales Protegidas por el Estado* (National Service for Natural Areas Protected by the State)
SFM	Sustainable Forest Management
SMSCPF	San Matias-San Carlos Protection Forest
tCER	Temporary Certified Emission Reduction
TEEB	The Economics of Ecosystems and Biodiversity
TGC	Terrestrial Carbon Group
TPA	Trade Promotion Agreement
UNEP	United Nations Environment Programme
UNEP-WCMC	United Nations Environment Programme World Conservation Moniroting Centre
UNESCO	United Nations Educational, Scientific and Cultural Organisation
UNFCCC	United Nations Framework Convention on Climate Change
UN-REDD	United Nations REDD Programme
USD	United States Dollar
WB	World Bank
WWF	World Wildlife Foundation
YChNP	Yanachaga-Chemillen National Park
YCR	Yanesha Communal Reserve

CHAPTER 1

INTRODUCTION

1.1 Global Context

Global climate change induced by rising concentrations of atmospheric greenhouse gases (GHGs) threatens to alter dramatically and irreversibly human society and the natural systems on which it relies (Parry *et al.*, 2007). The high ecological and financial cost of inaction in the face of these changes (Stern, 2006) has driven the development of mechanisms to counter the causes and effects of climate change through mitigation and adaptation actions (Nabuurs *et al.*, 2007). Mitigation – limiting further accumulation of atmospheric GHGs, most commonly carbon dioxide (CO_2) – is the focal point of this thesis.

Forests provide humanity with a wealth of benefits, known as ecosystem services, including the sequestration and storage of vast quantities of carbon (C), the latter estimated at 500 PgC (1PgC = 1 GtC = 10^{15} gC) in living biomass and 700 PgC in soil organic matter (Malhi *et al.*, 2002). The counterpoint to this service, however, is the release of large amounts of carbon emissions as a result of deforestation and forest degradation, which now account for ~12% of anthropogenic CO_2 emissions, second only to fossil fuel combustion (van der Werf *et al.*, 2009). Forests continue to be cleared because their financial worth is greater as timber and crops than standing: a historical market logic reflective of the lack of value assigned to ecosystem services and their provision (Pierce, 2001).

In an attempt to reverse the loss of undervalued natural services through the alteration of economic incentives, the past decade has seen the accelerated development of markets and payments for ecosystem services (PES) (Gómez-Baggethun *et al.*, 2010). A forest conservation market mechanism, 'reduction of emissions from deforestation and forest degradation, conservation, sustainable management of forests, and enhancement of

carbon stocks', or REDD+, has emerged at the forefront of these developments (Auckland *et al.*, 2003; Canadell & Raupach, 2008; Gullison *et al.*, 2007; Niles *et al.*, 2002). The fundamental concept underscoring REDD+ is that of making forests more valuable standing than felled through the economic valuation and sale of the carbon services they provide. REDD+ also offers an attractive and unique form of climate change mitigation due to the co-benefits it is able to generate in tropical developing countries, such as poverty alleviation and biodiversity conservation (Pagiola *et al.*, 2005; Stickler *et al.*, 2009; Venter *et al.*, 2009).

REDD+ featured heavily in the UN's Framework Convention on Climate Change (UNFCCC) negotiations in 2009, one of the few successes of the meeting, with the Copenhagen Accord noting:

> "We recognize the crucial role of reducing emission from deforestation and forest degradation and the need to enhance removals of greenhouse gas emission 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".
>
> (UNFCCC, 2009:6)

At the most recent UNFCCC Conference of the Parties (CoP) in Cancun, Mexico, in December 2010, 193 nations signed the 'Cancun Agreements' (UNFCCC, 2010), which make clear the importance of REDD+ in reducing global emissions within the UNFCCC system. The Agreements provide valuable formal preparation guidance for countries, such as the recognition that a phased approach will be necessary: from planning and implementation (phases 1 and 2) to results-based activities (phase 3), and the need for developed countries to finance REDD+ activities in developing countries. Although a number of issues remain unresolved, such as whether REDD+ will be market- or fund-based, but the Agreements represent a concrete step towards a post-2012 regulated REDD+ mechanism under the UNFCCC.

In parallel to the UNFCCC efforts, countries are participating in developing their REDD+ capacity through the World Bank's Forest Carbon Partnership Facility (FCPF) (WB, 2010) and the FAO's UN-REDD Programme (UN-REDD, 2009). Non-governmental organisations (NGOs), local communities and private actors are also participating in this space, developing methods and standards, and implementing pilot activities. Still, there remain key issues to be resolved. While much of the conceptual and practical development of REDD+ to date has focused on global and national architectures (*e.g.* Ebeling & Yasue, 2008; Miles & Kapos, 2008; Strassburg *et al.*, 2009), the major challenge now is the engagement and integration of the mechanism at the sub-national, or local, level (Phelps *et al.*, 2010). To maximise the utility of REDD+ and achieve the realisation of its potential co-benefits, context-specific knowledge of its engagement with local state and non-state institutions, as well as populations, landscapes and economies is crucial. Now, prior to the setting of international rules, is a critical time for enhancing knowledge and learning lessons surrounding the local engagement of REDD+.

1.2 The Peruvian Amazon

Peruvian Amazonia is an important region for REDD+ research for a number of reasons. From the top-down perspective, recent global surveys of carbon buyers have revealed the emerging demand for South American REDD+ credits, with 'community and environmental benefits' cited as the primary motivation for this interest (Neeff *et al.*, 2009; Neeff *et al.*, 2010). A separate survey of the western general public also highlighted the awareness of the carbon services provided by tropical forests and a willingness to pay for these (Baranzini *et al.*, 2010). At the global and regional scale, the importance of the Amazon Basin is well recognised in terms of carbon storage (Phillips *et al.*, 1998), water cycling (Gedney & Valdes, 2000; Werth & Avissar, 2002) and biodiversity (Dirzo & Raven,

2003; Hubbell *et al.*, 2008). Deforestation, following the incremental encroachment of development along the Amazon's frontiers and penetrative roads, threatens to degrade the provision of these services and greatly weaken the resilience of the entire region to climate change-induced drought (Malhi *et al.*, 2008). Emissions from deforestation in Peru, a country covering the Amazon's western frontier as it meets the Andean highlands, are estimated to be the joint fifth highest globally, at 41 MtC/yr (with Indonesia, following Brazil, DR Congo, China and Colombia) (Strassburg *et al.*, 2009). There is now an urgent need to stabilise frontier encroachment to safeguard the Amazon Basin and the globally invaluable services it provides.

At the national level, there is currently an apparent dichotomy of thinking in the Peruvian government's approach to the Amazon. The region has been subject to neoliberal development policies since the 1960s which, despite the 'lost decade' of economic crisis of the 1980s, have encouraged expansive timber extraction, agricultural expansion, Andean migration and settlement and, more recently, hydrocarbon prospecting and extraction (Finer & Orta-Martinez, 2010; Orta-Martinez & Finer, 2010). Meanwhile, the nascent Environment Ministry – established in 2008 – is advancing the development of REDD+ in the region, as of 2009 employing two full-time staff dedicated to this. Moreover, on 15th July 2010 the Environment Ministry created the National Programme for the Conservation of Forests for the Mitigation of Climate Change, funded by the governments of Germany (USD 10 million) and Japan (USD 40 million) (MINAM, 2010). The programme aims to conserve 54,660,000 ha of tropical forest, and is a significant step towards a national-level framework for REDD+. Non-governmental organisations (NGOs) are contributing significantly to the creation of knowledge through technical methodological advancements and initiation of pilot projects. Interested state and non-state parties meet as the REDD Group Peru once a month to discuss the issue. Yet despite the considerable national-level aspirations and the progress made with technical aspects of REDD+, little is known about local-scale social and

economic engagement of the mechanism. This raises concerns that the speed of the development and deployment of REDD+ will not be matched by the evolution of its socio-economic context, and therefore the urgent need to consolidate this knowledge to inform policy and practice.

At the landscape level, the Amazon frontier is noteworthy as much for its social characteristics as its ecological ones. As the meeting place of geographies, ecosystems and cultures, it presents extraordinary natural and social diversity and endemism, much of which is now being degraded through the modernist development path involving road building and the spread of market-driven extraction practices and consequent deforestation (Mäki *et al.*, 2001; Soares-Filho *et al.*, 2006). Although land use allocation policies such as protected areas are providing a degree of protection from these processes (Oliveira *et al.*, 2007) for biodiversity and indigenous communities, poor land use governance and accelerating deforestation threaten to isolate protected areas. Concurrently, recent reforms have resulted in the management of an increasing number of protected areas being handed over to third parties such as NGOs, which are turning to REDD+ as an additional source of funding. Because of the natural (biodiversity) and cultural (indigenous use) importance of protected areas on the frontier, alongside the increasing encroachment of deforestation leading to their isolation, this research focuses on the inhabited transition areas surrounding all protected areas, buffer zones.

1.3 Research Questions

This dissertation addresses the question: *How can REDD+ engage effectively and sustainably at the local level in high conservation-value areas on Peru's Amazonian frontier?* This aim is addressed through three lines of enquiry:

1. In what ways do existing land use governance institutions, arrangements and histories shape challenges and opportunities for sub-national REDD+ engagement?
2. How do smallholder livelihoods, land uses and preferences influence and determine challenges and opportunities for local REDD+ engagement?
3. In what ways do smallholder production and land economy influence and determine the need for nuanced approaches to local REDD+ engagement?

In its wider context, this research examines how REDD+ could be used to stabilise the encroachment of deforestation on the Amazon frontier. At its most fundamental, this work aims to improve and expand the knowledge of human-environment interactions in rural developing country settings and contribute to current debates on the development of pathways towards greater social and environmental sustainability and development. The research questions are addressed through a political ecology case study analysis of land use governance, livelihoods and land economies in the buffer zones of two protected areas on Peru's Amazonian frontier.

1.4 Research Approach

1.4.1 Interdisciplinarity & Geography

The complexity of current environmental issues increasingly require research which transcends the traditional divides between natural and social sciences to provide interdisciplinary insights which cannot be gained from a single-discipline approach (Liu *et al.*, 2007). This research is funded by the UK's Natural Environment Research Council (NERC) and Economic and Social Research Council (ESRC) on a joint interdisciplinary studentship. This funding source aims to "foster greater interaction between the social and

environmental sciences" to "respond to the needs of the academic community, government and industry and to contribute to good quality research through the development of professional social and environmental scientists" (NERC/ESRC, 2009). This thesis' focus on REDD+, within the wider matrix of issues it encompasses such as natural resource management, climate change and sustainable development, is postulated as an example of research requiring interdisciplinary treatment of human-environment linkages and interactions.

The interdisciplinary nature and tradition of geography (Pattison, 1990; Rasmussen & Arler, 2010) situate it ideally as a general approach to this research. Some of the core concerns of geography – linking scales, locations and landscapes across space and time – are central to understanding REDD+ in terms of its theoretical components: transformations of environmental governance and the commodification of nature (Liverman, 2004). Importantly, geography provides the tools to engage and deconstruct subjects critically, generating practical alternatives and solutions for policy and practice (Baerwald, 2010). Geography's diversity of approaches – development, cultural, economic, multi-scalar – facilitates the engagement of tools such as political ecology to address, analyse and understand multifaceted human-environment subjects such as REDD+.

1.4.2 Political Ecology

While not constituting a coherent theory *per se*, political ecology provides a useful toolkit for analysing human-environment interactions (Bryant, 1998; Paulson *et al.*, 2003). By combining material nature with human agency and political economy, political ecology examines the social, cultural and historical factors which shape human responses to the environment, patterns of resource use and the multi-scalar workings of political and economic forces (Blaikie, 1985; Blaikie & Brookfield, 1987). At its most fundamental,

political ecology uncovers the specific ways in which environmental change and ecological conditions are products of political process (Bryant & Bailey, 1997), within which lie three fundamentally linked assumptions (Robbins, 2004). First is the unequal distribution of costs and benefits of environmental change; second, the reshaping of existing social and economic inequalities; third, the production of political implications of altered actor power relations (Bryant & Bailey, 1997).

Tropical deforestation is an emblematic case of political ecology. While apolitical neo-Malthusian arguments hold that forest conversion is a product of over-population and the inevitable 'tragedy of the commons', political ecologists hold that this crude demographic argument alone cannot account for this land use change (Adams, 2008). Political ecology instead pursues forces geographically and conceptually far from the site of deforestation, upwards from local to global along 'chains of explanation' (Blaikie & Brookfield, 1987; Robbins, 2004). In doing so, political ecology unravels the context within which deforestation occurs and its relationship to the struggles for control between powerful groups and the disempowerment of marginal communities (*e.g.* Schmink & Woods, 1987). For instance, in many cases the process of frontier environment colonisation, enclosure and modernisation is followed by degradation, in turn driving more intense extraction, what Robbins refers to as 'classic political ecology' (Robbins, 2004). Prominent examples of this form of classic political ecology research in tropical forest regions include Hecht and Cockburn (1989) on rubber extraction in the Amazon, Peluso on forest mapping and resource control in Indonesia (Peluso, 1992, 1995), and Robbins on institutions, land use change and conservation in India (Robbins, 1998, 2000; Robbins *et al.*, 2007).

Nevertheless, political ecology has been critiqued from two notable perspectives. Following the popular emergence of the field in the late 1980s, Watts (1990) and Peet and Watts (1996:6) contended that one of the early seminal works, Blaikie and Brookfield's (1987) *Land Degradation and Society*, was overly 'land' focused and called for more

attention to micro-scale community politics and global forces (Forsyth, 2008). As a result, a more 'poststructuralist' political ecology emerged, with a greater emphasis on local-level environmental movements, discourse and politics (Watts, 1997). Critics in the late 1990s, most notably Vayda and Walters (1999), then claimed that there had been an overreaction to 'ecology without politics' leading the field to become 'politics without ecology' (Vayda & Walters, 1999:178), and called for a move towards 'event ecology'. This approach calls for a greater focus on environmental events or changes of interest and less on the human actions which bring them about, i.e. emphasising the material – in stark contrast to Peet and Watts' call for greater focus on the constructed. Yet, as highlighted by Robbins (2004), neither of these critiques ourightly contradict or weaken the field, but rather serve to advance it through seeking to tighten theoretical coherence, as advocated by Peet and Watts, and opening methods to the empirical surprise, as advocated by Vayda and Walters. Moreover, in a review of the evolution of the field, Walker (2005) highlights how the work of two prominent political ecologists (Turner, 1993, 1998a, 1998b, 1999a, 1999b, 1999c; Zimmerer, 1991, 1993a, 1993b, 1999) demonstrates that "the careful examination of environmental change ... remains alive in political ecology today" (Walker, 2005:76).

This research adheres to this tradition by placing human-environment relations at the centre of the analysis, examining sites within their multi-scalar contexts to provide a place-based and historically-contextualised analysis of political and ecological processes shaping human-environment interactions and chains of explanation. Papers in this thesis draw upon both the more poststructural approach (notably in the case of chapter 5, providing critical insights into the "impact of perceptions and discourses on the specification of environmental problems and interventions" (Bryant, 1998)) as well as Vayda's 'progressive contextualisation' of causal factors to situate 'events' (in the form of land use changes) within their historical, social and ecological context. Importantly, political ecology allows a

critical analysis and understanding of local engagement of globalised mechanisms (Bebbington, 2001), here in the form of REDD+.

By approaching this research through political ecology, distinct practical and theoretical components are drawn upon to analyse human-environment relations multi-dimensionally and generate an understanding of the interdisciplinary issue that is REDD+. The resulting political ecology thus guides this analysis towards issues of importance by providing a theoretical basis for the analysis of complex relations of power alongside multi-level land use governance structures. By linking the local political ecology of forest and land use to the emerging REDD+ agenda this thesis addresses an issue missing from the academic literature, and provides a timely analysis for policy makers and practitioners to apply towards the improvement of REDD+ efficiency, equity and effectiveness.

1.5 Thesis Structure

This thesis takes the 'papers route' to thesis, comprising five articles, on which I was the sole or lead author, submitted to peer reviewed journals. See Annex 1 for co-author statements affirming that the majority of the work was my own, and Annex 2 for confirmations of article submissions to peer-review journals.

Following this introduction, I introduce the literature (Chapter 2) which grounds the rest of the analysis and discussion in this thesis. In Chapter 3 I then briefly review the case study sites and justify the selection of methods (the methods themselves are discussed individually within each paper).

Chapter 4 (Paper 1: *Preparing for REDD: Forest governance challenges in Peru's Central Selva*) analyses specific, multi-scalar land use governance challenges for REDD(+) in and around Yanachaga-Chemillen National Park (YChNP), a case study site in Peru's 'Central Selva', a region directly over the Andes from Lima. The analysis draws on key

actor interviews and examines the roles of land use governance institutions and processes in shaping land use outcomes and what these mean for REDD+ design and implementation. The paper was originally presented at a conference at Yale School of Forestry and Environmental Studies in March 2009, with the article invited for submission as part of a special issue of the 'Journal of Sustainable Forestry'. It was written between April-May 2009 and submitted in May 2009. It was edited following the comments of three reviewers, and re-submitted in April 2010.

Chapter 5 (Paper 2: *Nature, People & Capital: Discourses shaping land use governance & carbon forestry initiatives in the Peruvian Amazon*) analyses how distinctly different perspectives have shaped land use governance and the emergence of REDD+ initiatives in the second case study site, the buffer zone corridor between Manu National Park (MNP) and the Amarakaeri Communal Reserve (ACR) in the southeastern region of Madre de Dios. This paper draws on interview data and is co-authored with Diana Liverman and Frank Hajek, basing itself to a greater extent than paper 1 in the post-structural political ecology tradition. Findings provide a unique insight into how REDD+ actors are differentially adopting the mechanism to propagate their own discourse. The paper was written between October 2009-March 2010 and submitted to 'Geoforum' in April 2010.

These first two papers serve to uncover the historical ecology of the sites in terms of land use governance, yielding a critical understanding of the contemporary political ecological settings.

Chapter 6 (Paper 3: *Lessons for sub-national REDD+ resource targeting from the governance of protected areas & their buffer zones in the Peruvian Amazon frontier*) then compares land use governance at the two sites to draw out practical policy lessons for engaging REDD+ in pre-existing land use governance structures, from the national to local level. This paper also draws on interview data and is co-authored with Yadvinder Malhi. A particularly compelling outcome of the paper is a multi-faceted understanding of the distinct

characters of the two sites, and how these shape the need for nuanced approaches to REDD+ engagement. It was written between November 2009-May 2010 and submitted to 'Forest Policy and Economics' in August 2010.

The final two papers then bring in data from smallholder surveys to ground the analysis in local-scale social, physical and economic practicalities.

Chapter 7 (Paper 4: *Integrating REDD+ into livelihoods, land uses & preferences in strategic sites along Peru's Amazonian frontier*) draws on survey data to analyse the engagement of REDD+ in smallholder livelihoods, land uses and preferences, and the extent to which these vary between the two sites. Findings quantify the local social and natural differences between the two sites, and provide a valuable insight into the conditions under which land users would prefer to participate in REDD+. This paper is based on a presentation given at the Association of American Geographers' 2010 Annual Conference in Washington, DC, April 2010, and was written between April-June 2010. It was submitted to 'Global Environmental Change' in August 2010.

Chapter 8 (Paper 5: *Rewarding, Regulating & Reshaping: Differentiating local engagement of REDD+ in Amazonian smallholder production, land use & economy*) combines survey and interview data analysis to present an innovative conceptual framework for REDD+ engagement in smallholder production and economy, the 3Rs: rewarding, regulating and reshaping. The results show how smallholder production characteristics at the two sites have shaped the different landscapes, and the profound implications of these for REDD+. It was written in May-July 2010 and submitted to 'Ecological Economics' in August 2010.

Chapter 9, the thesis conclusion, provides an overview of the main findings, their practical and theoretical implications, and suggestions for further research.

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CHAPTER 2

REVIEW OF THE LITERATURE

In this chapter I introduce the specific literature that is used to ground the data analysis and discussion later in the thesis. This section is intended to illustrate how different literatures are brought together under the broad political ecology framework, and serves as a reference point for understanding the context of each paper. The review begins with Amazonian deforestation, the overarching physical issue addressed by this thesis. I then review the evolution of the 'ecosystems services' concept and its contemporary application as reduced emissions from deforestation and degradation and enhancement of carbon stocks (REDD+). Literatures on the core topics of the thesis, as they relate to REDD+, are then reviewed in turn. I conclude with a brief summary of the ways in which the literature facilitated the identification and analyses of my research questions.

2.1 Amazonian Deforestation

2.1.1 Processes of Change

Tropical forests cover roughly 19.6 million km^2 of the earth's surface and contain the greatest biodiversity of all terrestrial habitats (Pimm & Sugden, 1994). They also provide important services to human populations through the regulation of water supplies (Bruijnzeel, 2004), mitigation of flood impacts (Bradshaw *et al.*, 2007), reduction of infectious disease transmission (Foley *et al.*, 2007) and pollination of agricultural systems (Ricketts *et al.*, 2004). Most importantly for the context of this research – as outlined in Chapter 1 – tropical forests store and sequester vast amounts of carbon (Malhi *et al.*, 2002). Although humans have occupied tropical regions for thousands of years, the current

intensity of anthropogenic activity on tropical forests is unprecedented: humans burn, occupy, log, hunt and alter vast areas of forests each year (Lorena & Lambin, 2009). In recent decades the pace and extent of land use and land cover change has increased throughout the world's tropical forests, culminating in 1.4% of the biome being deforested between 2000-2005 (Asner *et al.*, 2009). In their global review of change in tropical forests, Asner *et al.* (2009) also found about half of all tropical forest areas to contain 50% or less tree cover, and one fifth to be undergoing some level of timber extraction.

Nowhere has the plight of tropical forests been more evident than the Amazon Basin in South America. The tropical forests of the Amazon cover some 5.5 million km^2, roughly 68% of which is in Brazil and 13% in Peru, and form the largest expanse of closed-canopy tropical forest in the world. In the global context, they are estimated to harbour a quarter of all terrestrial species (Dirzo & Raven, 2003) and account for roughly 15% of terrestrial photosynthesis (Field *et al.*, 1998). Processes of evapotranspiration and condensation over Amazonian forest are drivers of global atmospheric circulation which have downstream effects on rainfall across South America and into the Northern Hemisphere (Gedney & Valdes, 2000). Amazonia also contains a wealth of natural resources which, particularly over the past 40 years, have been increasingly sought by humans, including timber, land, rubber, game, hydrocarbons, minerals and hydropower. Indeed, the present-day patterns of anthropogenic forest use, conversion and degradation bear little resemblance to the millennial-scale natural impacts which the region withstood until recently, such as floodplain erosion (Salo *et al.*, 1986), windstorm-induced blow-downs (Nelson *et al.*, 1994) and episodic fire (Sanford *et al.*, 1985). Over the nine countries containing the Amazon, 63,800,000 ha of tropical forest were cleared between 1990-2005 (FAO, 2006) – 9% of Amazonia.

2.1.2 Causes of Change

The specific causes of forest clearance and degradation are harder to determine, and are now widely considered to result from "multiple interacting factors originating from different levels of organisation of the coupled human-environment systems[1]" (Lambin *et al.*, 2003:217). Drivers of land use change vary over time and space according to the prevailing socio-ecological conditions specific to local human-environment systems, and are therefore not solely attributable to population or poverty, as was postulated in the early literature on the subject (*e.g.* Allen & Barnes, 1985). Instead, at the underlying level it is individual and collective responses to economic opportunities, mediated by institutional factors, which bring about land use changes (Lambin *et al.*, 2001). It follows, then, that local as well as national and international policies and markets have the ability to create opportunities and constraints for new land uses (Angelsen & Kaimowitz, 1999). Meanwhile, at the proximate level, spatially and temporally distinct modes of agricultural expansion, timber extraction, and infrastructure extension prevail as the principal agents of deforestation (figure 2.1) (Geist & Lambin, 2002). Understanding the local physical processes and exigencies of forest clearance also helps inform the socio-economic causality of deforestation. An early insight into this was gleaned by Rudel and Horowitz (1993), who identified that the hardships of clearing land use restricts the poorest from undertaking them – providing a further rebuttal to the claim that poverty was a principal driver of deforestation.

[1] Coupled human-environment systems are integrated strucutures in which people interact with natural components; people and nature interact reciprocally and form complex feedback loops, *e.g.* intensive agriculture leading to soil degradation, in turn decreasing crop yields, leading to greater food insecurity which hastens the conversion of remaining forests to agriculture (Liu *et al.*, 2007).

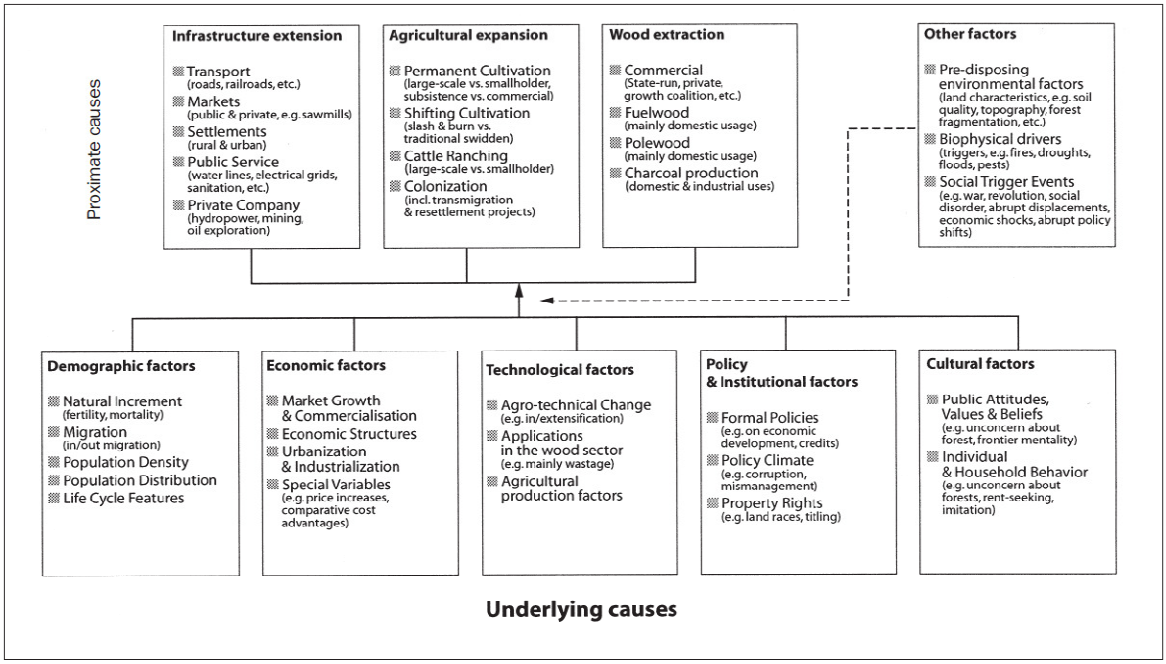

Fig. 2.1. Causes of forest decline. Five underlying driving forces underpin proximate causes of tropical deforestation (Geist & Lambin, 2002).

Political upheaval and technological advances during the Second World War provided the foundations for the first major wave of tropical deforestation across the Amazon. Rural insurrections, inspired by the Cuban Revolution, took hold across much of Latin America, leading to the formation of resistance movements based in remote, forested areas in the 1960s (Wickham-Crowley, 1992). It was within this setting that the US (under the presidency of J. F. Kennedy) in 1961 pushed for agrarian reform in Latin America through a programme called Alliance for Progress which, in part, aimed to deter revolutionary activity by providing smallholders with property (Grindle, 1985). However the political difficulties of enacting agrarian reform – taking land away from large land owners – led to the greater emphasis on colonisation programmes across many Amazonian countries (Domike, 1971). To stimulate and drive this process, governments enacted large-scale programmes involving the construction of penetrative roads into the Amazon, establishment of settlements along the roads and the population of these new frontiers with the rural poor who supported the government (Jones, 1988).

These types of colonisation and titling projects were notable policies in Brazil and Peru in the 1960s and '70s (Pfaff, 1999; Morcillo, 1980). In Brazil, General Emilio Medici – the president from 1969-1974 – famously offered the Amazon territory as "a land without men for men without land" (Hecht & Cockburn, 1989). Similarly, President F. Belaunde of Peru declared his ambition "to conquer, occupy and exploit the Amazon" (Dourojeanni, 2001). In 1979, this process culminated in the signing of an agreement between Peru and Brazil to construct a 5,739km Interoceanic Highway passing from Acre, Brazil, through the SE Peruvian region of Madre de Dios (CTAR, 1998). Despite attempts to plan Amazonian colonisation and settlement, the prospect of free property attracted many more migrants than expected to the frontier, with subsequent generations looking to the forest frontiers, rather than cities, for economic opportunities. Since the 1980s to the present, Rudel *et al.* (2009) contend that deforestation has been enterprise-driven as private agricultural enterprises replaced smallholders as the major agents of deforestation in the second wave of Amazonian deforestation in the 1990s. Nonetheless, with 69% of Amazonian studies continuing to identify small farmers as drivers of deforestation, as collated by Rudel *et al.* (2009), there is compelling evidence that the local scale still matters in studies of Amazon land use.

I now turn to look specifically at processes which have shaped land use change in the Peruvian Amazon. The attempts to suppress the development and proliferation of radicalism through colonisation policies were unsuccessful in Peru, and the 1980s saw the rise of the Shining Path (*Sendero Luminoso*), a Maoist guerrilla movement. The 1980s was also a period of economic turmoil for many Latin American countries, including Peru, brought about in large part by burgeoning national debts. In the face of the economic difficulties facing the population, *Sendero* was able to recruit more poor Andean members and thereby increase their anti-capitalist activities, such as disrupting rural agricultural markets. This in turn led to more migration to the Peruvian Amazon as people fled the violence (Chicchón, 2001). The growth of the Amazonian population combined with the macroeconomic policies

of President Alan Garcia (in his first term: 1985-1990) – a result of which was the tripling of agricultural credit flowing into the Peruvian Amazon – to open up large areas of forest for crops and cattle. In stark contrast, this was followed by President Alberto Fujimori's (1990-2001) radical austerity programme, aimed at bringing the country's hyperinflation under control. Fujimori dismantled the agrarian bank, removed credit and subsidies, and imposed taxes (Naughton-Treves, 2004), with agricultural production and forest extraction declining considerably as a result (Varcarel, 1993). This sequence of events illustrates how patterns of deforestation and forest regrowth vary dramatically over space and can shift over time according to national policy, as well as the need to understand causes and effects across multiple levels. Specifically, the rates of deforestation and forest disturbance in the Peruvian Amazon (covering 66,100,000 ha) were calculated at 64,500 ha per year and 63,200 ha per year, respectively, in the period 1999-2005 (Oliveira *et al.*, 2007). This highlights the significant scale at which these changes are taking place, though the paper's authors go on to show how land use allocation policies, such as protected areas, titling of indigenous territories and sanctioning of selective logging activities have provided a "moderate level of success in the conservation of its forest ecosystems" (Oliveira *et al.*, 2007:1235).

2.1.3 Outcomes of Change

The impacts of tropical deforestation transpire at multiple scales. The most immediate effect is the degradation or loss of ecosystem function and habitats. Ecosystem degradation restricts or halts the services forests provide, such as the supply and regulation of freshwater (Martinez *et al.*, 2009), with implications for both proximate and downstream human populations that rely upon and consume these services (Postel & Thompson, 2005). A further impact on local human populations is the loss of soil fertility as deforestation removes the protection previously afforded (McGrath *et al.*, 2001). Probably the most

widely reported direct impact of land use change is the loss of biodiversity harboured by tropical forests (Turner *et al.*, 2007; Wright & Muller-Landau, 2006), as well as, at the wider landscape and continental scales, the incremental fragmentation of the tropical forest biome (Asner *et al.*, 2009). The loss of biodiversity also restricts pollination (Priess *et al.*, 2007), another service which many human populations are reliant upon. By altering the patterns of evaporation and condensation that take place over tropical forests, deforestation can also impact regional and global climate, including precipitation intensities and patterns in regions far from the sites of deforestation (Gash & Nobre, 1997; Silva *et al.*, 2006).

For the purposes of this thesis, the most salient impact of tropical land use change is the release of greenhouse gases (GHGs) from deforestation and forest degradation, as touched upon in Chapter 1. Estimates of the contribution of land use change as a proportion of global anthropogenic GHG emissions have varied over time, and are a moving target given the pace of rises of GHG emissions from other human sources such as fossil fuel combustion and cement production. In their 2007 Fourth Assessment Report, the Intergovernmental Panel on Climate Change (IPCC) reported forestry to account for 17.4% of anthropogenic emissions (Solomon *et al.*, 2007), with subsequent academic literature often rounding up the figure to 20-25% (*e.g.* Ebeling & Yasué, 2008; Gibbs & Herold, 2007, Schrope, 2009; Venter *et al.*, 2009). More recently, van der Werf *et al.* (2009) recalculated the figure for global emissions from deforestation and forest degradation at 12% of current total anthropogenic emissions – 15% if peat degradation is included. Part of the reason for this smaller number is the rapid ongoing increase in CO_2 emissions from fossil fuel combustion. This figure nevertheless constitutes a sizeable proportion of man-made emissions, towards which much research, policy and practice effort is currently being directed. This provides the setting for the remainder of this review and fundamental justification of the thesis.

2.2 Payments for Ecosystem Services

This section provides a background on payments for ecosystems services (PES) and REDD+, the central concepts of this thesis which are referred to in each of the papers in this thesis.

2.2.1 Precursors to Ecosystem Services

Prior to the modern conceptualisation and implementation of 'payments for ecosystem services', there existed similar forms of financial exchange which brought about similar outcomes under distinct foundations. These go as far back as the conservation programmes under President Franklin Roosevelt's 'New Deal' in the 1930s – specifically the Civilian Conservation Corps – though the two most notable forms are debt-for-nature swaps and ecotourism.

Debt-for-nature swaps were first conceived by the World Wildlife Fund in 1984 as a mechanism to address developing country indebtedness and the consequent environmentally damaging development paths which proceed it, such as deforestation (Visser & Mendoza, 1994). In fact, the idea emerged in the wake of the Latin American debt crisis alluded to in the above section, as a method for ameliorating the heavy social impacts of national debt and simultaneously promoting conservation. Under debt-for-nature swaps, financial transactions are undertaken wherein a portion of a developing country's debt is absolved in exchange for environmental commitments. The swaps can take place either commercially, mediated by a non-governmental organisation (NGO), or bilaterally between two governments (Deacon & Murphy, 1997). Debt-for-nature swaps continue today, despite the emergence of other conservation finance mechanisms, with the US forgiving USD 21 million of Brazil's debt in

2010 for the conservation of Atlantic Rainforest, Caatinga and Cerrado ecosystems (BBC, 2010).

The concept of ecotourism was also born out the growing environmental consciousness which emerged in the 1980s, as a nature-based form of alternative tourism, offering a 'win-win' strategy of sustainable development wherein tourism spending contributes to the conservation of biodiversity and natural sites (Fennell, 2001). Early definitions of ecotourism focused on 'environmentally responsible' practices (Ceballos-Lascurain, 1993) which provided 'direct benefits' to nature conservation and the 'economic welfare of local residents' (Ziffer, 1989). Today, ecotourism is recognised as the practice of low-impact, 'responsible' travel to natural and/or fragile areas, aiming to educate the traveller, provide funds for ecological conservation, directly benefit economic development and empowerment of local communities (Honey, 2008). It is based on the sustained provision of services provided by ecosystems, in the form of natural features and landscapes. A significant contribution made by successful ecotourism ventures is the provision of employment of local people as alternative livelihood sources to extractive or otherwise environmentally degrading practices (Lindberg *et al.*, 1996). This form of financial exchange for conservation and livelihood provision provides a close semblance to systems of payments where ecosystem services are themselves the subject of valuation and exchange, as reviewed in the section 2.2.2. Indeed, ecotourism research provided the background for one of the leading figures in ecosystems services research and practice, Sven Wunder (Wunder, 2000). The explosive popularity of ecotourism, followed by an expanding literature, in the last 20 years has also spurred considerable debate over the legitimacy of ecotourism in achieving its ecological and economic goals (Weaver & Lawton, 2007). This is an issue this research touches upon by examining the nature, context and impact of tourism at the two case study sites in Chapter 6.

2.2.2 Emergence & Theoretical Foundations

The concept of 'ecosystem services' was introduced in 1981 (Ehrlich & Ehrlich, 1981), building on earlier utilitarian literature highlighting the value society derived from nature (*e.g.* Krutilla, 1967; Odum & Odum, 1972). While prior to this, in ecology, the term 'ecosystems function' had been employed to denote an ecological process – regardless of whether it was beneficial to humans, publications in the 1960s and '70s began referring to the way in which 'functions of nature' served society (King, 1966; Helliwell, 1969; Braat *et al.*, 1979). In the 1970s and 80s, use of the term evolved to communicate ecological concerns in economic terms as a way to raise public awareness of society's dependence on natural services, with authors beginning to specifically refer to ecosystem, or environmental, or ecological, or nature's, services (Westman, 1977; Thibodeau & Ostro, 1981; de Groot, 1987). The 1990s saw the mainstreaming of ecosystem services as part of research and policy agendas. The subject was brought to the fore in science and policy through a series of high-profile publications, most notably Costanza *et al.*'s (1997) *Nature* article and Daily's (1997) *Nature's Services* book (as well as Contanza & Daly, 1992). Following this, the concept of ecosystem services made its concrete entrance into the policy arena in the late 1990s and early 2000s through the United Nation's Convention on Biological Diversity's (CBD) 'Ecosystem Approach' (UNEP-CBD, 2000) and launch of the Millennium Ecosystem Assessment (MA) in 2001. Since the inception of the MA, the numbers of high-profile publications and projects addressing ecosystem services has expanded substantially (Fisher *et al.*, 2009; Stern, 2006; TEEB, 2010).

The expansion of research into the monetary value of ecosystems services was accompanied by a growing interest in applying the principles in practice through market-based approaches to conservation through markets for ecosystem services (MES) and payments for ecosystem services (PES) (Jack *et al.*, 2008). In practice, MES and PES entail

the transfer of economic resources from providers to consumers of ecosystem services in such a way that the former benefit economically while the latter receive the right to the resource yielded by the service in question. Corbera *et al.* (2007) specify the differentiation of MES and PES as lying within their institutional framework, with MES requiring a well-defined ecosystem services and trading commodity, and the existence of active supply and demand sides; while PES do not constitute actual markets where ES are sold to buyers, and often involve the government in an intermediary role (Corbera *et al.*, 2007).

Costa Rica pioneered PES through the establishment of a country-wide programme called *Pagos por Servicios Ambientales* (PSA) in 1997, with the aim of reversing rampant deforestation rates (Pagiola, 2008). Under PSA, farmers sign contracts and are paid by the government for the ecosystem services they produce when they adopt management practices which preserve forest, allow secondary forest growth and reforest degraded lands and pastures (Rodriguez Zúñiga, 2003). Research into Costa Rica's PSA importantly demonstrated that smallholders will allow regrowth if subsidised to do so (Sierra & Russman, 2006). This is a basic but fundamentally important finding given the voluntary premise of PES. Throughout the 2000s, similar PES-like programmes spread further into Meso-America (Corbera *et al.*, 2007; Pagiola *et al.*, 2008) and South America (Asquith *et al.*, 2008; Wunder & Alban, 2008).

MES and PES have thereby emerged as mechanisms to translate non-market values of the environment into tangible financial incentives for local actors for the provision of ecosystem services (Engel *et al.*, 2008; Wunder, 2005). This construct, drawn from free-market environmentalism and ecological modernisation, promotes the assignation of property rights and valuation of nature's services, which are then traded within a market which will assign higher prices to scarce resources and thus encourage sustainable natural resource management (Liverman, 2004). Taken from this perspective, the evolution of ecosystem services research and practice can be seen as a process of ecosystem function

commodification (Gómez-Baggethun *et al.*, 2010; Kosoy & Corbera, 2010), encompassing three main stages. The first stage, in the 1970s and '80s, was the utilitarian framing of ecological functions, adopted by scientists in an attempt to reach economic decision-making circles (Armsworth *et al.*, 2007). The second stage, archetypal of efforts in the 1990s to make a more direct appeal to decision makers, was the monetary valuation of ecosystem services (cf. Costanza *et al.*, 1997). The third stage in the commodification process was the appropriation and exchange of ecosystem services through the definition of property rights and the creation of institutional structures for their sale and exchange (Engel *et al.*, 2008, Vatn, 2010).

A robust and increasingly accepted definition of PES is provided by Wunder (2005), who suggests the five key criteria as:

1. A voluntary transaction where
2. A well-defined ecosystem service (or land use likely to secure that service)
3. Is being bought by an ecosystem service buyer
4. From a (minimum one) ecosystem service provider
5. If and only if the ecosystem service provider secures ecosystem service provision (conditionality).

2.2.3 Critiques of PES

MES and PES have brought about a new understanding of the nature-society relationship, yet concerns have been raised regarding the potential side effects of mainstreaming utilitarian market-based approaches to conservation. At the fundamental level, some have suggested that the pricing of the environment is undesirable since it erodes the boundaries between the "unpriced world of knowledge, the body and soul" and the

market (O'Neill, 2007; McAfee, 1999), and that nature should be protected for its own sake (McCaulay, 2006). Others have undertaken more engaged critiques which highlight the shortcomings in current adolescent period of PES policy and practice. An important case is illustrated by Robertson's (2006) critique of the commodification of ecosystems services, where he suggests that the valuation process is limited by the capacity of science to provide stable and consistent representations of value. This salient point reinforces the need for careful approaches to PES based on science and is one of the major challenges currently facing ecosystems services research and development (cf. Burkhard *et al.*, 2010). In response, recent and ongoing research continues to highlight and address specific issues in PES measurement and mapping, which will contribute to improved knowledge to the processes and methods for ecosystem service valuation (Eigenbrod *et al.*, 2010; Dominati *et al.*, 2010; Ooba *et al.*, 2010; Yapp *et al.*, 2010).

There have also been critiques of the impacts of PES in local settings. For instance, in their evaluation of initiatives in Meso-America, Corbera *et al.* (2007) raise concern over the requirement for well defined property rights driving and imposing the privatisation of customary common property regimes. Indeed, little is currently known about the negotiation of claims to ecosystem services in practice, particularly where ecosystems are held in common and there are overlapping rights claims by different social groups (Ostrom & Schlager, 1996). There have been cases where forest carbon services have been apportioned to institutions which do not equitably distribute the benefits (Corbera *et al.*, 2007), and where land owners transfer their ecosystem services rights to private actors (Corbera, 2008). Kosoy and Corbera (2010) build on this to highlight how the production, exchange and consumption of ecosystem services could reproduce or even exacerbate rather than ameliorate existing inequalities in local access to natural resources and services. A further risk is that the provision of economic incentives for conservation may induce logics of individualism and competition in regions and communities which had previously relied on

traditional community structures and values (Gómez-Baggethun *et al.*, 2010; Vatn, 2010). Essentially, these concerns stem from the risk that market-based mechanisms may not fully consider non-market aspects, including the needs and priorities of forest dwellers (Pereira, 2010).

This thesis views this range of critiques as a call to arms for wider and deeper research on PES, to which it aims to contribute, rather than a wholesale rejection of its utility and/or viability. Studies to date illustrate how a greater understanding of the conditions under which these systems can contribute to co-benefit realisation, such as poverty alleviation (Pagiola *et al.*, 2005; Zilberman *et al.*, 2008) and the conservation of biodiversity (Venter *et al.*, 2009; Wunder, 2007). This research takes this as its point of departure to justify its local approach to learn for and about PES.

2.3 REDD+

This thesis focuses on the provision of carbon sequestration and storage ecosystem services through forestry. By valuing, monetising and marketing forest carbon, MES and PES can be deployed as mechanisms to mitigate global climate change by reducing the toll and rate of deforestation and forest degradation, and thereby the resultant GHG emissions. This process not only has the potential to produce co-benefits which promote sustainable development and biodiversity conservation in developing countries, but has also been identified as an effective and low cost climate change mitigation strategy (Nabuurs *et al.*, 2007; McKinsey & Co., 2009; Stern, 2006; Tavoni, 2007). What follows is a brief history of the concept of emissions trading followed by an outline of the development of mechanisms to mitigate climate change through forestry.

Emissions trading is a policy tool for controlling pollution through the provision of economic incentives for achieving reductions in targeted emissions, with the aim of reducing

overall emissions. Under an emissions trading scheme, entities (such as companies, groups or countries) are issued with emission permits, representing their right to emit a specific amount (allowance) of the pollutant in question. Entities which emit more than their allowance must purchase credits from other entities, thus forming an emissions trading system. The US first pioneered emissions trading in the 1970s and 80s with the successful phase-out of lead from motor fuel (Nadim *et al.*, 2001). This was followed by the US Environmental Protection Agency's (EPA) highly successful sulphur dioxide (SO_2) emissions trading programme (Burtraw & Swift, 1996), aimed at reducing acid rain, which imposed a limit on the pollutant from coal-fired power plants through the 1990 Clean Air Act. The 1980s also witnessed increasing concerns regarding the role of carbon dioxide (CO_2) and other GHGs in raising global temperatures, leading to calls for the treatment of GHGs as pollutants and the regulation of their emissions.

In response to this concern, the first forestry project designed with the primary purpose of sequestering carbon was brokered by Applied Energy Service, Inc. in 1989. The reforestation project was based on the recommendation of the World Resources Institute and undertaken by CARE International in the western highlands of Guatemala, with an aim of sequestering between 15.5-16.3 MtC over 40 years as a means to offset a proportion of the emissions from the energy company's new Conneticut-based power plant (Wittman & Caron, 2009). This project marked the beginnings of an emerging market in which organisations and individuals could offset their GHG emissions on a voluntary basis, though it was not until the signing of the UN's Framework Convention on Climate Change's (UNFCCC) in 1992 that emissions trading became more broadly recognised as a means to reduce net carbon emissions.

The formulation of the UNFCCC's 1997 Kyoto Protocol was a landmark in the evolution of MES and PES. Based on the principal that systems of 'cap and trade' had effectively reduced sulphur emissions and acid rain in North America, the Kyoto Protocol

included an option for countries that were able to exceed their national GHG/carbon emissions targets to sell their surplus reductions to those unable or unwilling to meet theirs (Liverman, 2009). Carbon trading was thereby integrated into international policy under the premise that the most efficient way to mitigate climate change was to price nature's services, assign property rights and trade these services within a global market (Liverman, 2004; Portney & Stavins, 2000). The demand for carbon reductions, or credits, is created by commitments made by signatories to the Kyoto Protocol, who agreed to reduce their national emissions on average by 5.2% by 2012, based on 1990 baseline emissions. The Protocol went into force in 2005, spurring international carbon trading, notably across Europe, into action, building on earlier schemes based on voluntary participation and carbon reductions.

The designers of the Kyoto Protocol recognised that developed countries would face considerable financial barriers to enacting all of their emissions reductions domestically due to the high marginal costs involved (Gundimeda, 2004). They sought to address this issue by allowing Annex 1 (developed) countries to pay for emissions reductions in Annex 2 (developing) countries through the Clean Development Mechanism (CDM) under Article 12 of the Kyoto Protocol. The CDM is the first instance in international environmental law that makes provisions for private actors and actively generates commodities through market mechanisms (Böhringer, 2003). The mechanism was first designed as a fund to compensate developing countries, but was re-structured into a market mechanism to provide Annex 1 countries with carbon credits and incentives for investing in carbon reductions in Annex 2 countries (Boyd *et al.*, 2007). The CDM was designed with the twin objectives of assisting developed countries in achieving their emissions reductions targets and contributing to local sustainable development in developing countries (UNFCCC, 1997). Within the second of these objectives lies a significant point of contention surrounding the CDM. In defining 'sustainable development', the Marrakesh Accords (UNFCCC, 2001) determined that each

host (Annex 2) country can define their own criteria which, in combination with the market nature of the mechanism, is widely believed to have created an incentive to set low social standards (Sutter & Pareno, 2007). Kelly and Helme (2000) describe this as a "race to the bottom" in terms of sustainable development standards, with countries undercutting one another in an effort to attract cost-effective CDM investments and guiding the CDM away from low-cost projects (Roberts & Parks, 2008). A body of academic literature has now established the limited contribution of CDM projects to local development, including local analyses in Honduras (Bumpus, 2009), Brazil (Cole, 2009), India (Sirohi, 2007), as well as comprehensive reviews of the CDM policy and practice literature (Boyd *et al.*, 2009; Olsen, 2007; Sutter & Pareno, 2007). A further critique of the CDM is the high transaction costs and process requirements deeming to have geared CDM investment towards the more advanced developing countries, such as China, India and Brazil, shaping a highly uneven global distribution of CDM projects and investment (Bumpus & Liverman, 2008).

Land use, land use change and forestry (LULUCF) activities, such as afforestation/reforestation (A/R), were included under the CDM, although the popularity and success of these projects was severely inhibited by the strict rules, short-term carbon credits (tCERs) and exclusion from the EU Emissions Trading Scheme (ETS), the hub of CDM finance and credit trade (Schlamadinger *et al.*, 2007). When the CDM was negotiated, mechanisms to avoid emissions from deforestation were excluded due to concerns over diverting resources away from the energy sector and problems with methodologies – particularly relating to emissions leakage and ensuring sufficient robustness to ensure real carbon benefits (Skutsch *et al.*, 2007). The politics surrounding the use of forests as carbon sinks was equally as complex, with early negotiations on the types of projects which should be eligible in the CDM leading to polarisation between countries for and against sinks (Boyd *et al.*, 2008). Columbia, for instance, argued that more time was required to negotiate their inclusion, given their additional value to biodiversity; while Brazil, India and China

remained opposed – creating a rift over sinks in the 'G-77 and China' negotiation group. Much of the early opposition was based on the issue of non-permanence – *i.e.* the possibility that carbon sequestration may be reversed due to fire, pests or degradation.

Following the inception of the CDM, academics, practitioners and policy makers rapidly developed the science and practice of 'avoided deforestation' (AD – as it was initially known). Initial proposals by the Coalition of Rainforest Nations (led by Papua New Guinea) (UNFCCC, 2005), based on reports by Brazilian researchers (Santilli *et al.*, 2003; Santilli *et al.*, 2005), advocated the monetary compensation of developing countries for lost income opportunities associated with reducing rates of deforestation relative to a historical baseline, coined 'compensated reductions'. In contrast to the project-based CDM, compensated reductions was proposed at the national level. A subsequent research paper by the Joint Research Centre (JRC) of the European Commission (Achard *et al.*, 2006) advanced the CR proposal through the introduction of a remote sensing method for determining carbon gains and losses from deforestation and forest degradation. Interested Parties then attended a UNFCCC workshop on the issue in Rome in 2006, where Brazil proposed a voluntary fund for avoiding deforestation which did not compensate developed countries' emissions or commit developing countries to participation. Countries of the Congo Basin proposed a similar fund which additionally rewarded sustainable forest management (SFM) and certification (UNFCCC, 2006). An important outcome of the Rome workshop was the message that data and advanced remote sensing technologies were available which – when combined with appropriate field measurements – would enable the monitoring of country commitments.

The 13th Session of the Conference of the Parties (CoP) of the UNFCCC in 2007 in Bali then adopted a decision confirming the intention of parties to address the issue of deforestation in a post-Kyoto (post-2012) framework, encouraging the implementation of demonstration activities at both national and sub-national (or project) levels (UNFCCC,

2007). It was at this point that the term 'reduced emissions from deforestation and forest degradation', or REDD, came into wide use. This decision lead to the proposal of a combined national and sub-national 'nested approach' to REDD (Pedroni *et al.*, 2007; Pedroni *et al.*, 2009), wherein governments establish a national forestry accounting framework and monitoring system, while local/regional governments, communities, non-governmental organisations (NGOs) or private actors develop sub-national conservation, reforestation and/or SFM initiatives. Nested REDD would encourage national governments to adopt internationally negotiated targets for deforestation reductions and be correspondingly rewarded for reductions, while attracting private capital to project-based activities (Cortez *et al.*, 2010).

A key event then took place at CoP14 in Poznan, December 2008, which transformed the scope of the mechanism. Whereas the methodological guidance in the Bali Action Plan referred to 'issues relating to reducing emissions from deforestation and forest degradation in developing countries; and the role of conservation, sustainable management of forests and enhancement of forest carbon stocks in developing countries', countries including India pushed for, and succeeded in, the replacement of the semicolon with a comma (UNFCCC, 2008). This move marked a shift in the mechanism towards the greater recognition of the role of conservation and other activities, after which it was referred to as 'REDD+'.

REDD+ featured heavily at the UNFCCC CoP15 negotiations in Copenhagen, December 2009. Despite the failure of the Parties to reach agreement on a post-2012 climate treaty framework, the negotiations manifested enthusiastic support for a REDD+ approach. The major breakthrough for REDD+ came at CoP16 in Cancun, December 2010, where negotiators agreed to a phased approach to REDD+ (REDD+ readiness (phase 1), REDD+ implementation (phase 2), and results-based payment-for-performance (phase 3)) and the need for countries to develop REDD+ national strategies or action plans (UNFCCC, 2010).

The Cancun Agreements also set out a global goal for reducing emissions from deforestation and allow for interim sub-national activities.

A nested approach to REDD+ has gained wide popular support as the most likely post-Kyoto forest mechanism (Angelsen *et al.*, 2008; Cortez *et al.*, 2010; Nepstad *et al.*, 2010; Phelps *et al.*, 2010a), with developing countries having been pledged USD 3.5 billion in multilateral funding (from the US, UK, France, Japan, Australia and Norway) for early initiatives of this sort (REDD+ Partnership, 2009). REDD+ could therefore mark the beginning of a fundamental paradigm shift in tropical forest management. Indeed, regardless of multilateral decisions on the issue, individual governments and non-state actors will continue to advance REDD+ projects and initiatives at a variety of scales. Academia therefore faces a significant challenge to keep pace with the rapid evolution of policy and practice in this field (Campbell, 2009).

Emerging REDD+ literature has begun to highlight some concerns and priority areas for research and development. At the broad scale, in terms of national-level REDD+, a central concern is that of perverse incentives, where the most effective use of payments would focus on states with the highest current rates of deforestation (Pirard & Karsenty, 2009). If REDD+ resources are predominantly targeted at the agents of deforestation, current stewards of forests have little incentive to participate in the mechanism or, perhaps of greater importance, to anticipate and reduce latent deforestation threats. This issue has spurred, and is being addressed by, a number of macro-scale research efforts into global REDD+ architectures, carbon accounting and baseline setting methodologies (Baker *et al.*, 2010; Brown *et al.*, 2007; DeFries *et al.*, 2007; Motel *et al.*, 2008; Strassburg *et al.*, 2009). The literature has also highlighted some unexpected implications of REDD+. For instance, Aragão and Shimabukuro (2010) recently identified through satellite imagery analysis an increase in fire occurrence in areas of the Brazilian Amazon which have experienced reduced deforestation rates, raising questions over the accuracy of carbon accounting solely

through forest cover analysis. This illustrates the importance of considering the downstream physical and ecological consequences of the mechanism, and the need for further methodological development.

This review now moves to consider in turn the specific areas addressed in this thesis in relation to REDD+, highlighting along the way how this thesis helps address research gaps in each of the areas: land use governance, livelihoods and land economy.

2.4 Environmental Governance

Governing the world's natural resources is an increasingly complex challenge in the face of globalisation, trans-boundary pollution and climate change (Bulkeley & Newell, 2010). Effective multi-scalar environmental governance, involving multiple actors, is critical for long-term sustainability. Governance is concerned with responsibility and accountability; it includes policies, institutions, processes and power, and is about who decides and how (Swiderska *et al.*, 2008). Environmental governance therefore encompasses the policies and practices that shape the ways in which humans interact with the environment. Lemos and Agrawal (2006) observe that: "Environmental governance is varied in form, critical in importance, and near ubiquitous in spread" (Lemos & Agrawal, 2006:299). The importance of environmental governance analyses is illustrated by the evolution of research on the commons. The publication of Hardin's *Tragedy of the Commons* in 1968 convinced many policy makers, practitioners and academics that overexploitation was a near inevitability everywhere not owned privately or by a government. Yet a wealth of multidisciplinary research since then – lead in particular by Elinor Ostrom (*e.g.* Ostrom, 1990) – has shown how a wide diversity of adaptive governance regimes can effectively avert *the tragedy* (Dietz *et al.*, 2003).

Governance, and the legitimacy it creates, has been made more important in the environmental field through the shift from 'government to governance' (Rhodes, 1996), wherein an increasingly decentralised, inclusive and flexible character has led to the increasing prominence of local and non-state actors (Biermann & Pattberg, 2008; Steffek, 2009). This can in turn produce different outcomes across space – a phenomenon that geography should have much to say about. It is also an issue the state is obliged to respond to. In a commentary on the future challenges and opportunities for global environmental governance, Roberts (2008) highlights the need for the strengthening of the state at multiple levels, as well as the formation of innovative state–non-state coalitions. Dietz *et al.* (2003) also comment on this process, hinting at the importance of local context in the examination of diverse decentralised institutional configurations, which Agrawal (2007) identifies as a research priority, citing an "absence of reliable cross-sectional and longitudinal datasets on governance strategies at the local level" (Agrawal 2007:126).

REDD+ represents a novel multi-scalar, multi-actor set of land use governance arrangements which pose considerable capacity challenges to developing countries, particularly in rural areas where the impacts of the mechanism will be most important (Corbera & Schroeder, in press). REDD+ requires effective and equitable land use governance institutions and frameworks, including clear land tenure and functional monitoring to allow the enforcement of REDD+ conditions and the facilitation of payments (Thomson *et al.*, in press). However, in many countries and regions where deforestation is highest, land use governance is weak and compounds and underlies the extent and pace of forest clearance and degradation (Saunders *et al.*, 2008). Of particular importance is the potential for levels of land use governance to vary significantly across single countries, as Bond *et al.* (2009) identify in Brazil. Chhatre & Agrawal (2009) recently illustrated the potential importance of governance for REDD+ through an internationally comparative

study in which they found positive links between greater decentralisation of power over forest resources and greater carbon storage.

Land use governance is adopted as a central area of analysis in this thesis, reflecting its centrality in both the shaping of current land use circumstances and its keystone role for effective, efficient and equitable REDD+, holding all other aspects (social, environmental, financial, technical) together. Because the natural environment is governed and able to bring about political outcomes (Batterbury & Fernando, 2006), the tools and techniques of political ecology are vital components for inserting natural resource management and the environment into the understanding of land use governance and its impacts. Political ecology also facilitates assessments of impacts across time and scales by showing how governance affects the activities of land users, who are ultimately responsible for altering, or conserving, the landscape.

Three out of the five papers (Chapters 4-6) comprising this thesis address forest and land use governance: one paper covering each of the two case study sites (Chapters 4 and 5) followed by a comparative analysis of the two, drawing out policy lessons for REDD+ (Chapter 6). What follows are reviews of the central themes of each of the land use governance-related papers.

2.4.1 Institutional REDD+ Readiness

This section is of primary relevance to Chapter 4 (Paper 1: *Preparing for REDD: Forest governance challenges in Peru's Central Selva*), and secondarily for Chapter 5 (Paper 2: *Nature, People & Capital: Discourses shaping land use governance & carbon forestry initiatives in the Peruvian Amazon*) and Chapter 6 (Paper 3: *Lessons for sub-national REDD+ resource targeting from the governance of protected areas & their buffer zones on Peru's Amazon frontier*). In many of the developing countries where REDD+ is

likely to be important, illicit and uncontrolled forest exploitation is a major cause of deforestation and degradation (Saunders *et al.*, 2008). If these processes are not adequately addressed in anticipation of REDD+ through land use governance capacity improvements, it follows that economic incentives alone will not succeed in bringing about the necessary behavioural changes. This, combined with the complexity and multi-scalar nature of nested REDD+ requiring novel hybrid (state–non-state) modes of land use governance (Sikor *et al.*, 2010), raises important questions and compels the need for in-depth analyses of land use governance and institutional arrangements to inform REDD+ decision making (Agrawal *et al.*, 2008; CIFOR, 2009). Institutions here are taken as organisations whose activities relate to and impact on land use outcomes. These types of analysis can inform local REDD+ implementation and the creation of credible and robust credits for international sale. This brings to the fore the importance of assessing countries' preparedness for REDD+. As recently highlighted by Skutsch and McCall (2010) in what they refer to as 'the governance gap':

> "What has been conspicuously lacking both in [REDD+] policy discussions and in the scientific literature is critical analysis of whether countries are actually going to be able to put into practice effective policies and programmes that reverse deforestation and degradation."
>
> (Skutsch and McCall, 2010:396)

There is now an urgent need to critically assess, engage and develop appropriate multi-scalar land use governance institutions in preparation for the implementation of sub-national REDD+ in developing countries (Canadell & Raupach, 2008; Corbera & Brown, 2008; Miles & Kapos, 2008; Phelps *et al.*, 2010b). This is a particularly salient subject of analysis for Peru given the major governance shortcomings that a review of its World Bank (WB) Forest Carbon Partnership Facility (FCPF) Readiness Plan Idea Note (R-PIN) found

(Davis *et al.*, 2009a). Among the conclusions from Peru's R-PIN submission review were that:

- "There is no detailed information presented about capacities to monitor forests.
- ... [the R-PIN] does not provide any useful discussion of law enforcement issues or challenges. This is a major weakness of the R-PIN.
- Challenges such as lack of capacity, excessive bureaucracy, and inability to address simple but key issues are mentioned in passing, and could benefit from a more thoughtful analysis."

(Davis *et al.*, 2009b:21)

Despite this apparent lack of readiness, the Peruvian Environment Ministry have formally identified REDD+ as the mechanism with the greatest potential to sustainably attract international resources to protected areas (SERNANP, 2009), and as a strategic national priority for 2010-2021 (MINAM, 2010). There is therefore a compelling need for the creation of knowledge surrounding the multi-scalar engagement of REDD+ in pre-existing land use governance structures and capacities. The two case study sites are highly relevant due to their targeting as REDD+ sites during the course of data collection by state and non-state initiatives. This area of investigation also contributes to scholarship on forest commons by bringing to light the structure, function and effectiveness of land use management and control in developing countries. This responds to a common complaint among commons researchers regarding the absence of reliable cross-sectional accounts of local-level governance strategies (Agrawal, 2007).

2.4.2 Discursive Framing of Governance

The approach taken in this thesis follows a tradition of discursive analysis of forms of environmental governance, including market approaches to conserving nature and climate

change mitigation policies (Bakker, 2005; Castree, 2003; Hajer & Versteeg, 2005; Liverman, 2009; McCarthy & Prudham, 2004). A number of notable studies have examined the interactions between discourse and land use/forest governance, such as Bryant (1996) in Burma, Leach and Fairhead (2001) in Guinea, Braun (2002) in British Columbia, Hecht *et al.* (2006) in El Salvador and Robbins *et al.* (2007) in India. Bäckstrand and Lövbrand (2006) also made an important contribution to the field in their analysis of the evolution of tree plantations as carbon sinks in developing countries. They use three contested discourses to describe the phenomenon: ecological modernization promoting market solutions, green governmentality engaging scientific expertise, and civic environmentalism advocating participation and partnerships (Bäckstrand and Lövbrand, 2006). More recently, the journal *Forest Policy and Economics* published a special issue on 'Discourse and Expertise in Forest and Environmental Governance' (Kleinschmit *et al.*, 2009), which brought to the fore the importance and usefulness of analysing and understanding forest governance processes discursively at the science-policy interface – the so-called *discursive-institutional approach* (Arts & Buizer, 2009). Discursive analyses offer a more nuanced picture of land use and forestry, and can yield insightful and practical policy recommendations for improved efficiency of interventions such as REDD+.

Chapter 5 (Paper 2: *Nature, People & Capital: Discourses shaping land use governance & carbon forestry initiatives in the Peruvian Amazon*) takes this discursive approach to examine the theoretical and historical foundations of land use governance structures and their impacts on land use and REDD+ design in south-eastern Peru. This approach addresses critical gaps in the theoretical development of both commons and forest carbon scholarship through the depiction of the specific outcomes discourses and institutions shape. In his landmark book *Environmentality* (2005), Arun Agrawal illustrates how the effects of distinct ways of thinking about forest use, management and conservation among individuals and communities who are subject to governance are central to the possibility of

effective environmental governance. Chapter 5 takes this as its point of departure to describe the specific effects, impacts and outcomes of key actor perceptions. Within this, I identify REDD+ as one of the new domains identified by Agrawal (2007) "in which theoretical contributions are needed to improve what we know about governance, and through which studies of forest-based commons can substantially advance the social science" (Agrawal, 2007:127).

The approach taken in this paper bases itself to a greater extent within the post-structural tradition in political ecology, relying more heavily on discourse theory (Peet & Watts, 2004). This is used to show how the meanings and interpretations of land use governance, which in turn determine outcomes, are framed by the fundamental and historically contingent interdependence between knowledge, understanding and relations of power (Batterbury & Fernando, 2006). The paper illustrates how the popularity of REDD+ has lead to its adoption by a range of actors propagating distinct discourses (shared ideas, concepts, practices), which are reflected in their approaches to carbon finance. For instance, through REDD+, environmentally-focused organisations attempt to conserve large and pristine areas; those with a social development remit – such as governments – may intend to improve local livelihoods; and private actors capitalise upon the market opportunity.

2.4.3 Multi-Scalar REDD+ Policy Lessons

Chapter 6 (Paper 3: *Lessons for sub-national REDD+ resource targeting from the governance of protected areas and their buffer zones on Peru's Amazon frontier*) presents a practical analysis and policy recommendations for REDD+ resource targeting based on a multi-scalar comparative land use governance and capacity analysis of the two sites. In doing so, it responds to multiple calls in the literature for pragmatic governance lessons for REDD+. The Centre for International Forestry Research (CIFOR) cite a "lack of knowledge

about 'what works'" in relation to REDD+ engaging with existing structures and practices (CIFOR, 2009:2), as well as a need to address the "links between REDD[+] processes and the political, economic and social structures" (Springate-Baginski & Wollenberg, 2010:v). The paper addresses these knowledge gaps by analysing and comparing land use governance at the two case study sites to unravel the differential capacities and impacts of, and power relations between, the range of land use governance actors. Phelps *et al.* (2010b) call for research to optimize REDD+ effectiveness through forest innovations in forest governance, citing concerns that the mechanism could reverse the growing trend towards greater decentralisation if not carefully designed to maximise engagement with local populations. This matter points to the importance of understanding the implications of local processes for REDD+. A cross-country analysis of forest governance institutions by Chhatre & Agrawal (2009) reinforced this need for adequate institutional mechanisms to channel REDD+ funds to local communities. With a large number of factors influencing the effectiveness and outcomes of forest governance (Agrawal & Chhatre, 2006; Ostrom, 2007), it is clear that deeper analyses of land use governance arrangements are now needed – not just for REDD+ – but simply in order to allow the numerous actors to make better decisions about land use and forest governance and management at a variety of scales (Agrawal *et al.*, 2008).

2.5 Livelihoods

Chapter 7 (Paper 4: *Integrating REDD+ into livelihoods, land uses & preferences in strategic sites along Peru's Amazonian frontier*) analyses the engagement of REDD+ in local livelihoods, preferences and land use, questioning the extent to which these vary over space. A livelihood refers to the means by which people make a living which, following Ellis (2000:10), encompasses "... the assets (natural, physical, human, financial, and social capital), the activities, and the access to these (mediated by institutional and social relations)

that together determine the living gained by the individual or the household." This 'capital assets' conception creates an understanding of the resources people need to access in the process of creating their livelihood, and is increasingly important where livelihoods shift from being directly natural resource-based to relying on a more diversified range of assets, incomes and labour markets (Bebbington, 1999). Livelihood-focused research emerged in the 1990s, when studies approached households from this perspective to show how people survive (de Haan & Zoomers, 2005). The central objective of this focus is to search for effective approaches to support people, households and communities in ways which are more meaningful to their daily lives and needs – in contrast to more prescriptive interventionist instruments (Appendini, 2001). The livelihoods approach is thus adopted in this research to analyse how to effectively integrate REDD+ into existing livelihood strategies.

Political ecology is concerned with how livelihoods are impacted by international and transnational processes (Batterbury, 2001; Blaikie & Brookfield, 1987; Brown, 1998), placing particular emphasis on the ways in which globalisation development processes are engaged with locally (Bebbington, 2000). Through this approach, the ways in which social and ecological communities form part of, and can be sustainably engaged with, broader political and economic structures can be unravelled (Neumann & Schroeder, 1995). While political ecological accounts often portray conservation in opposition to livelihood and resource management systems (Robbins, 2004), this research places an important emphasis on understanding the historical dynamism of agro-ecological systems on the Amazon frontier and the ways in which they are shaped by wider-scale political-economic institutions and processes (Bebbington, 2004). Although the livelihoods approach has been critiqued for its lack of attention to structural forces (Arce, 2003), this thesis' attention to governance, institutions and power relations in the first three results chapters ensures that the livelihoods

analysis is situated within a broader analytical framework, shaping an important contextual understanding of the mobilisation and deployment of social and organizational resources.

An important backdrop to the analysis of the engagement of carbon finance mechanisms in developing country livelihoods are the lessons learned from the CDM. As reviewed in section 2.3, the absence of international sustainable development norms or standards, alongside the competitive supply-side of carbon credits, was widely reported to have shaped a trade-off which compromised the sustainable development contributions of CDM projects (Boyd *et al.*, 2009; Sutter & Pareño, 2007). Cole (2009) shows how this has been the case in Brazil, where the emphasis of the Brazilian CDM authority was on attracting projects and investment, rather than the strict fulfilment of the countries' sustainable development criteria.

Equitable sustainable development and local livelihood benefits were also found by a number of studies to fall short of their objectives in early forest carbon sink and conservation projects. Asquith *et al.* (2002) and Boyd *et al.* (2007b) reveal how forest carbon projects in Brazil and Bolivia did not achieve their sustainable development objectives due to their centralised project design and weak social objectives, in some cases actually resulting in the greater impoverishment of communities. Meanwhile, studies of forest carbon projects in Mexico by Corbera *et al.* (2007) and Brown *et al.* (2004) similarly found that centralised design and implementation of projects resulted in participation deficiencies. In a seminal paper on the interaction between PES and poverty in Latin America, Pagiola *et al.* (2005) unravel how adverse effects can transpire where property rights are unclear and when PES programmes involve less labour-intensive practices, emphasising the need for careful PES design. Research beyond Latin America has reached similar conclusions. For instance, a study of carbon credits in Senegal by Tschakert (2004) concluded that ignoring differences in access to resources and household dynamics risks widening rather than narrowing the poverty gap. These cases all highlight the risks of

inadequate attention to local social nuance. Meanwhile, the literature has also highlighted the importance of local participation and empowerment in REDD+ projects as crucial – not only to the top-down realisation of co-benefits (Miles, 2007; Rickets *et al.*, 2010), but also to the effective, efficient and equitable execution of projects as a whole (Blom *et al.*, 2010; Phelps *et al.*, 2010b; Springate-Baginski & Wollenberg, 2010). The growing body of research on this issue identifies that contemporary forest carbon interventions should seek to lower livelihood risks and capitalise upon pre-existent capital assets to create a sound foundation for local engagement (Smith & Scherr, 2003; Weinthal & Lawlor, 2009), and that now is a critical time for the expansion of knowledge regarding the dynamics of contextual engagement of REDD+ in local livelihoods (Petheram & Campbell, 2010).

The Amazon frontier offers an intriguing study region for the analysis of REDD+ engagement in livelihoods and land use due to the heterogeneity it presents (Coomes *et al.*, 2000; Takasaki *et al.*, 2001). A recent analysis of patterns of forest clearance and human development at Amazonian frontiers by Rodrigues *et al.* (2009) uncovered how living standards increase initially as a frontier is colonised, then fall as deforestation continues, underlining the importance of conservation incentives in these areas. Unique to the western Amazon frontier, highland Andean populations meet with indigenous Amazonian communities, bringing about a highly diverse socio-ecological landscape (Naughton-Treves, 2004). These characteristics intermingle with increasingly market-orientated extractive activities to shape some robust challenges to the stabilisation of the frontier through REDD+, strengthening the case for local livelihood analyses of engagement in order to capture and understand this diversity.

2.6 Smallholder Production & Economy

Chapter 8 (Paper 5: *Rewarding, Regulating & Reshaping: Differentiating local engagement of REDD+ in Amazonian smallholder production, land use & economy*) addresses the engagement of REDD+ in local land economies at the two sites. As a market mechanism, REDD+ fundamentally concerns the transfer of funds from buyers to providers for the delivery of a service in the form carbon sequestration or storage. The pricing of carbon services, however, will vary over space, scale and time according to a multitude of factors.

At the global level, although REDD+ has been identified as a 'cost-efficient' mechanism for mitigating climate change relative to other sectors (Eliasch, 2008; Naaburs *et al.*, 2007; Stern, 2006; Tavoni *et al.*, 2007), the range of cost estimates for reducing deforestation is considerable. Stern (2006) calculated it would cost USD 5 billion/yr to halt deforestation in eight high forest cover countries (Brazil, Indonesia, Papua New Guinea, Democratic Republic of Congo, Cameroon, Bolivia, Ghana and Malaysia). Eliasch (2008) estimated a cost of USD 4 billion over five years to fund necessary reforms and capacity building in 40 'forest nations' followed by USD 11-19 billion/yr to halve deforestation emissions by 2020. Falling within the higher end of this latter bracket, Kindermann *et al.* (2008) place a cost of USD 17.2-28 billion/yr to reduce global deforestation by 50% between 2005-2030. Most recently, Strassburg *et al.* (2009) price the elimination of deforestation in the 20 most forested developing countries – constituting a 90% reduction in global deforestation – at USD 30 billion/yr. This diversity of estimates provides useful guidance as to the broad costs of reducing emissions from deforestation in comparison to other sectors, but belies the lack of certainty surrounding the macro-scale economics of REDD+. In order to derive and compare more localised estimates of the micro-scale cost of

reducing deforestation, this research adopts a bottom-up approach from the smallholder level (cf. Börner *et al.*, 2009), the opportunity cost approach.

The opportunity cost of forest conservation or reforestation is the income per ha per year that is forfeited as a result of not converting the land to agriculture (conservation) or replacing a profitable activity with forest (reforestation). It follows that, as rational economic agents, individuals or entities would need to be compensated at least as much as the opportunity cost to undertake REDD+ activities (Stavins & Richards, 2005). These costs vary widely between, as well as within, countries depending on a range of factors such as the specific drivers of deforestation (Southgate *et al.*, 2009), and it is now clear that a thorough understanding of their spatial distributions is necessary to make informed decisions about tropical landscape management (Adams *et al.*, 2010). Börner *et al.* (2010) adopted the opportunity cost approach to PES to show that the economic preconditions are in place to avoid the deforestation of half of threatened forests in the Brazilian Amazon – though the same optimism was not applied to the institutional preconditions. Nevertheless, the variation in cost estimates has created much uncertainty as to the exact costs of paying landholders to conserve forests (Bond *et al.*, 2009), highlighting a significant research gap. In response to this, a number of recent studies have called for more studies to enhance the knowledge of the spatial dynamics and local contextualisation of forest carbon compensation costs in order to adequately inform REDD+ policy and practice (Coomes *et al.*, 2008; Corbera *et al.*, 2007; O'Connor, 2008; Southgate *et al.*, 2009).

In addition to the compensation costs of REDD+, Chapter 8 also questions if and how REDD+ activities could engage with pre-existing land use practices, including local perceptions of markets, place and risk. In doing so, it brings together two distinct literatures. The first is on Amazonian smallholder income and land use dynamics, a field notably advanced since the 1990s by Oliver Coomes (Coomes, 1992, 1996; Coomes & Burt, 2001; Coomes *et al.*, 2010). A central concept evinced by Coomes' body of research is the

heterogeneity of smallholder extractive practices and resource holdings, an area of significant relevance to REDD+ interventions and reward systems. Another notable contributor to this field is Stephen Perz, who has made several important contributions (Perz & Walker, 2002; Perz *et al.*, 2006), among which is the finding that the promotion of agricultural diversity can increase the compatibility of forest conservation and agricultural production (Perz, 2004). Amacher *et al.* (2009) also recently made an important contribution to this field by empirically demonstrating how timber sales are used to reduce cash constraints along the Interoceanic Highway. The second body of literature Chapter 8 calls upon and contributes to is the PES-agriculture interface, a field significantly advanced by a 2007 special issue of the journal *Ecological Economics* (to which Chapter 8 has been submitted). In this issue, Kroeger and Casey (2007) put forward the salient point that designing incentives for smallholders will require nuanced and dynamic policies which can be adapted to different scales and configurations of socio-ecological settings and property regimes. Börner *et al.* (2007) also make an important contribution for the context of this thesis, putting forward a case for flexibility at the individual level as to how farmers in the Amazon are able to provide ecosystem services.

This chapter also addresses an important knowledge gap identified in the review of Peru's FCPF REDD R-PIN, which found "... little socio-economic information on forest dwellers" (Davis *et al.*, 2009b:21), by questioning and analysing smallholder livelihoods, including income. This section of the research therefore not only feeds into important discussions surrounding the costs and practicalities of REDD+, but also addresses the wider need to better understand the interactions between natural resource management, market access and income in frontier regions.

2.7 Summary

If carefully constructed, REDD+ offers an important opportunity to mitigate climate change, improve forest management, help protect biodiversity, strengthen rural land use governance, improve livelihoods and open a new market opportunity. The bodies of research which are brought together under the REDD+ umbrella are diverse and raise as many compelling questions within their distinct fields as they do through their assimilation in this nascent field. Given the pace of political and practical development of the mechanism, the research questions pursued by this thesis aimed as much to provide practical and timely insights into REDD+'s sustainable and effective local deployment as to contribute to its theoretical understanding and advancement. Moreover, with the literatures illustrating how the social and institutional aspects of similar mechanisms (notably the CDM) have often been left behind, this thesis pursues these lines of enquiry to uncover how REDD+ can harness its market nature to increase the sustainability of livelihoods and effectiveness of institutions. It is hoped that this thesis provides a timely and original contribution regarding the engagement of REDD+ at the local scale in high priority areas for the effective realisation of co-benefits, protected area buffer zones, in a globally high priority region for forestry, the Amazon Basin's frontier.

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CHAPTER 3

SITES & METHODOLOGY

This chapter first introduces the case study sites analysed and compared in this thesis. Their socio-cultural, political and physical characteristics are described in further detail in the results chapters. This is followed by an overview of research methodology and the justification for the adoption of selected methods. Specific data collection methods are outlined in each chapter, so are not elaborated upon in detail here.

3.1 Study Sites

3.1.1 Case Study Approach

A case study approach is taken is this research. This form of inquiry is used to empirically examine contemporary phenomena within their real-life contexts using multiple sources of evidence (Yin, 2009). The adoption of case studies here derives from the need to gain a contextualised understanding of complex socio-ecological subjects and interactions. A major analytical strength of the approach is the ability to compare causal processes and factors across cases through the homogenous treatment of data collection and analysis (Bebbington, 2003). Within political ecology and geography research, Bebbington (2001:432) observes that:

> "Case studies help understand the global-local dynamics under which particular types of network might foster more secure livelihoods, safer environments and more inclusive forms of governance. Comparative analysis of such cases, then, serves as a starting point for building more general understanding of the institutional conditions

under which globalization might be turned to the advantage of particular people and places."

3.1.2 Site Locations

Peru has a network of protected areas in its Amazonian region (figure 3.1). Case studies for this research are taken from buffer zones of two protected areas on Peru's Amazon frontier, Yanachaga-Chemillen National Park (YChNP) and Manu National Park (MNP). The selection of these two sites was driven by the objective of capturing the socio-ecological heterogeneity and spatio-temporal dynamism of frontier land use. The two sites are also interesting because together they form part of an almost continuous conservation corridor stretching from the border with Bolivia to central Peru. The sustainable management of not only the protected areas themselves, but also their surroundings, is therefore a compelling subject of analysis, in order to maintain this ecological continuity along the highly biodiverse frontier. Another significant advantage of working at these sites over others on the frontier was the logistical support afforded to me through in-country partners and collaborators, which facilitated lodging, transport and access to communities.

Fig. 3.1. Protected areas in Peru (green areas). The locations of case study sites along the Amazon frontier (green line) are indicated by red circles (Google Earth, 2010).

YChNP lies on the eastern slopes of the Andes in Peru's 'Central Selva', between 10°15'-10°55' S and 75°70'-75°10' W, and is among the closest tropical forest regions to the capital Lima, at a distance of 250km. The park covers 122,000ha of tropical cloud and lowland forest, ranging in elevation from 3,643m to 460m amsl. It lies within the region of Pasco, province of Oxapampa and districts of Villa Rica, Oxapampa, Huancabamba and Pozuzo. To the east and south of the Park lie the Yanesha Communal Reserve (YCR) (covering 35,000ha between 10°15'-10°50' S and 75°45'-75°08' W) and the San Matias-San Carlos Protection Forest (SMSCPF) (covering 145,000ha between 9°90'-10°90' S and 75°25'-74°65' W), which comprise, together with YChNP, the Yanachaga Conservation Complex. The most exposed and developed axis of YChNP's surroundings is its western buffer zone, where communities have formed around watersheds running down from the Park's western escarpment into the Chontabamba River (flowing south-north), and within which lies a main road (parallel to the river) and the provincial capital of Oxapampa. This western buffer zone is the focal area for this research; the communities sampled are (from south to north) Chacos, San Alberto, Navarra, San Daniel and Agua Salada (figure 3.2). The population in this area is comprised of descendents of German colonists who established Oxapampa in 1890, and Andean migrant peasants (known as '*colonos*') who settled in the area throughout the 20th century (Smith, 1981); as well as mixtures of the two. This western buffer zone (hereafter YChNP) is the focal area of this study site.

Manu National Park (MNP) lies between 11°30'-13°21' S and 72°42'-70°85' W in south-eastern Peru. It covers 1.6 million ha and ranges in elevation from over 4,000m amsl in the Andean highlands to 365m amsl in the Amazonian lowlands. 93% of the Park is contained within the region of Madre de Dios, province of Manu and districts of Madre de Dios, Manu and Fitzcarrald; with 7% stretching into the region of Cusco, province of Paucartambo, district of Kosñipata. To the southeast of MNP lies the 402,000ha Amarakaeri Communal Reserve (ACR) (between 12°30'-13°30' S and 71°33'-70°49' W). The study

area for this research is the buffer zone corridor formed between the two protected areas, running south-west to north-east, and divided by the Alto Madre de Dios River as it enters the region of Madre de Dios. The communities sampled within this area (from south to north) are Pilcopata, Atalaya, Gamitana, Salvacion, Yunguyo, Los Aguanos, Masquitania, Mansilla, Santa Cruz, Palotoa, Shintuya (indigenous community), Palotoa-Teparo (indigenous community), Itahuania and Mamajapa (figure 3.2). The population of the corridor is comprised of seven indigenous communities of three ethnicities: Harakmbut, Machiguenga and Yine; and Andean *colonos* who, since the 1970s, have established numerous settlements along the road which runs from the Cusco highlands down the steep Andes-Amazon gradient, thence parallel to the river, where it currently reaches as far north as Itahuania (see figure 1). A lowland section of this buffer zone corridor (hereafter MNP), from Pilcopata to Mamajapa, is the focal area of this study site.

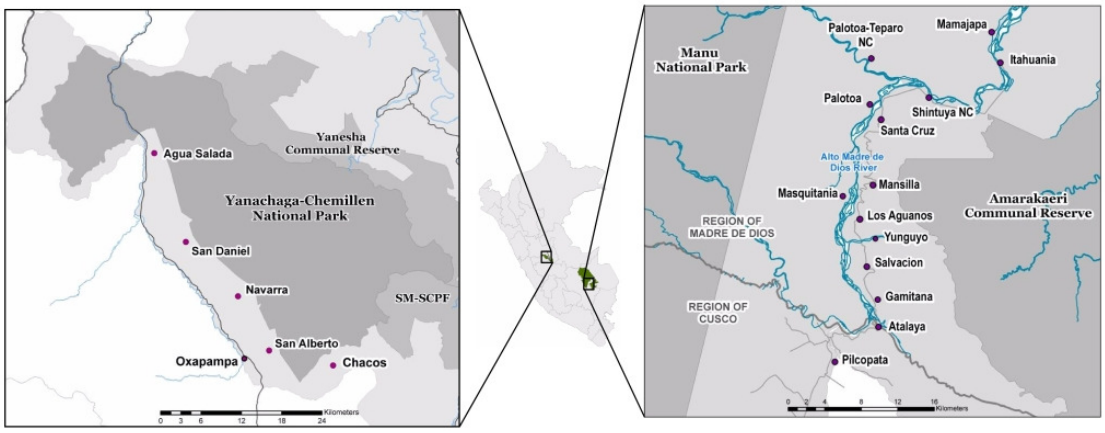

Fig. 3.2. Case study sites: the buffer zones of Yanachaga-Chemillen National Park (left) and Manu National Park (right). Dark shade indicates protected area; lighter shade indicates buffer zone (shapefiles courtesy of Pasco Regional Government, INRENA in Puerto Maldonado and ACCA in Cusco).

3.2 Methodology

This section provides the justification for the adoption of specific data collection methods in this research, as well as an overview of their execution (further details provided in each paper). This research combined qualitative and quantitative data collection methods as a means to capture the diversity of institutional, social, economic and behavioural characteristics and interrelationships at the two sites. This form of mixed methods can enrich the understanding of the human-environment relationship by combining the flexibility and depth of qualitative methods with the consistency and statistical rigour of quantitative approaches.

The first method adopted is qualitative: key informant semi-structured interviewing. The central premises of this form of interviewing are flexibility and allowing the interviewee to relate how they understand issues and events (Bryman, 2008). In case study research it has the added advantage of ensuring there is some structure to ensure cross-case comparability. Recording and transcribing of interviews, while time-consuming, allows a more thorough examination of interviews, permits repeated examinations and allows the data to be reused in other ways than originally intended, if required. Key informants are individuals with first-hand experience or knowledge about the target topic, and facilitate the efficient collection of detailed accounts and specific information. Of particular importance is the collection of accounts, perspectives and motivations from a range of actors on the same issues, to capture the range of heterogeneity in opinion and experience.

Access to actors was achieved in the first instance by direct communication (e-mail, telephone call) to a wide diversity of organisations, state institutions and private actors. Each actor interviewed (see Annex 3 for affiliations of interviewees) was then asked to identify other individuals and institutions with a stake in their area of expertise – known as the ‘chain referral’ or ‘snowballing’ approach to sampling (Gimble & Chan, 1995). In this way, many

interviewees acted as 'gatekeepers' (Odendahl & Shaw, 2001), making introductions to other individuals in their network to whom access would not have been otherwise possible. Bias toward certain constituent groups was avoided by directly contacting a wide range of national, regional and local actors (casting a wide net) in the first instance. Furthermore, the current circles of forestry and carbon expertise in Peru are small, with key actors knowing all/most others, which greatly facilitated the process. Some guiding principles in the process of contacting and interviewing informants were: establishing rapport (driven by being attentive, punctual, receptive and patient), maintaining neutrality and objectivity, probing (encouraging informants to elaborate on certain responses), and transparency (explaining objectives of the research and leaving contact details).

The quantitative component of data collection comprised private landowner surveys, with the objective of determining livelihoods, land use practices and REDD+ preferences of land users in the two study regions (survey shown in Annex 4). Surveys were adopted in order to measure local-level realities and capture the range of perspectives of smallholders. Participatory Rural Appraisal (PRA) preference ranking exercises were included in the survey to measure the range of preferences as perceived by individuals, and uncover relative prioritisation of components of a single issue. Surveys hold the distinct advantages of creating identically structured and comparable cross-site datasets, and are a form of data collection which rural land users are accustomed to (*e.g.* through population censuses) – given that recorded interviews could be intimidating. In order to reduce bias, surveys at each site were carried out within relatively short windows of about six weeks in order to reduce temporal heterogeneity, and personally delivered by myself or a trained research assistant (in YChNP).

The overall outcome of this mixed methods approach to data collection was a thorough understanding of smallholder practices and perceptions from surveys complemented by a wider structural context provided by interviews. A distinct advantage of

this approach was the way in which qualitative responses augmented and/or explained complex survey responses. To take a simple example, discontent among some YChNP smallholders as to the consistency and longevity of the support of NGOs which surfaced through surveys was then contextualised through interviews with NGO employees who set out a history of, and reasons behind, funding shortfalls. In this way, the mixed methods approach helped understand the direction of causality of events and prevailing opinion, as well as allowing cross-checking of events. Nevertheless, articulating and integrating the two datasets in the analysis phase was not always straightforward, being highly time-intensive and with survey and interview data at times diverging so dramatically that evaluation was made very difficult. Yet in several cases I overcame this latter difficulty by re-visiting communities and sites, which underscored the utility of in-field data input and interview transcription.

Prior to, during and following data collection field visits, a further method comprising the careful tracing and close reading of documentary sources (published books and articles, reports, briefings, technical notes and media coverage) provided invaluable contextual frameworks and settings for this research.

A great deal of insight was also gained through (unstructured) participant observation in the context of interviews, meetings and other participatory fora (such as meetings of the Peruvian REDD Group). From this mode of enquiry I was able to evaluate the dynamics of participation which shape positions and outcomes. This method was most relevant in the pilot visit of July 2008, during which the formal research plan was elaborated. For instance, at the Peruvian REDD Group's second meeting I was able to glean the extent of the technical expertise held by international NGOs and the limited knowledge of the mechanisms of government institutions.

While conducting this research, due diligence was accorded to the positionality of the researcher (Cochrane, 1998; Herod, 1999), *i.e.* the way in which one is inserted in grids of

power relations and how that influences interpretations and knowledge production (Sultana, 2007). Specifically, as a white male from a developed country I acknowledged that my presence could intimidate some individuals, so wore plain clothes and emphasised my objective of learning from and about local people. The relationships I built with my research assistants also served to encourage trust. Prior to initiating any data collection, permission was obtained from individual land users as well as local authorities. Interviewees and survey respondents partook in the research voluntarily and anonymity was assured. Prior to, and following, each survey it was made clear that no direct benefits would accrue from participating in the research and that the issues explored and answers participants gave did not suggest any carbon payments scheme would be implemented in the future. The research proposal was approved by Central University Research Ethics Committee (CUREC) to be in accordance with University of Oxford conditions for research involving human participants.

3.3 Research Structure Summary

Figure 3.3 illustrates how the research design brought about the findings, individual research papers and collective conclusions. The first two papers (chapter 4: *Preparing for REDD: Forest governance challenges in Peru's Central Selva*; and chapter 5: *Nature, People & Capital: Discourses shaping land use governance & carbon forestry initiatives in the Peruvian Amazon*) are the result of stand-alone analyses, while rest of the papers are comparative.

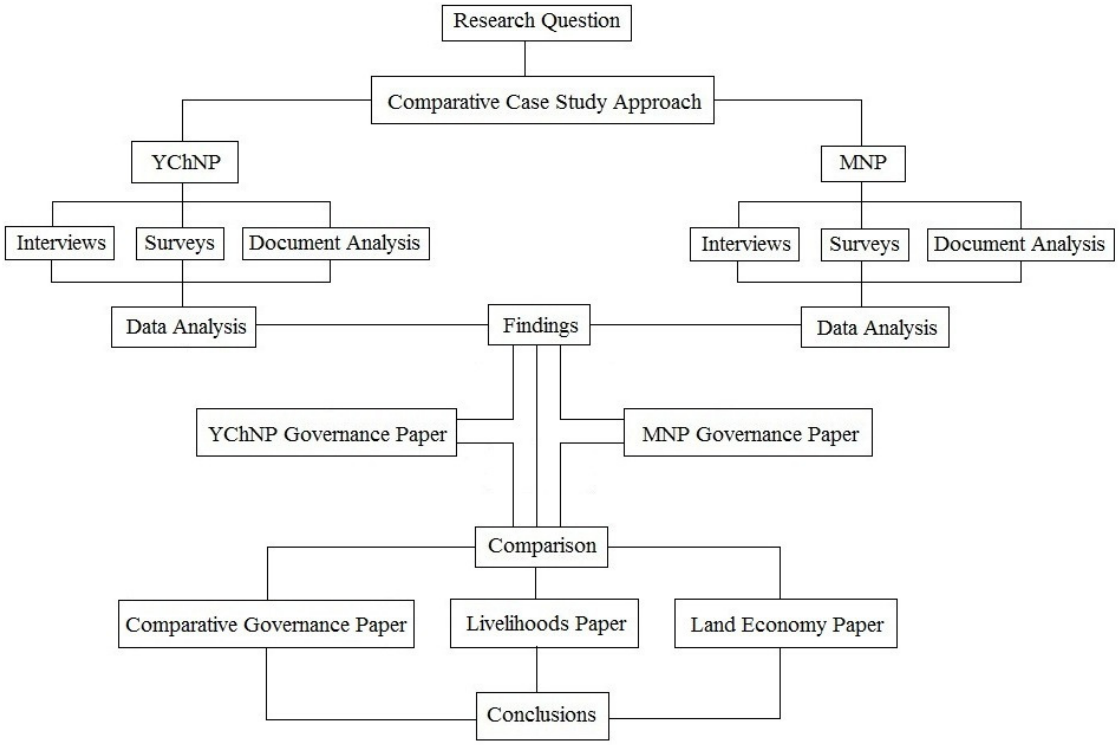

Fig. 3.3. Research structure outline.

3.4 Data Summary

My first data collection visit to Peru was a pilot visit in July 2008 to carry out interviews with key actors and land users, and to visit potential field sites to ensure feasibility of full-scale data collection. I then returned in October 2008 for two months for data collection at YChNP, comprising interviews and surveys (including extensive piloting), as well as further interviews in Lima. My third and final trip was in June 2009 for three months to collect data in MNP, during which I carried out further, high-level, interviews in Lima and Cusco.

Table 3.1. Summary of data collected in-field.

Date	Location	Data Collected
Jul 2008 ***Pilot visit***	Lima	Interviews: National State Authorities, NGOs, private sector actors
	Puerto Maldonado	Interviews: Regional State Authorities, NGOs
	Manu	Interviews: Local State Authorities, NGOs, land users
Oct-Nov 2008 ***YChNP***	Lima	Interviews: NGOs
	Oxapampa	Interviews: Local & Regional State Authorities, NGOs, private sector actors
	YChNP buffer zone communities	Interviews: Land users Surveys: 100 across 5 communities (not including piloting) (see figure 3.2 for names and locations)
Jun-Aug 2009 ***MNP***	Lima	Interviews: National State Authorities, NGOs
	Cusco	Interviews: NGOs, MNP Authority
	Pilcopata	Interviews: Local State uthorities
	Salvacion	Interviews: Local & Regional State Authorities, private sector actors
	MNP buffer zone communities	Interviews: Land users Surveys: 100 across 14 communities (spread over more communities than with YChNP due to lower population densities) (see figure 3.2 for names and locations)
Final Data	**Interviews: n = 82 (236,130 transcribed words)** - n = 23 from YChNP used for Paper 1 - n = 40 from MNP used for Paper 2 - n = 48 from Lima, YChNP & MNP used for Paper 3	
	Surveys: 200 (100 at each site)	

3.5 Some Reflections on Data Collection

My first visit to Peru in July 2008 was a time of rapid learning – through interview accounts as well as firsthand experience – during a period of transformation of the environmental agenda in the country. The government had recently created a new Environment Ministry in April 2008 and the legislative landscape was being radically reformed, including changes to the forestry law which were brought in by executive decree rather than the usual consultative process through Congress. This led to several indigenous protests in some Amazonian regions, one of which I accidentally encountered in Puerto Maldonado on the 8th July 2008. This particular protest resulted in the burning of the Madre

de Dios Regional Government's buildings and, ultimately – following more and bloodier uprisings – to the laws being repealed.

This national political context made me particularly nervous of asking smallholders for details about their land when I returned in subsequent visits, given that part of the indigenous narrative on these laws was that of the government making it easier for western companies to buy their land. These concerns were upheld on several occasions, with some smallholders entirely refusing to engage with me, and others not doing so until they had absolute proof – through various forms of identification – that I was not working for the government or a company. Ultimately, though, at the two sites one of the greatest challenges to overcome during surveying was the legacy left by NGOs, which many smallholders said had promised so much and delivered so little. In addition, in Manu, where an oil company had just entered to begin seismic testing, the majority of the population had filled out one of the company's extensive personal surveys so some did not want to have to answer any more questions. For this reason, I was very pleased to have included the participative preference ranking exercises (see chapter 4) and a final open ended question asking for their thoughts and comments. These were novel to all people I encountered, and the large majority enjoyed the process of choosing and ranking their preferences through the interactive cards, and having their say.

The physical conditions at the two sites also presented some challenges. In YChNP, despite being very damp, this was not as relevant, given the comparatively good infrastructure and a motorbike I was kindly lent by a local NGO. In MNP, however, the conditions of the infrastructure and availability of transport were both highly unpredictable, and compounded by the tropical climate. I was infinitely grateful to have the support of a research assistant who was invaluable in accessing modes of transport (passing trucks of produce or sheep/pigs, buses, motorbikes, government vehicles, boats, and his favourite – walking), as well as the local communities he knew so well.

I found the key actor interviewing less challenging, but fascinating as a means to access comprehensive histories, experiences and perspectives. The process of in-field interview transcribing was the greater challenge – by candlelight, under mosquito nets, etc – though I was grateful to persevere with it while the memories of the interviewees' actions and reactions were still fresh, adding another layer of understanding.

All things considered, I am very satisfied with my selection of methods and their in-field execution, and feel that I managed to collect a rich qualitative and quantitative data set. In the process I encountered some interesting challenges, but no major obstacles which could not be overcome through careful planning, flexibility and a friendly attitude toward the predominantly very helpful local population.

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CHAPTER 4

Preparing for REDD: Forest Governance Challenges in Peru's Central Selva

Joel N.H. Scriven

ABSTRACT

Recent rises in levels of tropical deforestation across the Peruvian Amazon, along with the country's interest in pursuing a reduced emissions from deforestation and forest degradation (REDD) agenda, raise important questions regarding levels of forest governance and institutional capacity in the region. This research adopts a political ecology approach to examine forest governance in Peru's Central Selva region. Semi-structured key informant interviews were carried out in Lima, Oxapampa and communities across the western buffer zone of the Yanachaga-Chemillen National Park. The region's history highlights the nature of the exploitative activities which lead to the present institutional and floristic conditions, while a geopolitical dichotomy has played an important role in preventing the formation of a common vision for regional development. The state authorities are found to be critically under capacitated for their remit, while NGO efforts in the area appear disperse and uncoordinated. National market forces, along with national Amazonian settlement policy, are found to have the greatest influence on land use. The relative lack of state presence, inappropriate institutions and extractive economy suggest that the region is currently institutionally unequipped to undertake and govern a REDD initiative. Through studies like the one presented here it is possible to gain a thorough understanding of local governance workings to ground and contextualize REDD in local realities.

Keywords: Reduced Emissions from Deforestation and Forest Degradation (REDD), political ecology, land use governance, institutional capacity.

4.1 Introduction

Forests provide humanity with a wealth of benefits, known as ecosystem services, including the sequestration and storage of vast quantities of carbon (C), the latter estimated at 500 PgC (1PgC = 1 GtC = 10^{15} gC) in living biomass and 700 PgC in soil organic matter (Malhi *et al.*, 2002). The counterpoint to this service, however, is the release of considerable volumes of carbon emissions as a result of deforestation and forest degradation, which now account for 12-17% of anthropogenic CO_2 emissions, second only to fossil fuel combustion (Solomon *et al.*, 2007; van der Werf *et al.*, 2009). Forests continue to be cleared because their financial worth is greater as timber and crops than standing: a historical market logic reflective of the lack of value assigned to ecosystem services and their provision.

In an attempt to reverse the loss of undervalued natural services through the alteration of economic incentives, the past decade has seen the accelerated development of markets and payments for ecosystem services (PES) (Gómez-Baggethun *et al.*, 2010). A forest conservation market mechanism, 'reduction of emissions from deforestation and forest degradation', or REDD, has emerged at the forefront of these developments (Auckland *et al.*, 2003; Canadell & Raupach, 2008; Gullison *et al.*, 2007; Niles *et al.*, 2002). The fundamental concept underscoring REDD is that of making forests more valuable standing than felled through the economic valuation and sale of the carbon services they provide. REDD also offers an attractive and unique form of climate change mitigation due to the co-benefits it is able to generate in tropical developing countries, such as poverty alleviation and biodiversity conservation (Pagiola *et al.*, 2005; Stickler *et al.*, 2009; Venter *et al.*, 2009).

Although it is a relatively new concept, REDD has already mobilised significant attention and potential resources for land use and forestry management (Gullison *et al.*, 2007; Laurance, 2007). Incentivised by the prospect of accessing forest carbon funds from

multilateral organisations such as the World Bank's Forest Carbon Partnership Facility (FCPF) (FCPF, 2010) and the UN's REDD Programme (UN-REDD, 2010), many stakeholders are evaluating their capacities and reviewing relevant experiences in a process now widely referred to as 'REDD Readiness' (Johns & Johnson, 2009). On the basis of these evaluations, governments, Non-Government Organisations (NGOs) and private actors can evaluate their ability to reduce emissions and take appropriate action in an attempt to establish an enabling framework for REDD deals.

Much of the conceptual and practical development of REDD to date has focused on global and national architectures (e.g. Ebeling & Yasue, 2008; Miles & Kapos, 2008; Strassburg *et al.*, 2009), and the major challenge now is the engagement and integration of the mechanism at the sub-national, or local, level (Phelps *et al.*, 2010a). To maximise the utility of local REDD and maximise the realisation of its potential co-benefits, context-specific knowledge of its engagement with local institutions, populations, landscapes and economies is crucial (Phelps *et al.*, 2010b). Among the many challenges facing REDD methodologies is the development of appropriate multi-level governance systems to manage the technical and financial elements efficiently and equitably (Campbell, 2009; Canadell & Raupach, 2008; Skutsch & McCall, 2010). Yet with a large number of factors influencing the effectiveness and outcomes of forest governance (Agrawal & Chhatre, 2006; Ostrom, 2007), it is clear that deeper analyses of governance arrangements are now needed not just for REDD but simply in order to allow the numerous actors to make better decisions about forest governance and management at a variety of scales (Agrawal *et al.*, 2008). Now, prior to the setting of international rules, is a critical time for enhancing knowledge and learning lessons surrounding the local engagement of REDD.

This paper focuses on the governance challenges facing REDD in the Peruvian Amazon. Emissions from deforestation in Peru, a country covering the Amazon's western frontier as it meets the Andean highlands, are projected to become the fifth highest globally,

at 41 MtC/yr (Strassburg *et al.*, 2009). While land use allocation policies in the Amazon have served to provide some protection, deforestation and degradation threaten to isolate protected areas such as national parks (Oliveira *et al.*, 2007). Nevertheless, state and non-state enthusiasm for REDD in the country continues to grow, with interested parties meeting regularly as the Peru REDD Group (Peruvian REDD Group, 2008) and NGOs beginning to develop pilot projects. This critical mass of interest raises important questions regarding the levels and appropriateness of existing forest governance arrangements and institutional capacity across the region. Peru offers a particularly salient case for the examination of REDD governance challenges given the World Bank's external review of the country's submitted REDD Readiness Plan Idea Note (R-PIN) concluding that the document:

a) Does not provide a full vision of the challenges faced by Peru in respect of REDD;
b) Does not provide information on existing capacity to monitor and implement REDD;
c) Requires a more detailed analysis of key issues in forest law enforcement and forest sector governance.

(FCPF, 2008)

This paper aims to address these knowledge gaps through a locally-grounded analysis of forest and land use governance along Peru's Amazonian frontier, taking a case study from the 'Central Selva' region to evaluate the extent to which REDD would be practicable under the current structures. To this end, this research adopts three primary lines of inquiry. Firstly, in recognition of the central importance of the history of forest governance arrangements in understanding outcomes (Agrawal *et al.*, 2008), the role of past processes in influencing current land use and governance arrangements in the region is questioned. Secondly, this work builds on the work of others in a Latin American context (cf. Corbera & Brown, 2008) in examining the extent to which political structures enable or

inhibit forest protection and sustainable use. Finally, given the claims that global forest politics has to a large extent been recently shaped by non-state actors (Arts & Buizer, 2009), this article analyses the differing local-scale roles of non-state actors in the region in bringing about land use changes. A critical knowledge gap in the literature is addressed in this paper through its focus on local perspectives of governance and drivers of land use change, linking the findings back to address their implications for REDD.

This work adopts a political ecology approach in its study of power relations in land use governance and institutions, combining multiple scales and incorporating state and non state actors. While not constituting a coherent theory *per se*, political ecology provides a useful toolkit for analysing human-environment interactions (Bryant, 1998; Paulson *et al.*, 2003). By combining material nature with human agency and political economy, political ecology examines the social, cultural and historical factors which shape human responses to the environment, patterns of resource use and the multi-scalar workings of political and economic forces (Blaikie, 1985; Blaikie & Brookfield, 1987). At its most fundamental, political ecology uncovers the specific ways in which environmental change and ecological conditions are products of political process (Bryant & Bailey, 1997). Here, a political ecology approach will serve to highlight conflicts in the form of struggles over meanings as well as land and resources, and places emphasis on understanding the historical construction of present circumstances (Blaikie & Brookfield, 1987; Bryant & Bailey, 1997). The resulting political ecology thus guides this analysis towards issues of importance by providing a theoretical basis for the analysis of complex human-environment relations alongside multi-level governance structures. By linking the local political ecology of forest and land use to the emerging REDD agenda this paper addresses an issue missing from the academic literature, and provides a timely analysis for policy makers and practitioners to apply towards the improvement of REDD efficiency.

4.2 Study Area & Methods

A case study for this research is taken from Peru's central inland region, or Central Selva, the Yanachaga-Chemillen National Park and its buffer zone, which lie in the region of Pasco, province of Oxapampa and districts of Oxapampa, Huancabamba, Pozuzo and Villa Rica. At a distance of 250km from the national capital, Lima, Yanachaga-Chemillen National Park straddles the eastern flank of the Andes, its cloud forests reaching an elevation of 3,000 masl. The Park covers an area of over 122,000 ha and forms part of a protected area complex which additionally encompasses the Yanesha Communal Reserve (covering 35,000 ha), running along the eastern border of the Park, and the San Matias-San Carlos Protection Forest (covering 145,000 ha), beginning at the southern border and extending southeastwards and northwards, as illustrated in figure 4.1. This is a site of particular current land use governance and REDD interest, due to its recent proposal as a UNESCO Biosphere Reserve (at the time of data collection this proposal had been sent to UNESCO for evaluation) and a pledge of €2 million (USD 2.7 million) from the German Environment Ministry to reduce deforestation in the area.

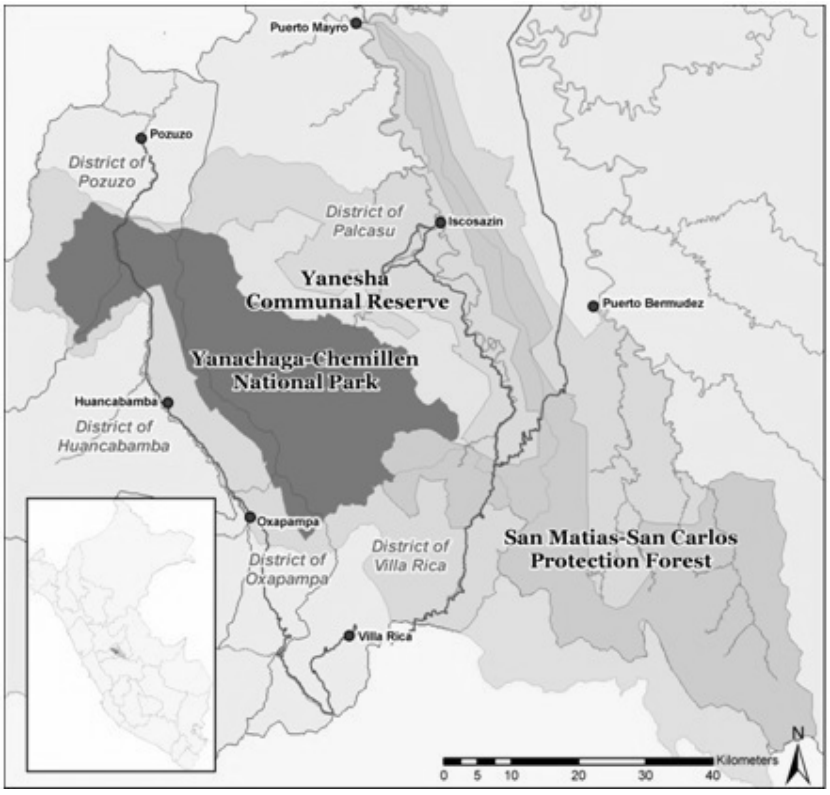

Fig. 4.1. The Yanachaga Conservation Complex. Darkest shade indicates the Yanchaga-Chemillen National Park; to its east the Yanesha Communal Reserve; to the far east and south the San Matias San Carlos Protection Forest; light shade surrounding protected areas indicates the buffer zone of the Conservation Complex (shapefiles courtesy of Pasco Regional Government).

Key informant semi-structured interviews (n=23) were carried out between July 2008 and August 2009 in Lima, Oxapampa (the provincial capital) and communities in the western buffer zone of Yanachaga-Chemillen National Park. State, NGO and private sector interviewees were selected through a stakeholder analysis 'snowballing process' (cf. Grimble & Chan, 1995), where individuals interviewed were asked to identify other individuals and institutions with a stake in local and regional land use governance. Land users were selected by random sampling in the study area. Findings from interviews are reported here anonymously, revealing only the affiliations of respondents, shown in table 4.1. Secondary data from the published and grey literature were used to unravel the historical context of forest governance in the region.

Table 4.1. Affiliations of interview respondents.

Informant	Sector	Institution	Date
1	State	Pasco Regional Government, Oxapampa	11.11.2008
2	State	Pasco Regional Government, Oxapampa	11.20.2008
3	State	Police Department, Oxapampa	11.03.2008
4	State	Forestry & Wildlife Authority, Oxapampa	10.16.2008
5	State	Protected Areas Authority, Oxapampa	10.27.2008
6	State	FONDEBOSQUE, Oxapampa	11.14.2008
7	State	Mayor of Oxapampa	11.11.2008
8	State	Yanachaga-Chemillen Management Committee	06.19.2009
9	NGO	ProNaturaleza, Oxapampa	10.29.2008
10	NGO	ProNaturaleza, Oxapampa	10.29.2008
11	NGO	ProNaturaleza, Lima	07.07.2008
12	NGO	Instituto del Bien Comun, Oxapampa	10.17.2008
13	NGO	Instituto del Bien Comun, Oxapampa	10.20.2008
14	NGO	PROSOYA (Association for the Promotion of Support to Youth and the Communal Development), Huancabamba	10.30.2008
15	Private	Oxapampa sawmill	11.11.2008
16	Private	Oxapampa sawmill	11.11.2008
17	Private	Reforestation company, Pozuzo	07.01.2008
18	Private	Forestry consultant	08.26.2009
19	Private	Conservation consultant	07.08.2008
20	Land user	Community of San Alberto (adjacent to Oxapampa)	10.25.2008
21	Land user	Community of San Alberto	11.20.2008
22	Land user	Community of Navarra (15km north of Oxapampa)	11.10.2008
23	Land user	Community of Navarra	11.21.2008

4.3 Findings

4.3.1 Modern History of Forest Governance in the Central Selva

The second half of the 19th century marked the beginning of permanent occupation of the Central Selva, prior to which immigration to the region had been limited by the absence of adequate colonial administration and conflicts among early colonizers (Ortiz, 1969). As post-independence economic recovery began in the 1840s, state policies encouraged colonization by Europeans, resulting in road construction and the establishment of large estates, whose produce satisfied the needs of coastal cities and provided goods for export (CIDA, 1966). Legislation in 1845 (Peruvian Congress, 1845) declared indigenous

communities to be the owners of the lands they occupied, and colonists to be the owners of lands on which they settled, a policy which ultimately resulted in conflicts between the two groups (UNEP, 1987). The administrations of Ramón Castilla (1845-1851 and 1855-1862) most notably established immigration agreements with Germany and Austria, the resultant first wave of which arrived from Antwerp in the Central Selva in 1859, establishing the town of Pozuzo. The colonists built in their Tirolean style, planted coffee in agroforestry systems and cleared large areas of forest for cattle raising (UNEP, 1987). Successive German colonists arrived and, with suitable land becoming scarce, travelled southwards to found Oxapampa in 1890 and Villa Rica in 1920.

Up until the completion of a trans-Andean road in 1919 (Tarma-San Ramon-La Merced), the only profitable products, exported by pack animal, were coffee and sugar. Small quantities of fine woods, principally Spanish cedar (*Cedrella odorata*) and mahogany (*Swietenia macrophylla*), were also transported in this manner, but the road made large-scale selective forest extraction feasible, rapidly changing the floristic structure of the region's then-accessible forests (UNEP, 1987). European immigrants and their descendants monopolized economic activity – primarily timber extraction and cattle ranching – until 1960, while allowing indigenous communities to carry out subsistence farming on colonized lands (Smith, 1981).

In 1969, under the military rule of Juan Velasco, the Government's agrarian reform eliminated all large private holdings, converting the majority into cooperatives owned by former workers (Hudson, 1992). However, following the mixed success of the cooperatives, the majority were converted to individual private holdings in the 1980s under the second Presidency of Fernando Belaunde. This administration was notable for its desire to colonize the Amazon to stimulate the national economy, encouraging landless coastal and Andean peasants to migrate and settle in the 'under-populated' Amazon. One result of this policy was the Pichis-Palcasu Special Project (*Proyecto Especial Pichis-Palcasú*, PEPP), involving

road construction, the establishment of wood-processing plants and the settlement of 150,000 people in the Palcasu Valley of the Central Selva (Southgate & Elgegren, 1995).

In 1981, the United States Agency for International Development (USAID), keen to support Peru's return to democracy, financed an evaluation of the resources in the valley. The study concluded that a large proportion of the area would be inappropriate for agriculture and that, as planned, the PEPP would have a negative impact on the region, and in particular on the indigenous communities (Southgate & Elgegren, 1995). The PEPP's focus was subsequently changed to the establishment of a methodology for sustainable forest management and agroforestry. This strategy was accompanied by a territorial ordering of the Project area involving the allocation of land categories based on their 'greatest capacity', and a subsequent official titling of lands to native communities and colonists (Rada *et al.*, 2005). One component of the Project, the Program for Rural Development in Palcasu (*Programa de Desarrollo Rural*, PDR Palcasu), made the PEPP the first initiative in the Peruvian Amazon to include in its design clear and defined environmental protection requirement, and in 1986 led to the creation of the Yanachaga Complex, encompassing the National Park, Communal Reserve and Protection Forest.

A corollary of the colonisation policies and development efforts was the large-scale migration of Andean peasants and subsequent settlement in a spontaneous and disorganised fashion, primarily along roads and tracks made by timber extractors, leading to the exportation of Andean farming practices to the Central Selva (Bebbington, 1990). Whereas in the highlands a 3 to 5 ha parcel often maintains a family and produces surplus yields, the nutrient-poor, thin soils of the Central Selva, often on slopes, are susceptible to erosion and leaching, and require several years lying fallow to recover their productivity (UNEP, 1987). Andean practices of burning all vegetation in a parcel prior to planting therefore quickly exhausted agricultural land, leading to the expansion of the area cleared on the following cycle and an acceleration of deforestation.

The 1980s, known as the lost decade across Latin America, saw the rise of the Shining Path (*Sendero Luminoso*), a Maoist guerrilla movement, in Peru. This in part resulted from, and certainly acted to reinforce, a period of economic turmoil brought about in large part by burgeoning national debts. *Sendero* took control of large areas of the Central Selva, displacing indigenous communities and closing rural markets in an attempt to end small-scale capitalism and starve Lima of produce (Vargas *et al.*, 1993). During this time, USAID terminated their presence in the area, but continued their work through the funding of a partnership between the Peruvian NGO ProNaturaleza (*Fundacion Peruana para la Conservacion de la Naturaleza*, Peruvian Foundation for the Conservation of Nature) and The Nature Conservancy (TNC), for management of the National Park.

Following the considerable decrease in guerilla activity since the arrest of *Sendero's* leader in 1992, commercial agricultural activity in the Central Selva grew to the present levels--where several thousand boxes (each approximately 2 cubed feet in volume) of produce are exported to Lima on a weekly basis. The most recent official figures for the Province of Oxapampa (total size: 1,813,480ha) place the population at 78,108 (Pasco Regional Government, 2006), and estimate agriculture to cover an area of 32,419ha (Pasco Regional Government, 2007). Among the results of this population increase and agricultural expansion have been high levels of deforestation, almost exclusively by slash and burn practices, as well as extreme degradation of the large majority of remaining non-protected forested areas due to historical and ongoing timber extraction.

4.3.2 Regional Context of Forest Governance in Central Selva

4.3.2.1 Regional "Divorce"

The Region of Pasco is notable for its geography, straddling both Andean and tropical forest biomes. The Region is subdivided into three provinces, Pasco and Daniel Alcides Carrion in the west and Oxapampa in the east, as illustrated in figure 4.2. The primary Pasco Regional Government is based in the Andean city of Cerro de Pasco, at an elevation of 4,800m (13,973ft), while a decentralized Regional Government office is located in Oxapampa, at 1,800m (5,905ft). The diversity encompassed by the Region presents a wide diversity of cultures and ecosystems, though the differential needs and priorities of the Provinces have caused a political rift and presented a barrier to a common vision for regional development.

Fig. 4.2. Pasco Region and its provinces; territorial jurisdiction of the Oxapampa FFS office shown in darker shade (adapted from Bronder, 2008).

The distinct provincial histories and economies serve to highlight the construction of this regional geopolitical "divorce"[2]. The Regional Capital, Cerro de Pasco, has been a focal mining centre since the discovery of silver in the region in the early 1600s. Although this resource was largely exhausted by the Spanish, it remains an active extractive centre for other metals and minerals such as copper and zinc. In contrast, Oxapampa's economic history is dominated by timber extraction, relatively recently being succeeded by agricultural production feeding the Lima markets. Therefore whereas the Andean provinces favour the development of regional policies and investments supporting mining activities, the decentralized Oxapampa Regional Government favour those promoting the agricultural and – in order to capitalize on their protected areas – tourism sectors. This raises critical questions as to the distribution of REDD funds among decentralised State bodies, highlighting the need to resolve inter-regional development agenda conflicts before resources can be targeted efficiently towards REDD-conducive region-wide activities.

4.3.2.2 Budgetary Increase & Regional Capacity

As part of the national decentralization drive under President Alejandro Toledo (2001-2006), a change in the tax system gave regional governments a greater share of mining proceeds. In Pasco, this led to a three-fold increase in the regional budget for the execution of projects which "surprised the institutions" because "they were not ready to administrate such volumes of money"[3]. This is felt to be largely down to a technical knowledge deficit among the Regional Government staff in their ability to design medium- to large-scale civil engineering projects, and further compounded by high staff turnover rates and lengthy administrative and consultative processes. The current system thereby favours populist projects such as temporary road improvements (e.g. filling in of craters on dirt

[2] Informant 1
[3] Informant 2

roads) rather than long-term, region-wide endeavours such as sewerage systems and treatment plants. Moreover, with attempts being made to direct available resources towards pressing regional health issues, among them the highest national rates of childhood morbidity[2], land use and forest governance issues have, to date, been largely sidelined at the regional level.

4.3.3 Private Land Use Governance

4.3.3.1 Land Use Classifications

The Peruvian State classifies private lands into five categories:

- A: Harvested crop: whole plant may be planted and removed (e.g. corn).
- C: Permanent crop: product or part of plant may be removed (e.g. coffee).
- P: Pasture: suitable for cattle pastures.
- F: Forest exploitation: trees and forest products may be removed but forest cover must remain.
- X: Protection: nothing may be removed.

Where land owners have forest cover over A, C or P lands, they must first be granted land use change permission from the State forest regulator, INRENA's (*Instituto Nacional de Recursos Naturales*, National Institute for Natural Resources) Forestry and Wildlife Department (*Forestal y Fauna Silvestre*, FFS), a representative of which is then obliged to oversee the requested change. Although the classifications allow for clear-cutting on lands designated A, C and P, the law requires that 30% of these lands must remain as arboreal cover (while not defining 'arboreal cover'). Further, while A, C and P lands are granted by

the State to individuals as private property, areas of F and X are granted as 'sessions in use', remaining the property of the State. Examples of areas which would be assigned as X are alluvial forests – to prevent erosion and run-off into waterways – and hilltops. However, the origins and enforceability of the land use categories call into question their value and applicability, with important implications for forest protection efforts.

The territorial ordering of the Central Selva undertaken following the PEPP in the 1980s divided lands and assigned their greatest capacity based on aerial photographs from the 1970s, with very little ground-truthing carried out to endorse the allocated categories[4]. This method and the subsequent divisions of land have drawn wide criticism from state and non-state actors alike[5], with one Oxapampa employee of INRENA FFS concluding that the classifications are "practically meaningless" and very difficult to apply in practice when in the field[6]. An illustration of the disparity between the classifications and ground realities can be drawn from the work of the State entity for the promotion of forest development, FONDEBOSQUE (*Fondo de Promocion del Desarrollo Forestal*). This institution maintains a forest species nursery and demonstration plot in Oxapampa, sells plantlings and offers forest plantation consultation services to land users. In a notable case during a field consultation, a FONDEBOSQUE engineer found land legally classified as A on a steep slope within the National Park buffer zone – having been erroneous classified through the aerial photography technique. As a result, and despite advice to the contrary, the land user was able legally to clear the forest and establish a monoculture pine plantation[7].

This, and numerous similar cases, has resulted in criticism of FONDEBOSQUE by NGOs as well as other State bodies, who allege that FONDEBOSQUE's primary objective is the promotion of exotic forest species plantations[8]. The recent completion of an

[4] Informants 5, 9
[5] Informants 1, 6, 14 18
[6] Informant 4
[7] Informant 6
[8] Informants 2, 5, 9, 10, 21

Ecological-Economic Zoning (EEZ) of the Province of Oxapampa, based on remote sensing and GIS technology, is hoped to enable the improved planning of future projects[9]. Nevertheless, the social (negotiation of land disputes), economic (compensation of parties) and logistical (travel to remote areas to GPS land boundaries) complexity of re-categorizing lands likely poses a logistical as well as legal barrier to the conceptualization of sustainable land use practices under REDD.

4.3.3.2 Land Use Compliance & Enforceability

Other than the appropriateness of the land use classifications is the local authorities' capacity to enforce their compliance. INRENA FFS is the entity within the Ministry of Agriculture responsible for the sustainable use of forest resources and wildlife through regulation and supervision. FFS has a local office in Oxapampa, the personnel of which are responsible for the oversight of forestry-related activities over four districts: Oxapampa, Chontabamba, Huancabamba and Pozuzo, covering roughly 18,000km^2 (shown in grey in figure 4.2). These regulatory responsibilities encompass both extractive activities and land use changes. In order to carry out any extractive activities – of forest or non-forest products (such as orchids or nuts) – from private or concessioned land, owners must submit a management plan to the local FFS office. Following review, FFS authorises or prohibits the proposed activities. A similar process of management plan submission applies for land use change proposals, for example where a land owner wishes to remove forest covering land denominated as A in order to plant a crop. If the land use change permission is granted, FFS are then required by the Forestry Law of 2000 to make a field visit to oversee the activity and ensure it is carried out within regulatory parameters.

[9] Informants 1, 2

Yet this broad remit is not reflected in the capacity assigned to FFS by the Ministry of Agriculture. The Oxapampa FFS office employs two people: one forest technician and an assistant. Because one person must remain in the office to attend to visits and correspondence, this apportions a field capacity of one person to cover an area of 18,000km^2. To do this, the office is allocated one motorbike for field inspections and an inadequate fuel budget[10]. This minimal field capacity has resulted in few visits taking place to oversee land use changes or ensure compliance with land classifications[11], with an FFS employee admitting that "99% of people burn without authorisation" and that it is not practical to fine offenders "because we would have to do it with almost all of the people"[12]. This lack of oversight has on several occasions meant that fires have previously become uncontrollable and cleared whole hillsides of forest[13].

Staffing details reveal further shortcomings. The technician is paid ~$400 per month, a salary described "not enough to live on" in order to support his wife and children[14]. Moreover, since the technician carries out field inspections unarmed and receives no insurance in case of accident or injury, there are widespread allegations of corruption and bribery for allowing the passage of illegally extracted timber, rather than attempting to sanction the perpetrators and risk violent confrontation[15]. In the case of finding illegally harvested timber, the FFS technician has previously had to borrow a truck from a NGO in order to transport it[16]. When the law has required sanctions or penalties for groups or individuals caught extracting illegally, the same NGO has had to pay for the fuelling of police vehicles in order for them to accompany the FFS technician to the field.

This acute lack of capacity and resources has been felt by local land users, among them claiming that widespread deforestation and forest degradation have taken place due to

[10] Informants 1, 4
[11] Informants 1, 11, 12, 13, 20
[12] Informant 4
[13] Informant 14
[14] Informant 12
[15] Informants 1, 2, 5, 12, 20
[16] Informant 12

the lack of authority and capacity of the institutions[17]. Yet other land users even claim to be unaware of the existence of INRENA, since they have never visited their community[18]. These capacity shortcomings also reflect salient implications for REDD governance. The lack of comprehensive land use monitoring facilities increases the demands of a REDD initiative due to the absence of a governance baseline to build from, suggesting that considerable time and resources would be required to design an original, functional monitoring regime. Additionally, a critical psychological barrier to REDD has been shaped by the disjuncture between the population and the State in land use matters – given that the population has not been subject to the power of the state and/or the rule of law – which would require bridging before land users respond to and engage in regulated REDD activities.

4.3.3.3 Property Titling Methodology

The Central Selva's colonial history and proximity to Lima have resulted in high levels of property ownership relative to other Amazonian regions of the country, with land prices close to populated centers such as Oxapampa having increased incrementally since the consolidation of private land ownership and rise in interest in reforestation plantations. However, lands in more remote parts of the region, such as the community of Agua Salada at the northernmost point of the western buffer zone of the National Park, have only recently been officially surveyed, delimited and titled.

The institution responsible for property titling is the Agency for the Formalization of Informal Property (*Organismo de Formalización de la Propiedad Informal*, COFOPRI), with the titling process beginning with the land user requesting a survey from this agency. When a COFOPRI technician arrives at the land they are responsible for defining the

[17] Informants 20, 23
[18] Informant 22

borders of the area to be titled using a hand-held GPS, before returning to the office to formalise the agreement and produce a land title certificate. Yet COFOPRI are alleged to have titled land areas using inaccurate methods[19], in the community of Agua Salada resulting in privately titled areas overlapping with the National Park boundary by up to 50ha[20]. This in turn brought about a lengthy conflict between land users, the protected areas authority (*Servicion Nacional de Areas Naturales Protegidas*, SERNANP) Oxapampa branch, and COFOPRI, with the State taking legal action against ten land users for invading protected land. The case was ultimately ruled in favour of the land users, allowing them to retain the land titled to them[21], but the episode resulted in a severe degradation of relations between community members and State institutions. In an effort to avoid future conflict, the SERNANP Oxapampa branch undertook a new delineation of the National Park boundary in November 2008. This incident serves to highlight an operational deficiency in COFOPRI, as well as the lack of communication and coordination (in this case the interchange of mapping data) between state institutions in the region. In this respect, REDD efforts face the dual challenges of improving coordination between State land use institutions and reconciling State-community relationships.

4.3.4 Protected Area Governance

SERNANP is the entity responsible for the management of protected areas across the country. At the national level, SERNANP formerly sat within INRENA (as *Areas Naturales Protegidas*, ANP), in the Ministry of Agriculture, but in 2008 was transferred into the newly formed Environment Ministry. The State took charge of the management of the Yanachaga Complex in 1996, previous to which it was administered by ProNaturaleza. Until 2009, the

[19] Informants 5, 8, 18, 20
[20] Informant 5
[21] Informant 7

SERNANP branch in Oxapampa solely administrated the three protected areas of the Complex (covering a total of 302,000ha) with a budget for only the Park. The passing of SERNANP into the Environment Ministry had the effect of empowering the protected area agenda and raising their national profile[22], translating down to the Central Selva in the form of each protected area (Yanachaga Chemillen National Park, Yanesha Communal Reserve and San Matias-San Carlos Protection Forest) receiving an individual manager. Nevertheless, a lack of regulatory framing of this process led to a series of hierarchical conflicts between the three managers, stemming from power struggles over overall control of the area as the Yanachaga Complex. Meanwhile the local field capacities of the protected area authorities remain minimal--five guards maintaining responsibility for the monitoring of all three areas. Moreover, with the farthest points of the San Matias-San Carlos Protection Forest one day's drive away from the SERNANP office in Oxapampa and a very limited fuel budget, the protected area guards are finding that there is a "constant illegal extraction of wood, on a daily basis" in those areas which they are unable to monitor[23]. In contrast, very little illegal extraction takes place within the National Park boundaries since its proximity to Oxapampa ensures more effective monitoring and deterrence[24].

An illustration of the inefficiencies in protected area enforcement is presented through a case where illegal timber extraction was intercepted in the San Matias-San Carlos Protection Forest. In the event, the only power the park keepers could exert was upon the offenders was to record their names and addresses, to be sent to the central SERNANP office in Lima for follow-up. The park keepers then proceeded to carry the timber to the nearest road and from there to the Oxapampa office, taking the entire team of park guards one month to complete. The lack of storage facilities forced them to stack the timber in the vehicle shelter, moving the vehicles into the open. With no procedure in place to deal with

[22] Informants 8, 18
[23] Informants 5, 7, 10
[24] Informants 1, 5

decommissioned timber, in 2008 the timber had been in the yard for five years, compounded by the accelerated deterioration of their vehicles due to constant subjection to the tropical heat and rain. This example is illustrative of a wider institutional failing in the region, namely the lack of communication and collaboration between the two state land use governance institutions in Oxapampa, FFS and SERNANP, in tackling illegal extractive activities. There appears to be a clear divide between the two institutions in addressing forest governance within and outside of protected areas, and no evidence of the two collaborating to tackle the issue in the region together[25]. The shortcomings of SERNANP Oxapampa appear further exacerbated by the position of branch director being cyclical and political in nature[26]. The position carries a relatively low salary (around $700 per month) but provides a stepping stone to other State appointments, which has resulted in a string of incumbents holding the post for an average of two years before moving on. The position is also politically appointed, with the SERNANP office director alleged to only be there "because he helped the Regional President win the election"[27]. This situation is likely to have hindered the development of an effective long-term vision and management plan for the institution.

The analysis of protected area governance arrangements offers important lessons for REDD efforts. The first is the disconnect between SERNANP and FFS in the monitoring and tackling of illegal activities in protected areas and their buffer zones. Although these two institutions now belong to separate ministries at the national level, REDD efforts would likely benefit from a strengthening of the connection between the two at the local level through the establishment of bilateral land use governance procedures. The second lesson for REDD here is the need for a long-term Regional conservation vision and committed leadership.

[25] Informants 3, 8, 18
[26] Informant 1, 8
[27] Informant 1

4.3.5 Roles of Non-State Actors

4.3.5.1 NGOs

There are a number of NGOs in the Selva Central region which have been involved with forests, conservation and other environmental issues. The most resource-intensive initiative to date was the inclusion of Yanachaga-Chemillen National Park in TNC's Parks in Peril program, partnered by ProNaturaleza. In 2005, this program culminated in the submission to the United Nations Framework Convention on Climate Change (UNFCCC) of a proposal for a Clean Development Mechanism (CDM) afforestation/reforestation (AR) project over the region. Yet the proposal was rejected due to a lack of methodological clarity[28] and TNC ended their presence in the area. Meanwhile, in the late 1990s and early 2000s, other NGOs such as Missouri Botanical Gardens and the Institute for the Common Good (*Instituto del Bien Comun*, IBC) had established a presence in the area, and there began a general and important shift in the focus of NGO work which reflected global conservation policy from 'fortress' to community-based conservation[29]. A major part of this shift was a change of focus of NGOs from the collection of scientific data to the elaboration of projects with a greater focus on local people and social development. This is exemplified by efforts to propose the Yanachaga Complex as a UNESCO Biosphere Reserve. The first effort was led by ProNaturaleza, almost exclusively focusing on conservation benefits, under the name 'Selva Central Biosphere Reserve'. This proposal focused on the environmental conservation benefits that this status would bring about, but was rejected by UNESCO. Subsequently, a second effort was led by IBC, in consultation with the local indigenous associations ANAP (*Apatyawaka Nampitsi Ashaninka Pichis*) and FECONAYA (*Federacion de Comunidades Nativas Yaneshas*), and the regional and municipal

[28] Informant 19
[29] Informants 1, 19

governments, under the name 'Oxapampa-Yanesha-Ashaninka Biosphere Reserve', highlighting the involvement of indigenous communities and the cultural benefits of the conservation program. Nevertheless, other than in this proposal grassroots and indigenous NGOs and associations have had little impact on land use governance.

The extent to which the benefits of the shift in the focus of NGO work towards community-based conservation have been felt by land users in the region appears less certain. While some land users have experienced some benefits from reforestation projects initiated by conservation NGOs[30], many others have experiences various projects come and go with little lasting effect[31]. The overall effect on land user attitudes appears to be a jaded and indifferent view of NGOs and their ability to make a lasting difference through their work. Perhaps the most significant role NGOs have played in the region is the generation of scientific data which the local State authorities would have no technical capacity to commission by their own means[32]. This information fed directly into the work of the regional government as it created the provincial EEZ, on the basis of which long-term development planning decisions may be taken. Therefore while the shift in NGO foci from science to social issues has provided an important recognition and inclusion of indigenous populations in regional land use planning, the considerable shift away from the generation of scientific data presents a challenge to the generation of sound REDD baseline and monitoring data.

4.3.5.2 Private Sector

Since colonial times the private sector, encompassing the trade of timber, wildlife and agricultural produce, has dominated and shaped the fate of the forests in the Central

[30] Informant 20
[31] Informants 22, 23
[32] Informants 1, 2

Selva (Bebbginton, 1990). At the peak of the region's timber production industry in the 1950s there were 28 sawmills in Oxapampa, of which two now remain working at half capacity[33]. As roads over the Andes to the coast were improved and paved, agricultural land expanded to feed Lima's growing demand for fresh produce. In the contemporary trade system intermediaries drive trucks along the road within the boundary of the western buffer zone of the Park several times a week. Land users harvest and package their produce in wooden boxes, stacking them on the roadside in anticipation of the buyers. These intermediaries set the price per box, according to supply and demand factors, and pay land users accordingly. The price offered to land users can vary each week and is non-negotiable, placing the producers in the powerless position, unconscious of each harvest's return. This in turn sparks rushes to clear areas to plant different types of produce when word reaches land users that alternative products are fetching higher market prices (restricted to plants which can grow at altitude), hindering the development of longer-term land use planning strategies. The power held by intermediaries is also alleged to have given rise to corrupt and nepotistic practices[34], where producers are offered different prices according to their relationship with the intermediary.

Over the past forty years, boom-and-bust cycles have shifted land use production patterns in response to market demands from pumpkin (*Cucurbita* spp.) to rocoto (*Capsicum pubescens*) to granadilla (*Passiflora ligularis*), each having distinct impacts on forests and land use. For instance, rocoto is widely believed by land users to grow best on freshly cleared primary forest[35], and thereby acts as a direct agent of deforestation. Granadilla, on the other hand, is able to grow on previously cleared areas such as cattle pastures[36], but requires a large number of wooden posts (~600 per ha) to suspend the vines on, so acts as an agent of considerable forest degradation.

[33] Informants 15, 16
[34] Informants 21, 22, 23
[35] Informants 12, 20, 22
[36] Informants 13, 20

The land use production and trade systems in place, in conjunction with the relative lack of State presence and regulation, have resulted in two notable outcomes. Firstly is the deforestation and degradation of all but the most inaccessible forested areas, with cropland – following forest burning – encroaching higher up hillsides with each passing season[37]. Secondly, this system has produced a form of private sector land use governance, where land users respond to the market and influence their surrounding landscape and forests accordingly. This latter aspect is being reinforced and exacerbated by the influx of investment in exotic tree species plantations, which in itself represents a response to a national market demand for construction timber[38]. A thorough understanding of local land economies and trade patterns are essential to the conceptualization of sub-national REDD initiative. By understanding the motivations and economics behind land use changes, contextualized alternatives can be offered to local populations.

4.4 Discussion

The overarching aim of this paper was to examine the local-scale forest governance challenges to REDD initiatives in the Central Selva, adopting a political ecology approach for the examination of human-environment relations. With Peru's REDD R-PIN falling short on identification of specific challenges facing REDD implementation and governance, this article sought to 1) depict historical constructions of current forest governance arrangements, 2) examine how political structures influence land use and 3) analyze the role of non-state actors in bringing about land use changes. Political ecology guided the analysis to untangle institutional linkages, social relationships and their impacts on land and forest use, while providing a critical recognition of scale and improving explanations of both societal dynamics and interrelations of social and ecological systems (Mauro, 2009). To this

[37] Informants 6, 13, 16
[38] Informants 15, 17

effect, political ecology illustrates how environmental changes in this frontier region of the Peruvian Amazon are intrinsically linked to political and economic processes which will influence the engagement of REDD initiatives.

This analysis identifies weak structures and institutions in the governance of land use and forests. Of the three bioregions in Peru – coast, highlands and rainforest – the Amazon has historically been the most removed from state influence (Gray, 1997). This work illustrates that this apparently remains the case even in the closest tropical forest region to the highly centralised capital. The case study region's modern history highlights the nature of exploitative activities which led to the present institutional and ecological conditions, while Pasco's geopolitical rift has played a significant role in preventing the formation of a common vision for modern regional development. Despite the region being targeted as a model for Amazonian development in the 1970s and 80s, the more recent decentralisation efforts have served to overwhelm the local authorities rather than empower them and kick-start a surge in infrastructure construction.

State presence in the region consists of a series of social relationships of power which are frequently changing, with administrations which wax and wane with elections, a territory far from under the State's control and a seemingly distant relationship with civil society which fluctuates between conflict and indifference. For REDD to truly succeed, a key component is the wide engagement of civil society, including consultation, dissemination of information and benefit sharing. The current general lack of trust and effective communications channels between the local population and the state therefore present significant governance challenges for REDD engagement.

There are several similarities and contrasts between FFS and SERNANP. They are both provided with minimal resources by the Ministry of Agriculture and the Environment Ministry, respectively, a situation which has prevented them from covering and fulfilling their geographical and logistical remits. This has led to moderate levels of governance in

areas proximate to their offices in Oxapampa, but entirely inadequate coverage, monitoring and regulation of forests and land uses further afield. SERNANP's comparatively greater field capacity of five park keepers – to FFS's one field technician – appears misplaced, given FFS's responsibility to regulate and oversee all land use changes and extractive activities on all private lands across four districts. There also appears to be a critical lack of communication between the two offices at present. The mandates of both of these institutions are central to effective REDD governance: conserving protected areas and ensuring compliance with land use regulations. State-led REDD would therefore greatly benefit from reinforcement strengthening of, as well as improved coordination between, the two institutions.

A lack of collaboration is also reflected by the network of NGOs in the region, which appear to have followed their own agendas in pursuit of central office mandates. This, in concert with inconsistent funding, has resulted in short-term projects and in turn in local populations experiencing initiatives come and go without a significant lasting impact and ultimately becoming skeptical of the ability of NGOs to improve their livelihoods. While the most significant contribution of the conservation NGOs may have been the provision of local data which has informed province-wide land zoning, the shift away from data-generation may slow the conceptualization of scientifically accountable REDD.

Land users are heavily reliant on national agricultural and timber markets for their livelihoods. The whims of the Lima market are felt locally, historically causing cycles of planting and harvesting products fetching the highest prices at the time. The system in place for the buying and selling of produce on the roadside puts the land users in a position where they are powerless to negotiate and easily the subjects of corrupt intermediaries. Because prices can vary substantially across seasons and even weeks, land users are often not in a position to be able to plan investments and land uses adequately, and are therefore vulnerable to becoming fixed in cycles of poverty. Effective and transparent REDD

theoretically presents an opportunity to rework this cycle through the provision of alternative livelihoods (cf. Springate-Baginski & Wollenberg, 2010), yet the extractive, market-focused mindset which has been shaped among local inhabitants over time could prove to be among the most robust challenges.

The findings of this study suggest that the Central Selva region is currently institutionally unequipped to undertake and govern a REDD initiative. With German funds for the reduction of deforestation being anticipated, it is critical that project developers put careful thought into both the actors and institutions to be benefitted, as well as and the means of capital distribution. Over protected area lands, it is clear that more capacity is required for effective governance of all three protected areas. Over private lands, it is the land users who shape the fate of the forests based on land economy, and a seriously under-capacitated FFS who are responsible for regulating these activities. Policy approaches for REDD over private lands must therefore consider the choice they face between carrot and stick strategies—to either reward them directly for their efforts in reducing deforestation or more closely regulate activities and sanction accordingly.

The complexity and multi-scalar nature of sub-national REDD requires close attention and response to local scale processes if it is to deliver on its full potential for climate change mitigation, biodiversity conservation and poverty alleviation. By exploring the ways in which local agents and processes respond to and engage with national and regional forces, analyses such as this one allow a granular scale understanding of the distinct challenges facing the mechanism's effective and efficient local implementation.

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CHAPTERS 4-5

Inter-Chapter Link

The previous chapter (Paper 1: *Preparing for REDD: Forest Governance Challenges in Peru's Central Selva*) examined land use governance at the first case study site, the Yanachaga-Chemillen National Park (YChNP) and its buffer zone, drawing out specific challenges for the engagement REDD(+) in this local and regional context. The findings revealed the importance of understanding historical and geographical influences on patterns of forest extraction and land use, and how these in turn present challenges and opportunities for REDD+. These findings naturally raise questions regarding land use governance at the second case study site, the buffer zone corridor between Manu National Park (MNP) and the Amarakaeri Communal Reserve (ACR).

The following chapter (Paper 2: : *Nature, People & Capital: Discourses Shaping Land Use Governance & Carbon Forestry Initiatives in the Peruvian Amazon*) examines how the perspectives and understandings of actors at work in the MNP-ACR buffer zone corridor have shaped land use governance and outcomes over time. In doing so, the chapter takes a post-structural turn within the overarching political ecology framework adopted in this work to examine and understand the nature of governance and its implications for REDD+.

CHAPTER 5

Nature, People & Capital: Discourses Shaping Land Use Governance & Carbon forestry Initiatives in the Peruvian Amazon

Joel N.H. Scriven, Frank Hajek, Diana M. Liverman

ABSTRACT

This paper analyses how distinctly different perspectives shape land use governance and emerging carbon forestry initiatives in the Peruvian Amazon. It does so by addressing critical knowledge gaps in the workings of local land use governance and emerging trade-offs in the implementation of systems of payments for ecosystem services (PES) across locally diverse socio-ecological contexts. We take a case study from the Manu-Amarakaeri buffer zone corridor in SE Peru to examine how nature conservation, social development and market-driven extraction discourses have dominated, competed and interacted to shape a highly heterogeneous biological, cultural and economic landscape in the study region. Three emerging carbon forestry (REDD+) initiatives in the region are analysed to expose their ideological foundations and the associated key challenges to their implementation. The paper concludes that discourses which have shaped local land use governance are intertwined and often non-distinct; approaches to designing carbon forestry initiatives should therefore endeavour to reflect this.

Keywords: Latin America, Peru, discourse, land use, environmental governance, carbon forestry, REDD+.

5.1 Introduction

Effective land use governance in tropical developing countries is challenging. Growing and competing demands for natural resources, agricultural space and ecosystem services continue to place pressure on the coupled social and ecological systems that all forest governance represents (Agrawal *et al.*, 2008). Historical constructions of land use, property rights regimes, local populations and national policies further complicate the path to efficient, transparent and accountable land use governance. There currently exists a critical lack of knowledge on the workings of local-scale land use governance arrangements which must be better understood in order to improve decision making at a variety of scales (Agrawal *et al.*, 2008).

Forest governance embraces increasingly broader approaches to managing forests including institutional arrangements that encompass regulation, markets, land tenure, community organization, public, private and NGO partnerships, and international, national, local and community scale activities. Amid this complexity, payments for ecosystem services (PES) have emerged as mechanisms "to translate external, non-market values of the environment into real financial incentives for local actors" to ensure the sustained provision of ecosystem services (Engel *et al.*, 2008). In particular, carbon forestry, aimed at the maintenance or increase of carbon stocks in forests, has come to international prominence as a cost effective strategy to mitigate rising atmospheric CO_2 concentrations (Stern *et al.*, 2006; IPCC, 2007; Eliasch, 2008), in the form of reduced emissions from deforestation and forest degradation (REDD), conservation, sustainable forest management (SFM) and enhancement of carbon stocks, collectively known as 'REDD+'. The speed at which these mechanisms have emerged at the policy-level are outpacing the rate at which local-scale land use governance arrangements can adapt to, and adopt, these measures. While a number of papers have evaluated local-scale equity and poverty alleviation outcomes of PES

schemes (Corbera *et al.*, 2007; Grieg-Gran *et al.*, 2005; Kerr, 2002; Pagiola *et al.*, 2008; Smith & Scherr 2003; Zbinden & Lee, 2005; Zilberman, 2008), fewer have examined their institutional and governance characteristics (Corbera & Brown, 2008; Vatn, 2010). This has created an important knowledge gap in the development of institutional arrangements for carbon forestry (Canadell & Raupach, 2008; Corbera & Brown, 2008; Vatn, 2010) and the emerging trade-offs in PES implementation across diverse and changing socio-ecological contexts (Kosoy & Corbera, 2010; Pagiola *et al.*, 2005).

The research presented here takes a case study from the Peruvian Amazon to illustrate the fundamental role played by discourses and historical contexts in shaping land use governance and emergent carbon forestry initiatives. The analysis of discourses constructs an explicit understanding of the interests and frames local actors apply to issues (Wolf & Klein, 2007) and can show how different perspectives and interpretations shape views on land use, environmental governance and, more specifically, carbon forestry (Bäckstrand & Lövbrand, 2006). This paper specifically aims to answer the following questions:

- How have different discourses shaped the views and practices of land use governance in the study region?
- How do the discourses interact?
- How have actors adopted these discourses to frame their ideas about carbon forestry initiatives?

This paper seeks to contribute to the scholarly literature and policy discussions through the triangulation of the discursive construction of land use, local experiences and material outcomes of these discourses, and the ways these then affect debates about carbon forestry initiatives, thereby advancing the understanding of payments for environmental services in theory and practice.

In the next section, we outline the approach taken to this research and describe the case study region and data collection methodology. In Section 5.3, we describe the discursive shaping of land use governance arrangements and the actors propagating each of the three discourses, paying particular attention to local experiences and perspectives, before unpacking the discursive interactions in Section 5.4. Section 5.5 then describes how ideas about carbon forestry have independently emerged from each of the discourses, highlighting the contradictions in efficiency versus equity trade-offs and grounding the approaches in the local context.

5.2 Research Approach & Case Study

5.2.1 Research Approach

The analysis is framed within the general approach of political ecology (Blaikie & Brookfield, 1987; Bryant & Bailey, 1997) which shows how interactions between institutions, individuals and nature shape landscapes and livelihoods within particular historical and geographical contexts. Although political ecology has been traditionally framed around political economy, scholars in the 1990s began to push the boundaries of the field into more post-structural directions, relying heavily on discourse theory (Escobar, 1996; Peet & Watts, 1996). Political ecologists have used discourse analysis to show how ideas, often associated with powerful actors, have shaped the governance of forests in places such as British Columbia (Braun, 2002), India (Robbins *et al.*, 2007), West Africa (Leach & Fairhead, 2001) and El Salvador (Hecht *et al.*, 2006).

This paper follows Humphreys (2009) in its use of the term ‘discourse’ to denote “a set of linked understandings and ideas that structure how people think about, interpret and understand the world”. Discourses thereby elucidate “how what is said fits into a network

that has its own history and conditions of existence" (Barrett, 1992). By defining the parameters within which social life is conducted, discourses facilitate and legitimise certain types of action while delimiting and constraining others. The shift from top-down, hierarchical regulation to inclusive, deliberative forms of new governance, where society and non-state actors exert their power to provide accountability and legitimacy (Fischer & Forester, 1993; Cashore, 2002), has given discourse a central role in shaping land use governance. Discourses have been shown to have a particularly influential role on Amazonian frontiers (Medina *et al.*, 2009), where they dominate debates on resource use by shaping perceptions about what is correct and socially acceptable, how resources should be used, and who can use them. Furthermore, the microcosm of competing and overlapping power-knowledge relationships represented in forest sequestration projects has illustrated the need for a "reflexive debate on the power, interests and values defining the dominant discursive framing" of carbon forestry initiatives (Bäckstrand & Lövbrand, 2006). The approach taken in this paper identifies discourses as powerful, structural ideologies which are shaping land use governance outcomes, with the aim of unpacking the reflexive relationship between local actors and these structures.

Governance is concerned with responsibility and accountability; it relates to decisions that grant power, characterise expectations or verify outcomes. Governance implies an exchange between actors in a system to define the interface between individual self-determination and State sovereignty (Görg, 2007), and the circumstances under which one takes precedence over the other. While governance structures the exercise of power and policy, it is through different instruments – such as geo-political governments (nation states), corporate or third sector governments (non-nation states) or socio-cultural governments (communities, families) – that governance is enacted. In practice, governance requires an institutional presence at the local level that is representative and efficient, with generally accepted and clearly defined representation, and measured through the exchange

between multiscalar structures and actors (Chabot, 2007). Land use governance specifically addresses the regulatory processes, mechanisms and organizations through which actors influence actions and outcomes (Lemos & Agrawal, 2006), and has become a central tenet of the global environmental change discourse (Roberts, 2008). In their review of global forest governance, Agrawal *et al.* (2008) highlight the presence of "major gaps in existing knowledge about the history and distribution of forest governance arrangements and in the understanding of how different features of governance affect outcomes". The research presented here aims to address this knowledge gap through a historically and geographically contextualised discursive analysis of multi-scalar land use governance arrangements in the SE Peruvian Amazon.

5.2.2 Case Study: Manu-Amarakaeri Buffer Zone Corridor, Madre de Dios, Peru

The Peruvian Amazon offers an important case for understanding the interaction between discourses and governance in the context of land use and the engagement of PES in these structures. The south-eastern region of Madre de Dios (MDD) lies at the base of the Andes, covering 85,000 km^2 – 15.4% of the Peruvian Amazon. Despite a long history of natural resource exploitation, 60% of MDD – self-titled "The Peruvian Capital of Biodiversity" – has been designated as protected. The region's extraordinary biodiversity is accompanied by a unique socio-cultural mix composed of native communities of multiple ethnicities and migrant settlers from the Andean highlands, known as *colonos*. The region has long been a site of human interest due to its wealth of natural resources, ranging from rubber to timber and hydrocarbons. This richness and diversity of natural resources, biodiversity and cultures has produced a variety of parallel and interweaving discourses which will be examined in this paper.

The study region is the corridor between the Manu National Park (MNP) and the Amarakaeri Communal Reserve (ACR) (figure 5.1). MNP was created to preserve a diverse range of ecosystems which it covers, encompassing highland grassland (4,000m amsl), cloud forest and lowland tropical forest (400m amsl) habitats. It is Peru's flagship rainforest National Park, covering over 1,600,000 ha, and stretches over two regions: the majority in MDD and 7% in the adjoining region of Cusco. The ACR was created in 2002 as a strategy to conserve the biodiversity, resources and history of indigenous ancestral territories. Covering just over 400,000 ha, it is entirely contained in MDD. This study focuses on the buffer zone corridor running between the two protected areas. The corridor starts in the Andean highlands of Cusco, District of Kosñipata, dropping down through montane forest of the Kosñipata Valley and reaching the lowland settlements of Pilcopata and Atalaya. As the corridor enters the region of Madre de Dios, Province of Manu, the Alto Madre de Dios River divides the buffer zone corridor as it flows north-eastward to join the Madre de Dios River at Boca Manu, where the corridor ends. The stated purpose of protected area buffer zones in Peru is to minimize human interference in the conservation objectives of the adjacent protected area, but receive no formal protection status to achieve these ends. Private properties and concessions are therefore granted within buffer zones.

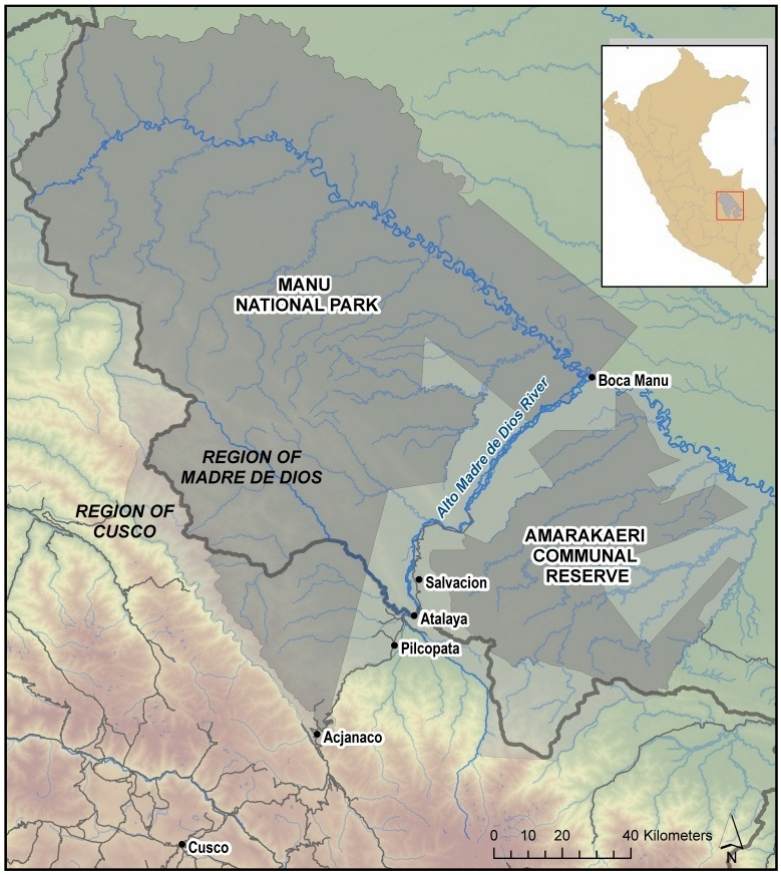

Fig. 5.1. MNP and ACR. Buffer zones of the protected areas are shown in lighter shade. Study region is the corridor formed between the two areas, from Acjanaco to Boca Manu (shapefiles courtesy of INRENA Madre de Dios, Puerto Maldonado).

A qualitative approach to data collection was adopted, based on semi-structured key informant interviews. 40 interviews were conducted with local and national government officials, NGO project directors, private sector actors and local land users. State, NGO and private sector interviewees were selected through a stakeholder analysis 'snowballing process' (cf. Grimble & Chan, 1995), where individuals interviewed were asked to identify other individuals and institutions with a stake in local land use governance and carbon forestry. Land users were selected by random sampling in the study area. Interviews were conducted in July 2008 and June-August 2009 across the study area and in the cities of Cusco, Lima and Puerto Maldonado. The content of interview transcripts was analysed with a focus on knowledge production, language and meaning (Fairclough, 1989), as well as local

reactions and experiences, to reveal local agency through discourse affirmation and resistance. Critical discourse analysis of texts was also undertaken, with themes identified through *a priori* knowledge derived from the literature conflated with knowledge gained from field observations. For each discourse we describe its historical origins, material and land use governance outcomes, and the reactions and resistance of local people to the discourse and its manifestations.

5.3 Discourses Shaping Land Use

5.3.1 Nature: Biological Conservation

The characterisation of the modern conservationist era began in the 1950s as post-war concerns for game and charismatic species captured the popular imagination. Concurrent emergent concerns over human population growth (Ehrlich, 1968), rates of resource consumption (Meadows *et al.*, 1972) and the threat of species extinctions (Terborgh, 1974) helped form a highly preservationist perspective towards biodiversity protection by the end of the 1960s. The associated conservationist ideology has been characterised by the goal of protecting all species, their subsequent genetic diversity, ecological interactions and evolutionary processes, and an exclusionary approach towards local human populations. Protectionist land use governance policies, most commonly in the form of protected areas, were implemented globally as a result of this discourse from the 1970s onwards, many in tropical developing countries where biologically rich ecosystems remained largely intact. Protected areas are still widely considered the most effective mechanisms for the protection of biodiversity (Jenkins & Joppa, 2009; Loucks *et al.*, 2008; UNEP-WCMC, 2008a), including the conservation of tropical forests (Gardner *et al.*, 2009). The Convention of Biological Diversity (CBD) enshrined the biological conservation

discourse into an international legally binding treaty for signatories at the Rio de Janeiro Earth Summit in 1992. Even while a powerful and well-documented social movement acted to include development concerns, such as local participation, into the conservation debate during the 1990s (Agrawal & Gibson, 1999; Arnold, 1990; Chambers & McBeth, 1992; Chitere, 1994; Naughton-Treeves *et al.*, 2005), many conservation advocates maintained their call for the need for strict protection of biodiversity (Brandon, 1995; Kramer *et al.*, 1997; Myers *et al.*, 2000). A more recent endorsement of the conservation discourse came from Locke and Dearden (2005), who claimed "it would be a mistake to put people at the very centre of protected area management (as advocated by proponents of the new paradigm) and thereby move nature to the periphery".

5.3.1.1 Discourse Manifestations in the Study Area

The biological conservation discourse has significantly influenced land use outcomes in the study region, most clearly in the establishment and maintenance of MNP. The earliest proponent of conservation in the area was Celestino Kalinowski, a taxidermist and biologist of Polish descent who had explored the western Amazonian region since his childhood (Shepard *et al.*, 2010). Alarmed by the rate of indiscriminate logging and hunting taking place, Kalinowski lobbied Felipe Benavides, a government official, to set the Manu River basin aside as a 'reserved zone' (Patterson *et al.*, 2006). Concurrently, the Peruvian government had hired the English naturalist Major Ian Grimwood to propose an area of pristine forest appropriate to be set aside as a National Park. Coincidentally, Kalinowski and Grimwood met in the Benavides' office in 1967, after which they embarked on a three-week expedition to Manu. On their return Grimwood made his recommendations and a year later the Manu basin was declared a national reserve and, in 1973, a National Park (MacQuarrie, 1992). In line with the biological conservation discourse, at this time missionaries, hunters

and loggers were expelled from the Park, and firearms and extractive activities prohibited – other than those adhering to indigenous subsistence lifestyles (Terborgh, 1999). Meanwhile, Manu's biodiversity began to attract international conservation NGOs, with the Frankfurt Zoological Society (FZS) entering the area in 1969 and donating funds for the building of a research station and supporting Park management. In 1977 UNESCO declared the National Park and its adjacent area a Biosphere Reserve; a decade later it was named a World Heritage Site. Among the other international designations it has received are Conservation International's 'Conservation Hotspot', WWF's '200 Eco-region', WWF/IUCN's 'Centre of Plant Diversity' and BirdLife's 'Endemic Bird Area'. To date more than 3,500 plant species, 800 bird species, 160 mammal species and 500,000 arthropod species have been identified within the Park (IUCN, 1987; UNEP-WCMC, 2008b). The Park is roughly shaped like an inverted teardrop, with its eastern border forming the western flank of the study region corridor.

Today, MNP is managed by a decentralised branch of the State Protected Areas authority (SERNANP, *Servicio Nacional de Areas Naturales Protegidas por el Estado*, National Service for Natural Areas Protected by the State) based in Cusco which employs 26 Park guards to patrol and survey the area, and whose ability to effectively protect the Park is significantly bolstered through the continued support of the FZS. The FZS assist the Park authority in developing strategic management and tourism plans, fund raising, biological monitoring and Park guard training, to achieve their institutional goals of biological research and conservation. The Park authority and FZS are thereby key propagators and enforcers of the biological conservation discourse.

The conservation of the Park's biodiversity has also attracted a self-reinforcing ally in ecotourism operators. To the east of the Park's eastern border in the cloud forest of Kosñipata, and along the mid-section of the western bank of the Alto Madre de Dios River in MDD, lie a series of properties on which research stations and tourism lodges have been

built. Since the lodge owners rely on the biodiversity to attract tourists, their self interest provides a powerful incentive to conserve the surrounding wildlife habitats. In doing so, they reproduce and empower the conservationist discourse propagated by the Park. Indeed, MNP itself promoted ecotourism by incorporating a previously denominated 'Reserved Zone' of the buffer zone along the lower Manu River into the formal Park area and designating a portion as a 'Touristic Use Zone' (see figure 5.2). Within this area, lodges and campsites which adhere to Park regulations may be established and accommodate tourists.

Further indications of the materialisation of the conservation discourse in land use outcomes is seen in conservation concessions, of which the conservation NGO ACCA (*Asociación para Conservación de la Cuenca Amazonica*, Association for the Conservation of the Amazon Basin) has been the primary propagator. At the most northerly end of the case study corridor lies the 145,000 ha Los Amigos Conservation Concession (LACC), Peru's first concession of this type, established in 2001 and managed by ACCA. The primary purpose of this area is the conservation of the Los Amigos River watershed's lowland tropical forest and increased biological knowledge through research. Using the experience gained in the creation of LACC, ACCA led the establishment of the 7,000 ha Haramba Queros Wachiperi Conservation Concession (HQWCC) in the Kosñipata Valley in 2008, with the aim of promoting and developing activities that maintain and protect the biodiversity of the conservation corridor running from the highland to lowland forest. The concession was created in coordination with the Queros indigenous community, comprised of 40 individuals, to whom management of the area was delegated. Several formerly active timber concessions also exist in the region, covering considerable tracts of now-degraded forest either side of the upper Alto Madre de Dios River (see figure 5.2). Some of these are reverting to the State due to contractual non-fulfilment on behalf of the concessionaires, as set out in their management plans, including non-payment of fees due. It is currently unclear

as to whether these concessions will remain as timber concessions, be converted to conservation or ecotourism concessions, or be abandoned for agricultural use.

From the account put forward here, it can be concluded that the predominant land use outcomes to emanate from the biological conservation discourse in the study region are relatively large, protected areas of tropical forest habitat, inherently designed with a view to minimize human interference in the natural systems. The influence of the discourse has spread beyond the borders of the Park to legitimise conservation concessions, and found mutually reinforcing and powerful allies in conservation NGOs as well as international ecotourism operating along the western flank of the Alto Madre de Dios River.

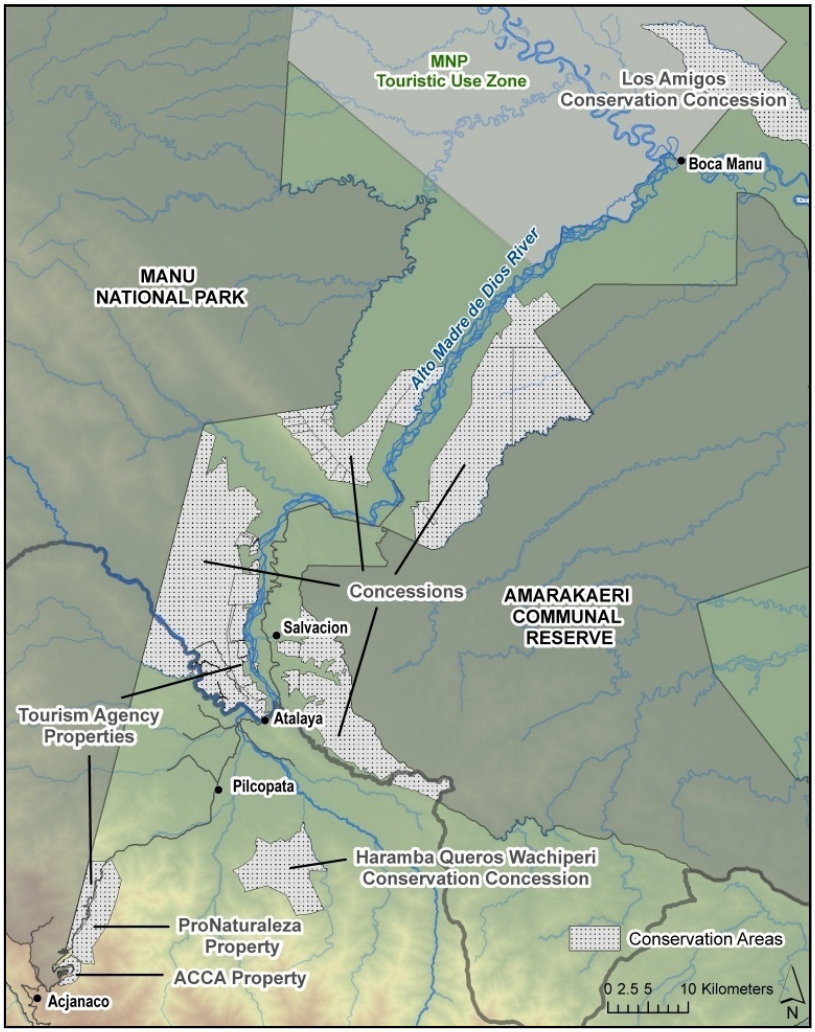

Fig. 5.2. Biological conservation land uses in the study region (shapefiles courtesy of INRENA Madre de Dios, Puerto Maldonado, and ACCA).

5.3.1.2 Critical Local Responses & Resistance to Conservation Discourses

Designated conservation areas have impacted local populations in profound ways. There is consensus among the leaders of the local municipalities surrounding the MNP that the exclusionary approach to conservation has prevented the population from accessing their natural resources:

> "... we consider it unfair for someone to say, 'Do not go in here', when there is a lot of poverty and many limitations here ... The only thing that Protected Areas here give us is a type of pat on the back, they say, 'That's great, well done'."[39]

> "The Park has not impacted at all on the development of the area ... the population does not see it as an opportunity for development, it is more like they see it as a hindrance."[40]

The sentiment that the MNP authority propagate the conservation discourse beyond the Park borders is corroborated by other local State employees: "they [the population] are already being prevented from amplifying their agriculture"[41]; "the Park no longer permits them [to clear forest]"[42], as well as by local land users: "The Park [authority] prohibits, they do not want us to cut the timber, so it is quite difficult"[43]. Highlighting the exclusionary nature of the Park as well as the geographical disjuncture between the authority's office location and the Park itself, one land user described how:

[39] Manu Municipality official, pers. comm., July 10, 2009
[40] Kosñipata Municipality official, pers. comm., July 24, 2009
[41] Manu Agrarian Agency official, pers. comm., July 10, 2009
[42] Manu forestry official, pers. comm., July 10, 2009
[43] Manu Province land user, pers. comm., June 28, 2009

> "... even though we can see the Park from our houses, we do not even have the opportunity to visit it. If we want to visit it we have to go to Cusco to ask. It is a disgrace for us and for the whole Province that we need to go ask permission to enter our National Park."[44]

The way in which tourism has developed around the Park has drawn criticism from local populations. In the montane forest region of the buffer zone (Kosñipata Valley, Region of Cusco), there are a series of private properties which border the Park, the first of which is owned by ACCA. Although the primary purpose of the facility is to accommodate scientists undertaking research on their private property, the NGO also allows the use their facilities by tourist groups. The next properties down the gradient are owned by Peruvian conservation NGOs ProNaturaleza (*Fundación Peruana para la Conservación de la Naturaleza*, Peruvian Foundation for Nature Conservation) and Peru Verde, the latter having built a popular tourist lodge on their property. Local government representatives in the Kosñipata municipality have perceived the NGOs as having come to the area to "work on some activity or other, and afterwards turn into tourism operators or become owners of some of our large properties"[45].

Downriver of the port settlement of Atalaya – as the buffer zone corridor enters Madre de Dios – a key land use governance impact on local people becomes evident. As the Alto Madre de Dios River divides the buffer zone corridor, the road continues – running parallel – to the east of the river. This has resulted in migrant settlements being established along the eastern flank of the river and rendering the western flank – where the private tourism properties are located – accessible only by boat. While this has helped ensure effective conservation of the tourism properties, it has isolated local populations of the upper section of the river from the tourism (and capital) which arrives in the area: "they [tourists]

[44] Manu Province land user, pers. comm., July 20, 2008
[45] Kosñipata Municipality Official, pers. comm., July 24, 2009

go along the river, they don't come here … to capture tourism you have to build a lodge, protect the forest"[46].

The creation of conservation concessions in the study region has also upset local governments. Local government representatives feel that both the motivations and methods used to acquire the areas have been inappropriate, claiming that ACCA's "ultra-conservationist attitude"[47] that views people as obstacles to forest protection has propelled its strategies of purchasing properties and acquiring concessions for exclusive conservation. In applying for a third (62,000 ha) conservation concession in Kosñipata in 2006 – which was ultimately unsuccessful – local authorities claim to not have been consulted or informed prior to or during ACCA's application process in Lima[48]. The Municipality of Kosñipata subsequently lobbied Congress and the Peruvian Agency for International Cooperation to undertake an inquiry into the issue, while the MNP Management Committee and a General Assembly in Pilcopata called for the expulsion of the NGO from the area. In response to these criticisms, ACCA has more recently adopted policies of local inclusion including environmental education and micro-business projects in the Kosñipata Valley. This is indicative of shifting power relations driving an emergent reflexive structure-agency relationship.

5.3.2 People: Social Development

The broader social development discourse places people at the centre of development, characterised by a central concern for addressing human needs and enhancing well-being (UN, 1969). While the existence of several contested normative approaches has suppressed a singularity of purpose (Midgley, 2003), social development values are widely

[46] Kosñipata District land user, pers. comm., July 25, 2009
[47] Kosñipata Municipality Official, pers. comm., June 22, 2009
[48] Kosñipata Municipality Official, pers. comm., July 24, 2009

accepted to encompass concepts of equality, popular participation and empowerment (Elliot, 1993; Falk, 1981; Omer, 1979). The concern with social development emerged in the 1950s in the United Nations' policies to alleviate poverty in developing countries, and came to prominence as a result of the UN's 1995 World Summit on Social Development in Copenhagen, where 117 heads of state pledged their commitment to a number of global social concerns ranging from poverty to social integration (UN, 1996). The principal actors propagating these ideas globally are the foreign aid organizations of developed country governments, multilateral development agencies such as the World Bank, and development NGOs operating in developing countries. In many countries the State's role in social development has been reduced due to shifts towards neoliberal policies, fiscal difficulties, debt and limited technical and institutional capacity (Midgley, 2003). Nevertheless, national governments maintain a social development narrative in response to political constituencies.

5.3.2.1 Discourse Manifestations in the Study Area

A social development discourse, acting to address human needs and enhance well-being, has played a central role in the assignment of land rights in the region, the drivers and outcomes of which have varied according to ethnicity. Local populations in the study region can be broadly divided into indigenous people and *colonos* – Andean migrant settlers, generally of Quechuan or mestizo descent.

Indigenous claims for land rights and social development are significant in the region. Far from being a wilderness, human habitation in and around the study region is estimated to date back least three millennia (Huertas & Garcia, 2003). While the unsuccessful Incan efforts to conquer lowland Amazonia caused little disturbance to the area, the search for natural resources by European colonisers in latter half of the 19th century brought disease and oppression to the region which decimated and displaced indigenous

populations (Shepard *et al.*, 2010). The survivors assimilated and intermarried with other groups (Lyon, 1975), resulting in only a vague picture of the territories originally occupied by the different ethnic groups. Today, the study region corridor contains seven indigenous communities, representing three ethnicities: Harakmbut, Machiguenga and Yine: Queros (Harakmbut), Santa Rosa de Huacaria (Machigenga, Harakmbut and Quechua), Palotoa-Teparo (Machiguenga), Shintuya (Harakmbut), Shipetiari (Machiguenga), Diamante (Yine and Machiguenga) and Isla de los Valles (Yine and mestizo).

The indigenous social development discourse has been primarily propagated by NGOs, comprising regional and local collective action indigenous organizations and national development NGOs. FENAMAD (*Federación Nativa del Rio Madre de Dios y Afluentes*, Native Federation of the Madre de Dios River and its Tributaries) was formed in 1982 to represent the indigenous population of the region of Madre de Dios. This was followed a decade later – in a bid to provide better organization for the Harakmbut communities – by the creation of COHARYIMA (*Consejo Harakmbut,Yine y Machiguenga*, the Harakmbut, Yine and Machiguenga Council) after incorporating these other ethnicities into the institution. Meanwhile, the national NGO at the forefront of the advancement of indigenous territorial rights in the region has been CEDIA (*Centro para el Desarrollo del Indigena Amazonico*, Centre for the Development of the Indigenous People of the Amazon), which operates in seven Amazonian regions and began its work in the study region in 1992. The indigenous organizations and CEDIA have undertaken processes which have lead to important land use governance outcomes.

Firstly, indigenous organizations were central in the creation of the ACR, which forms the eastern boundary of the study region corridor. In response to concerns raised by Harakmbut communities in 1986 regarding the need to conserve their ancestral territories, FENAMAD formalised and submitted a request for the creation of a communal reserve to the State in 1990. Over the next decade FENAMAD and COHARYIMA negotiated with the

national protected areas authority and ultimately created the 402,000 ha ACR in 2002. A co-management agreement was signed between MNP authorities (IANP-INRENA, now SERNANP), and the eight communities surrounding it (Shintuya, Shipetiari, Diamante, Boca Isirioe, San Jose del Karene, Puerto Luz, Barranco Chico and Puerto Azul). The ACR has a SERNANP head and an indigenous community head of the ECA (*Ejecutor del Contrato de Administracion*, Contract Administration Officer), who is accountable to the representatives of the eight communities. The ACR protects a central part of the Harakmbut territory, containing sites of religious importance, a cemetery and ancient tracks which connect the surrounding communities. In addition to its cultural value, indigenous community members may use the area to sustain their livelihoods through fishing and hunting (Parks Watch, 2003). The creation and granting of the management rights of the ACR to indigenous communities capture key social development themes such as the recognition of historical socio-cultural rights and local empowerment and participation, and highlights the centrality of the role played by land use in achieving these ends in the study region.

The second important land use outcome to emerge from the indigenous social development discourse is the creation of indigenous community territories. In an effort to organise rainforest space through a legal regulatory process of land ownership, the state approved two laws in the 1970s (the 1974 Native Communities Law (D.L. 20-653) and 1978 Native Communities Law (D.L. 22-175)) which introduced the 'Native Community' concept to legally recognise the territorial rights of indigenous people (Rosengren, 1987). Subsequent to the latter law, CEDIA was founded and became a central proponent of indigenous social development through territorial organization, leading the legal recognition and titling of indigenous communities' territories in the study region. Today, these territories constitute a significant proportion of the corridor, with the communities respectively owning: Queros: 2,924 ha; Santa Rosa de Huacaria: 38,133 ha (28,000 ha of which lies

within MNP); Palotoa-Teparo: 11,865 ha; Shintuya: 16,652 ha; Shipetiari: 25,895 ha; Diamante: 23,234 ha; Isla de los Valles: 5,249 ha (INRENA 2005) (see figure 5.3).

The social development discourse has also shaped the construction of land rights appropriated to the migrant *colono* population. *Colonos* first began to settle in the study region in the 1940s, driven to the lowlands by the prospect of improved livelihoods through extractive activities (Isenrich and Degregori, 2003). While loggers moved progressively further down the Alto Madre de Dios River in search of timber, much of the settlement took place in the Kosñipata Valley and the upper eastern flank of the Alto Madre de Dios River. This pattern can be explained by the deterioration in quality of both soils and transport routes the further one travels into the lowlands and away from rivers, incentivising the agricultural settlers to remain at the base of the Andes and along riverbanks. As local State agrarian and forestry authorities were established in the area (in Pilcopata to cover the District of Kosñipata, and Salvacion to cover the Districts of Madre de Dios and Manu), they began to use their limited capacity to recognise the rights of the settlers by granting them private properties. This has resulted in private property consolidation in the lower Kosñipata Valley and eastern flank of the Alto Madre de Dios River.

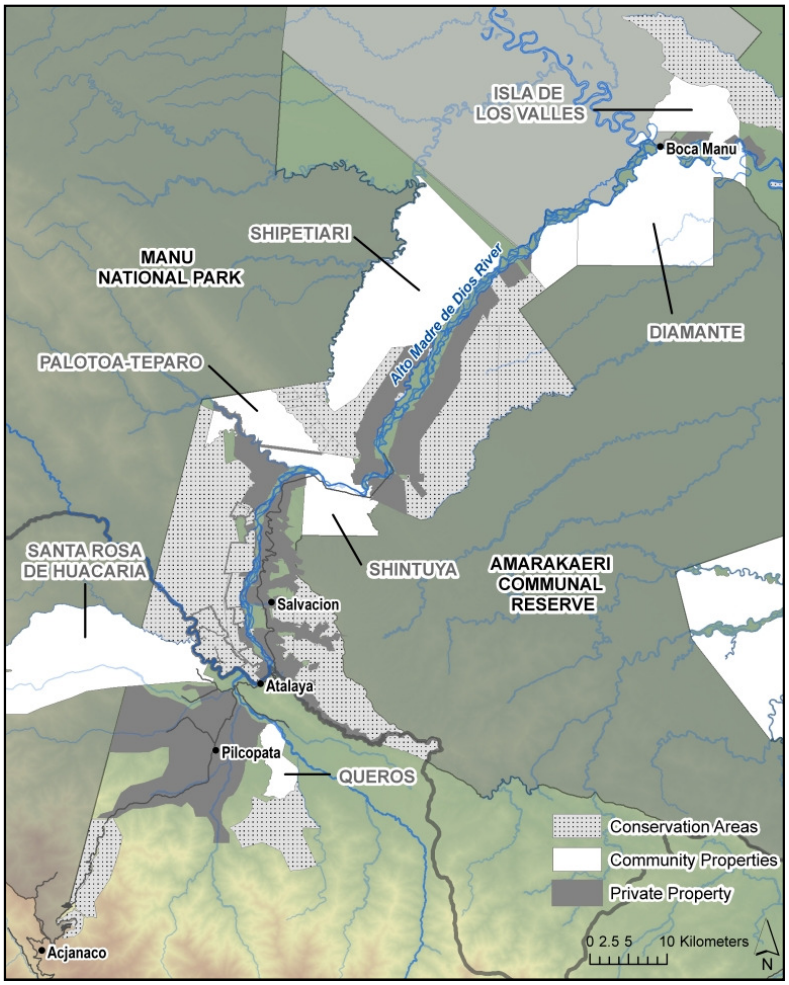

Fig. 5.3. All land uses in the study region (shapefiles courtesy of INRENA Madre de Dios, Puerto Maldonado, and ACCA).

5.3.2.2 Critical Local Responses & Resistance to Social Development Discourses

The ACR has divided public opinion – perhaps not surprisingly – between those who are and are not entitled to use the area. While the indigenous communities surrounding the area benefit from the wildlife they are able to extract from the Reserve – particularly because of the putative lack of fish elsewhere[49] – they have also sought to capitalise upon its biodiversity by forming a communal tourism company, Wanamei. Each of the Amarakaeri communities owns an equal share in the company and profits are divided equally between them. From the indigenous perspective then, the ACR has conserved heritage, wildlife and

[49] Manu Province indigenous community member, pers. comm., July 19, 2009

provided the prospect of income through tourism, a member of the Shintuya community asserting "the creation of the Reserve was important … if not there would be an invasion now, [by] a lot of *colonos*"[50]. The communities feel entitled to the properties granted to them, although there are concerns among NGOs and local authorities that these inhibit their historical nomadic hunter-gatherer lifestyles, forcing them to settle as communities and adopt agricultural practices alien to their cultures.

A common *colono* perspective of the ACR is that, as with MNP, it constitutes a significant restriction to their land use activities:

> "... all of this flank on the right has been closed off by the Amarakaeri Reserve, and on the other side is the Manu Biosphere Reserve, so there are no lands left."[51]

> "... the area left for agriculture and all the other activities is very small."[52]

According to the Mayor of Salvacion, this situation is compounded by the expansive territories owned by indigenous communities:

> "... here the [indigenous] communities are closing in on the *colono* communities ... the conflicts that are taking place are over territories. We have eight native communities who have large extensions of titled land. Good for them. But added to that are other Communal Reserves which are also given to them. So where are we, the *colonos*? On the shore and in the current of the Alto Madre de Dios River!"[53]

In the lower Kosñipata Valley, the consolidation of properties has brought about social tensions due to the lack of land available for second generation *colonos*. A result has

[50] Manu Province indigenous community member, pers. comm., August 9, 2009
[51] Manu Province land user, pers. comm., June 26, 2009
[52] Madre de Dios Regional Government official, pers. comm., July 22, 2008
[53] Manu Municipality Official, pers. comm., July 22, 2008

been the formation of group called Landless Youngsters ("*Jovenes Sin Tierra*"), which demands the redistribution of lands and encourages the illegal and forceful occupation of private properties. There is agreement among local authorities that continued current trends of migration from the highlands to the lowlands, compounded by the lack of available agricultural lands, will lead to the population presenting a risk to themselves, as well as to the protected areas. A further experience gleaned from the *colono* contingent of the social development discourse is one of slow State bureaucracy and limited capacity, with one land user waiting 10 years to receive his land title.

5.3.3 Capital: Market-Driven Extraction

The extractivist discourse is usually seen to derive from neoliberalism, the hegemonic contemporary ideology advocating capitalist free markets whose theoretical origins can be traced back to Hayek (1944) and Friedman (1962). The philosophy adopted 18th century values of unrestricted trade and reduced government intervention (Smith, 1776) while drawing on the liberal economics notion that the competition generated by individuals in the market place brings about the greatest collective good. However, neoliberalism's unsettled ontology – emphasising competition between market actors for resources on one hand and cooperation through codes of practice on the other – causes it to produce uneven outcomes that vary according to social, economic and geographical contexts (Humphreys, 2009; Liverman & Vilas, 2006). The widespread adoption of neoliberal ideology fundamentally restructured human-environment relations by placing natural resources under the auspices of the self-regulating market (McCarthy & Prudham, 2004). In practice, proponents of resource markets draw on extractivist discourses as justification for land uses that often have destructive consequences.

5.3.3.1 Discourse Manifestations in the Study Area

It is important to note that market-driven extraction in the study region dates back at least as far as the height of the Inca civilisation, when indigenous Amazonian groups engaged in trade with Andean populations (Lathrap, 1973). Roads extended into the Kosñipata Valley where the Inca – and later the Spanish – maintained coca (*Erythroxylaceae coca*) plantations and gold mines (Shepard *et al.*, 2010). There was a great expansion of coca production under the Spanish, the product – dried coca leaves – sent to fuel productivity in the Andean silver mines as well as being used as currency (Isenrich & Degregori, 2003). However, following widespread infestation of the species in 1808, many of the plantations, or haciendas, turned to sugarcane (*Saccharum* spp.) production – driven by the Cusquenian demand for the alcohol it produced, *aguardiente*. The first drastic change to the extractive landscape, though, was marked by the discovery of vulcanisation by Charles Goodyear in 1839, which brought about the 'Rubber Boom' from 1895-1917. North American and European demand for latex from *Hevea* spp. – at that point only existent in Amazonia – drove the deeper penetration into the Madre de Dios lowlands than had previously been achieved by non-indigenous people, in search of rubber trees. It was this incursion that brought disease and oppression to indigenous people (described above), who were forced into labour in rubber camps (Shepard *et al.*, 2010). This period was brought to an end in 1917 following the drop in latex prices driven by British rubber plantations in Malaysia – save for a brief recurrence of rubber demand during World War II (Coomes & Barham, 1994). Concurrently, the opening of the first road through the Kosñipata Valley to the Alto Madre de Dios River in the 1940s lead to the arrival of large numbers of loggers seeking fine timber, specifically Spanish cedar (*Cedrella odorata*) and mahogany (*Swietenia macrophylla*). The 1950s saw the closing of the haciendas as a result of agrarian reform and being outcompeted by coastal operations, with the workers setting up cooperatives to

manage the lands themselves. President Belaunde's policies in the late 1960s, designed to "conquer, occupy and exploit the Amazon" (Dourojeanni, 2001), lead to the extension of the penetrative road up to the indigenous community of Shintuya and the arrival of more *colonos* to the region, bringing about a second wave of (lower value) timber extraction. The creation of MNP and its declaration as a site of global biodiversity importance lead to the expulsion of extractors from within its boundaries and the banning of the use of chainsaws in the early 1990s (Isenrich & Degregori, 2003). Meanwhile, the cooperatives broke down in the 1980s and gave way to independent agriculture on smaller holdings, the *colonos* instead opting to organise themselves into community or producer associations. The entrance of traders from Cusco into the area facilitated the creation of a market-driven agriculture, for export to the highlands, in the late 1990s.

This history has produced a heterogeneous modern extractive landscape in the Manu-Amarakaeri corridor. Extractive land use in the lower Kosñipata Valley is typically small-scale, but maintains resemblances to Incan and colonial practices in the continued presence of coca, crops of which are estimated to cover up to 400 ha. Other common crops grown for export in the area are banana (*Musa* spp.) and pineapple (*Ananas comosus*), while others such as yuca (*Manihot esculenta*), maize (*Zea mays*) and rice (*Oryza* spp.) are grown for auto-consumption or sale in local markets. There are also areas of pasture used for small-scale cattle ranching; the meat usually being sold locally. The application of Andean agricultural techniques in the lowlands by *colonos* has lead to the near-ubiquitous practice of swidden-fallow agriculture – as found in the Peruvian Amazon by others (Coomes *et al.*, 2000) – including slash-and-burn prior to planting. The extraction of timber also continues in the lower Kosñipata Valley, albeit of low-value species locally referred to as 'common' ('corriente'), which feeds highland construction markets. Extractive land uses continue largely unchanged in the *colono* private properties down the eastern flank of the Alto Madre de Dios River, the notable difference being the comparative absence of coca. The promotion

of extractive markets has also influenced land use practices within several of the indigenous community properties, who have fed the market with timber and agricultural products from their lands. Timber extraction, targeting hardwood species such as 'tornillo' (*Cedrelinga catenaeformis*) (following the exhaustion of cedar and mahogany) as well as common species, dominates extractive activities from the settlement of Itahuania to the northern end of the corridor, areas from where the export of agricultural produce becomes less efficient due to poor overland access. The extraction of natural gas is a final (and as yet unrealised) activity, brought about through the Peruvian State's ownership of all subsoil property and it's granting of hydrocarbon exploration concessions, or lots, to energy companies. Lot 76 covers much of the ACR and several indigenous communities' lands, as well as other private properties within the study region (figure 5.4). Texas-based Hunt Oil was granted the contract for hydrocarbon exploration and extraction in 2006 and in 2009 began seismic exploration of the area.

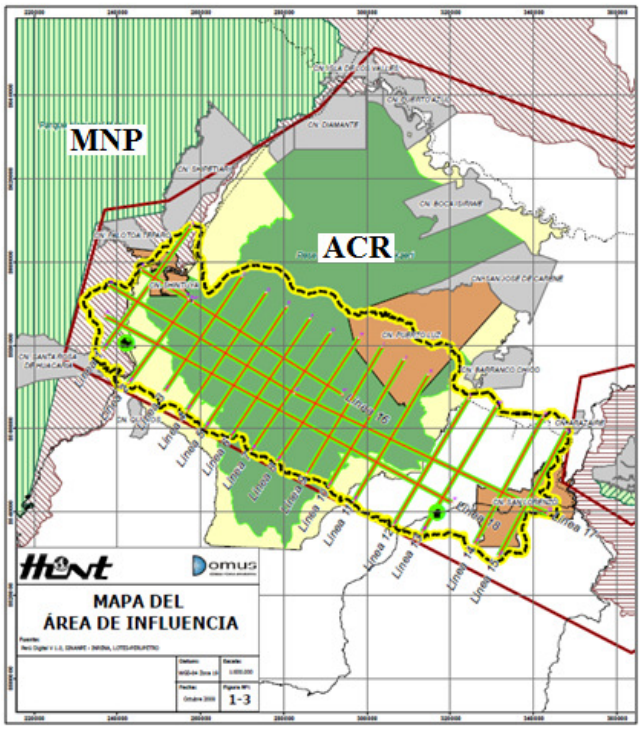

Fig. 5.4. Lot 76 hydrocarbon concession (adapted from DOMUS, 2008).

While the principle drivers of the extractive discourse are the markets, it is most often the traders, or intermediaries, who transport both the knowledge of market demands to the producers as well as the products to the markets. Locally, the State directs a proportion of its limited capacity towards regulating and improving the efficiency of extractive activities in a bid to generate wealth in the area, with an agrarian agency and a forestry authority office in each of the two District capitals, Pilcopata and Salvacion. In addition, the municipality of Kosñipata and regional government of Madre de Dios are promoting the adoption of agroforestry practices among their populations through the gifting of banana plants and tree saplings. NGOs have also propagated the market discourse, with efforts dating back to ProNaturaleza's land ordering and reforestation projects in the 1990s and culminating in the large-scale ProManu project (1998-2004), a joint EU-Peru program which promoted efficient land management practices, reforestation and introduced the pineapple crop to the region. More recently, the NGO DRIS (*Desarrollo Rural Sustentable*, Sustainable Rural Development) has worked in the area since 2006 with *colono* associations and indigenous communities on reforestation, rearing of small animals (chickens and guinea pigs) and agricultural commercialisation. These State and non-State efforts have lead to widespread adoption of reforestation by *colonos*, both in plantation and agroforestry systems, primarily with a view to harvesting the timber after 10 to 15 years. The prospect of profiting from reforestation has also attracted a private company, Renuebo (*Empresa Reforestadora Nuevo Bosque*, New Forest Reforestation Company), which began buying lands and establishing plantations of the native species 'bolaina' (*Guazuma crinita*) in 2006 between Itahuania and Nuevo Eden.

5.3.3.2 Critical Local Responses & Resistance to Market Discourses

The abundance of timber in the region when the first generation of *colonos* arrived in the 1970s and '80s led to many people exclusively deriving their livelihoods from its extraction: "for 20 years I have fed my children by cutting trees, my children grew on timber"[54]. The fast returns that could be made from the sale of timber in comparison to agriculture drove many of the settlers progressively further down the Alto Madre de Dios River in search of valuable species, a result of which was the adoption of extractive practices by indigenous communities. Today, with the State forestry authority minimally staffed – two people control activities over ~28,000km^2 – the majority of timber extraction takes place informally on private lands, often through the laundering of legal extraction permits. There are also concerns that a lack of capacity of the ACR administrators is allowing illegal timber extraction from the Reserve. Another illegal activity is the production of cocaine paste from the coca plants grown in the Kosñipata Valley, principally around the settlement of Patria, upstream from Pilcopata. Coca plantations and improvised processing 'laboratories' have been found within the borders of MNP in the cloud forest (a 1992 UN report identifies MNP as a site of "probable invasion" to which particular attention should be paid [Dourojeanni, 1992]), the activity becoming of increasing concern to the Kosñipata populace and authorities in Madre de Dios fearing its spread into the lowlands.

Meanwhile, agricultural products – principally banana – are grown on small plots from Pilcopata to Itahuania for export to Cusco. However, the acidic soils in the lowlands make agriculture difficult, with poor yields and prevalent crop diseases further compounded by the low prices offered by intermediaries, bringing about a situation where small-scale land users are "slaves to their 1 or 2 has"[55]. These circumstances have also created a subsistence agriculture where land users are not able to accumulate capital, and are forced to

[54] Manu Province official, pers. comm., July 22, 2008
[55] Kosñipata District land user, pers. comm., July 25, 2009

turn to timber extraction to gain additional income. The local State agrarian agencies, with their equivalent capacity to the forestry authority of two people, and a lack of mobility, are largely unable to reach, assist or advise the population on agricultural improvement. In addition, the adoption of extractive practices by indigenous communities has lead to changes in their traditional lifestyles. The community of Shintuya, for example, is described as being in "an accelerated process of decomposition"[56] following extensive timber extraction from their communal land and the individualisation of land parcels for agriculture.

NGOs have sought to improve livelihoods through agricultural practices. While some efforts, such as ProNaturaleza's reforestation, have brought about a change in attitude in participants – after seeing that profits can be made over the medium-term through reforestation – other initiatives are felt by locals to have lacked contextualisation, capacity and follow-up. The ProManu project is regarded by local authorities to have focused too heavily on institutional strengthening of MNP and too little on local government, while the improved efficiency agricultural techniques demonstrated to land users appeared to be removed from their reality. An example of this is the technique for producing rice in wells. Where previously land users planted, weeded and harvested rice on land, the new technique required them to dig and maintain wells and irrigation systems, regulate water levels and manage sanitation issues. Therefore, although the technique produced higher yields, it proved unpopular with land users and was not widely adopted.

There is also evidence of a lack of social adjustment in the work of DRIS, the most salient of which is their methods of engaging Quechuan communities. DRIS work with highland and lowland populations on their agricultural programs, with a preference for engaging with community associations. In the Andes people live communally, sharing scarce water supplies and producing on communal land. Community members are expected to attend regular community meetings, known as *faenas*, and are penalised for non-

[56] NGO employee, pers. comm., August 3, 2009

attendance through a reduction in their personal water or land quota. The close living arrangements and scarcity of resources therefore allow and impulse regular participation in community matters. In the lowlands, as *colonos*, Quechuans have sought to arrange themselves communally or as associations, but to little effect. *Colonos*, for the most part, settle along roads as they arrive in the lowlands and occupy far larger areas than they do in the highlands. When *faenas* are called, members therefore have to travel far and have little incentive to do so, given the abundance of water and land available to them in the lowlands. When DRIS came to the area they began establishing communal biogardens, only to find there was little follow-up by the participants: "they say that it has to be done in a communal way, without knowing how this area is, how things are done"[57]. Apart from this, in several cases *colonos* have found the support they have received insufficient to warrant the time taken by their participation:

> "... you lose a whole day to be given 20 plants. If you could get 300 plants in a *faena* then I would be happy."[58]

> "... the project supports you, they give you the plant. You reforest it and the project disappears and the plants have died. There is no follow-up."[59]

The prospect of hydrocarbon exploration in the region has divided local opinion. In light of capacity deficiencies and limitations on the wealth-creating opportunities, local authorities and several indigenous communities see it as an opportunity for social and economic development of the region. Others, including the remaining indigenous communities, tourism advocates and NGOs, claim there has been no clear information from

[57] Manu Province land user A, pers. comm., July 10, 2009
[58] Manu Province land user B, pers. comm., July 10, 2009
[59] Manu Province land user, pers. comm., June 28, 2009

the company as to their exploration intentions, and see it as a threat to the way of life and sustainable development in the area.

5.4 Discursive Interplay

Some discourses produce clearly defined land use outcomes, often as a result of being embedded in powerful institutions, as was the case with the State creation of MNP. In many cases, however, land use outcomes are shaped by the interaction between discourses, three prominent examples of which are illustrated here.

The ACR was created as a result of calls from Harakmbut communities for protection of their ancestral lands, with roots in the social development discourse. Concurrently, the creation of the area played directly into the conservation ideology by the limitation of extractive activities in a Conservation International 'Biodiversity Hotspot' and the extended continuity of the Vilcabamba-Amboro Conservation Corridor. The conservation of the area also facilitated and legitimised the creation of the communal tourism company, Wanamei, which in turn feeds back into the social development discourse through capital accumulation. Moreover, although a limited amount of fishing and hunting is permitted within the ACR by communities for subsistence, extractive market demands are pressing in on the area in the form of logging and gold mining (Galvin & Thorndahl, 2005), propagated by *colonos* as well as indigenous people.

Secondly, while the large properties titled to indigenous communities were legitimised by the recognition of indigenous rights, the spreading of knowledge of the extractive discourse allowed communities to learn of markets for natural resources and possibilities for agency and capital accumulation. This process was facilitated through the national government's propagation of the extractive discourse, bringing about increased

rates of Andean migration as well as extension of the road which allowed the export of products.

A third case of discursive interplay is apparent in the efforts of some NGOs, such as DRIS. The objective of the NGO, as suggested by its name, is rural development: enhancing the well-being of the population, as centrally posited by systems of thought of the social development discourse. The way it has sought to legitimise its objective is through the propagation of the extractive discourse, though capacity limitations have prevented effective deployment of the strategy.

Understanding the ways in which discourses interact provides an insight to the ways in which different ideologies have contended, collided and influenced one another over time. This is significant given that resultant land use outcomes are therefore often driven by dynamic power struggles over resources as well as meanings.

5.5 Discursive Shaping of Carbon Forestry Initiatives

Proposals for payments for ecosystem services (PES) in this region, and specifically carbon forestry, can be seen as a meeting point of the three discourses discussed above. At its foundation the concept emerges from the neoliberal discourse, advocating the commodification of nature and drawing on concepts from free-market environmentalism and ecological modernisation (Costanza *et al.*, 1997; Gómez-Baggethun *et al.*, 2010; Liverman, 2009; Liverman & Vilas, 2006; McCarthy & Prudham, 2004). In practice, PES schemes are differentially touted as mechanisms for the conservation of nature (*e.g.* Wunder, 2008) or the alleviation of poverty (*e.g.* Pagiola *et al.*, 2005), or oftentimes both (*e.g.* Coomes *et al.*, 2008). These diverse and intertwined understandings and interpretations raise interesting questions as to how PES are being designed in practice, by whom and towards what ends. Given the significant global interest in the areas of nature conservation and social

development, coupled with the power of markets for natural resources, a wealth of actors could potentially engage with and shape PES in ways which reflect and reinforce specific discourses. The study region corridor offers a unique opportunity for the examination of this phenomenon, with three distinct carbon forestry initiatives currently in development. In particular, our analysis shows how discourses shape trade-offs between environmental efficiency and distributional equity, and how local people respond to these tensions and proposals.

The earliest carbon forestry effort in the region was initiated by ACCA in the Los Amigos Conservation Concession in 2005, when they contracted the US NGO Winrock International to calculate the above-ground carbon stock of the concession to use as a basis for generating REDD credits. Since then, ACCA have expanded their plans for REDD in the area to include reduced incidence of fire within MNP and forest conservation in the Haramba Queros Wachiperi Conservation Concession, and are working in partnership with other NGOs to calculate the regional deforestation baseline of Madre de Dios. The methods adopted for reducing deforestation rely on the increased enforcement of protection of the areas, with funds generated from the sale of carbon credits to be fed back for further reinforcement. There are several features of ACCA's approach to carbon forestry which underscore its conceptual roots in the biological conservation discourse. Firstly is the sole focus on REDD, where actions are focused on forest protection and preservation – i.e. using carbon as a means to achieve conservation. The second is the use of large, protected and uninhabited areas with few owners: MNP and conservation concessions. A final aspect is the primacy of science, the measurement of carbon stocks placed at the fore of initiatives. It is also notable that ACCA's approach to financing their carbon work is through their more powerful Washington DC-based sister organization Amazon Conservation Association (ACA) by way of appeals for international funders and donors, a traditional method of conservation financing. Nevertheless, an aspect of discursive interplay is evident in ACCA's

efforts to reduce the incidence of fire, where they are aiming to provide Andean communities with alternative livelihoods to reduce deforestation. Predominantly, however, the biological conservation discourse emphasises the preservation of the natural environment, compelling and placing priority on maximum environmental efficiency of carbon forestry initiatives. Aspects of distributional equity are largely sidelined in their large-scale REDD projects over the conservation concessions, although their fire incidence reduction proposal bucks this trend through its focus on poverty alleviation in local communities. However, the legacy of ACCA's earlier work may present a challenge to developing carbon forestry initiatives in the lowlands, among a *colono* population already feeling constrained by protected areas and possessing unfavourable connotations of conservationist NGOs.

DRIS is another actor involved in the development of carbon forestry initiatives in the region. Their involvement dates back to 2007, when the World Bank was leading the development of a PES project and approached DRIS as a partner. As the World Bank developed the idea and sought to involve ACCA as the technical partner in the project, DRIS retracted its involvement, citing ACCA's poor relationships with local populations and authorities and the lack of "local harmonisation" of their work[60]. The World Bank then withdrew their plans and DRIS began developing their own carbon forestry project, designed to cover the study corridor region presented in this paper, a section of the highland buffer zone of MNP and the south-western buffer zone of ACR. The project aims to avoid deforestation over 25,000ha and reforest 11,000ha on private and public lands, as well as strengthen the management of MNP and calculate forest biomass and rates of carbon capture. DRIS aim to work with over 1000 families in 70 multi-ethnic communities to reforest, improve markets for produce and strengthen grass-roots organizations. The initiative bases itself on a principle of addressing a series of intertwined 'filigrees', or

[60] NGO employee, pers. comm., June 22, 2009

threads , listed in order of importance by DRIS as socio-economic, institutional, territorial, financial and technical. The initial project development stages have been discussions with local authorities and a social and proprietary survey of the populations. The approach taken by DRIS therefore fundamentally emerges from the social development discourse, placing people at the centre of the project, illustrated by the intended popular participation and importance placed on socio-economic issues (and least to technical aspects). The source of project financing once again provides interesting insights, with DRIS having been granted funds from the European Union, the initiative thus seen to be contributing to national development.

Other perspectives are also evident in the approach of the initiative, with the strengthening of MNP and improvement of produce markets borrowed from the conservationist and market discourses, respectively. However, in this context these both feed back to the social development objectives through the provision of jobs and training for the local population (through the strengthening of MNP) and increased incomes (though improved markets). The focus through this approach has been distributional equity, the project area covering highlands and lowlands; *colono* settlements and indigenous communities; public and private lands. Moreover, the inclusion of reforestation and forest conservation activities allow the involvement of all land owners. This is much to the cost of environmental efficiency, where an equal proportion of resources will be expended to include owners of small and large properties alike, and lengthy consultations, explanations and discussions to take place before action is taken. This inefficiency was highlighted by one mayor who, following three meetings with DRIS regarding the project, stated:

> "I don't know about it. I hear a lot, and the more I hear about it, the less I understand ... what are the benefits? And at what prices? And who pays me? It is a complicated issue ... There are still so many questions that I don't know if it is a utopia or if it is too complicated."[61]

DRIS's work to date in the region appears to have been spread too thinly given their limited operational capacity. Many in the population, or that contingent of the population it has been willing to work with – members of associations, have expressed that DRIS has not delivered on promises and have been left disillusioned by their efforts. Other land owners feel resentful for not having been allowed to participate for not being part of an association. Therefore while DRIS's plans are designed for the benefit of the population, the logistical and capacity building aspects, as well as the legacy of their previous work, are likely to incur significant inefficiencies.

The final carbon forestry initiative, still in its conceptual stages, is being designed by Renuebo, a reforestation company. To date, the company has bought and reforested 100 ha of land and aims to purchase and reforest at a rate of 20 ha per year into the future. They plant softwood and hardwood species, their harvesting period ranging from 8 to 50 years, with a view to exporting their timber nationally and internationally. In response to market demands, they are putatively seeking Forest Stewardship Council (FSC) certification of their timber, as well as credits for the carbon sequestered in their plantations. The source of their funding to put systems in place to yield carbon credits is expected to proceed from the capital gained from their market-driven activities. This approach to PES clearly emerges from the market discourse. The comparatively small areas of land over which carbon is sequestered limits the environmental efficiency of this design, although FSC certification would go some way to ensure that sequestered carbon will remain in quality products rather than poorer ones which will re-release the carbon at a more accelerated pace (e.g. furniture

[61] Manu Municipality official, pers. comm., July 10, 2009

rather than paper). With the company privately owning the land, distributional equity is significantly limited since the company will exclusively receive carbon funds. However, indirect effects such as local employment on the plantations are both greater and more immediate than proceeds from carbon funds would be.

5.6 Conclusion

This paper analyses the role of discourses in shaping land use governance and emerging carbon forestry initiatives in the Peruvian Amazon. It shows how certain types of action have been differentially facilitated and constrained by powerful and structural ideas, while highlighting the importance of the historical socio-cultural context in understanding current land use governance arrangements. The focus on discourses shows how the landscape and carbon forestry are differentially interpreted, as well as how a diversity of actors actively try to influence definitions and understandings in efforts to propagate their ideas.

The conservationist discourse began to fundamentally alter the way of life in the region with the creation of MNP, subsequently moving beyond the borders of the Park to shape conservation sub-sections in the form of an increasing number of conservation and ecotourism concessions. Its influence also spread into the indigenous social development discourse, where it materialised as the ACR, fulfilling cultural, livelihood and conservation ends. A social development discourse has guided and shaped the recognition of local rights, bringing about the titling of lands to indigenous communities as well as to migrant *colonos*. A market discourse is perhaps the longest-established of the three, brought about by the wealth of resources in the region coupled with – at times ruthless – exploitation, leading to economic gains and resource depletion.

The landscape of the region today offers a unique setting for the analysis of land use and its governance. The two protected areas have funnelled human populations into a corridor constrained at its south and north by the Andean escarpment and a conservation concession, respectively. The heterogeneous population is further constrained by the presence of large concessions, the depleted state of natural resources and poor Amazonian soils. What have materialised in the population as conflicts over land and resources can be seen as fundamentally ideological in origin: the meeting points of oppositional discourses in the midst of power struggles attempting to capture representational ground. Elsewhere, as with the creation of the ACR, discourses have interacted harmoniously. The analysis of local experiences, perspectives and responses to theses discourses provides an unparalleled insight into 'what works' and shows how important the consideration of past experiences could be in strategically and effectively designing locally contextualised land use policies and actions (Richardson, 2002), as well as PES schemes.

The study region also presents an important opportunity for the study and theoretical advancement of carbon forestry. This paper has described the discursive foundations of three carbon forestry initiatives, grounding them in local physical and social reality and exposing some key challenges. Firstly, the science and social setting of carbon forestry are fundamental to external accountability and local acceptability, and approaches could balance these carefully rather than prioritising one over the other. That is to say, rather than relying purely on pursuing one discursive approach to carbon forestry – for instance through a predominant focus on conservation which seeks to maximise carbon effectiveness – discursive interweaving which combines science and local populations through participatory approaches are more likely to appeal to local people, leading to greater acceptability and thereafter greater sustainability. Secondly, efficiency and equity are discursively constructed but not mutually exclusive: initiatives could therefore seek to combine aspects of both by offering the opportunity to participate in carbon forestry initiatives to owners of all property

sizes rather than restricting to large ones. Equity among owners of ranging property sizes, in contrast to bias towards larger properties such as those of indigenous communities, would be more likely to build bridges between ethnicities and enrol greater participation and sustainability. Thirdly, operational capacity is shown to often be the determining factor in governing land use; carbon forestry efforts could be locally grounded in order to build on and strengthen efficiencies of pre-existing institutions. This could be achieved, for instance, by providing state institutions with greater budgets so that they may pay higher salaries, hire more personnel and procure vehicles in order to monitor the lands they are charged with governing; and/or building the capacity of agricultural cooperatives so that they may be empowered to manage carbon forestry initiatives. In this way, knowledge and experience of the local landscape would likely represent greater value for money in governing land use than charging non-locals with the task. Discourses which have shaped land use governance are intertwined and often non-distinct; approaches to designing carbon forestry projects should therefore endeavour to reflect this.

5.7 References

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CHAPTERS 5-6

Inter-Chapter Link

The previous two chapters (Paper 1: *Preparing for REDD: Forest Governance Challenges in Peru's Central Selva* and Paper 2: *Nature, People & Capital: Discourses Shaping Land Use Governance & Carbon Forestry Initiatives in the Peruvian Amazon*) independently examined land use governance at the two case study sites, Yanachaga-Chemillen National Park (YChNP) and Manu National Park (MNP) and their buffer zones. The findings of both chapters illustrate the distinct natures of the forces shaping land use governance and outcomes, with chapter 5 additionally gleaning important theoretical insights into the emergence of REDD+ in the Peruvian Amazon.

The evident social, economic and ecological differences between the sites raise questions as to the practical implications of these for REDD+ engagement.

The following chapter (Paper 3: *Lessons for Sub-National REDD+ Resource Targeting from the Governance of Protected Areas & their Buffer Zones on Peru's Amazon Frontier*) takes a pragmatic approach to critically compare the drivers and implications of forest and land use governance at the two sites, drawing out multi-scalar policy lessons for REDD+ resource targeting.

CHAPTER 6

Lessons for Sub-National REDD+ Resource Targeting from the Governance of Protected Areas & their Buffer Zones on Peru's Amazon Frontier

Joel N.H. Scriven & Yadvinder Malhi

ABSTRACT

One of the central challenges now facing REDD+ is the development of sub-national governance institutions. We analyse land use governance in and around two protected areas on Peru's Amazonian frontier, Yanachaga-Chemillen National Park (YChNP) and Manu National Park (MNP), through a qualitative political ecology approach to link multi-scalar land use governance structures to global REDD+ processes and uncover power relations at work in land and environmental governance. From the analysis we draw out practical lessons for REDD+ policy and practice. The challenges for REDD+ in Peru begin at the national level, with the historical sidelining of Amazonian issues on the national political agenda hindering a consolidated national approach to the mechanism. At the regional and municipal scales, capacity weaknesses and inefficiencies of state bodies highlight the significant potential benefits of targeting REDD+ resources towards the clarification of rights and jurisdictions of government institutions. Important lessons are also taken from powerful non-state influences, including NGOs, tourism agencies and markets. We conclude with wider and specific REDD+ policy lessons which can inform locally relevant approaches. Studies such as this one highlight the importance of attention at the local-scale to inform sub-national REDD+ resource targeting in rural developing country settings.

Keywords: Peru, Amazonian frontier, REDD+, resource targeting, governance, protected areas, buffer zones.

6.1 Introduction

6.1.1 REDD+ & Governance

Deforestation and forest degradation currently account for about 12-15% of anthropogenic CO_2 emissions (van der Werf, 2009). Mechanisms to reduce emissions from deforestation and forest degradation (REDD), as well as forest conservation, the sustainable management of forests, and enhancement of forest carbon stocks (together REDD+) have emerged as cost effective payments for ecosystem service (PES) strategies for reducing greenhouse gas emissions (Angelsen *et al.*, 2009; Nabuurs *et al.*, 2007; McKinsey & Co., 2009; Stern, 2006). In addition to climate change mitigation, slowing deforestation can ameliorate problems which may jeopardise the sustainable development of tropical countries, such as rainfall reduction, biodiversity loss and human health degradation from biomass burning pollution, as well as the inadvertent elimination of productive or protected forests (Chomitz *et al.*, 2007). While REDD+ is likely to be incorporated into a global climate change agreement at both national and sub-national (project) levels (Angelsen & Wertz-Kanounnikoff, 2008; Humphreys, 2008), little research to date has focused on how interventions will be implemented at the sub-national scale (Blom *et al.*, 2010). Moreover, as international support for the mechanism continues to grow and methods and strategies for implementation are designed, it is clear that many challenges remain. Foremost among these is the development of appropriate REDD+ governance institutions in tropical developing countries (Corbera & Brown, 2008; Corbera *et al.*, 2009; Gullison *et al.*, 2007; Phelps *et al.*, 2010a; Phelps *et al.*, 2010b; Saunders *et al.*, 2008). This aspect is all the more salient in light of recent research directly linking increased land use governance quality with lower levels of deforestation (Umemiya *et al.*, 2010), underlining the central importance of governance for REDD+.

A review of 25 REDD Readiness Plan Idea Notes (R-PINs) – the first step for developing countries to access REDD financing from the World Bank's Forest Carbon Partnership Facility (FCPF) – identified governance as a key area to address as countries proceed with REDD readiness programmes (Davis *et al.*, 2009). Findings revealed the need for "a more systematic assessment of relevant governance challenges and needs" in order to inform "more realistic and specific estimates of what it will take in terms of financial, technical, and other support" (Davis *et al.*, 2009:3) from the international community to achieve REDD readiness.

Therefore although REDD+ presents an opportunity to reconfigure the perception and use of forest resources, its effective deployment is dependent upon a deeper knowledge of land use governance arrangements at a variety of scales (Agrawal *et al.*, 2008; Blom *et al.*, 2010; Bond *et al.*, 2009; Canadell & Raupach, 2008; Ghazoul *et al.*, 2010; Landell-Mills & Porras, 2002). While much of the initial debate on REDD+ governance centred on global architectures (*e.g.* Niesten *et al.*, 2002; Santilli *et al.*, 2005), the focus has increasingly moved towards the national and local levels (Angelsen *et al.*, 2009). This paper responds to calls for multi-scalar REDD+ research (Campbell, 2009; Miles & Kapos, 2008; Ostrom, 2009; Phelps *et al.*, 2010a) with a particular focus on local land use governance arrangements. Our central research question is: What lessons can be learned for sub-national REDD+ resource targeting from existing multi-scalar land use governance structures in the Peruvian Amazon?

REDD+ presents an opportunity for a fundamental paradigm shift in natural resource management in developing countries (Sikor *et al.*, 2010). In these nascent stages of REDD+ conceptualization at the global and national scales, and project development at the local level, the provision of multi-scalar lessons can help practitioners to 'get REDD+ right', in design and on the ground. The provision of a nested approach to REDD+ allowing for state and non-state actors to develop sub-national initiatives affords significant flexibility in the

development of nuanced local approaches, which this study aims to inform. The work presented here provides an original contribution to the emerging scholarly literature in the area, as well as practical lessons for REDD+ practitioners and policy makers.

6.1.2 Protected Areas & Buffer Zones on Peru's Amazon Frontier

The Peruvian Amazonian frontier forms the transition region between the Andean highlands and lowland tropical forest, running the length of the country. This region possesses extraordinary levels of biodiversity and endemism (*e.g.* Wilson & Sandoval, 1997) and forms the multicultural meeting point between Andean, Amazonian and other populations and ethnicities (Huertas & Garcia, 2003). It is also an area of significant forest disturbance and deforestation due to growing populations and the rapid expansion of extractivist and agricultural land use practices (INEI, 2005; Labarta, 2007). While a network of protected areas established across the region has been shown to provide a degree of protection from these processes (Oliveira *et al.*, 2007), poor land use governance and accelerating deforestation around the protected areas increasingly threaten to isolate conservation priority sites (cf. DeFries *et al.*, 2005). An attempt to counter this effect exists in the form of buffer zones surrounding each protected area. Buffer zones are transition areas designed to limit the impact of human activity on the protected area (Wells & Brandon, 1993), yet in Peru are not granted the legal protection which the core areas are. Buffer zones not only represent physical areas of transition, but also areas of transitional land use governance, from nationally strategic land use governance mechanisms, in the form of protected areas, to areas of local land use governance. Nevertheless, the majority of socioeconomic evaluations of buffer zones report a lack of success in their implementation (Martino, 2001), which raises important questions as to the potential role of carbon finance in consolidating the social and environmental objectives of these areas. Moreover, the

demonstrated potential for REDD+ in the Amazon to provide a wealth of ecosystem services to local populations (Stickler *et al.*, 2009), and the potential importance of protected areas as strategic REDD+ sites in the Neotropics (Brandon & Wells, 2009; Campbell *et al.*, 2008; Miles & Kapos, 2008), further contextualise the need for land use governance lessons for sub-national REDD+ in these priority areas and their buffer zones. To address this knowledge gap we provide a timely contribution to the literature by adopting a multi-scalar comparative approach to land use governance analysis by comparing two historically and geographically distinct sites on Peru's Amazon frontier.

6.1.3 Political Ecology Approach

This analysis is framed within 'Sustainability Science' (Biermann, 2007; Clarke *et al.*, 2005), a problem-driven and normative approach emphasizing the promotion of sustainable development as its objective (Kates *et al.*, 2001) and compelling a focus on practical policy and implementation dimensions (Rasmussen & Arler, 2010). Within this framework, the analysis of local land use governance conditions and arrangements undertaken in this research, including the roles of multiple actors, uses a political ecology approach (Blaikie & Brookfield, 1987; Peet & Watts, 1996). Political ecology is an explicitly normative and political approach to the study of power relations in land and environmental management which compels a focus on linking the local to the global (Bebbington & Batterbury, 2001): in this case linking local land use governance to global climate change mitigation through forestry, in the form of REDD+. Political ecology allows a particularly incisive analysis of governance due to the importance it places on understanding actors in relation to conflicts, and understanding rationalities within their political, social and environmental contexts (Bryant & Bailey, 1997). The roles of non-state actors within multi-actor, multi-level systems are increasingly recognised as important

characteristics of the 'shift from government to governance' (Arts & Buizer, 2009), and therefore form an important part of the analysis presented here. The detailed analysis of local practices, knowledge and perceptions within a political ecology approach can be used to highlight alternatives to current practice, which can form the foundations of REDD+ policies. In particular, political ecology pointed us to ask questions about historical processes, key actor power relations and physical environmental outcomes, and look specifically at land use governance in the form of government institutions, NGOs, tourism and markets.

In the following section we introduce the study sites and data collection methodology. Section 3 sets out the lessons for REDD+, in turn reviewing the *de jure* versus *de facto* roles and implications of national and municipal governments, state land use regulation institutions, NGOs, tourism operations and commercial produce markets. We conclude with the local and wider implications of the findings.

6.2 Case Studies & Methods

Case studies are taken from two protected areas and their surroundings that are both UNESCO Biosphere Reserves and being targeted as potential REDD+ sites. The UNESCO Biosphere Reserve designation recognises efforts seeking to reconcile conservation of biological and cultural diversity and economic and social development (UNESCO, 2010), yet is not accompanied by funding to maintain or further promote these ends. REDD+ therefore offers an innovative approach to realising the objectives of – and providing additional funding for – tropical forest Biosphere Reserves.

Yanachaga-Chemillen National Park (YChNP) (figure 6.1) lies on the eastern flanks of the Andes in Peru's Central Selva which, at 250km, is among the closest forested region to the national capital, Lima. YChNP lies within the region of Pasco, province of Oxapampa

and districts of Villa Rica, Oxapampa, Huancabamba and Pozuzo. The Park covers an area of 122,000 ha and forms part of the Yanachaga Conservation Complex which additionally encompasses the Yanesha Communal Reserve (YCR) (to the east of YChNP) and the San Matias-San Carlos Protection Forest (SMSCPF) (to the south and east of YChNP). In 2008, the YChNP authority received funds from the German Environment Ministry to initiate efforts to reduce deforestation in and around the park, while the Yanachaga Complex and its buffer zone were designated as a UNESCO Biosphere Reserve in 2010.

Manu National Park (MNP) (figure 6.2) also straddles the Andes-Amazon gradient, lying in the south-eastern regions of Madre de Dios (accommodating 93% of the Park) and Cusco (7% of the Park), provinces of Manu and Paucartambo and districts of Madre de Dios, Manu, Fitzcarrald and Kosñipata. The Park covers 1.6 million ha and was declared a UNESCO Biosphere Reserve in 1977. To the south east of MNP lies the Amarakaeri Communal Reserve (ACR), a protected area covering 400,000 ha designed to conserve the biodiversity, resources and history of indigenous ancestral territories. This research focuses specifically on the Park and the south-eastern buffer zone corridor between MNP and ACR, in the districts of Madre de Dios, Manu and Kosñipata. MNP and its buffer zone are also currently being targeted as sites for REDD project development by a number of state and non-state institutions (Scriven *et al.*, in review).

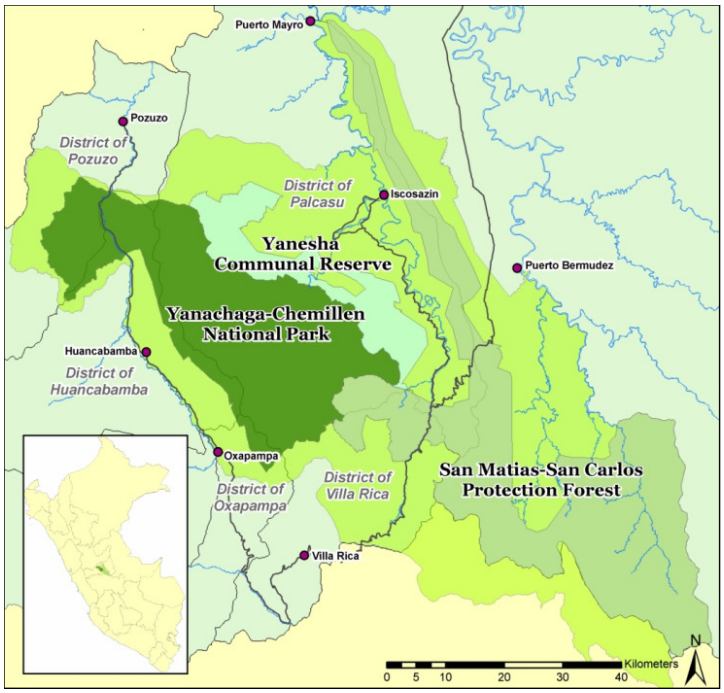

Fig. 6.1. The Yanachaga Conservation Complex. The lighter shade surrounding all areas indicates the buffer zone of the Conservation Complex (shapefiles courtesy of Pasco Regional Government).

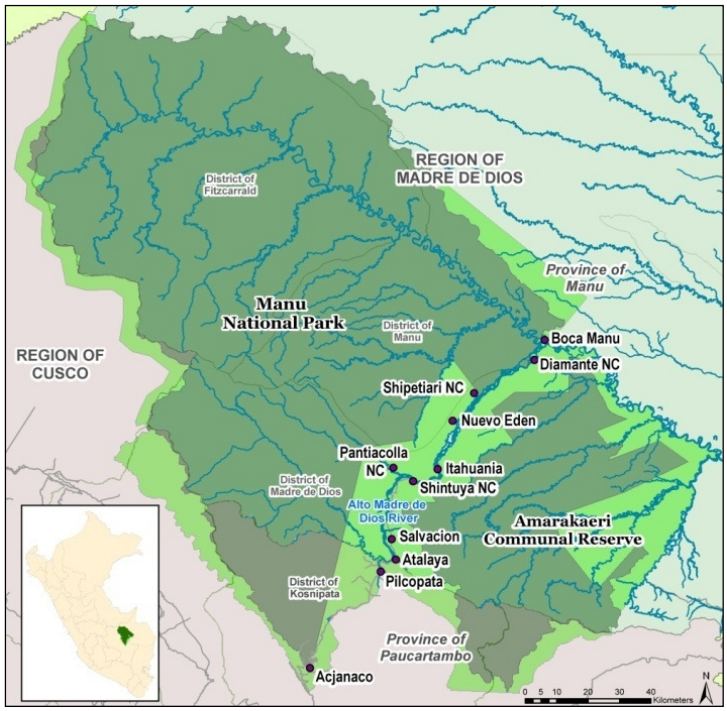

Fig. 6.2. The Manu National Park and Amarakaeri Communal Reserve (dark shade) and their buffer zones (lighter shade) (shapefiles courtesy of INRENA Madre de Dios, Puerto Maldonado).

A qualitative approach to data collection was adopted, with key informant semi-structured interviews (n=48) carried out between July 2008 and August 2009 in Lima, Cusco and towns and communities in the case study regions. State, NGO and private sector interviewees were selected through a stakeholder analysis 'snowballing process' (Grimble & Chan, 1995) (see table 6.1 for interviewee affiliations), where individuals interviewed were asked to identify other individuals and institutions with a stake in multi-level land use governance. Land users were selected by random sampling in the study areas and asked for their opinions and perspectives on land use governance, local institutions, markets, production and the regions and landscapes they inhabit. Interviewees partook in the research voluntarily and permission was granted prior to interview initiation. Interviews were recorded and transcribed, and their content subsequently analyzed thematically.

Table 6.1. Interviewee affiliations.

Affiliation	No. of Interviewees
Government	14
NGO	13
Private sector	6
Smallholder	10

6.3 Findings: Lessons for REDD+

6.3.1 National-Level Analysis

Both state and (national and international) non-state actors have taken a keen interest in the potential for REDD+ in Peru. In its 2009 financial plan for the country's National Service of Natural Protected Areas (*Servicio Nacional de Areas Naturales Protegidas*, SERNANP), the state identified REDD as "the mechanism with the greatest potential to sustainably attract international resources" (SERNANP, 2009), and the nascent Environment Ministry now employs full-time staff dedicated to REDD issues. At the same time, NGOs

and researchers are undertaking deforestation and carbon measurement studies, as well as conceptualising and implementing pilot REDD+ projects. Representatives from the state, NGOs and the private sector also meet regularly as the Peru REDD Group to discuss the country-wide advancement of the mechanism (Grupo REDD Peru, 2010).

Despite this multi-actor interest, however, three key national-level barriers are slowing progress towards REDD+ in the country. The first of these is the prevalent lack of knowledge of the Amazonian region among decision makers in the capital, Lima. The highly centralised nature of political and economic activity in the country has meant that Amazonian, and indeed forestry, issues have long been sidelined on the national agenda [1]. This is reflected in the resources granted to the state forestry body, the Ministry of Agriculture's General Directory for Forestry and Wildlife, of 700 employees nationally for the administration of ~650,000km^2 of forest land cover in the Peruvian Amazon (FAO, 2005) with a budget totalling less than USD 15 million (in financial year 2008-09). The lack of value placed on Amazonia at the national level notably impacts local-level state institutions, analysed in sections 3.2 and 3.3, but also produces a knowledge shortfall in the decision-making surrounding Amazonian land use and REDD+. A first lesson for REDD+ is therefore the need for awareness-raising of Amazonian issues in Lima.

A second challenge results from the lack of a legal framework within which to situate REDD+ activities. Modifications to the 2000 Forestry and Wildlife Law in 2008 (via Legislative Decree 1090) – which included provisions relating to environmental services – were repealed in 2009 after being deemed unconstitutional. The modifications had been approved by executive decree, rather than the usual consultative route through Congress, in part to meet environmental regulations imposed by the US-Peru Trade Promotion Agreement, and were believed to restrict indigenous rights to forests (Chota, 2008). Meanwhile, a proposed law to regulate the provision and compensation of environmental

[1] Former National Head of Forestry, 26.08.2009

services (No. 3213/2008) remains to be approved by Congress. There are therefore currently (as of August 2010) no laws governing environmental service provision in Peru (Capella & Sandoval, 2010). The second national-level lesson is the need to fill this legislative gap, which will otherwise inhibit the legal practicability of REDD+ implementation and land use governance.

Taken together, these first two national-level lessons are illustrative of political ecology 'chains of explanation' (Blaikie & Brookfield, 1987), which serve to uncover relations of power and resulting outcomes. In this case, inappropriate knowledge of the Amazonian region informed legal modifications imposed by international trade regulations and enacted by the President through decree rather than consultation. This produced conflict at local sites across the Amazon, leading to the annulment of the modifications and a the creation of an important legislative gap which currently prevents national legal governance over systems of PES, including REDD+.

A third national-level obstacle is the slow and disjointed decentralisation efforts. Government ministries, such as 'Agriculture' and 'Energy and Mining', have sought to decentralise independently (Ausland & Tolmos, 2005), rather than adopting a coordinated spatial and territorial approach to resources and land use. This has resulted in poorly defined, and often superimposed, spatial rights and responsibilities (Heuft & Buchenrieder, 2003), and subsequent conflicts and territorial power struggles between decentralised entities at the local level. A third lesson for national-level REDD+ governance is the need for greater coordination of responsibilities and spatial planning at the landscape scale between ministries in the decentralisation process.

6.3.2 Local Government Realities

Peru is divided into 25 regions, each possessing its own democratically elected Regional Government since 2002 and in receipt of the taxes on regional economic activities since 2005 (previous to which they went to central government in Lima). Regions are subdivided into provinces, governed by a provincial municipality and headed by a mayor. Provinces are in turn subdivided into districts, the smallest state administrative subdivision. In this section we first highlight lessons for REDD+ from regional governments in the case study sites, followed by those from the municipalities. The case studies offer important areas for the analysis of land use governance due to their geographies, straddling the frontier gradient between the Andean highlands and Amazonian lowlands.

Cerro de Pasco, the regional capital of Pasco wherein YChNP is located, is 100km to the west of the Park at an elevation of 4,000m amsl. Cerro de Pasco is an important mining centre, and the 2005 decentralisation of taxes roughly tripled the region's income, primarily from mining taxes which were previously sent to central government in Lima[2]. The regional government has a provincially decentralised branch closer to YChNP in Oxapampa (1,800m amsl), but differential histories, economies and cultures (Scriven, in review) have created a rift between the highland and lowland branches of the Pasco regional government[3]. This lack of a common vision for social and economic development in the regional government has led to state revenues being divided and dispersed rather than targeted towards region-wide development initiatives (*ibid.*). Furthermore, following the budgetary increase, the lack of administrative, operational and technical capacity in the Oxapampa branch resulted in 95% of the 2007-2008 budget for public works going unspent and reverting back to Lima[4].

[2] Head of Oxapampa branch of Pasco Regional Government, 20.11.2008
[3] Employee of the Oxapampa branch of Pasco Regional Government, 4.11.2008
[4] Mayor of Oxapampa, 11.11.2008

A regional-level geopolitical dispute also took place around MNP over a European Community (EC) funded conservation-development project, ProManu. This cooperation project between Europe and Peru aimed to promote sustainable management of natural resources, including forestry, agriculture and tourism, of the Manu Biosphere Reserve (including the Manu-Amarakaeri buffer zone corridor) and National Park (Ortega & Hostnig, 2000). Following a €7 million first phase between 1998-2004, the EC approved a €20 million second phase, but disputes between the regional governments of Cusco and Madre de Dios over entitlement to the administration of the funds led to delays and ultimately the cancellation of the second phase[5]. Therefore while geopolitical disputes have played out differently at each site, the roots can be traced back similarly to spatial causations and, differentially to capacity shortfalls (YChNP) and power struggles over resources (MNP). These cases highlight the importance of considering regional-scale political geographies and histories in the design of REDD+ financial distribution and benefit sharing mechanisms.

Further common characteristics between the two sites are the pressing social and economic issues, such as illiteracy and poverty, faced by the regional-level state authorities. While these have historically taken precedence over environmental concerns, authorities at both sites have more recently sought to overcome these challenges through land use, forestry and conservation activities. In YChNP, the Pasco sub-regional government in Oxapampa invested 1 million soles (~USD 350,000) (financial year 2008-9) into a proposal to designate the Yanachaga Conservation Complex a UNESCO Biosphere Reserve. The objective of this investment was the conservation of the ecological and cultural heritage of the region, raising of the profile of the area as a research and tourism destination, and strengthening of the capacities of local agricultural producers by providing them with a means of reaching added-

[5] ProManu employee, 26.06.2009

value (*e.g.* organically-grown produce) and export markets[6][7][8]. In June 2010, UNESCO announced its approval of the designation and creation of the Oxapampa-Ashaninka-Yanesha Biosphere Reserve (UNESCO, 2010). In MNP, regional authorities directly focused a 2008 budgetary increase towards strengthening local land user capacity by financing an agroforestry programme. By providing free banana (*Musa* spp.) and timber tree saplings (primarily 'Pashaco', *Schizolobium parahyba*), producers were assisted in overcoming the financial barriers to agroforestry practices[9]. These cases illustrate grass-roots activities which have sought to empower and strengthen the capacities of local land users, and represent important opportunities for REDD+ to engage with and build on existing land use initiatives.

At the provincial level, the municipalities at both sites are involved in contested power struggles with the regional authorities and neighbouring local authorities. The inability of the Oxapampa branch of the Pasco regional government to spend their budget resulted in criticism from the municipality[10], which had lobbied for the funds to be directed towards infrastructure improvements. Moreover, opposing political allegiances between the regional and municipal entities intensified the conflict, one result of which was the foreseeable delay (at the time of data collection) of the implementation of a strategic land zoning study carried out by the regional government which the mayor refused to authorise[11]. The Oxapampa municipality also engaged in a legal conflict with a neighbouring district, Palcasu, whose authorities began constructing a road through the SMSCPF without prior consent or environmental impact assessment[11]. In Manu, similar municipal-regional conflicts have transpired, wherein a lack of institutional obligational clarity in the decentralisation process resulted in the population deferring to the municipality for all state-

[6] Director of Oxapampa branch of NGO *Instituto del Bien Comun*, 20.10.2008
[7] Director of Oxapampa branch of NGO *ProNaturaleza*, 29.10.2008
[8] Former National Head of Forestry, 26.08.2009
[9] Head of Manu branch of Madre de Dios Regional Government, 10.07.2009
[10] Mayor of Oxapampa, 11.11.2008
[11] Employee of Oxapampa branch of Pasco's Regional government, 19.06.2009

related matters, rather than the appropriate ministry within the regional government. The Mayor of Manu described the municipality's power relation with the regional government:

> "we are doing their [regional government's] work, and on top of that we need to beg them for the finance to do their work"[12]

In both Oxapampa and Manu, the municipalities offer a local-level link to the populations, yet their limited capacities and conflicts over power and resources inhibit their ability to fulfil their remits. Given that systems of PES are reliant on, and substantially influenced by, state institutions (Corbera *et al.*, 2009), attention to these local land use governance realities is critical for the design and effective governance of locally contextualised REDD+ initiatives.

6.3.3 Local Land Use Regulation

This section analyses and compares local-level state land use institutions in the study regions, encompassing protected areas, forestry and agrarian institutions, prefaced by a brief national-level overview of the historical relationship between protected areas and forestry governance institutions. The key contemporary institutions are the National Service for Natural Protected Areas (*Servicio National de Areas Naturales Protegidas*, SERNANP), the General Directory of Forestry and Wildlife (*Dirección General Forestal y Fauna Silvestre*, DGFFS), the Agrarian Agency (AA) and the Institute for the Formalisation of Informal Property (*Organismo de la Formalización de la Propiedad Informal*, COFOPRI).

The first protected areas in Peru were designated in the early 1970s, termed 'Units of Conservation' and administrated by the Forestry Directory within the Ministry of Agriculture. In 1992 forestry and conservation were separated into independent (and

[12] 22.07.2008

hierarchically equal) departments – 'Forestry and Wildlife' and 'Natural Protected Areas' – under the newly created National Institute for Natural Resources (*Instituto Nacional de Recursos Naturales*, INRENA) within the Ministry of Agriculture. 2008 saw the creation of the Environment Ministry as a result of environmental regulations imposed by the US-Peru Trade Promotion Agreement (TPA), and the disbandment of INRENA. Under the new structures, the PA authority passed into the Environment Ministry as SERNANP, with forestry remaining under the Ministry of Agriculture as DGFFS. This process has resulted in higher priority for protected areas while forestry has remained in much the same position. Since 2008, SERNANP receives greater administration and staffing budgets than DGFFS and, importantly, possesses a board of directors: a space within which it can interact with other public bodies and the public – while DGFFS does not.

Institutional capacities at the local level largely reflect these national-level hierarchies. SERNANP branches in Manu and Oxapampa employ 23 and six park guards, respectively, figures indicative of the comparative sizes of the parks. Nevertheless, protected area authorities at both sites similarly consider themselves to be understaffed and under-capacitated to fulfil their remit[13,14]. A key aspect of similarity between the governance capacities of protected areas authorities in both areas is their lack of authority over their buffer zones, activities within which are entirely under the jurisdiction of the forestry authorities. In other ways, SERNANP bodies at the two sites are very different. The YChNP branch is subject to severe logistical capacity shortfalls, including an inadequate fuel budget to reach and patrol the SMSCPF from their base in Oxapampa (*ibid.*). In contrast, the capacity and power of the MNP branch is significantly bolstered by the technical and logistical support of NGOs which train park guards, supply equipment and assist the elaboration of management plans[15]. The concentration of powerful NGOs in MNP owes

[13] Head of MNP authority, 06.08.2009
[14] YChNP park guard, 27.10.2008
[15] Director of NGO *Frankfurt Zoological Society*, 22.06.2009

itself to the fame of the Park attracting greater amounts of international funds. Furthermore, the MNP authority is likely to have been strengthened politically by the decentralisation of the Environment Ministry to the city of Cusco in 2009, where they now share an office building. The institutional capacity disparities between SERNANP at the two sites illustrate the need for REDD+ resources to be carefully assigned between decentralised state authorities according to need and ability to meet institutional remits, in order to use the mechanism to prevent protected area invasion.

Geography also plays an important role in the operational efficacy of SERNANP branches at the two sites. In the case of YChNP, although its western buffer zone is on a gradient, it is populated by towns and settlements and is accessible by road. In contrast, the south-eastern lowland buffer zone of MNP covers largely impassable mountain ranges and is only accessible by river. In YChNP, these characteristics have combined with SERNANP's institutional capacity deficits to allow widespread clearance of primary forest and establishment of crops along the western boundary of the park. Meanwhile, MNP's geography has allowed SERNANP to place park guards at strategic points where access to the park and the buffer zone is easiest to deter deforestation threats, resulting in effective protection of the south-eastern park boundary. This case illustrates how, in some cases, effective forest protection can be achieved by harnessing natural features of landscapes and strategically target resource allocation. Conversely, it also highlights potential difficulties for REDD+ in human-dominated landscapes.

Local forestry authorities at both sites are materially and politically weak. Local DGFFS branches are responsible for granting permissions for, and overseeing, all timber and non-timber product extractions and land use changes (such as clearing forest for agriculture), as well as sanctioning of illegal extractive activities. Staffing of two people per DGFFS branch (each responsible for one to two districts), comparatively poor local salaries and limited operational budgets have resulted in widespread illegal timber extraction and

land use changes at both sites – though more notably at YChNP – as well as corrupt practices among overwhelmed and under-capacitated staff[16,17]. A notable impact of the shortcomings of this entity has been the removal of accountability in land use practices among local populations, creating a disparity between legality and enforceability. For instance, in YChNP this capacity limitation has resulted in nominal regulation and enforcement of land use activities over the buffer zone, leading to forest clearance and agricultural establishment up to the border of the park. REDD+ initiatives seeking to build on existing systems of land use enforcement are therefore likely encounter not only debilitated local entities but also a population disconnected from the regulations surrounding land use. Addressing limitations of the state forestry regulation body in YChNP would require a significant increase in funding from the responsible central government institution, the Ministry of Agriculture, in order to allow the local DGFFS branch to fulfil its remit and substantially increase land use oversight and regulation.

The final institution involved in local land use regulation is the AA, part of the Ministry of Agriculture and responsible for providing technical assistance to land users on crop and livestock management. The AAs in both regions are equipped with similar capacities to the forestry authorities: two staff and limited operational budgets. However, the dearth of decentralised state institutions in Manu has led to the AA in Salvacion additionally fulfilling the role of COFOPRI, the state agency responsible for land titling. While the larger settlement of Oxapampa has its own branch of COFOPRI, the AAs in both regions are largely unknown to the populations[18,19], as corroborated by the Head of the Oxampampa branch of Pasco's regional government:

[16] Employee of NGO *Instituto del Bien Comun*, 17.10.2008
[17] Employee of the Oxapampa branch of Pasco Regional Government, 4.11.2008
[18] Land user in Navarra, YChNP buffer zone, 21.11.2008
[19] Land user in Masquitania, MNP buffer zone, 10.07.2009

> "... the efforts of the land users ... have not been accompanied by the institutional support to defend them from attacks from plagues, diseases"[20]

The lack of agricultural oversight and regulation around YChNP has contributed to the widespread use of chemical fertilisers and pesticides on crops; whereas this practice has been largely suppressed around MNP due to a lack of availability and lower purchasing power of the population[21].

Compounding the limited land use regulation capacities at both sites is a lack of coordination between the key institutions. This is particularly evident in MNP, where a rift between the forestry and protected area authorities has been created by their disparate office locations, with the DGFFS office in Salvacion, and the SERNANP office in Cusco. In YChNP, the poor relations between these two institutions appear to stem from suspicions of corrupt practices in DGFFS among SERNANP officials, and a resentment of the greater resources allocated to protected areas in the forestry authority. A further lesson for REDD+ is therefore the need to target resources not only at strengthening individual institutional capacities, but also towards the strengthening inter-institutional relationships and coordination in order to improve regulatory efficiency.

6.3.4 Learning from NGO Efforts

Both sites have attracted national and international NGOs, dating back to 1969 in Manu (MacQuarrie, 1992) and 1983 in the Central Selva (Staver *et al.*, 1994), encompassing both conservation and social development remits. A notable logistical distinction between the approaches taken by NGOs at the two sites has been the location of their headquarters in relation to the areas and populations they have sought to work in. NGOs working around

[20] 20.11.2008
[21] Employee of NGO *CREES Foundation*, 26.06.2009

YChNP have almost exclusively based themselves in Oxapampa, which lies within the buffer zone of the park and 4.5km from the park boundary. The limited size of the town ensured that NGOs working there interacted, and to an extent collaborated, with other NGOs and local state authorities[22]. These relationships led to the establishment of a Municipal Environmental Commission, comprised of three NGOs and the municipality, who provide advisory and environmental impact assessment services to infrastructure projects. Moreover, local data compiled by environmental NGOs in the area were shared with the Regional Government, who used it as a basis to compile a provincial land use planning strategy[23].

In contrast, NGOs working in and around MNP based themselves in Cusco, 8-10 hours distance by road, due to poor communications lines and inaccessibility of the MNP buffer zone – as done by the MNP SERNANP branch. Projects and initiatives were thereby predominantly designed at a distance from the region and executed independently of other NGOs or local authorities[24]. While two conservation NGOs – Association for the Conservation of the Amazon Basin (*Asociacion para la Conservacion de la Cuenca Amazonica*, ACCA) and the Frankfurt Zoological Society (FZS) – have been an exception to the rule through a degree of coordination, organizations have commonly acted unconscious of other initiatives. Moreover, NGOs have operated in the region without consulting or informing local state authorities, leading to a distrust of NGOs among local government leaders, particularly in the District of Kosñipata[25].

A similarity between the outcomes at the two sites is the predominant view among the populations of a lack of tangible results and consistency in NGO efforts. This local perspective was more prevalent in Manu, where land users have felt "fooled"[26] and abandoned by NGOs, and considered that projects had not been adequately adjusted to local

[22] Employee of Oxapampa branch of NGO *ProNaturaleza*, 29.10.2008
[23] Head of YChNP Management Committee, 19.06.2009
[24] Mayor of Kosñipata, 24.07.2009
[25] Employee of the Municipality of Kosñipata, 22.06.2008
[26] Land user, Salvacion, Manu, 26.06.2009

realities. This smallholder perspective reflects the lack of accountability of the work of NGOs, which has shaped distrust. One land user stated:

> "... they [NGOs] work only because they need to do something, so there is no follow-up from any honest institution to ensure that the land user is able to sustain themselves with sufficient income to have a basic, minimum income".[27]

These experiences offer important lessons for REDD+. In the two regions, NGOs have brought in far greater administrative and technical capacities than local institutions have at their disposition, yet their resources have often been squandered due to a lack of coordination and local knowledge. REDD+ efforts should seek to consolidate and build on the constructive outcomes of previous NGO efforts (requiring a deep knowledge of historical activities) (cf. Blom *et al.*, 2010), and root efforts in local land use governance structures to maximise local acceptance and participation. Consistency will be central to disbanding suspicion of NGOs and building local trust.

6.3.5 Tourism in Land Use Governance

The study regions attract very distinct forms of tourism which have in turn influenced land use governance. Visitors arriving to the Oxapampa region are primarily attracted by the culture of the region, rather than by YChNP. In 1859, an international immigration agreement led to the arrival of German colonists to the Central Selva, establishing the town of Pozuzo in their Tirolean style (UNEP, 1987). As their numbers grew, they travelled south to establish Oxapampa, creating a unique cultural and architectural character for the region. While tourism practically ceased during the 1980s and early 90s due to Maoist guerrilla activity in the area, it has steadily increased since the mid-

[27] 25.07.2009

1990s[28]. The 2000s saw the towns surrounding YChNP become popular destinations for Lima residents, primarily for long weekends and during national holidays, using local facilities and consuming local produce[29]. Only a small proportion of visitors arrive on specialist birding tours of the park. This cultural (as opposed to ecological) tourism does not directly contribute to conservation efforts in the area, but does so indirectly through the provision of alternative income streams to agriculture – the predominant local economic force.

In contrast, visitors to Manu arrive primarily through package tours to Peru organised by international tourism agencies, typically encompassing Cusco, the Sacred Valley, Machu Picchu and a 'jungle eco-tour'; or on specialist birding tours. The emphases of visits to Manu are nature, wildlife and wilderness. Guides lead tourists between private lodges along the western bank of the Alto Madre de Dios River – thereby avoiding most populous areas – with all food and supplies brought from Cusco[30]. This form of nature tourism reinforces conservation efforts, with lodge operators motivated to conserve forests in order to maintain wildlife, yet makes a negligible contribution to the local economy, and therefore provides no incentive for limiting forest clearance in the populated areas of the region.

The analysis of the drivers and outcomes of tourism in the study regions provides some salient lessons for REDD+. With ecotourism often touted as a 'win-win' strategy for conservation and development in tropical forest regions (*e.g.* Cusack & Dixon, 2006), the example from Manu illustrates the potential disparity between this objective and ground realities. Conservation and the provision of alternative livelihoods are local objectives of REDD+ initiatives and ecotourism (Ghazoul *et al.*, 2010), which could be differentially targeted in the two regions. Around Manu, where tourism has incentivised conservation, REDD+ efforts could be targeted towards diverting tourism towards the local populations,

[28] Employee of Oxapampa branch of Pasco Regional Government, 04.11.2008
[29] Former Head of YChNP, 29.10.2008
[30] Madre de Dios tour guide, 09.07.2009

with tours of Andean population settlements as well as indigenous communities. Conversely, around YChNP, resources could target improvements of conservation and wildlife watching facilities, as well as local and national awareness-raising of the biodiversity found in the Park.

6.3.6 The Influence of Markets on Land Use

Markets for natural resources and agricultural produce have brought about fundamental landscape changes over time in the study regions. The Central Selva was the site of the earliest timber extraction in the Peruvian Amazon[31], which grew in intensity as road connections to Lima improved to the regional peak of the industry in the 1950s (Drewes, 1958). As timber volumes fell in the 1960s, markets for agricultural produce began to exert more power over the landscape, resulting in the widespread establishment of crops (Bebbington, 1990). In response to the market demands in Lima, agricultural outputs shifted over time from coffee (*Coffea* spp.) to pumpkin (*Cucurbita* spp.) to rocoto pepper (*Capsicum pubescens*) and granadilla passion fruit (*Passiflora* spp.). Over time, markets for agricultural produce have established a deeply rooted economic relationship between producers and their land, though land users continue to face significant challenges. Demand, and therefore prices fetched, for agricultural products are subject to substantial variation across months and even weeks, producing considerable income uncertainty[32,33]. A further result of the intensity of agriculture around YChNP is the widespread use of chemical fertilisers, incurring considerable expense to local producers[34]. A lesson for REDD+ from local perspectives of markets is that many land users are in positions which would lead them

[31] Saw mill owner, Oxapampa, 11.11.2008
[32] Land user, San Daniel, Oxapampa, 25.10.2008
[33] Land user, Navarra, Oxapampa, 10.11.2008
[34] Land user, Navarra, Oxapampa, 21.11.2008

to welcome alternatives to their current practices which provided them with reliable incomes – as could be possible from carbon finance.

In MNP, although timber extraction first began in Manu in the 1940s – targeting mahogany (*Sweitenia macrophylla*) and Spanish cedar (*Cedrella odorata*) (Shepard *et al.*, 2010) – the area's inaccessibility delayed large-scale extraction until the introduction of chainsaws in the 1970s. Since then, and aided by the extension of the road into the area, fine timber has been largely exhausted[35]. A large proportion of the timber extraction was undertaken by Andean migrants, a corollary of which was the establishment of settlements along the Alto Madre de Dios River and clearance of predominantly small forested areas (<5 ha per producer) for agriculture. Selective timber extraction continues, though it is most often of common (known as '*corriente*') softwood species[36], and it remains a practice ingrained in the population as a reliable income source. Banana (*Musa* spp.) is the most common crop – regularly produced in agroforestry systems – which is exported by intermediaries to Cusco. These practices have lead to a largely intact, but highly degraded, forest landscape in the south-eastern MNP buffer zone.

The influence of market forces on tropical landscapes almost exclusively brings about processes of forest clearance and degradation, though the above cases illustrate the importance of local nuance in understanding specific drivers and processes of change. An important lesson for REDD+ in tackling the fundamental causes of carbon losses is the need to address local heterogeneity of land use change across landscapes.

6.4 Conclusion

This paper set out to identify lessons for REDD+ from current land use governance arrangements in two national parks and their buffer zones on the Peruvian Amazonian

[35] Former timber worker, Salvacion, Manu, 21.07.2009
[36] Forestry consultant, Salvacion, Manu, 13.07.2009

frontier. By creating a thorough understanding of local-scale realities, this research aimed to inform global debates on REDD+ governance architectures and the conceptualisation of sub-national REDD+ governance frameworks and resource targeting. The comparative approach to this research allowed a disentanglement of land use governance characteristics common to the Amazonian frontier from locally explicit ones in the two areas. Table 6.2 shows the key REDD+ governance lessons from this study. In the current nascent stages of REDD+ in Peru, broad land use governance lessons for the Amazonian frontier can inform a foundation upon which to build national capacity and a nurturing institutional environment for the mechanism. Nevertheless, distinct local-scale environmental, cultural and economic landscapes of potential implementation sites necessitate locally contextualised and individualised approaches to REDD+ resource targeting.

As forestry resource-rich developing countries such as Peru continue on their paths of economic development, some degree of further deforestation and degradation seems inevitable. What REDD+ offers is a strategic tool for the sustainable planning and use of tropical forest landscapes, which can form the foundations of sustainable economic, social and ecological development. As REDD+ funds become increasingly available, driven by carbon market demands (Neeff *et al.*, 2010), the importance of specific and efficient resource targeting will become more evident. The study presented here depicts the importance of a local understanding of history, geography and economy of proposed sites if REDD+ is to deliver on its potential to provide alternative livelihoods to extractive-dependent people and conserve biodiversity.

Table 6.2. REDD+ governance lessons.

Broad governance lessons for REDD+ on the Peruvian Amazonian frontier
- Raise awareness of Amazonian issues among Lima policy makers
- Define responsibilities and jurisdictions of municipalities, regional governments and decentralised ministries at the local level
- Extend protected areas authorities' jurisdiction to buffer zones of protected areas
- Build capacity of Ministry of Agriculture at national and local levels
- Adopt codes of conduct for NGOs, including communication procedures with other NGOs and local authorities, and local adjustment of work programmes
- Build capacity for local participation in tourism
REDD+ lessons for YChNP
- Consolidate highland-lowland vision of regional development for Pasco
- Decentralise Environment Ministry to Pasco to reinforce protected areas authority
- Build on existent institutional relationships between NGOs and municipality
- Build capacity for ecotourism, ensuring local participation and ownership
- Offer land users steady income alternatives to their current practices
REDD+ lessons for MNP
- Establish of codes of conduct between the regions of Cusco and Madre de Dios to renew bi-regional cooperation
- Decentralise COFOPRI to the province of Manu
- Support and build on Madre de Dios regional government's agroforestry programme
- Diversify tourism activities to include cultural aspects and greater involvement and ownership by local populations
- Focus on reducing processes of forest degradation

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CHAPTERS 6-7

Inter-Chapter Link

The previous chapter (Paper 3: *Lessons for Sub-National REDD+ Resource Targeting from the Governance of Protected Areas & their Buffer Zones on Peru's Amazon Frontier*) compared land use governance at the two case study sites to draw out practical policy lessons for REDD+ engagement and resource targeting. The findings offer insights into how nuanced approaches would be required at the two sites in order to maximise resource efficiency, both at the national level and at the two sub-national case study sites.

The governance realities at the two sites offer unique insights into how structures and institutions shape and drive land use outcomes, but raise further questions regarding the agents of physical change in these rural settings, their perceptions and experiences of land use, and how they would prefer to engage with REDD+.

The following chapter (Paper 4: *Integrating REDD+ into Livelihoods, Land Uses & Preferences in Strategic Sites along Peru's Amazonian Frontier*) addresses these central issues. It does so by drawing on smallholder survey data to examine and compare how local people derive their livelihoods and use buffer zone land, and how these influence their REDD+ preferences. Of particular interest for policy, practice and theory is the extent to which these vary between the two sites, and why.

CHAPTER 7

Integrating REDD+ into Livelihoods, Land Uses & Preferences in Strategic Sites along Peru's Amazonian Frontier

Joel N.H. Scriven

ABSTRACT

The conceptual and practical foci of mechanisms to reduce deforestation and degradation, enhance carbon stocks and conservation (REDD+) are increasingly shifting from the international to sub-national level. This process compels an urgent need for information regarding forms of engagement with local populations and the value of REDD+ to their livelihoods. The research presented here takes case studies from the buffer zones of Amazonian frontier protected areas in Peru, Yanachaga-Chemillen (YChNP) and Manu (MNP), to question the conditions under which REDD+ can be sustainably integrated into livelihoods and land uses, and the extent to which these might need to vary over space, with an aim to inform REDD+ policy and practice. Data were collected through land user surveys (n=200), including preference rankings, across the two study sites, with multivariate analyses employed to explore and quantify the relationships between respondent characteristics, deforestation and REDD+ preferences. The results suggest comparatively higher levels of social and natural capital among MNP inhabitants, and financial and human capital among those in YChNP. MNP's rurality has suppressed greater deforestation to date while YChNP's proximity to Lima has lead to widespread deforestation, intensive agriculture and greater expanses of fallow land. Preference rankings reveal the willingness of local populations to participate in systems of payments for conservation and reforestation, a leaning towards non-state institutions to manage such a scheme, and market assistance and road improvements as preferred additional benefits. Age and income (MNP), and property size and deforestation to date (YChNP), are found to vary significantly with conservation and reforestation response patterns, providing important insights into the drivers of local-

level decision making. While MNP preferences yield greater absolute additionality of first conservation and reforestation preferences, while higher relative additionality is evident in YChNP. REDD+ policies could reasonably aim for 50-75% forest conservation and 25-50% reforestation in these areas. While carbon funds would bring about greater efficiency in MNP, the intensity of past and current anthropogenic land use in YChNP compels the more urgent deployment of carbon finance for conservation and restoration at this site.

Keywords: Peru, Amazon, buffer zone, local, reduced deforestation and degradation, enhance carbon stocks and conservation (REDD+), livelihoods, land use, preference.

7.1 Introduction

The current diversity of proposals for mechanisms to reduce deforestation and degradation, enhance carbon stocks and conservation (REDD+) (TCG, 2009; Trivedi *et al.*, 2009; van Noordwijk & Minang, 2009) reveal that the exact rules are far from agreed upon (Phelps *et al.*, 2010b). What is clear is that the current demand for carbon credits from REDD+-type initiatives (Baranzini *et al.*, 2010; Neeff *et al.*, 2009; Neeff *et al.*, 2010) will drive the development of sub-national level projects, ultimately likely forming part of a 'nested approach' to avoided deforestation (Angelsen *et al.*, 2008; Pedroni *et al.*, 2009). The shift in the conceptual and practical foci of REDD+ from global architectures to national and local levels (Angelsen *et al.*, 2009) now necessitates an improved knowledge of multi-level forms of context-specific engagement (Phelps *et al.*, 2010a).

The development of sub-national REDD+ initiatives, as with any system of payments for ecosystem services (PES), is challenging, not least because of the relative lack of global experience and the range and diversity of local-scale factors which influence such arrangements. Two important local approaches offer solutions. Firstly, much can be learned from experiences from past environment and development initiatives (Blom *et al.*, 2010; Martin, 2010) in order to avoid the repetition of mistakes. Secondly, in-depth knowledge of local livelihoods and conditions has been shown to be critical to the design of effective and equitable PES (Petheram & Campbell, 2010; Potvin *et al.*, 2007a; Rosa *et al.*, 2004; Sikor *et al.*, 2010; Southgate *et al.*, 2009; Tschakert *et al.*, 2007). Both of these aspects point to the fact that local experience and conditions matter to the realisation of participative, effective and equitable – and therefore locally harmonised – PES.

By understanding the nuances in rural livelihood strategies and land uses, specific synergies can be built into REDD+ design and goals (Petheram & Campbell, 2010; Phelps *et al.*, 2010a). Moreover, by engaging local populations in participatory approaches (Potvin *et*

al., 2007b), REDD+ can build on the preferences and interests of local people (Springate-Baginski & Wollenberg, 2010) and thereby maximize the local harmonisation of forest carbon retention and sequestration strategies. This paper presents an original contribution to the academic literature on PES by grounding global REDD+ design features in local conditions and preferences to question the conditions under which the mechanism can be sustainably and effectively integrated into livelihoods and land uses, and the extent to which these vary over space. This article additionally aims to inform PES policy and practice by providing practical information on local REDD+ conceptualisation and implementation.

Case studies are taken from Peru's Amazonian frontier. The Peruvian Amazon is considered an important target for REDD+ (Capella & Sandoval, 2010), primarily due to its high forest cover and latent deforestation threat, along with early indications of low opportunity costs (Swallow *et al.*, 2007). In addition, the Amazonian region presents opportunities for significant co-benefits. As a historically institutionally semi-abandoned region, poverty and unsustainable land use is rife and often intense (Aramburú & Garland, 2003), particularly at the frontier (Southgate & Elgegren, 2003). REDD+ therefore presents an important opportunity for rural sustainable development and resource use capacity building. The Peruvian Amazon also famously possesses extraordinary species and habitat diversity (Rodriguez & Young, 2000), together with an expansive network of protected areas, the latter advocated both within Peru and internationally as potentially key strategic areas for REDD+ (Ricketts *et al.*, 2010; Seymour & Angelsen, 2009). While legal protection of these areas often serves to reduce deforestation in comparison to the surrounding areas (Bruner *et al.*, 2001; Nepstad *et al.*, 2006; Pfaff *et al.*, 2009), poor land use governance and under-funding regularly result in continued deforestation within their boundaries (Curran *et al.*, 2004). With the widespread failure of efforts to date to link protected areas to local socioeconomic development (Naughton-Treves *et al.*, 2005), REDD+ presents an opportunity for a new approach to their governance.

Protected areas in the Peruvian Amazon have been found to be providing 'moderate protection' (Oliveira *et al.*, 2007), though ongoing deforestation and degradation in adjacent areas threaten to isolate the core areas, restrict wildlife migration corridors and deplete remaining natural resources for future generations. It is therefore not necessarily within the protected areas that REDD+ could generate the greatest benefits, but in the inhabited surrounding areas, the buffer zones. Buffer zones surround every protected area in Peru, with the remit of limiting human impact on the core area, and yet are out of the jurisdiction of the protected area authority and have no legal protection status. The theoretical re-enforcement of the social and environmental objectives of REDD+ and buffer zones therefore compels a deeper look into their social and physical engagement and integration.

Taking case studies from protected area buffer zones 500km (300 miles) apart on Peru's Amazonian frontier, this paper adopts three lines of enquiry. First, I explore the social and physical characterisation of the people and properties of the sites, followed by an analysis of local preferences. The results of this facilitate an evaluation of the potential for local scale engagement of REDD+ in relation to the social and physical facets of the areas. The preference ranking exercise give local populations a voice and suggest how they would like to participate in REDD+ and what they would like receive in return for their participation. Second, statistical analyses are employed to determine the extent to which livelihoods or land use characteristics act as predictors of conservation and reforestation preference response patterns, to evaluate which, if any, variables predispose people towards greater or lesser conservation or reforestation tendencies. Finally, I analyse the additionality of first stated conservation and reforestation preferences under payment scenarios, compared to a business-as-usual scenario, to determine the potential physical impact of REDD+. The paper concludes with an evaluation of specific and wider policy implications of the findings for the development of REDD+.

7.2 Methodology

7.2.1 Study Areas

Yanachaga-Chemillen National Park (YChNP) lies on the eastern slopes of the central Peruvian Andes, between 10°15'-10°55' S and 75°70'-75°10' W, covering 122,000ha of tropical cloud and lowland forest, and its elevation ranging from 3,643-460m amsl. It is contained within the region of Pasco, province of Oxapampa and districts of Villa Rica, Oxapampa, Huancabamba and Pozuzo. To the east and south of the Park lie the Yanesha Communal Reserve (YCR) (covering 35,000ha between 10°15'-10°50' S and 75°45'-75°08' W) and the San Matias-San Carlos Protection Forest (SMSCPF) (covering 145,000ha between 9°90'-10°90' S and 75°25'-74°65' W), which comprise, together with YChNP, the Yanachaga Conservation Complex (figure 7.1). The most exposed and developed axis of YChNP's surroundings is its western buffer zone, where communities have formed around watersheds running down from the Park's western escarpment into the Chontabamba River (flowing south-north), and within which lies a main road (parallel to the river) and the provincial capital of Oxapampa. The population in this area is comprised of descendents of German colonists who established Oxapampa in 1890, and Andean migrant peasants (known as '*colonos*') who settled in the area throughout the 20th century (Smith, 1981); as well as mixtures of the two. This western buffer zone (hereafter YChNP) is the focal area of this study site.

Manu National Park (MNP) covers 1.6 million ha and lies between 11°30'-13°21' S and 72°42'-70°85' W in south-eastern Peru, ranging in elevation from over 4,000m amsl in the Andean highlands to 365m amsl in the Amazonian lowlands. 93% of the Park is contained within the region of Madre de Dios, province of Manu and districts of Madre de Dios, Manu and Fitzcarrald; with 7% stretching into the region of Cusco, province of

Paucartambo, district of Kosñipata. To the southeast of MNP lies the 402,000ha Amarakaeri Communal Reserve (ACR) (between 12°30'-13°30' S and 71°33'-70°49' W). A buffer zone corridor is formed between the two protected areas, running south-west to north-east, and divided by the Alto Madre de Dios River as it enters the region of Madre de Dios. The population of the corridor is comprised of seven indigenous communities of three ethnicities: Harakmbut, Machiguenga and Yine; and Andean *colonos* who, since the 1970s, have established numerous settlements along the road which runs from the Cusco highlands down the steep Andes-Amazon gradient, thence parallel to the river, where it currently reaches as far north as Itahuania (see figure 7.1). A lowland section of this buffer zone corridor, from Pilcopata to Itahuania (hereafter MNP), is the focal area of this study site.

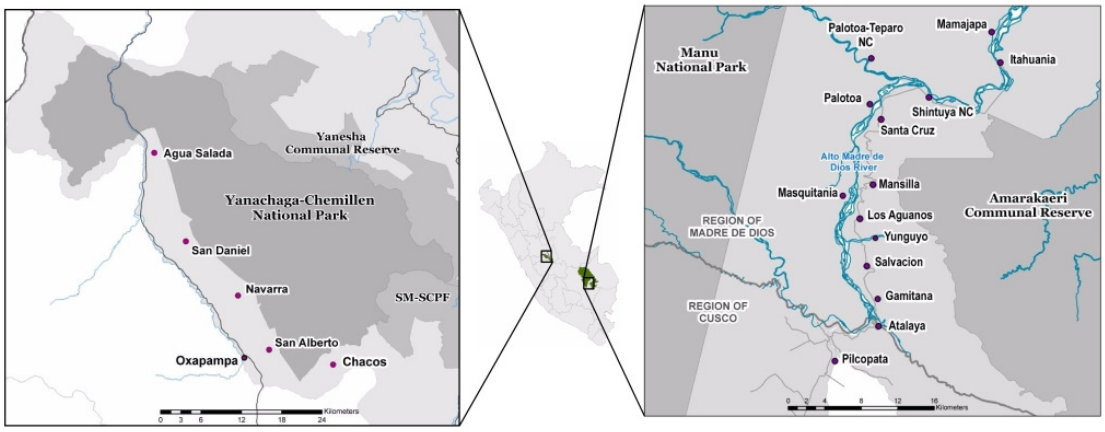


Fig. 7.1. Case study sites: the buffer zones of Yanachaga-Chemillen National Park (left) and Manu National Park (right). Dark shade indicates protected area; lighter shade indicates buffer zone (shapefiles courtesy of Pasco Regional Government, INRENA, Puerto Maldonado, and ACCA).

The two study sites provide particularly salient cases for the study of REDD+ due to national and international interest in the development of the mechanism in both areas. The German Environment Ministry designated €2 million for the reduction of deforestation in and around YChNP in 2009, while at the same time several NGOs and businesses independently entered the early stages of REDD+ project development in the MNP-ACR

corridor (Scriven *et al.*, in review). Given both this interest and the geographical and historical disparities between the sites, this research in part aims to determine the extent to which their differences necessitate nuanced approaches to the integration of REDD+ at each site.

7.2.2 Land User Surveys

Data were collected through surveys administered across the two study sites. The structure and layout of the survey draws on designs and concepts from Porras *et al.* (2007) and Hope *et al.* (2005), encompassing sections on basic information (age, provenance, family size, satisfaction with living conditions), livelihoods (assets and strategies), land use (past and present uses, future change projections) and preference rankings (see section 7.2.3). The survey design was ground tested and adjusted through an iterative and collaborative process with two focus groups comprised of local state officials and NGOs, and ten pilot runs with individuals in two communities (pilot surveys were not included in the final results).

100 surveys were collected at each site, between October-November 2008 in YChNP and between June-August 2009 in MNP. The study areas similarly stretch over approximately 50km; sampling strategies aimed to capture these ranges. The generally larger population sizes of settlements around YChNP, particularly those closer to Oxapampa, facilitated the collection of larger samples at this site, culminating in 25 in each of three southernmost communities: Chacos, San Alberto and Navarra; 10 in San Daniel, and 15 in Agua Salada (figure 7.1). The smaller size of settlements in the MNP-ACR corridor necessitated an approach wherein each of the 14 successive settlements and communities from Pilcopata to Itahuania was sampled (figure 7.1). This sampling area included two indigenous communities, Palotoa-Teparo and Shintuya.

Land users or owners, or their partners, from sampled communities were selected at random, with one survey collected per household. Individuals were informed that participation was entirely voluntary, conveyed the research objectives and explained explicitly that no direct benefits would accrue from participating in the research.

7.2.3 Preference Rankings

Preference ranking is a technique within the Participatory Rural Appraisal (PRA) body of approaches to data collection, which advocate local participation and interactive knowledge sharing (Chambers, 1994a; Narayanasamy, 2009). Ranking exercises have been employed by researchers to enable local people in developing countries to express and evaluate their knowledge, values and resultant preferences (Chambers, 1994b), frequently in rural contexts relating forests and natural resource management (*e.g.* Ayele & Tefera, 1999; Mukherjee & Chambers, 2004; Pavlikakis *et al.*, 2003; Samra & Mishra, 1998). Preference ranking can be used to determine and quantify individuals' relative prioritisation of components of a single issue, and was adopted in this research to ascertain preferences on facets relating to REDD+. In this way, these exercises allow local people to express the ways in which they would be most willing to participate in REDD+. The primary motivation for the adoption of preference ranking was its explanatory and administrative simplicity in the rural developing country context, in comparison to alternative PRA methods such as scoring (Fielding & Riley, 2000). The preference ranking section of the survey comprised six separate exercises (table 7.1).

Recent global surveys of forest carbon buyers (Neeff *et al.*, 2009; Neeff *et al.*, 2010) revealed the most desirable project types to be avoided deforestation and reforestation with native tree species. The first two ranking exercises emanate from these global-level preferences, seeking to ground them locally while recognising local trade-offs between

environmental effectiveness (in terms of land area) and fiscal efficiency (in terms of payment levels) (Wunder, 2005).

The first exercise presented incremental payment levels corresponding to increasing forest areas. The lowest payment level was set following Mourato and Smith's (2002) findings on willingness to accept conservation payments in the Peru's Amazonian region of Pucallpa (USD67/ha/yr). Taking the conservative estimate of aboveground forest carbon at 100tC/ha (Anderson *et al.*, 2009; Houghton *et al.*, 2001; Malhi *et al.*, 2006; Palm *et al.*, 2004; Ricse *et al.*, 1996; Saatchi *et al.*, 2007) (and therefore 367tCO_2e/ha) and a project time-frame of 20 years (cf. Chomitz *et al.*, 1999), the forest conservation payment levels respectively correspond to tCO_2 prices per ha of USD3.79, USD4.75, USD5.69, USD6.60. These place them under the volume-weighted average price over time of USD7.88/tCO_2 set out in a comprehensive survey of forest carbon projects (Hamilton *et al.*, 2010), the USD8/tCO_2 price arrived at by Strassburg *et al.* (2009) in a global analysis of REDD costs, and the USD7/tCO_2 cost of credits from the first REDD project in the region of Madre de Dios[98], thus theoretically allowing for the incurrence of other project costs.

The second exercise offered similar incremental payments for reforestation with native species, long-term (at least 20 year harvest period). The payment levels were based on the Costa Rican approach of reforestation compensation set at double that of forest conservation (Chomitz *et al.*, 1999; Russo & Candela, 2006) and, as advocated by locals through focus groups, the recognition of the additional time, labour and material costs of reforesting versus conserving. Following each of the payment/land area ranking exercises, participants were invited to set a land area and price (PEN/ha/yr) which they believed would more accurately reflect their conservation and reforestation opportunity costs.

Subsequent to the payment/land area rankings, participants were asked to rank their: participation preferences (compensation for conservation, reforestation, both, neither or

[98] 'The Madeacre and Maderyja Madre de Dios Amazon REDD Project', developed by Greenoxx in 2009; see www.greenoxx.com

unsure); preferred entity to manage such an initiative (as well as a brief reasoning for their choices); preferred benefits to receive in addition to payments; and the relative importance of the different elements. Table 7.1 summarises the choices presented to participants in the preference ranking exercise.

Table 7.1. Preference ranking options presented to survey respondents (PEN 1 = USD 0.35).

Conservation compensation levels	**Reforestation compensation levels**	**Participation preference**	**Managing entity**	**Additional benefits**	**Importance of constituent parts**
200 PEN (USD70) /ha/yr for conserving 25% of remaining forest	400 PEN (USD140) /ha/yr for reforesting 25% of current non-forest land	Payment for forest conservation	Environment Ministry	Improved access to medical assistance	Price per ha
250 PEN (USD87) /ha/yr for conserving 50% of remaining forest	500 PEN (USD175) /ha/yr for reforesting 50% of current non-forest land	Payment for reforestation	Municipal (local) government	Road improvements	Proportion of land set aside
300 PEN (USD105) /ha/yr for conserving 75% of remaining forest	600 PEN (USD210) /ha/yr for reforesting 75% of current non-forest land	Payment for forest conservation and reforestation	Co-operative or association	Improved access to agricultural markets	Managing entity
350 PEN (USD122) /ha/yr for conserving 100% of remaining forest	700 PEN (USD245) /ha/yr for reforesting 100% of current non-forest land	Prefer not to participate	Peruvian NGO	Improved forest regulation	Additional benefits
		Currently unsure	International NGO		

Participants were asked to imagine a scenario wherein they were going to be compensated for forest conservation and/or reforestation, and asked to rank their preferences within this scenario accordingly. The main limitation in preference ranking data collection is

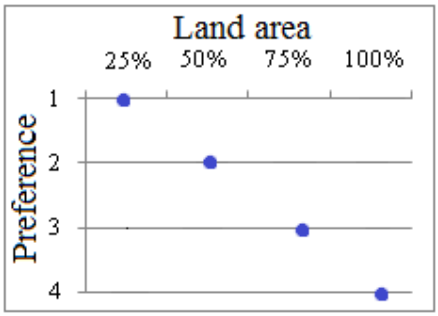
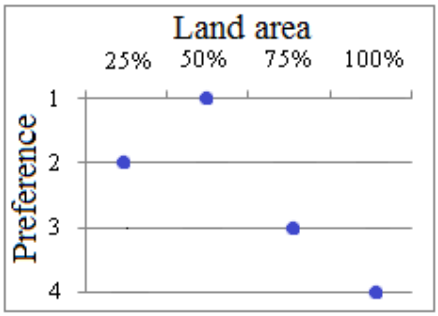
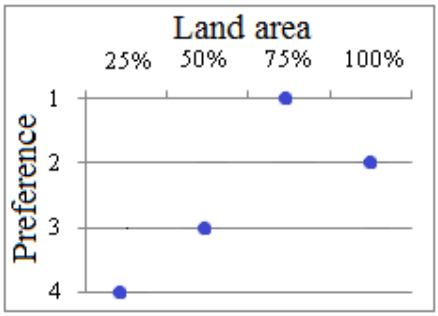
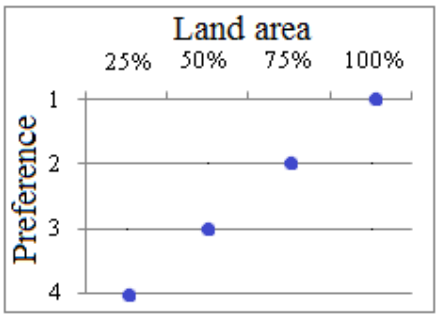
the risk of fatigue due to data/concept overload, which can be overcome with the paired comparison method, where just two options are presented at any one time.

7.2.4 Data Analysis

Data were analysed using SPSS. Forest conservation and reforestation preference rankings were coded into response types (RTs), according to the criteria set out in table 7.2, to facilitate the grouping of responses prior to analysis.

Responses which did not fit into any of the RT patterns were limited (n=2 in MNP conservation preferences) and were filtered out to prevent interference in the detection of explanatory variables. MANOVAs were undertaken using general linear models (GLMs) to explore and quantify the relationships between livelihood and land use variables and each RT. This form of analysis thus facilitated the quantification of relationships between multiple predictor and response variables (Potvin *et al.*, 2005; Potvin *et al.*, 2007b).

Table 7.2. Forest conservation and reforestation preference ranking Response Types (RTs).

	Interpretation	Example of preference graph shape
RT 1	Low land area participation preference	
RT 2	Mid-level land area participation, with 100% as last preference	
RT 3	Mid-level land area participation, with 25% as last preference	
RT 4	High land area participation preference	

7.2.5 Local Political Ecology

This research builds on a growing body of literature detailing place-specific analyses of PES in Latin America (*e.g.* Corbera *et al.*, 2007; Kosoy *et al.*, 2008; Muñoz-Piña *et al.*, 2008; Pagiola *et al.*, 2005; Pagiola, 2008; Russo & Candela, 2006; Wunder & Alban, 2008;

Zbinden & Lee, 2005). In addressing local perspectives on these issues, I adopt a "local political ecology", as coined by Warren et al. (2001), to provide a critical recognition of context and scale. This approach captures the traditional values of political ecology, incorporating social constructions of the environment and power relations in environmental change (Blaikie & Brookfield, 1987; Peet & Watts, 1996), yet obliges a sharper focus on local specificity and heterogeneity in analysing social and ecological conditions (cf. Bryant, 1992). A deeper knowledge of livelihood dynamics and resource use provides important insights into material practices (Batterbury, 2001) and thus the microprocesses of power and knowledge that shape local understanding and perspectives (McCusker & Carr, 2006). Moreover, local political ecology facilitates the linking of local livelihoods and land use to global processes (Bebbington & Batterbury, 2001), here in the form of REDD+, to determine how these new markets may reach populations in rural areas, and uncover the conditions under which both livelihoods and land uses may become integrated into, and more sustainable under, processes of globalisation (Bebbington, 2000; Bebbington, 2001).

While the role of meso- and macro-level structures are recognised as crucial to systems of PES and form an important part of the design and analysis of this research, empirical data collection was exclusive to the household level (cf. Sherbinin *et al.*, 2008; Sunderlin *et al.*, 2005). In this way, and through the adoption of participative methodologies, local context and conditions can be depicted and provide bottom-up linkages to, and information for, global REDD+.

7.3 Results & Discussion

7.3.1 Site Characterisations

7.3.1.1 Livelihoods

The livelihood characteristics of respondents (table 7.3) reveal some notable points of social and economic departure between the two sites. One emergent pattern is that of respondents in YChNP having been born closer to their current locations and possessing higher levels of private property ownership, yet owning smaller land areas. This pattern may be explained in large part by the geographies of the two areas, with YChNP lying in the accessible Central Selva region, directly over the Andes from the hub of the country, Lima; and MNP lying in the more remote southeast of the country, with Cusco – the closest major city – a rugged 8-10hr drive away. This resulted in the comparatively earlier non-indigenous colonisation of the Central Selva in comparison to the Manu region, including the 19th century European settlers mentioned above and the subsequent Andean *colonos*. This in turn led to earlier government presence in YChNP and consequent property privatisation, as well as the sub-division of properties as they were bequeathed to successive generations. In contrast, the figures for MNP respondents are rationalised through the more recent large-scale non-indigenous colonisation of the Manu region by *colonos* since the 1970s. This has been accompanied by the comparatively poorer institutional state presence resulting in lower levels of property formalisation to date. A further explanation for the significantly larger property sizes in MNP is the inclusion of indigenous communities in the sample. These are proprietors of large areas (Palotoa-Teparo owning 11,865ha and Shintuya 16,652ha) which, for the purposes of data collection, were divided between the number of families in each of

the communities to give a value for property size per household. However, even when these are factored out, average land areas in MNP remain significantly larger, at 41.90ha.

A further outstanding pattern is the comparatively greater capacities of YChNP respondents, evinced through levels of permanent labour and incomes, as well as the greater livelihood flexibility, illustrated by their statistically significantly higher perception of their ability to change their current land use practices. The Central Selva was the site of the earliest commercial timber extraction in the Peruvian Amazon and has more recently become an important supplier of agricultural produce to the Lima markets (Scriven, in press). This has in turn driven up land and produce prices, a corollary of which has been the comparatively greater reliance on agricultural income. In contrast, agricultural produce markets exert less power over land use in Manu, resulting in lower average land use incomes and a greater need to diversify income away from agriculture. It is notable that 70% of MNP respondents are in receipt of a non-agriculture income, compared to YChNP 34%. A final point of interest is the contrasting levels of affiliation to an agricultural co-operative, being significantly higher among MNP respondents. YChNP respondents conveyed that while co-operatives were common in the 1980s, they fell apart following the intensification of agriculture in the region, which resulted in land users wishing to operate individually. In sum, the livelihood figures provide evidence of greater levels of social (collective representation) and natural (land areas) capital among MNP inhabitants, and financial (income) and human (capacity to work and adapt) capital among those in YChNP.

Table 7.3. Livelihood characteristics of respondents in the study areas. Average values (standard error of mean in brackets for non-categorical values; *P*-values, calculated through the Wilcoxon test, shown for ordinal variables).

	YChNP	**MNP**	***P*-values**
Age	47.87 (1.59)	42.22 (1.15)	
Gender	0.14	0.10	0.346
0=Male; 1=Female			
Household size	5.37 (0.19)	4.76 (0.19)	
Distance from birthplace	2.06	3.01	0.000
1=Same district; 2=Same province; 3=Same region; 4=Different region			
Level of education	2.51	2.67	0.082
1=Not educated; 2=Primary; 3=Secondary; 4=Technical; 5=University			
Member of an agricultural co-operative	0.06	0.7	0.000
0=No; 1=Yes			
Satisfaction with living conditions	3.48	3.13	0.001
1=Do not like at all; 2=Do not like; 3=Like, but insufficient; 4=Like; 5=Like a lot			
Able to change current land use practices	0.63	0.38	0.001
0=No; 1=Yes			
Land area owned (ha)	29.27 (3.20)	58 (7.14)	
Land tenure	1.05	1.15	0.039
1=Titled; 2=Formalisation in process			
Full-time/permanent labour (human capital)	2.44 (0.15)	1.68 (0.09)	
Agricultural income* (USD/yr)	8,477 (1,479)	4,170 (636)	
Earn/receive non-agriculture income	0.34	0.71	0.000
0=No; 1=Yes			
Non-agricultural income (USD/yr)	6,922 (2,594)	4,853 (898)	

7.3.1.2 Land Use

Averaged current, past and projected land uses over respondents' properties shown in figures 7.2a and 7.2b reveal compelling distinctions between the two sites. Notable land use characteristics evident from figure 7.2a are the higher average proportions of current forest cover on properties in MNP and significantly greater average proportions of cattle ranching and fallow land uses in YChNP. Collaterally, figure 7.2b illustrates the comparatively higher

average proportion of historical deforestation in YChNP. While past deforestation patterns in each of the areas reflect their differential settlement histories, these can be further unravelled in light of current land use practices. The proximity of the Central Selva to Lima markets for agricultural produce is likely to have facilitated the expansion of cattle ranching and agricultural practices in the region, and thus contributed – along with the demand for timber – to greater past deforestation in YChNP. Current agricultural land use in YChNP appears limited in comparison to MNP, yet the extent of fallow land is indicative of fields being rested following intensive use. The physical nature of the crops grown in the two regions elucidates the relative proportions allocated to agriculture. In YChNP, the most common crops are at ground-level, such as rocoto (*Capsicum pubescens*) and granadilla (*Passiflora ligularis*), produced intensively (at high planting densities, with widespread use of chemical fertilizers and pesticides/fungicides) over small areas (Scriven, in press). In contrast, the primary crop grown in MNP is canopy-level banana (*Musa* spp.), produced over larger areas at lower intensity (low planting densities in order for each tree to receive sufficient light, and low use of chemical fertilizers and pesticides/fungicides). Moreover, the widespread use of agroforestry systems for growing banana (56% of respondents) accounts for the comparatively higher propensity to reforest in MNP.

Respondents' projected land uses over the next 20 years reveal potential business-as-usual (BAU) land use scenarios. MNP inhabitants conveyed a greater average proportion of projected deforestation, totalling ~25% of the original forest cover – reducing total average forest cover down to ~50%; while those in YChNP project an average ~20% reduction in forest cover – down to an average total of ~30%. While these projections reflect well-established patterns of deforestation and forest carbon loss at Amazonian frontiers following human settlement (Laurence *et al.*, 2001; Naughton-Treves, 2004; Rodrigues *et al.*, 2009), it is notable that MNP respondents project an average of 50% conservation. An explanation for this provided by the MNP natural and human capitals indicated in table 7.2. The evidence

suggests that Manu inhabitants, while possessing large areas with high forest cover, are limited by their physical and financial capacities (cf. Perz *et al.*, 2006) and thereby unable to carry out the land use changes they might otherwise elect to undertake. Nevertheless, as roads into the Manu region improve and extend northwards, this is likely to bring with it not only road-related deforestation (Mäki *et al.*, 2001), but also improved access to markets leading to increased land user capacity to undertake desired land use changes. The MNP deforestation projections presented here are based on respondents' predictions under current circumstances, and may therefore be taken to be conservative estimates. YChNP respondents' land use change projections reflect the greater profits which are available from alternative land uses through further forest clearance, evinced by the average land use profits shown in table 7.3. Moreover, the primary utility of the remaining average projected forest conserved in YChNP is as a natural resource extractive reserve, particularly for timber posts required for cultivating granadilla (Scriven, in review).

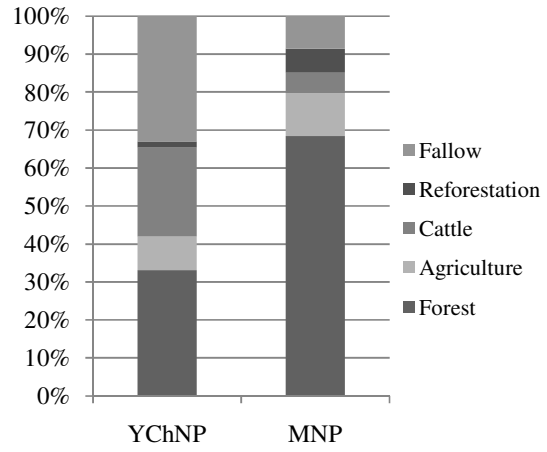


Fig. 7.2a. Averaged current land uses on survey respondents' properties.

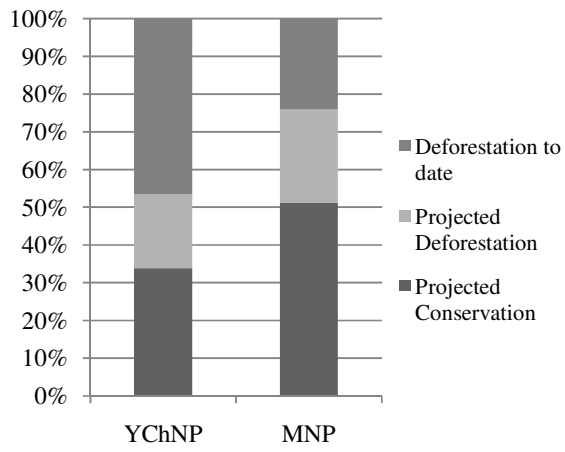


Fig. 7.2b. Averaged past and projected (under a BAU scenario over 20 years) use of original forest land cover when respondents arrived at their properties.

7.3.1.3 Preferences

The results of the preference ranking exercises displayed in figure 7.3 reveal the REDD+ preferences of respondents at the two sites. Forest conservation preferences indicate a willingness to conserve greater proportions of remaining forest among MNP inhabitants ('75% for PEN 300/ha/yr' as average first choice) compared to those in YChNP ('50% for PEN 250/ha/yr' as average first choice). '25% conservation' was on average the least preferred option at both sites, though this trend is more pronounced among MNP respondents. The K*W* values indicate greater response concordance among YChNP inhabitants. The standard deviations of '100% conservation' values in both sites (and that of '25% conservation' in YChNP) illustrate the wide ranges of rankings given to these options, frequently assigned an extreme value (1^{st} or 4^{th}). Taking average property size and forest cover values from above, inferences can be made on the physical implications of respondent preferences. In YChNP, where average property size is 29ha and average remaining forest cover is 33%, the overall first preference of '50% conservation' corresponds to the average conservation of 4.79ha of forest per respondent. In MNP, where average property size and forest cover values are 58ha and 68%, respectively, the overall first preference of '75% conservation' corresponds to an average 29.58ha of forest conserved per respondent. When invited to set their own forest area and price values, averaged responses were 59% for PEN 602.27/ha/yr in YChNP (from 33 respondents who chose to give alternative values) and 75% for PEN 767.05/ha/yr in MNP (from 44 respondents). Interestingly, when converted to figures for the monetary value of every 1% of forest cover, the values are very similar at the two sites: PEN 10.19 in YChNP and PEN 10.28 in MNP.

Average reforestation preferences of YChNP respondents reveal a clear signal (presenting the highest K*W* value among all variables) favouring lower proportions of land ('25% reforestation for PEN 400/ha/yr' first preference, followed by '50% for PEN

500/ha/yr'); while those from MNP indicate a willingness to reforest greater proportional areas ('50% reforestation' first preference, followed by '75%'). At both sites, '100% reforestation' is the least preferred option (which is reasonable to expect given that this option proposes the long-term reforestation of all non-forest area, including currently productive agricultural land). As with conservation preferences, overall first preferences can be translated into averaged physical values. In YChNP, '25% reforestation' of non-forest land corresponds to an average of 4.86ha of reforestation per respondent; in MNP, '50% reforestation' corresponds to an average of 9.28ha of reforestation per respondent. In stating their own reforestation values, averaged responses were 37.62% of non-forest area for PEN 1,181.82/ha/yr in YChNP and 63.06% for PEN 1,373.81/ha/yr in MNP. In contrast to the 'price per 1%' values for forest conservation, those for each 1% of reforestation were more distinct: PEN31.41 in YChNP and PEN21.77 in MNP. This disparity is indicative of the greater land economy in YChNP, as can be seen to be the case in table 7.3.

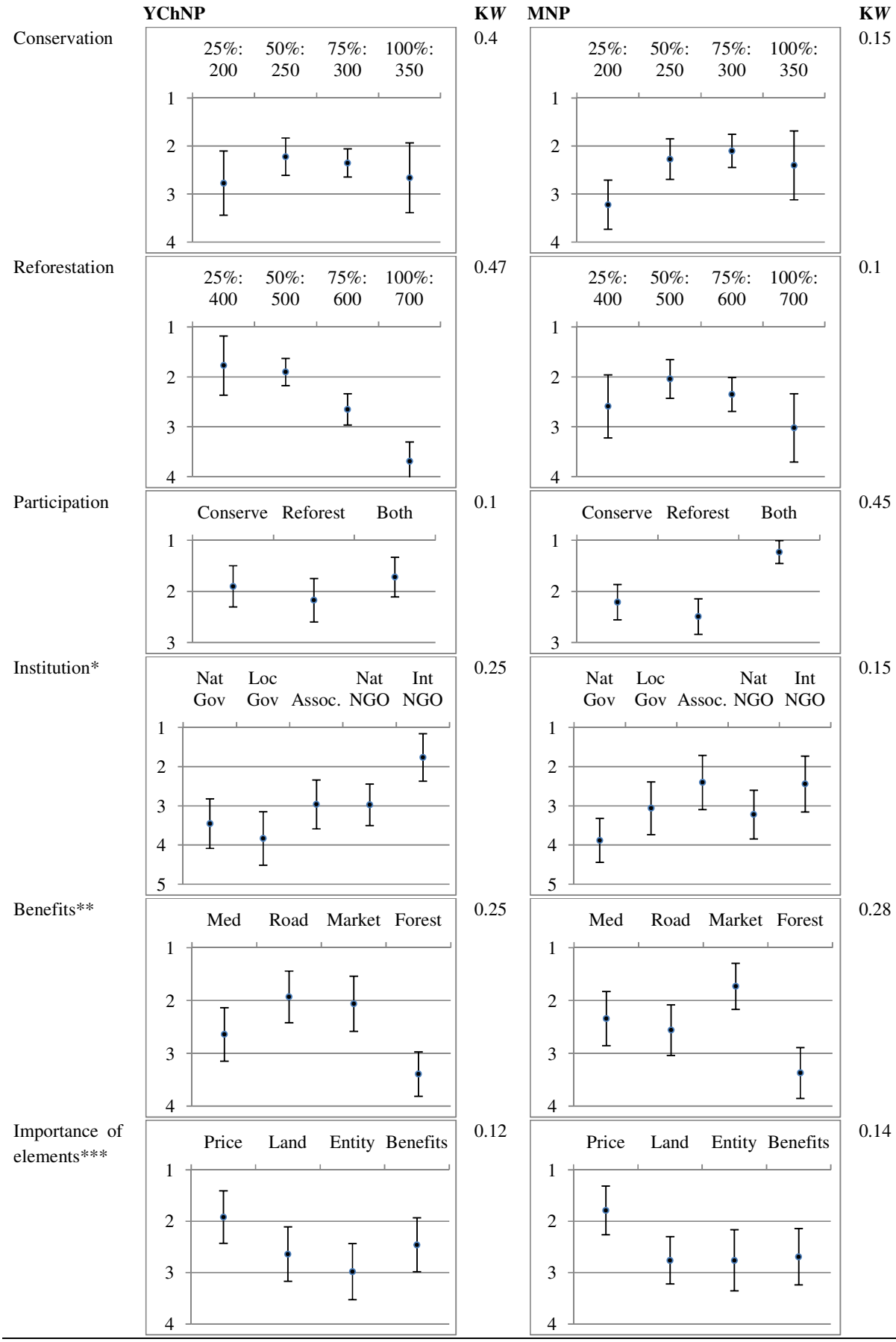

YChNP
KW
MNP
KW
Conservation
0.4
0.15
25%: 200
50%: 250
75%: 300
100%: 350
Reforestation
0.47
0.1
25%: 400
50%: 500
75%: 600
100%: 700
Participation
0.1
0.45
Conserve
Reforest
Both
Institution*
0.25
0.15
Nat Gov
Loc Gov
Assoc.
Nat NGO
Int NGO
Benefits**
0.25
0.28
Med
Road
Market
Forest
Importance of elements***
0.12
0.14
Price
Land
Entity
Benefits

Fig. 7.3. (Previous page) Respondents' preferences on selected REDD+ criteria, averaged from each of the study site samples (100 respondents from each site). Preferences shown on *y* axis range from 1 (most preferred) to 4/5 (least preferred). Error bars indicate standard deviation from the mean value, providing an indication of the range in responses for each value. The K*W* (Kendall's *W*, coefficient of concordance) values is a normalisation of the statistic of the Friedman's test used for assessing agreement among respondents, ranging from 0 (no agreement) to 1 (complete agreement).

The participation variable provides an indication of the type of support respondents would prefer to receive: compensation for conserving, reforesting, or both (a REDD+ approach). MNP respondents relay a clear preference for both, while there is less agreement among those in YChNP. Two other options offered concurrently with this variable were 'Unsure' and 'Prefer not to participate'; though since these represent absolute responses they cannot be factored into the figure. While no respondents at either site chose 'Prefer not to participate' as their first preference, greater levels of uncertainty (selection of 'Currently unsure') were evident among YChNP respondents (14%) compared to those in MNP (6%).

With broad international recognition that one of the major challenges now facing systems of PES is the development of appropriate governance institutions (Corbera & Brown, 2008; Corbera *et al.*, 2009; Gullison *et al.*, 2007; Phelps *et al.*, 2010a; Phelps *et al.*, 2010b; Saunders *et al.*, 2008), this research sought to gain an insight into this facet from a local perspective. Respondents were asked to rank institutions which could potentially manage a PES initiative in order of preference. Results from YChNP relay 'international NGO' as the strong favourite, followed by other non-state institutions ('national NGO' and 'association/co-operative'), with local and national state entities, in turn, least preferred. The K*W* values indicate less agreement among MNP respondents, who place 'association/co-operative' as first preference, marginally above 'international NGO', followed by 'local government', 'national NGO' and finally, 'national government'. This variable provides a valuable insight into local dimensions of institutional trust, which were elaborated upon when respondents provided their reasoning behind their selections. Across the two sites, four

broad factors were found to be the primary determinants in individuals' decision-making processes, the balance between which brought about final institutional preferences:

- Sovereignty (preference for Peruvian entity);
- Proximity and familiarity;
- Perceived capacity;
- Perceived honesty.

A common perspective at both sites was that of corruption within government institutions. However, while distance elicited the preference of local over national government among MNP respondents, notions of superior capacity at the national level and greater corruption at the local level produced the opposite outcome in YChNP. 'International NGO' received the overall greatest preference in YChNP due to the high levels of perceived capacity (encompassing financing, experience and knowledge) and honesty (terms such as 'conscientiousness' and 'professionalism' also used). While many respondents in MNP made similar claims for international NGOs, assertions relating to proximity, familiarity and sovereignty translated into 'association/co-operative' receiving on average greater preference.

Poverty reduction and sustainable development have been advocated as co-benefits of PES, including REDD+, since the inception of these mechanisms (Brown *et al.*, 2008; Grieg-Gran *et al.*, 2005; Kerr, 2002; Wunder, 2005; Wunder, 2008). However the mixed success of past initiatives in bringing about these objectives (Corbera *et al.*, 2007; Landell-Mills & Porras, 2002; Pagiola *et al.*, 2005) compels the need for a greater focus on local needs in the conceptualisation of sustainable development assistance. The 'additional benefits' variable aimed to determine the heterogeneity of local needs between sites, as well as the degree of concurrence among respondents concerning the needs within their sites –

i.e. inter- and intra-site variability in responses. Marginally greater concurrence of responses is evident in MNP, where 'market assistance' is on average the most preferred option, followed by 'medical assistance' then 'road improvements'. At both sites, 'improved forest regulation' is on average the least preferred option, not an unexpected result but important to consider in the context of REDD+. In YChNP there is a slight preference for 'road improvements' over 'market assistance', with 'medical assistance' ranked third. Taken alongside the lower agricultural income values from table 7.3, the average 'market assistance' rank given by MNP respondents is indicative of the difficulty land users encounter in reaching agricultural markets. In contrast, YChNP respondents' overall preference for 'road improvements' indicates greater market integration than in MNP, but infrastructure deficiencies – specifically relating to access to buffer zone communities from the main road. The higher ranking of 'medical assistance' among MNP respondents attests to a comparative lack of access to basic facilities, indicative of greater rurality.

The additional benefits suggested by respondents (table 7.4) provide further insight into local condition. These are of central interest to the local political ecology approach of this study which seeks to uncover local specificity and socio-ecological heterogeneity. Broadly, they suggest a lack of access to basic facilities, products and services in MNP; while highlighting the centrality of agricultural production and intensity in YChNP. It is also interesting to note that, after the top two most mentioned benefits, the assets most sought by YChNP smallholders largely reflect more material possessions, while those in MNP to a greater extent seek knowledge; perhaps reflective of the longer history, and inherited knowledge, of agricultural production in YChNP compared to MNP. In terms of benefit distribution under REDD+, this list of desired benefits emphasises the fact that there are no quick fixes when engaging local populations, and that significant time, capacity and labour investments are likely to be required in order to build local capacity in the way smallholders desire, particularly in more rural and more recently colonised regions such as MNP.

Table 7.4. Additional desired benefits stated by respondents.

	YChNP	MNP
Technical support for production & export, including plants	13	11
Technical support for reforestation, including tree nurseries	12	7
Tools, materials, fertilizers & pesticides	11	2
Technical support for pisciculture	1	9
Capacity building / education on conservation issues	2	7
Access to loans	2	4
Support for tourism	-	5
Cattle-related support	4	-
Land delineation & tenure assistance	1	4
Transportation assistance	1	3
Food	3	1
Access to water & sewerage connections	-	2
Access to higher education	-	2
Support for river defence	-	1

The final preference ranking variable aimed to provide a proxy of the relative importance assigned to the above constituent REDD+ elements. At both sites, price per ha is assigned the greatest importance, followed by additional benefits – although the positioning of the latter is more pronounced in YChNP, and on much the same level as land proportion and managing entity in the case of MNP. The managing entity is considered on average of least importance in YChNP, despite the strong preference for an international NGO conveyed above. However, a degree of uncertainty over the objective of this variable, and perhaps at times weariness from the subsequent exercises, are likely to have interfered with the gauging of exact preferences for this measure.

7.3.2 'Response Type' Characterisation

This section aims to uncover the existence of shared characteristics among individuals grouped by response type (RT), as outlined in section 7.2.4. Frequencies of conservation and reforestation RTs are shown in table 7.5. Counts not reaching 100 indicate a lack of response due to land use characteristics, *i.e.* respondents with no remaining forest cover did not undertake conservation preference rankings; those with no non-forest land did not undertake reforestation preference rankings. This ensured the exercise remained realistic and contextualised to each respondent's situation. Of particular note is the pronounced leaning towards lower reforestation RTs in YChNP, which brought about the clear preference signal identified in section 7.3.1.3.

Table 7.5. Response Type (RT) frequencies. RT 1: low land area participation preference; RT 2 & 3: Mid-level land area participation; RT 4: high land area participation preference.

	RT1	**RT2**	**RT3**	**RT4**
YChNP				
Conservation	27	18	6	37
Reforestation	66	15	12	6
MNP				
Conservation	10	32	8	46
Reforestation	30	33	5	29
	←Low land area ‖ High land area→			

Table 7.6 sets out the variables found to vary significantly (at least 95% confidence interval) with conservation and reforestation RTs at the two sites. The overall low R^2 values indicate the limited success of the GLM in predicting future outcomes, a finding not uncommon in local-scale studies of rural human-environment relations (Coomes *et al.*, 2000; Gavin & Anderson, 2007; Godoy *et al.*, 1998). Yet the *P*-values reveal some compelling findings of significant relationships.

Table 7.6. Variables found to vary significantly (at least 5% sig. level) with conservation and reforestation RTs at the two sites – results from multivariate GLM. R^2 (multiple correlation coefficient) values provide an estimate of the proportion of variance in the dependent variable explained by the model.

	P*-value	R^2
YChNP		
Conservation RTs		
Property size (ha)	0.007	0.134
Deforestation to date (ha)	0.021	0.109
Reforestation RTs		
BAU reforestation over 20yrs (ha)	0.018	0.100
MNP		
Conservation RTs		
BAU reforestation over 20yrs (ha)	0.000	0.249
BAU conservation over 20yrs (% of current forest cover)	0.000	0.199
Age	0.026	0.111
Reforestation RTs		
BAU reforestation over 20yrs (ha)	0.001	0.159
Total income (PEN/yr)	0.007	0.122

YChNP conservation RTs are found to vary significantly with two variables. The first of these is property size, with owners of greater expanses displaying a preference for conserving greater proportions of their forested land. The second, less significant, variable is the number of has deforested to date, with greater historical deforestation corresponding to a preference for conserving greater proportions of their remaining forest. These results point to individuals in YChNP possessing large land areas – of which they have deforested large enough areas to maintain their present livelihood – being the most likely to be willing to accept payments to conserve greater proportions of their remaining forest. Conversely, individuals with comparatively smaller properties and greater forest cover are likely to prefer to conserve smaller proportions of their forest.

YChNP reforestation RTs, given the clear overall signal they convey, were found to vary significantly with just one variable, BAU reforestation. This reveals a trend for respondents with higher BAU reforestation projections preferring to reforest greater proportions of their non-forest land.

The two most significant predictor variables for MNP conservation RTs are the BAU conservation and reforestation projections, where respondents with greater BAU projections are more likely to be willing to accept payments to conserve and reforest larger proportions of their properties. A further significant variable is age, with older respondents showing a greater propensity to prefer accepting payments for conserving larger proportions of forested land. This is indicative of younger respondents envisaging clearing greater proportions of forest than their older counterparts, presumably because of their comparatively greater ability to undertake land use changes over the projected 20 years.

MNP reforestation RTs vary significantly with BAU reforestation, with respondents projecting to reforest a higher number of ha being more likely to accept payments to reforest greater proportions of their non-forest land. A secondary significant variable is income from all sources (land use and non-land use incomes), with higher incomes predisposing respondents to prefer accepting payments to reforest greater proportions of their non-forest land. Common feedback from respondents was that of the high expense of reforestation (as indicated by the reforestation payment levels independently set by respondents in section 7.3.1.3). In light of this, greater income corresponding to preferences for the reforestation of greater areas is perhaps indicative of poorer individuals perceiving themselves to be – despite the compensation payments offered – less able to reforest greater proportions of their land due to financial constraints. Building local capacity regarding reforestation is therefore an important accompaniment to reforestation assistance in MNP.

Equally as compelling as the significance of the variables shown in table 7.6 on the RTs is the lack of significance of others. In particular, variables such as intra-site community location and level of education bearing no significant influence on RT are indicative of marked heterogeneity within, as well as between, sites. Meanwhile, the significance of relationships between conservation and reforestation projections and RTs raises questions about the additionality of stated preferences compared to a BAU scenario. This is a central

aspect of carbon finance upon which carbon credit delivery is contingent. The following section evaluates this aspect.

7.3.3 Additionality of Preferences

The objective of this section of the analysis is to gauge the additionality of primary conservation and reforestation preferences by placing respondents' first choice preferences in the context of their BAU land use change projections over a 20-year period (seen in figure 7.2b). Essentially, if respondents were to participate in a system of PES, this section questions the difference it would make to their BAU land use, thus addressing the environmental efficiency of REDD+. Each respondent provided their BAU projection towards the beginning of the survey, while preference rankings were undertaken at the end, to ensure robustness of projections. Table 7.7 sets out the sum values of respondents' BAU projections against the total number of has corresponding to each individual's first conservation and reforestation preferences. The sum values contextualise the comparative scales of private land use at the two sites.

Table 7.7. Additionality of first choice conservation and reforestation preferences against BAU conservation and reforestation projections (sum of ha of respondents from each site).

	Projected BAU conservation (ha)	Total conservation under first preferences (ha)	**Additional conservation under first preferences (ha)**	Projected BAU reforestation (ha)	Total reforestation under first preferences (ha)	**Additional reforestation under first preferences (ha)**
YChNP	768	942	**156**	327	819	**492**
MNP	3,397	3,801	**404**	924	1,508	**584**

Payment scenarios correspond to greater areas of additional conservation and reforestation in MNP, with respondents' first preferences bringing about 248 ha more conservation, and 92 ha more reforestation, than in YChNP. However, the contribution of

the additional proportions relative to the totals is greater for both conservation and reforestation in YChNP, constituting 16.7% of total conservation and 60.07% of total reforestation, compared to values in MNP of 10.6% for conservation and 38.7% for reforestation. Therefore although greater additional areas are conserved and reforested in absolute terms in MNP, greater relative additional contributions are evident in YChNP. A primary reason for the considerably greater conservation areas denoted in MNP than in YChNP is the bias imposed by the indigenous community territories in the sample. When these are factored out, the projected BAU conservation area is reduced to 1,817ha, with an additional 370ha conserved under first preferences. The additional forest area then increases to 16.9% of the total area conserved under first preferences, marginally superseding the YChNP value.

It is worth reiterating here that the BAU projections are based on respondents' current rates and patterns of land use change, and therefore do not take into account potential deforestation incurred by alterations to national, regional or local development patterns. This may be a more salient point in MNP, where rurality is likely to have played the lead role in suppressing more extensive land use change. Here, the lengthening and improvement of the penetrative road further downriver is an outstanding potential driver of accelerated deforestation (cf. Perz *et al.*, 2008). Hydrocarbon exploration and its potential impact in Amazonia (Finer & Orta-Martinez, 2010) is a further pertinent issue. This brings to the fore compelling aspects in the differentiation between REDD and REDD+. Under strict REDD only the additional conservation proportions shown in table 7.7 could be financed. Under REDD+, the inclusion of conservation could help provide land users with sufficient financial stability to ensure the endurance of their BAU conservation projections under altered circumstances or livelihood shocks which would otherwise engender land use change.

The extraordinary additionality of reforestation reflects both a great willingness to reforest among the populations in both sites and a current financial suppression of this

practice. Many respondents view reforestation as a favourable medium- to long-term investment, if not for them to capitalise upon then for subsequent generations. The good fortune that local populations in these strategic REDD+ areas are so willing to adopt this practice presents a significant opportunity for incrementing the practice through carbon finance.

7.4 Conclusion

This paper aimed to determine the conditions under which REDD+ could be sustainably integrated into livelihoods and land uses in the Peruvian Amazon, and the extent to which these conditions vary over space. A local political ecology approach (cf. Warren *et al.*, 2001) focused the analysis at the smallholder level and provides important insights into material practices and the processes that shape local actions and perspectives. This approach has shown that the local scale matters when designing new instruments to promote greater socio-ecological sustainability, and the extent to which practice and opinion can vary over space.

The larger size of individual properties in MNP, together with their forest cover, comparatively lower incomes from land use and the local inclination to conserve and reforest, make it a favourable site for environmentally efficient REDD+. In addition, the mechanism could act as a support mechanism to buffer the region from currently unforeseen land use changes. In policy terms, it would be reasonable to aim for 50-75% conservation of current forest cover, and up to 50% reforestation of deforested areas, under payment. Take-up of a voluntary PES system may be augmented through joint management between an agricultural co-operative and an international NGO, and by offering greater market integration. However, mechanisms to buffer the known corollaries of increased market access (*i.e.* increased forest clearance) would need to be buffered through continued land use

regulation, conservation capacity building and support to diversify incomes away from land use (*e.g.* into tourism).

Meanwhile, the smaller property size, lower forest cover, higher land use incomes and booming agricultural markets in YChNP, together with comparatively lower conservation and reforestation proportion preferences, would suggest lower REDD+ effectiveness. However, the degraded state of lands (see average proportion of fallow land in figure 7.3b) and low forest cover suggest this is a site in urgent support if it is to function as a buffer zone to the national park. Based on local preferences, policies could realistically target 50% conservation and 25% reforestation, and would be more likely to be taken up if managed by an international NGO. The preference for improved roads and market access is a red flag indicating respondents' aspirations to increase their agricultural areas. To counter this outcome, access to specialty, added-value markets (*e.g.* organics) could be incorporated into REDD+ design, which would increase the income fetched per ha, particularly due to it requiring less expense on fertilizers and pesticides. An effective target for REDD+ in YChNP would be reforestation, to address landscape restoration (cf. Sierra & Russman (2006) in Costa Rica), a practice currently suppressed which most respondents aspire to.

REDD+ clearly offers an opportunity for joint environment and development outcomes in the buffer zones of Amazonian frontier protected areas. This study indicates that the rapid development of blanket methodologies as finance for the mechanism becomes more readily available may pose a risk of rejection at the local level. Local populations hold the key to successful REDD+, and possess a vast knowledge of their landscapes, people and environments. A careful approach which combines nationally strategic site selection with local knowledge, empowerment and harmonisation through attention to local condition is more likely to maximize REDD+'s environmental effectiveness, fiscal efficiency and equity and co-benefits (cf. Angelsen, 2008). More research is now needed on the extent of divergences of local-scale land economies to inform heterogeneity of opportunity costs.

Another important area is the analysis of livelihood diversification in the context of REDD+, to determine how, and the extent to which, livelihoods can be harmoniously diverted away from forest clearance under payment.

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CHAPTERS 7-8

Inter-Chapter Link

The previous chapter (Paper 4: *Integrating REDD+ into Livelihoods, Land Uses & Preferences in Strategic Sites Along Peru's Amazonian Frontier*) examined and compared smallholder survey and preference data to determine how local-scale actors derive their livelihoods and use buffer zone land, how these influence their REDD+ preferences, and the extent to which these vary between the two sites. The findings showed considerable livelihood and land use disparities between smallholders at the two sites, highlighting the importance of attention at the local scale. The paper touched upon economic issues at the two sites but it was not within its scope to elaborate upon economies of land use and production. Nevertheless, the importance of economics in REDD+, given its market nature, raises questions about the opportunity costs of conservation and reforestation at the two sites.

The following chapter (Paper 5: *Rewarding, Regulating & Reshaping: Differentiating Local Engagement of REDD+ in Amazonian Smallholder Production, Land Use & Economy*) takes this as its point of departure to examine in more detail smallholder production, including the implications of the forms of agriculture adopted, incomes and livelihood diversification. In doing so, it proposes an innovative conceptual framework for the evaluation of local-scale REDD+ engagement, the '3Rs'.

CHAPTER 8

Rewarding, Regulating & Reshaping: Differentiating Local Engagement of REDD+ in Amazonian Smallholder Production, Land Use & Economy

Joel N.H. Scriven

ABSTRACT

Knowledge is urgently needed to inform the local engagement of mechanisms to reduce deforestation and increase conservation (REDD+) in rural developing country settings. Taking case studies from the buffer zones of national parks in the Peruvian Amazon, Yanachaga-Chemillen (YChNP) and Manu (MNP), I set out an innovative framework for REDD+ engagement at the smallholder level through the '3Rs': rewarding, regulating and reshaping. Data were collected through household surveys (n=200) and interviews (n=52). Production conditions require a reshaping of relationships between protected areas and buffer zone inhabitants and greater regulation of risk-coping strategies through targeted risk mitigation assistance. Existing REDD+-compatible production methods in MNP present an opportunity for rewarding of these practices, while commercial production in YChNP compels the need for fundamental reshaping and stringent land use regulation. REDD+ opportunity costs are explored and found to be low for cattle (USD 2/tCO2e) but prohibitively high for cash crops (reaching USD 68/tCO2e). Income diversification strategies are discussed in the context of their potential for reshaping smallholder livelihoods at the two sites. Findings inform potential local-level REDD+ engagement in two highly strategic sites; while the 3Rs provide an innovative and practical conceptual framework for the evaluation of REDD+ engagement and efficient resource targeting.

Keywords: Reduced deforestation, REDD+, Peru, Amazon, protected area, buffer zone, smallholder, production, land use, rural economy.

8.1 Introduction

The enhancement of scientific knowledge of ecological systems over the past 10 years has facilitated the conceptualisation and development of ecologically and economically complex mechanisms to mitigate climate change through land use and forestry, coined 'reducing emissions from deforestation and forest degradation in developing countries, conservation, sustainable management of forests, and enhancement of carbon stocks', or REDD+. The fundamental concept underpinning REDD+ is the monetisation forest carbon to increase the market value of forests sufficiently to make them more valuable standing than felled (Canadell & Raupach, 2008). While this mechanism, a form of payment of ecosystem services (PES), currently tops the global climate agenda (UNFCCC, 2009), international rules on its implementation are yet to be agreed. The most likely scenario is a 'nested approach' (Angelsen *et al.*, 2008; Pedroni *et al.*, 2007; Pedroni *et al.*, 2009), a multi-scalar governance approach wherein national governments establish a national accounting framework and monitoring system, while local/regional governments, communities, NGOs or private actors develop sub-national initiatives. In theory, this approach has the advantages of involving local-level state and non-state actors and providing the conditions for greater transparency of benefit distribution (Cortez *et al.*, 2010). In practice, local-scale REDD+ engagement is made highly complex by physical, economic and socio-cultural heterogeneity (Blom *et al.*, 2010; Börner *et al.*, 2007; Kosoy *et al.*, 2008; Phelps *et al.*, 2010a; Southgate *et al.*, 2009).

It follows, then, that differentiated local approaches to REDD+ design are needed to capture the full utility of the mechanism (Petheram & Campbell, 2010). In this respect, the literature highlights that there is now an urgent need for a greater 'understanding of trade-offs and synergies between rural livelihood activities, alternative land uses, and REDD+ goals' (Phelps *et al.*, 2010b), and knowledge to inform the development of on-the-ground

methods to ensure the full realisation of co-benefits (Miles & Kapos, 2008). While much of the literature to date has focused on the global-level costs of REDD+ (*e.g.* Böttcher *et al.*, 2009; Eliasch, 2008; Stern *et al.*, 2006; Strassburg *et al.*, 2009; Tavoni, 2007), less attention has been paid at the local, smallholder level, where the effects of the mechanism will ultimately transpire. Important knowledge gaps therefore currently exist concerning local contextualisation of opportunity costs (Corbera *et al.*, 2007; Southgate *et al.*, 2009), as well as the potential interactions between REDD+ and agriculture (Antle & Stoorvogel, 2008; Campbell, 2009). This papers sets out to uncover the ways in which differential household asset holdings and patterns of resource use among smallholders may affect the design of the 'next generation of conservation-development initiatives' (Coomes *et al.*, 2004), here in the form of REDD+.

While CIFOR's '3E' criteria (effectiveness, efficiency and equity) (Angelsen *et al.*, 2008; Engel *et al.*, 2008) facilitate a theoretical evaluation of the impact of REDD+ design, there is a lack of practical research and analysis on local REDD+ engagement. This paper takes this as its point of departure to propose an innovative framework for the examination of local-scale practical and economic engagement of REDD+ on rural private lands, the '3Rs': rewarding, regulating and reshaping of smallholder activities.

'Reward', in the form of monetary or material compensation, provides the foundation of economic REDD+ engagement, determined through differential combinations and triangulations of opportunity costs, forest carbon content and area. What is clear, yet often shied away from in the REDD+ literature, is that the fulfillment of REDD+ objectives will also entail stringent land use regulation and enforcement. 'Regulation' here addresses compliance with REDD+ commitments, and implies the strengthening of local monitoring and enforcement capabilities. The 'reshaping' of livelihoods deals with the provision and promotion of alternative income streams to ones involving deforestation or degradation and their associated carbon losses. I propose that local-scale physical, economic and social

heterogeneity will oblige differential engagement and balancing of these three elements in order to fulfill REDD+'s potential.

This paper adopts a case study approach with the aim of determining the extent to which, and how, inter-site heterogeneity at the smallholder level compels the need for differentiated sub-national REDD+ engagement through the 3Rs. The originality of the contribution of this paper lies in its innovative approach to connecting and differentiating global REDD+ in the context of local smallholder realities and practicalities. In the following section I describe the two case study sites and data collection methods. In section 8.3, I analyse in turn the implications of production conditions, existing land uses and the engagement of current practices, drivers of land use change, opportunity costs and livelihood diversification strategies. I conclude with a review of the specific and wider policy implications of the findings.

8.2 Methods

8.2.1 Study Sites

The Peruvian Amazon provides a highly relevant site for the analysis of local engagement of REDD+ due to its high forest cover, rich cultural and biological diversity and endemism, and the latent deforestation threat from development, exploitation and migration. Focusing on smallholders, case studies are taken from strategic development-conservation foci: the buffer zones of protected areas on the Amazon frontier. These areas are designed to limit anthropogenic impacts on the protected area, yet receive no legal status or budget allocation for their management or protection. By its application in these areas, REDD+ could strengthen protected area efficacy and induce more sustainable livelihoods and land

use practices, and therefore represent potentially key strategic target areas for the mechanism (cf. Springate-Baginski & Wollenberg, 2010).

The two case study sites provide particularly pertinent cases for the study of REDD+ since, as of 2009, both were being considered as forest carbon project sites by national and international NGOs. Their distinct geographies and histories provide an opportunity to contrast the differential engagement of REDD+ in local-scale economic systems.

Yanachaga-Chemillen National Park (YChNP) lies on the eastern slopes of the central Peruvian Andes, between 10°15'-10°55' S and 75°70'-75°10' W, covering 122,000ha of tropical cloud and lowland forest, its elevation ranging from 3,643-460m amsl. It is contained within the region of Pasco, province of Oxapampa and districts of Villa Rica, Oxapampa, Huancabamba and Pozuzo. To the east and south of the Park lie the Yanesha Communal Reserve (YCR) (covering 35,000ha between 10°15'-10°50' S and 75°45'-75°08' W) and the San Matias-San Carlos Protection Forest (SMSCPF) (covering 145,000ha between 9°90'-10°90' S and 75°25'-74°65' W), which comprise, together with YChNP, the Yanachaga Conservation Complex (figure 8.1). The most exposed and developed axis of YChNP's surroundings is its western buffer zone, where settlements have formed around the micro-watersheds running down from the Park's western escarpment into the Chontabamba River (flowing south-north), and within which lies a main road (parallel to the river) and the provincial capital of Oxapampa (1,800m amsl). The western buffer zone (hereafter referred to as YChNP) is the focal area of this study site.

The population in this area is comprised of descendents of German colonists who established Oxapampa in 1890, and Andean migrant peasants (known as '*colonos*') who settled in the area throughout the 20th century (Smith, 1981); as well as mixtures of the two. The region's proximity to Lima, coupled with this colonisation pattern and its accompanying commercial knowledge, led to it becoming the site of the earliest timber extraction in the Peruvian Amazon (Ortiz, 1967). Following the peak of this industry in the 1960s,

inhabitants increasingly turned to non-timber land use practices to sustain their incomes and satisfy Lima's growing demand for agricultural produce (Bebbington, 1990). Agriculture in the region developed through boom and bust cycles according to the demands of Lima markets, beginning with cattle and coffee and shifting through to potato (*Solanum tuberosum*), pumpkin (*Cucurbita* spp.), rocoto bell pepper (*Capsicum pubescens*) and, most recently, granadilla passion fruit (*Passiflora ligularis*) (Scriven, 2010).

Contrasting in size and remoteness, Manu National Park (MNP) lies between 11°30'-13°21' S and 72°42'-70°85' W in south-eastern Peru, covering 1.6 million ha and ranging in elevation from over 4,000m amsl in the Andean highlands to 365m amsl in the Amazonian lowlands. 93% of the Park is contained within the region of Madre de Dios, province of Manu and districts of Madre de Dios, Manu and Fitzcarrald; with 7% stretching into the region of Cusco, province of Paucartambo, district of Kosñipata. To the southeast of MNP lies the 402,000ha Amarakaeri Communal Reserve (ACR) (between 12°30'-13°30' S and 71°33'-70°49' W). A buffer zone corridor is formed between the two protected areas, running south-west to north-east, and divided by the Alto Madre de Dios River as it enters the region of Madre de Dios. A lowland section of this buffer zone corridor, from Pilcopata (in the region of Cusco) to Itahuania (in Madre de Dios) (hereafter referred to as MNP), is the focal area of this study site.

The population of the corridor is comprised of seven indigenous communities (each of which has been granted territory surrounding their community as private property, ranging in size from 3,000-38,000ha) and *colonos*, primarily from the Cusco highlands, who have formed settlements along the length of the Alto Madre de Dios River. A penetrative road extends northwards parallel to the river, reaching as far as Itahuania (as of 2009). The first commercial activity in the region was the extraction of natural rubber in the 1800s (Coomes & Barham, 1994), though non-indigenous settlement in the region did not begin until commercial timber extraction commenced in the 1940s. The region's inaccessibility

suppressed the feasibility of commercial agriculture to the city of Cusco until the 1990s (Scriven *et al.*, in review), at which point the export of small amounts of banana (*Musa* spp.) and pineapple (*Ananas comosus*) began.

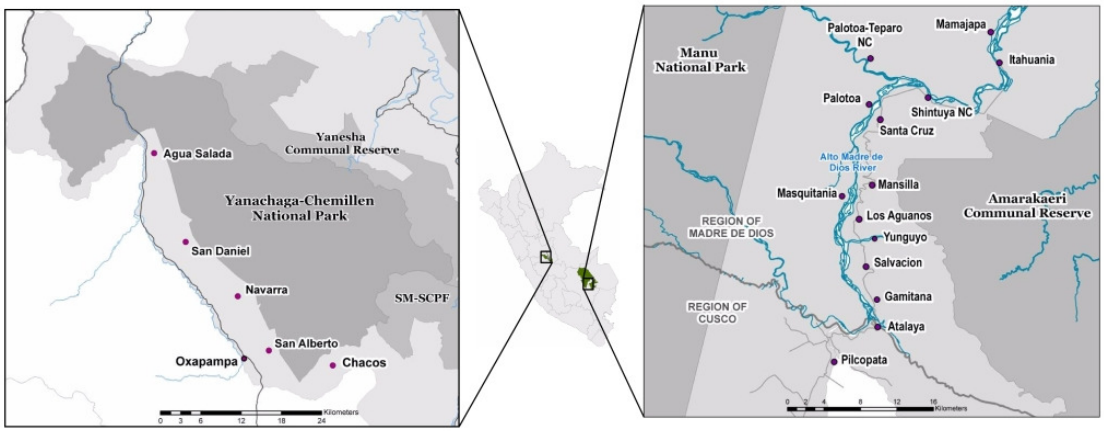

Fig. 8.1. Case study sites: the buffer zones of Yanachaga-Chemillen National Park (left) and Manu National Park (right). Darker shade indicates protected areas, lighter shade indicates buffer zone (shapefiles courtesy of Pasco Regional Government, INRENA, Puerto Maldonado, and ACCA).

8.2.2 Data

This paper questions the extent to which heterogeneity of smallholder production, land use and economy across Peru's Amazonian frontier compels the differentiation of local REDD+ engagement. A mixed methods approach was taken to data collection. Land user surveys (n=200) were used to collect quantitative data on private land use (forest area, three primary productive land uses) and economy (income per activity), production conditions (impact of producing in a protected area buffer zone, access to local and national markets and risks) and income diversification. One hundred surveys were completed at each site, in the settlements of Chacos, San Alberto, Navarra, San Daniel and Agua Salada in YChNP between October-November 2008; and in each settlement and indigenous community between Pilcopata and Mamajapa in MNP between June-August 2009. Survey data were analysed in SPSS. These data were supplemented by qualitative semi-structured interviews

with land users (n=20) and key state (n=18) and non-state (n=14) actors at each of the sites between July 2008 and August 2009. Interviews were recorded, transcribed and their content analysed thematically. Themes covered in interviews were land use governance, production economy, land use and land use change trajectories, and alternative income streams inhabitants draw upon.

8.3 Results

8.3.1 Production Conditions

This section explores respondents' perceptions of the impact of producing in a protected area buffer zone, ease of access to agricultural markets and production risk, providing the structural context of REDD+ engagement.

8.3.1.1 Buffer Zone Production Context

Buffer zones are designed to limit the impact of anthropogenic activities on protected areas while benefiting neighboring communities, though this aspiration often goes unmet in developing countries (Mas, 2005). Where buffer zones succeed in benefiting inhabitants, REDD+ can build upon this to better connect the population to the protected area. Where this is not the case, an understanding of the drivers behind local viewpoints can be drawn upon to target interventions. Findings reveal that most smallholders at both sites perceive no impact or some limitation from being in the buffer zone compared to those who see benefits (table 8.1) – although those in MNP convey a greater sense of limitation. The reasons behind attitudes are also revealing. While respondents at both sites cited the prevention of agricultural and extractive activities as limitations, those in YChNP attributed the favourable

productive conditions, in terms of land quality and water supply, to the buffer zone. Those in MNP largely concurred in attributing the benefit of the buffer zone to the attraction of tourism. A notable REDD+ target here are the smallholders perceiving the greatest benefit of living in the buffer zone to be timber from the protected area.

Table 8.1. Smallholder perceptions of the impact of producing in a protected area buffer zone (response frequencies).

	MNP	YChNP
Limitation	**35**	**14**
Prevents agricultural expansion	*15*	*6*
Prevents timber extraction	*12*	*7*
No benefit to local people	*6*	*-*
Prevents hunting	*2*	*-*
River flooding	*-*	*1*
Wild animals eat crops	*1*	*-*
No impact	**48**	**51**
Benefit	**17**	**35**
Attracts tourism	*11*	*1*
Provides good conditions for crops	*-*	*10*
Protects the environment	*2*	*7*
Water supply	*-*	*9*
PA provides source of timber	*1*	*3*
Prevents landslides	*-*	*2*
More animals for hunting	*1*	*-*
Good infrastructure	*-*	*1*
Attracts NGO projects	*1*	*-*
PA provides employment	*1*	*-*

A single respondent across the two sites, a park guard in MNP, accredited the provision of employment to inhabiting the buffer zone; while six in MNP cited the lack of benefit to local people in the protected area as the greatest limitation. A separate survey question revealed that a total of eight smallholders were presently involved in protected area management: four in YChNP who bordered the park had been asked by the protected area authority to monitor their borders; the four in MNP were more directly involved: three park guards (two indigenous ARC guards) and a member of Manu's support committee. This reveals a significant disconnect between the protected areas and the buffer zone populations, a characteristic that fuels an element of local resentment towards conservation efforts and institutions, and which has been shown to reduce protected area effectiveness (Agrawal &

Gibson, 1999; Elbers, 2008; Ellis & Porter-Bolland, 2008; Wells & Brandon, 1993). Reshaping this relationship through REDD+ to involve a greater number of local inhabitants in protected area management could work to bring about a greater sense of integration and conservation value in smallholders and the possibility of greater protected area effectiveness.

8.3.1.2 Access to Markets

Proximity and access to markets are important factors associated with deforestation and agricultural expansion and intensification (Goldman & Smith, 1975; Von Thunen, 1966). Research in the Amazon has pointedly illustrated the direct correlation between increased ease of market access and greater deforestation (Lorena & Lambin, 2009; Pacheco, 2009; Pfaff, 1999; Vosti *et al.*, 2003; Walker & Homma, 1996). It therefore follows that market access should be considered a central element in the local engagement of REDD+ in smallholder land use and economies.

At both sites, smallholders are almost exclusively reliant on intermediaries to sell their produce. In YChNP, the history of settlement and production has shaped a regular schedule for weekly intermediary visits which smallholders arrange their harvests around. In contrast, intermediary visits to MNP are less predictable due to distance from market (Cusco), road conditions (frequently impassable in the rainy season) and a lack of integration into regional agricultural markets. Several MNP smallholders reported occurrences of their produce rotting at the side of the road while awaiting intermediaries[1,2]. Consequently, smallholders perceive a considerable greater ease of market access in YChNP compared to those in MNP (table 8.2). The market access disparity between the sites introduces a major point of departure between the two regions which suggests the need for differentiated REDD+ engagement. While market limitations create an advantageous

[1] Masquitania land users A and B, 15.07.2009
[2] Salvacion land user, 26.06.2009

economic environment for REDD+ engagement in MNP – given that this will predispose a greater proportion of the population to adopt alternatives, the entrenched nature of markets of YChNP is likely to present a greater challenge. Here, the reshaping of productive practices (section 8.3.2.1) could therefore play a bigger role.

Table 8.2. Smallholder perceptions of market access (response frequencies).

	MNP	YChNP
Local markets		
Easy	51	83
Difficult	48	12
National markets		
Easy	24	68
Difficult	75	27

8.3.1.3 Risk

The analysis of local perceptions of risk and risk-coping strategies provides key insights into smallholder decision-making and production conditions which can be incorporated into targeted PES programs to increase their efficiency (Alix-Garcia *et al.*, 2008; Takasaki *et al.*, 2004). By providing targeted risk mitigation assistance to smallholders, REDD+ interventions could provide greater livelihood and land use sustainability.

There is a marked difference between the risks perceived by respondents at the two sites (table 8.3), which are likely to have been shaped by agricultural production and market conditions. A broad contrast between smallholders at the two sites is the greater emphasis on market access risks in MNP (reflecting the above-outlined market access difficulties) and production risk in YChNP. Together with banana diseases, the most cited risks in MNP were the difficulties in transporting produce, the low prices fetched and the lack of buyers. Lowland tropical forest production conditions were also perceived to be a risk, with crops damaged by high rainfall and strong winds (banana plants are regularly toppled by storms),

and smallholders producing near the Alto Madre de Dios River facing flooding risk. YChNP smallholders also face environmental risks due to the tropical environment producing high rainfall and humidity – which is in turn held culpable for the high rates of crop disease encountered, predominantly fungal conditions which thrive in the conditions. The highest frequency risk reported in YChNP is cattle disease (bovine enzootic hematuria), the widespread prevalence of which is induced by inappropriate cattle feed and corroborated by a histopathological study of cattle in the region (Gonzales *et al.*, 2004).

Table 8.3. Smallholder perceptions of the greatest risks they encounter (response frequencies).

	MNP	**YChNP**
Crop diseases (generic)	24	48
Banana disease	*52*	-
Granadilla disease	-	*28*
Rocoto disease	-	*9*
Crop pests	29	14
Cattle disease	9	51
Transport of produce	43	-
Low prices	32	-
River flooding	25	-
Climate		
Excessive rain	*23*	*25*
Strong winds	*22*	*3*
Excessive heat	-	*3*
Excessive humidity	*2*	*9*
Drought	-	*1*
Landslides	2	3
Dangers of timber extraction	6	-
Lack of state support	6	2
Lack of buyers	4	-
Lack of labor	2	-

The implications of these conditions for REDD+ are far-ranging. At both sites, carbon finance interventions could help mitigate environmental risks through agroforestry to help protect crops from rain, and boundary planting to buffer strong winds (reviewed in section 8.3.2.1). Beyond this, the most appropriate approaches at the two sites are likely to diverge.

Poor market access conditions in MNP have resulted in smallholders diversifying their incomes as coping strategies, including the extraction and sale of timber (section 8.3.3.2), and an increasing number turning to cattle to provide a low but steady, or emergency, income source. Both of these imply carbon losses through land use change which could be mitigated by a more stable agricultural produce market – thus reshaping livelihoods away from timber and cattle. To ensure the reciprocal stability of supply, greater yield consistency could be induced by building local capacity on natural crop management methods which reduce disease prevalence (such as felling and hewing banana plants following harvest, to prevent weevil proliferation).

In YChNP, a notable outcome of the production risks faced by smallholders has been the unchecked, ubiquitous and incremental use of chemical pesticides, fungicides and fertilizers[3,4]. An YChNP survey respondent observed how "the smallholder has turned into a chemist"[5] because of the profits which stand to be made from greater yields through the application of chemical fertilisers, pesticides and fungicides. This has led to the contamination of local waterways and the degradation of soils[6], but also to market limitations: a trial evaluating the feasibility of the international export of rocoto peppers found chemical concentration levels on the produce to be prohibitively high[7]. This issue is symptomatic of the challenges involved in engaging REDD+ in regions of high-intensity commercial production. Though a broader reshaping of agricultural practices (section 8.3.2.1) is required to provide alternative options for more sustainable production, the ecological damage imposed by the unchecked use of chemical applicants underscores the need for more stringent regulation and enforcement of their use within the buffer zone. To address cattle disease risks, the reforestation of cattle pastures – silvopasture – with shrubs

[3] Regional government state actor, 4.11.2008
[4] Forestry authority state actor, 16.10.2008
[5] Navarra land user, 11.11.2008
[6] NGO actor, 17.10.2008
[7] Regional government state actor, 27.10.2008

as well as trees could be an efficient measure to help mitigate disease prevalence by providing appropriate fodder for cattle to feed on.

8.3.2 Engaging Existing Land Uses

In addition to reducing deforestation and increasing reforestation, REDD+'s flexibility allows and rewards the incorporation of carbon stock enhancement interventions into existing practices. In order for these to be appropriately targeted, a thorough knowledge of the physical state of smallholder plots in terms of forest cover, types of agriculture and forest use is required.

General land use patterns and practices differ markedly between the two sites (figure 8.2). MNP smallholders possess considerably greater average property sizes and proportions of forest on their properties, 58 ha and 73% forest cover, compared to YChNP's 28 ha and 41% forest cover. This, together with YChNP's greater average proportion of fallow land (33% versus MNP's 9%), is indicative of the greater intensity of agricultural production in YChNP. These characteristics also indicate that while conservation may be the most efficient strategy in MNP, the extent of non-forest land in YChNP underscores the need for restoration alongside the reduction of further deforestation. YChNP's greater average proportion of smallholder land dedicated to cattle ranching (849 ha versus MNP's 194 ha) illustrates the greater ease of export and proximity of markets in comparison to the remote MNP. In these areas, simple interventions could enhance carbon stocks through silvopasture and 'living fences' (reforestation around the border of the pasture), which also serve to provide shade for cattle and protect soils.

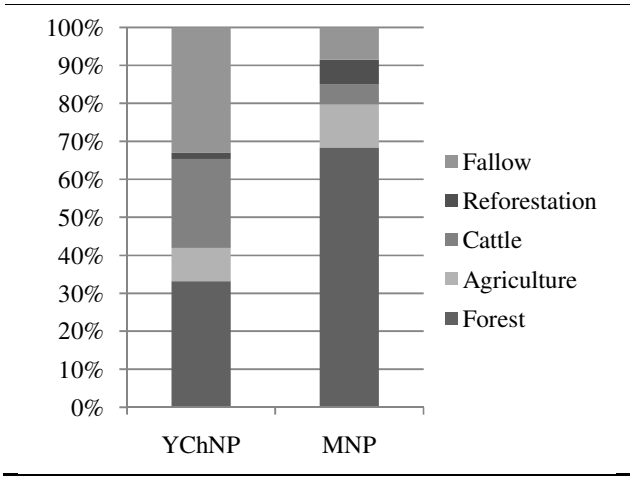

Fig. 8.2. Averaged current land uses on survey respondents' properties (percentages on *y*-axis represent the proportion of smallholder land area).

8.3.2.1 Agriculture

A closer look at the two primary (by total land area covered) commercial agricultural activities and their trade modalities at each site facilitates the differentiation of the physical nature and impact of commercial land use and the depiction of practical smallholder-level REDD+ interventions to capture and maximize carbon retention, storage and sequestration. These activities are banana (216 ha) and pineapple (23 ha) in MNP, and granadilla (177 ha) and rocoto (35 ha) in YChNP. The principle explanation for the general difference between the crop types at each site is elevation, with those at YChNP more suited to higher elevations, and those in MNP more typical of lowland tropical climes.

Banana, a canopy-level herb which can reach 9m (30 ft) in height, requires sufficient spacing between plants due to light requirements, although they are shade-tolerant (up to 50% for commercial production) (Nelson *et al.*, 2006) and are produced in agroforestry systems by smallholders who can afford tree saplings (note greater average proportion of reforestation in MNP in figure 8.2). The spacing required between plants, and therefore low density of planting, explain the greater average proportion of agricultural land in MNP compared to YChNP (figure 8.2). During harvest the entire peduncle is removed, carried to

the roadside, and then stacked on top of each other in the trucks of intermediaries. This crop's toleration of low-nutrient soils widely prevents the practice of burning plots prior to planting: vegetation is most often cut and left to decompose while the crop grows around it. Agroforestry with mixed native species (such as 'Pashaco' (*Schizolobium parahyba*), 'Copal' (*Bursera cuneata*) and 'Aguano' (*Machaerium inundatum*)) is common in MNP (57% of banana-producing respondents), giving smallholders a longer-term investment alongside the crop (timber). Agroforestry also reduces environmental risks by mitigating the impact of heavy rains and providing a wind buffer for banana plants. Further additional benefits yielded by agroforestry include soil protection, biodiversity enhancement and economic diversification (Schoeneberger, 2009). This previously-occurring practice therefore provides a potential foundation for engaging and rewarding carbon-enhancing practices under REDD+ through the provision of tree saplings to those who cannot currently afford them.

Pineapple, in contrast, is an herbaceous perennial which is grown at high densities (~15-20,000/ha) at ground level, is moderately shade tolerant and transported in the same manner as banana, stacked upon one another. The crop's high nutrient demand commonly means that forest areas are commonly burned prior to planting, and it is rarely produced under agroforestry. Here, REDD+ interventions to reshape production methods, such as the provision of organic fertilizers (to compensate non-burning) and tree saplings to pineapple producers, could reduce emissions and enhance crop carbon stocks.

In YChNP, the granadilla passion fruit crop, which grows as a vine, requires 600 wooden posts/ha on which to suspend wire at 2m, around which the vine wraps itself and suspends. It is shade-intolerant, grown at high densities and transported in wooden boxed once it is harvested, to protect the fruit. Rocoto is a high nutrient and light demanding ground-level shrub, planted at high densities to maximize yields and prevent shading, which is also packaged in wooden boxes to protect the soft produce during transport.

Engagement of REDD+ in existing YChNP commercial activities is likely to be more challenging, not least because of the intensive use of chemical applicants outlined above. Although granadilla is able to grow well on fallow land, its popularity (due to the income it generates – see section 8.3.4) and production method are driving forest degradation in addition to deforestation. One of its greatest impacts is the demand for wooden posts (see section 8.3.3.2), which are required to be hardwood in order to withstand the humid climatic conditions. Although granadilla can be produced under agroforestry (Yaguache, 2002), this technique is currently unknown among YChNP smallholders. To remedy this, in the first instance, demonstration agroforestry plots could illustrate the feasibility of the practice to smallholders. Secondly, the reshaping of granadilla production towards organic markets could provide an alternative paradigm. A growing middle class in Lima (Senauer & Goetz, 2003) could provide a target for premium-price organic produce, which could maintain high granadilla revenues. Moreover, the benefits of organic farming extend to promoting species evenness (the relative abundance of species, promoting biodiversity cobenefits) as well as inducing natural pest control (Crowder *et al.*, 2010), thereby mitigating the production risks encountered by smallholders. This major structural economic transformation could be informed by REDD+ actors, but ultimately relies on local and regional governments, NGOs and – importantly – private market actors to create the requisite conditions and incentives to facilitate the change for smallholders.

Rocoto is also challenging for REDD+ due to its high nutrient demand propagating primary forest clearance, and light requirements proscribing agroforestry shading. The short lifetime of the crop – two years – further compounds carbon losses by the frequency of forest clearance. As with granadilla, organics markets could be investigated and promoted under REDD+ to limit the intensity of production but, ultimately, rocoto is a likely to be a crop requiring greater regulation given its lack of compatibility with REDD+ – and buffer zone – objectives.

A final corollary of agricultural production in YChNP is the use of wooden boxes to transport produce. Softwood timber is extracted seemingly indiscriminately by box-makers in Oxapampa, each time requiring them to travel further to reach sufficient volumes. Boxes, measuring approximately 60cm x 60cm x 30cm, are put together in workshops, collected by intermediaries and distributed to smallholders to fill. Boxes leaving the YChNP region weekly are thought to number in the thousands[8], and are not returned to be reused. Here, an ambitious anti-degradation REDD+ intervention could pilot the introduction of alternatives, such as reusable plastic boxes, together with the provision of alternative incomes for box makers. (In contrast, the physical nature of MNP produce, with rugged skins, means they are able to be transported without packaging.)

8.3.3 Drivers of Change

Quantifying the extent of, and motivations behind, projected land use changes and practices provides an important understanding of where and how to utilise REDD+ to avert, limit or promote these processes. Figure 8.3 illustrates average past deforestation to date alongside projected deforestation and conservation over 20 years (from the time of data collection). The greater proportion of fallow land and cattle pasture in YChNP (figure 8.2) has predictably resulted in considerable average past smallholder deforestation (figure 8.3), roughly double that of the MNP average. Despite the extent of previous YChNP forest clearance, smallholders on average project to deforest a further 20% of current forest cover over the next 20 years, resulting in an ultimate average cover of 30%. This contrasts MNP where, although future deforestation projections surpass those of YChNP, an average of 50% forest cover is conserved in the long term. Furthermore, YChNP smallholders project to reforest an average of 3.3 ha (17% of land area owned) over the same time period; while

[8] Regional government state actor, 4.11.2008

those in MNP estimate 9.3 ha (25%). This section uncovers the drivers behind these projections and their implications for the engagement of REDD+ under the 3R criteria.

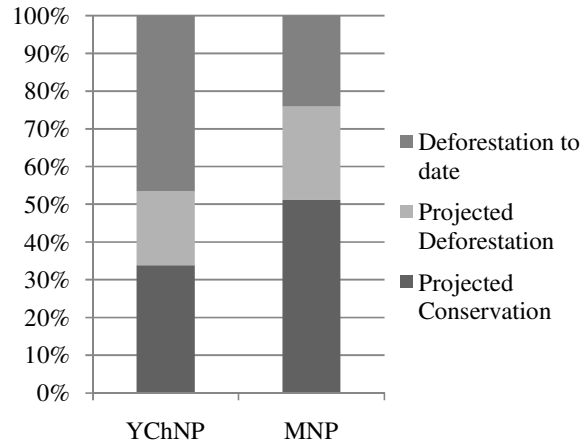

Fig. 8.3. Averaged past and projected (as estimated by smallholders under a BAU scenario over 20 years) use of original forest land cover when respondents arrived at their properties (percentages on *y*-axis represent the proportion of smallholder land area).

8.3.3.1 Deforestation motivations

The most common driver of projected smallholder deforestation at both sites is agricultural expansion for the establishment of crops (table 8.4), though this is more pronounced in MNP. Granadilla was explicitly mentioned by 57% of YChNP respondents as the crop driving their decision to deforest (though it may be higher than this figure), reflecting the current production boom of this product. Cattle pose a greater deforestation threat in YChNP, likely due to the superior export infrastructure and access to markets. The aspiration to reforest is a deforestation driver at both sites (given that smallholders want to plant commercially valuable species) and to a greater extent in MNP; while agroforestry is an additional minor driver in MNP.

Table 8.4. Frequencies (n=number of respondents) of motivations driving projected deforestation.

	MNP	YChNP
Agricultural expansion: crops	68	33*
Cattle pasture expansion	11	23
Reforestation	15	2
Agroforestry	3	-

* n=9 (57%) respondents specifically stated forest clearance in order to plant granadilla.

Reducing emissions from deforestation in these areas will be contingent upon providing alternatives to these activities (addressed in section 8.3.5), ensuring a lower carbon emission pathway to their materialisation, increased regulation, or a combination of these. A prominent lower-carbon emission strategy is the clearance of vegetation without burning (slash-and-mulch) – given the near-ubiquitous practice of slash and burn prior to planting – which returns nutrients and carbon to the soil, though carbon is still lost through decomposition. Land use governance limitations in both these areas (Scriven & Malhi, in review) mean that this REDD+ strategy, along with existing but widely unheeded land use legislation, would likely necessitate increased regulation and enforcement of smallholder activities.

8.3.3.2 Degradation: Use of Forest Products

Data on the use of forest products helps elucidate the extent of smallholder forest dependence as well as processes of forest degradation at the two sites (table 8.5). Significant forces of degradation are exerted on smallholder forests at both sites. YChNP smallholders display a narrow use of forest products entirely focused on timber, chief among the drivers of which is posts for granadilla production. This has induced extensive degradation and driven up the average price of posts from USD 1 to USD 3 each over the past five years. Indeed, even respondents who did not themselves grow granadilla were extracting posts to sell to producers. YChNP smallholders also extract timber for their own use, *e.g.* for

building and repairing houses and as material for boundary fences. In contrast, MNP smallholders are considerably more reliant on forests for fuel wood and as an income source through the sale of timber. They also make use of several non-timber forest products (NTFPs) such as medicinal plants and fruits, predominantly among respondents from the indigenous communities of Shintuya and Palotoa-Teparo.

Table 8.5. Frequencies (n = number of respondents) of forest product use by smallholders at the two sites.

	MNP	YChNP
Timber: posts	-	75
Fuel wood	63	15
Timber: commercialisation	58	10
Timber: own use	7	20
Currently none	7	13
Fruit	3	-
Medicinal plants	3	-
Wood for boxes	-	2
Bamboo	1	-
Leaves	1	-
Seeds	1	-

Differentiated REDD+ interventions are likely to be required at the two sites to address these distinct processes of forest degradation. In YChNP, the feasibility of reshaping practices to include post recycling and alternatives is an urgent target area. In concert, greater regulation of extraction, including perhaps a monitored quota and permit system, could be appropriate for this currently unrestricted practice. Given that commercial granadilla production is being advocated and encouraged by local authorities and is therefore likely to continue to grow in popularity, REDD+ here almost certainly requires multi-level, multi-actor engagement to address this major source of degradation. Dedicated reforestation plantations may provide the most realistic medium-term alternative to the continued degradation of natural forests for granadilla production. Meanwhile in MNP, promoting the manufacture and use of charcoal, or improved cook-stoves (which could lower the quantity

of timber used and reduce harmful emissions from incomplete combustion), could help reduce extraction of, and reliance on, fuel wood.

At both sites, though to a greater extent in MNP due to the greater remaining forest coverage, timber extraction for commercialisation would also need to be targeted. To address logging – very much an ingrained activity among smallholders at both sites – REDD+ could promote two pathways. First would be the direct monetary rewarding of smallholders reducing or halting the activity. This may prove to be an effective approach, given Amacher *et al.*'s (2009) finding that timber sales are largely a means for smallholders to reduce immediate cash constraints. Secondly, local capacity on low impact logging and sustainable forest management (SFM) practices could be stregthened, and timber certification feasibility investigated, *i.e.* transition the activity, through regulation and reshaping, to a more sustainable intensity. The large majority of timber extraction is currently carried out on a casual basis, with smallholders felling trees, sawing trunks into boards and subsequently individually dragging these to the roadside where they are stacked to await passing intermediaries to offer a price. When valuable hardwood species are extracted in this manner, without a permit, they are often stacked underneath common softwood species to conceal them in the case of the truck being superficially inspected. Moreover, despite the official ban on chainsaws at both sites, their use is rife and can be heard regularly when in the field. The use of formal management plans and improved regulation of these activities could improve environmental sustainability, while also reducing the risks posed to smallholders by informal extraction (see table 8.3). In addition, timber extracted under management plans and/or certification could fetch higher market prices and increase profitability for smallholders.

8.3.3.3 Conservation & Reforestation Motivations

REDD+ is also able to engage with pre-existing local forest conservation and reforestation incentives, in order to build on and reward grassroots predispositions. Again, an understanding of motivations driving these practices can give insights into if and how this could be achieved. A large majority of respondents at both sites plan to conserve at least some forest cover (94% of MNP respondents; 88% in YChNP) and reforest (91% in MNP; 80% in YChNP). Yet a significant disparity exists within reforestation objectives. MNP smallholders plan to predominantly plant mixed native species (such as 'pashaco' (*Schizolobium amazonicum*) – 86%, Spanish cedar (*Cedrela odorata*) – 43% and 'aguano' (*Cedrelinga cataeniformes*) – 38%) and harvest the timber after an average of 25 years. Those in YChNP aspire to plant primarily non-native eucalyptus (*Eucalyptus* spp. – 79%) and pine (*Pinus* spp. – 44%), harvesting after an average of 13.5 years.

The most common motivation for forest conservation and reforestation at both sites is timber, with the inability to work the land (*e.g.* on steep slopes) being a further unpropitious driver of conservation (table 8.6). Nevertheless, protection of the environment (notably in YChNP) and preservation for future generations (in MNP) are also prominent drivers. MNP respondents present a greater diversity of motivations, including tourism and receipt of carbon finance. These drivers represent benefits which could be appealed to and encouraged in the inception of local engagement of REDD+, and rewarded in its implementation.

Table 8.6. Frequencies of smallholder motivations for forest conservation and reforestation.

	MNP		YChNP	
	Conservation	Reforestation	Conservation	Reforestation
Source of timber: commercialisation	17	84	28	56
Protect the environment	20	5	29	11
Source of timber: posts	-	-	49	22
Unable to work the land	29	-	11	2
Preserve for future generations	13	10	3	-
Attract tourism	23	-	-	-
Source of timber: own use	4	1	-	10
Prevent landslides	1	4	8	-
Seed bank	4	2	-	-
No valuable timber remaining	2	-	1	-
Agroforestry	-	17	-	-
Sylvopasture	-	-	-	2
To receive carbon finance	2	-	-	-
Extraction of medicinal plants	1	-	-	-

8.3.4 Opportunity Costs

A comprehensive knowledge of local-scale land economy can provide important information and context regarding smallholders' opportunity cost for participating in REDD+ activities and avoiding activities which bring about carbon losses, *i.e.* the reward annuity. This logic assumes that, as rational economic actors, smallholders would need to be paid at least as much to participate in formal REDD+ activities.

Two broad characteristics emerging from net income and land cover figures for the two sites (table 8.7) are the greater average incomes per ha of YChNP production activities and the greater diversification of commercial production in MNP. This is illustrative of the more intense, market-response production in YChNP and diversified, low intensity, risk-hedged production in MNP.

Table 8.7. Net income from, and land cover of, commercial productive activities in MNP and YChNP.

	No. of affirmative respondents [*]	Mean ha per respondent [**]	Total ha covered [***]	Mean net income/ha /yr (USD[****])	Income range/ha/ yr (USD[****])	Income uncertainty	
						Too recent	Unkn-own
MNP							
Banana	83	2.61	216	1,131	3,626	8	2
Cattle	19	10.21	194	178	461	2	1
Citruses	15	1.27	19	344	675	6	1
Coca	4	0.93	3.7	3,373	6,148	-	-
Cocoa	3	0.92	2.75	1,440	2,038	1	-
Cocona	1	0.5	0.5	70	-	-	-
Coffee	2	2.25	4.5	339	24	-	-
Maize	5	0.8	4	1,876	1,967	-	-
Papaya	1	2.5	2.5	56	-	-	-
Pineapple	14	1.64	23	3,335	10,129	4	-
Pisciculture	2	0.75	1.5	-	-	2	-
Rice	6	1.33	8	611	879	-	1
Yuca	14	0.88	12.25	1,665	3,375	-	1
YChNP							
Cattle	64	13.26	848.5	191	2,832	4	-
Coffee	3	1.83	5.5	534	279	-	-
Granadilla	66	2.68	177	4,646	8,871	24	2
Reforestation	1	1	1	-	-	1	-
Rocoto	35	1.01	35.2	2,482	5,702	4	10

[*] Respondents' primary, secondary or tertiary land use.

[**] For respondents who responded affirmatively to each land use.

[***] By the 100 respondents at each site.

[****] 1 USD = 2.869 PEN.

The majority of MNP respondents produce banana, yielding an average yearly income of USD 1,131 per ha, with the second most common productive land use being cattle ranching (at USD 178/ha/yr), followed by citruses (generic) (at USD 344/ha/yr) in terms of respondent numbers – but pineapple (at USD 3,335/ha/yr) in terms of land coverage. The high establishment cost of pineapple (~USD 1,750/ha) is the primary barrier to entry to production of this crop, suppressing higher production levels despite it yielding the highest per ha income among MNP produce once harvested. These returns are, however, highly variable, as indicated by the income range figures. Meanwhile, the wide availability and comparatively lower establishment cost of banana (~USD 667/ha) contribute to its widespread occurrence. Coca (*Erythroxylum coca*), a plant containing numerous alkaloids

including cocaine, is found in the Cusco region of the MNP study area (principally in Pilcopata). The considerable income range depicts the disparity between sale for traditional (*i.e.* chewing and tea, fetching ~USD 1.5-2/kg dry weight) and illegal (*i.e.* processing into cocaine paste: ~USD 3.5-4/kg d.w.) uses. Given the extralegal nature of the crop, it is likely that a greater number of respondents were producing coca than admitted to through the survey (despite assured anonymity). Though the financial returns from banana, pineapple and coca materialise within a year, MNP farmers are also found to diversify into products with longer productivity cycles (notably fruit trees) which provide limited but steady incomes, such as citruses, cocoa (*Theobroma cacao*), papaya (*Carica papaya*) and cocona (*Solanum sessiflorum*).

The modal commercial land use in YChNP is granadilla, which yields the highest income across the two sites (USD 4,646/ha/yr). Cattle ranching is the second most common activity (yielding USD 191/ha/yr), followed by rocoto (at USD 2,482/ha/yr). The extraordinary returns from granadilla are a product of high investment and intense production methods. The increasing popularity of granadilla production has driven up the cost of the requisite materials (wire as well as posts), with investment in 2008 standing at ~USD 3,000/ha. The considerable numbers of uncertain income responses under 'Too recent' in table 8.7 indicate that these have been recently established, in turn illustrating the recent growth in popularity of the crop. Similarly to MNP, cattle ranching in YChNP is generally of low intensity, although the income range in YChNP illustrates the high returns being received by some individuals. Rocoto has been a consistently popular commercial land use in the YChNP region since the 1980s (Bebbington, 1990), one reason being its importance in *ceviche*, a national dish, ensuring ongoing demand. It also requires minimal investment so was adopted by many *colonos* upon their arrival in the area. However, it is subject to high price variations, as substantiated by the highest income range among YChNP respondents and the highest frequency of 'Unknown' returns across the two sites.

Respondents cited price variations between USD 0.30-15 per box (containing ~150 rocotos), and were therefore under perpetual uncertainty as to whether their earnings would reimburse their investment. The production of coffee (*Coffea* spp.; USD 534/ha/yr) is reflective of a historical practice (now more common around the settlement of Villa Rica, to the south of YChNP), while the single incidence of reforestation signals a growing wealthy immigrant contingent from Lima purchasing land to establish commercial reforestation plantations.

When the three primary commercial land uses (by area) in each site are costed over 10 years (cf. Börner *et al.*'s (2010) analysis of REDD feasibility in the Brazilian Amazon), including establishment and maintenance costs, as well as requisite fallow periods, a clearer picture of time-averaged income, and therefore REDD+ opportunity costs over time, is drawn (table 8.8 and figure 8.4). Time-averaged values are considerably lower than static ones, notably in the cases of pineapple and rocoto, although granadilla income remains far above all others.

Table 8.8. Time-averaged costs of the three primary commercial activities at the two sites (N.B.: cattle fetch higher sale prices in YChNP). These are calculated under the assumption that each ha is used consecutively for the same activity over the 10 year period, including requisite fallow periods.

	Establishment (USD/ha)	Maintenance (USD/ha/yr)	Productive period (years)	Fallow period (years)	Time-averaged income over 10 years (USD/ha/yr)
MNP					
Banana	666	400	5	2	546
Cattle	700	50	Ongoing	0	67
Pineapple	1,750	300	2	2	930
YChNP					
Cattle	700	50	Ongoing	0	79
Granadilla	3,000	1,000	4	3	2,480
Rocoto	500	500	3	5	850

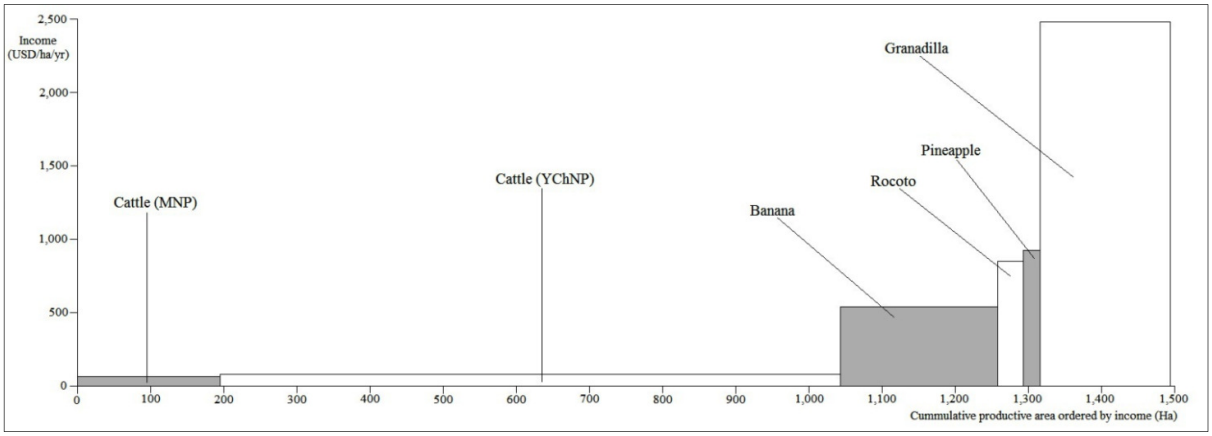

Fig. 8.4. Productive area vs. income cost curve of three primary activities at each site. Grey indicates MNP; YChNP shown in white.

The production economy figures can be used to calculate specific carbon prices required to both replace and avoid the activities (table 8.9) by accounting for the yearly rate of carbon uptake through reforestation and the carbon emissions avoided by not deforesting. Taking a conservative, time averaged, figure for the rate of carbon sequestration through reforestation in tropical regions of 5tC/ha/yr (18.34tCO_2e/ha/yr) (Brown, 1997; Nabuurs *et al.*, 2007; Richards & Stokes, 2004), reforestation carbon price values (C_x) (USD/tCO_2e) are calculated by dividing the time-averaged production incomes (i_x) (table 8.8) by the CO_2e sequestration rate (s):

$$\frac{i_x}{s} = C_x$$

Next, taking a conservative value for aboveground forest carbon of 100tC/ha (Anderson *et al.*, 2009; Houghton *et al.*, 2001; Ricse *et al.*, 1996) (and therefore 367tCO_2e/ha, agC) and a carbon payment period of 10 years, the production incomes (i_x) can be used to determine the carbon price (C_x) (USD/tCO_2e) required to fully compensate smallholders for avoiding each activity:

$$\frac{i_x}{\left[\frac{agC}{10}\right]} = C_x$$

Table 8.9. Carbon prices required to compensate smallholders for replacing and avoiding the most popular activities at each site.

	Carbon price for replacing activity with reforestation* (USD/tCO_2e)	Carbon price for avoiding activity** (USD/tCO_2e)
MNP		
Banana	30	15
Cattle	4	2
Pineapple	51	25
YChNP		
Cattle	4	2
Granadilla	135	68
Rocoto	46	23

* Assuming carbon sequestration rate of 5tC/ha/yr from reforestation.

** Assuming 100tC aboveground forest carbon and payment spread over a 10 year period.

This approach aims to determine whether current carbon prices could reduce the opportunity cost of leaving standing forest on smallholder lots (Shone & Caviglia-Harris, 2006), and thus the utility and realisitic economic prospects for REDD+ in the two areas. The values shown in table 8.9 can be compared to the carbon price of credits from the first REDD+ project in Madre de Dios[9], at USD 7/tCO_2e, as well as the estimated average cost in Peru of USD 12.39/tCO_2e (Deveny *et al.*, 2009). Against these figures, the results suggest that a low carbon price (USD 4/tCO_2e) would make forest conservation cost efficient against cattle ranching in these areas (cf. Coomes *et al.*, 2008). Nevertheless, under current prices the cultural (in YChNP, due to its presence in the region for many generations) and risk-mitigation (at both sites, as a source of low but steady income) importance of cattle ranching may mean this activity cannot be fully replaced, and instead carbon-enhancing options such

[9] The 'Madeacre and Maderyja Madre de Dios Amazon REDD Project', developed by Greenoxx in 2009; see www.greenoxx.com.

as silvopasture and living fences may present the most feasible REDD+ options. While the like-for-like replacement or avoidance of cash crops is untenable at current carbon prices, two factors could result in voluntary smallholder adoption of REDD+. First, in the face of income uncertainties and variations, production risks and establishment costs of crops, carbon may be viewed as an attractive steady alternative or, more likely, supplement, to current incomes for some smallholders. Second, with some economic models suggesting carbon prices rising to USD 30/tCO_2e (Murray *et al.*, 2009), it is feasible that carbon could provide a feasible economic alternative to medium-income cash crops in the near future.

8.3.5 Livelihood Diversification

Under REDD+, the provision of non-productive or -extractive income streams can be used as a strategy for reducing anthropogenic pressure on forests (Caviglia-Harris & Sills, 2005) and reshaping livelihoods through diversification away from ecologically unsustainable and emission-inducing activities. The detection of the most effective REDD+-compatible income alternatives is facilitated through an analysis of the extent to which, and how, smallholders currently diversify their incomes. In this way, the reshaping of livelihood strategies can be informed and contextualised from the bottom-up.

MNP smallholders display greater income diversification: 71% of respondents (with 16 individuals receiving two non-agricultural incomes) compared to YChNP's 34% (with 4 individuals receiving two). This is indicative of the disparate average total agricultural incomes per respondent between the sites, with YChNP smallholders earning USD 8,477 and those from MNP USD 4,170, in turn reflecting the greater market integration and production culture in YChNP. The extent of diversification among MNP respondents is likely a response to the greater range of risks they face and poorer access to markets (cf. Sunderlin *et al.*, 2005). The sources of alternative incomes (table 8.10) also reveal distinct

characteristics at each site. Smallholders' alternative activities in YChNP appear to derive from much greater transformation of economic and social structures that has occurred, in the form of urbanisation (with non-agricultural occupations including mechanic, electrician and taxi driver); while those in MNP are indicative of a more rural economy (chicken raising and radio operator). Across both sites, a number of alternative activities derive, directly and indirectly, from productive or extractive practices, notably the sale of timber, but also laboring, driving and trading. While REDD+ livelihood reshaping may imply constricting these activities through increased regulation, the results reveal several promising avenues for suitable income diversification.

Table 8.10. Sources of alternative smallholder incomes (frequencies).

	MNP	YChNP
Sale of timber	36	1
Shop	10	12
Production on other land	2	7
Laborer	5	2
State employee	5	2
Tourism	11	-
Trader/Intermediary	2	2
Teacher	2	1
Driver	1	2
Pension	2	1
Pisciculture	3	-
Protected area employee	3	-
Business person	1	1
Apiculture	1	1
NGO employee	1	-
Radio operator	1	-
Chicken raising	1	-
Mechanic	-	1
Doctor	-	1
Electrician	-	1
Taxi driver	-	1

In MNP, first among these is tourism. Although 11% of respondents currently receive an income related to tourism, this activity is currently subject to great suppression as a local revenue stream. Private companies hold a near monopoly, with visitors transported

between isolated private lodges (on the adjacent side of the river to the majority of settlements) which, while employing a small number of local people, bring all of their supplies from Cusco. The aspiration of many respondents to participate in the tourism industry (table 8.6) provides a potential foundation for REDD+ interventions to both build local capacity for the provision of tourist services and goods, as well as negotiate enhanced local engagement with the Cusco agencies. Similarly, as outlined in section 8.3.1.1, there is potential for greater integration of local populations in protected area management by rewarding smallholder monitoring and enforcement activities to increase local connectedness to the protected areas and potentially increase their effectiveness.

In addition, two productive activities offer potential for livelihood reshaping. The first of these is pisciculture. MNP's clay soils and abundance of water lend it the ideal characteristics for this activity, from which commercialisation can begin after just five months, produce up to 10,000kg of meat per ha per year and return an income of up to USD 30,000/ha/yr[10]. The current barriers to entry appear to be the provision of fry, the high cost of fishmeal and technical expertise. REDD+ could potentially help address or lower these barriers and promote this activity through targeted micro-enterprise loans, increased market connectivity for inputs and produce, and capacity building. Moreover, pisciculture under agroforestry can provide shade and biomass for fish, increase carbon sequestration, consolidate soils and provide an additional harvest for smallholders (*e.g.* citruses) (D'Silva & Maughan, 1994). Nevertheless, this practice is not problem-free, with risks including the proliferation of disease – both among the fish being farmed (Murray & Peeler, 2005) and ones affecting humans, notably malaria (Maheu-Giroux *et al.*, 2010) – and environmental pollution (Cole *et al.*, 2009). These issues highlight the need for phased approaches to alternative practices, allowing time for piloting, lesson learning and development of best practices prior to wider-scale implementation.

[10] Salvacion land user, 26.06.2009

A second alternative productive activity, currently practiced at both sites, is apiculture. This activity produces a potentially premium-market exportable product in honey and supports an additional ecosystem service in the form of pollination. Moreover, the practice is boosted by reforestation/agroforestry, making it highly REDD+-compatible. These alternative MNP activities are also potentially reinforcing, with the fish farms and bee hives forming part of community eco-tours.

The diversification of livelihoods away from intensive production in YChNP presents greater challenges. Here, where tourism is largely limited to visitors attracted by the Tirolean culture and architecture of the region's towns, smallholders display little enthusiasm for participation in the industry. Nevertheless, the decent access to, and infrastructure of, the region, reliable services (*e.g.* electricity, water, restaurants), cloud forest landscape and accessibility of the national park all create favorable conditions for various forms of tourism. REDD+ could therefore target the diversification and reshaping of the character of tourism itself, to include nature and adventure (*e.g.* mountain biking) tours. In YChNP, too, the existence of apiculture could be built upon and the strong market links capitalised upon to establish buyers in Lima.

8.4 Conclusion

The central aim of this study is to assess the engagement of REDD+ in smallholder production, land use and economies through the differentiation of the 3Rs: rewarding, regulating and reshaping. Addressing this objective has uncovered not only the stark extent and diversity of challenges involved in local REDD+, but also the benefit of insights gained from a local-scale analysis of heterogeneity. A wider issue addressed by this paper is the utility of REDD+ as a catalytic agent for engendering greater economic, social and land use sustainability in the buffer zones of protected areas on Peru's Amazonian frontier.

The findings suggest that MNP's geography, which has to date limited market integration and in turn constrained commercial production, together with the nature of productive practices (agroforestry-friendly) and diversified smallholder economies, lend it to efficient REDD+ engagement through rewarding existing sustainable activities. Three outstanding issues are the disconnect between the population and conservation efforts, the prevalence of timber extraction and the reliance on fuel wood. Here, the reshaping of incomes through greater local integration of protected area management and tourism, increased regulation of extractive activities and provision of modernised cooking technologies, could facilitate the necessary transition to REDD+. Here, it is not a case of regulating forests as off-limits, but transitioning to lower-impact, sustainable use (cf. Mertz, 2009). Technical agronomic assistance for smallholders to increase agricultural efficiency could also help reduce their reliance on forest products (Illukpitiya & Yanagida, 2010).

In YChNP, REDD+ engagement stretches to wider societal and economic challenges including market entrenchment and high opportunity costs, compounded by the physical nature of production itself. Though there is evidence of comparatively greater harmony between smallholders and conservation efforts, the extent of historical deforestation is expansive and reforestation is predominantly limited to medium-term exotic species plantations. Yet on a country- and continent-wide scale, it is exactly these rapidly-expanding productive frontier areas where REDD+ is most needed to bring about the transition to a more strategically planned and sustainably governed development of the Amazon basin. While the high risks and costs involved in agricultural production may be enough to predispose some smallholders to consider accepting rewards for changing their activities, the practices and livelihoods of the remaining contingent likely require a paradigmatic reshaping.

CIFOR's 3Es (Angelsen *et al.*, 2008), while providing a useful set of criteria for the evaluation of REDD+ architectures and projects, remain an idealised set of largely

normative overarching principals. As such they do not recognise the trade-offs which inevitably form a part of conceptualising and designing sub-national REDD+ initiatives. The 3Rs framework I propose here by no means purportes to challenge or replace the 3Es, but rather to provide a complementary framework to guide practical REDD+ design and implementation based on local realities. The 3Rs aim to allow distinctions to be drawn between REDD+ targets and engagement methods, in turn guiding the efficient allocation of resources.

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CHAPTER 9

CONCLUSION

9.1 Overview

Reducing emissions from deforestation and forest degradation and enhancing removals of greenhouse gases by forests (REDD+) is a mechanism which could contribute to the mitigation of global climate change, alleviate poverty and conserve biodiversity. It has taken many years for REDD+, a form of payments for ecosystem services (PES), to evolve into its current, comprehensive format, and there is now an urgency to understand and effectively engage the mechanism in local contexts in order to maximise co-benefit realisation. This thesis examines the potential local-level engagement of REDD+ on the Amazon frontier as an approach to altering patterns of anthropogenic encroachment on the world's greatest expanse of tropical forest by asking: *How can REDD+ engage effectively and sustainably at the local level in high conservation-value areas on Peru's Amazonian frontier*? A political ecology approach was taken to this question and three primary lines of enquiry adopted:

1. In what ways do existing land use governance institutions, arrangements and histories shape challenges and opportunities for sub-national REDD+ engagement?
2. How do smallholder livelihoods, land uses and preferences influence and determine challenges and opportunities for local REDD+ engagement?
3. In what ways do smallholder production and land economy influence and determine the need for nuanced approaches to local REDD+ engagement?

I applied an interdisciplinary comparative case study approach to data collection and enquiry, taking contrasting cases from the buffer zones of two national parks on Peru's Amazonian frontier, Yanachaga-Chemillen (YChNP) and Manu (MNP). These areas were chosen because of the potential roles they could play in limiting further anthropogenic encroachment on the Amazon basin forests if REDD+ could be effectively engaged at these strategic frontier sites.

The core of this dissertation comprises five chapters, each designed as a publishable paper. Chapters 4 and 5 (Paper 1: *Preparing for REDD: Forest governance challenges in Peru's Central Selva* and Paper 2: *Nature, People & Capital: Discourses shaping land use governance & carbon forestry initiatives in the Peruvian Amazon*) analysed how institutions and governance have shaped land use over time and how these influence and interact with emerging forest carbon initiatives. Chapter 6 (Paper 3: *Lessons for sub-national REDD+ resource targeting from the governance of protected areas and their buffer zones on Peru's Amazon frontier*) brought together and compared land use governance at the two sites, drawing out lessons for REDD+ in policy and practice. Chapter 7 (Paper 4: *Integrating REDD+ into livelihoods, land uses & preferences in strategic sites along Peru's Amazonian frontier*) used survey data collected using participatory methods to analyse, compare and differentiate the integration of REDD+ in local livelihoods and preferences. Chapter 8 (Paper 5: *Rewarding, Regulating & Reshaping: Differentiating local engagement of REDD+ in Amazonian smallholder production, land use & economy*) then presented an innovative conceptual framework, the 3Rs (rewarding, regulating and reshaping) to analyse the engagement of REDD+ in local production and land economies. In this concluding chapter I attempt to summarise and draw together the main findings to emerge from this research and their implications for theory, policy, practice and future research.

9.2 Findings

The main findings from each paper in this thesis are concisely summarised below.

9.2.1 Paper 1: Preparing for REDD: Forest governance challenges in Peru's Central Selva

This paper focused on forest and land use governance at the first case study site, YChNP, located in Peru's 'Central Selva', to draw out specific challenges for REDD. It used qualitative semi-structured interview data and adopted a political ecology approach to examine multi-scalar power relations among actors and the environmental outcomes they produced.

- The current general lack of trust and effective communications channels between the local population and the state in YChNP presents a significant governance challenge for REDD(+) implementation.

- More operational capacity of state authorities is required for effective governance of the Yanachaga Conservation Complex and smallholder activities. Over private lands surrounding the protected areas it is a question of whether REDD(+) funds should be used to reward land users directly for reducing deforestation or to strengthen the state forestry institution to enable it to better govern and regulate land use activities.

- NGOs have played an important role to date in generating biophysical data sets which have informed land use planning projects. A recent shift towards more socially-focused NGO projects threatens to slow the generation of scientific data

which could inform REDD(+). NGOs can play important roles in data generation and bringing international experience and greater capacity to REDD(+) initiatives.

- The levels of income received from agriculture and the extractive mindset of smallholders which has been shaped over time could prove to be the most robust challenges. The private sector could play an important role in REDD(+) by creating market opportunities which offer greater environmental sustainability, such as organics produce.

9.2.2 Paper 2: Nature, People and Capital: Discourses shaping land use governance & carbon forestry initiatives in the Peruvian Amazon

This paper took a post-structural turn within the broad political ecology approach of the thesis to examine how different perspectives and ideas have shaped distinct land use outcomes in the second case study region, the buffer zone corridor between MNP and the Amarakaeri Communal Reserve (ACR), in SE Peru. Using interview data, the paper illustrates how three discourses – biological conservation, social development and market-driven extraction – have dominated, interacted and competed to shape the landscape.

- The focus on discourses shows how the landscape and carbon forestry are differentially interpreted, and how a diversity of actors actively try to influence definitions and understandings in efforts to propagate their ideas.

- A conservationist discourse altered the region with the creation of MNP, subsequently moving beyond the Park to shape conservation sub-sections. A social development discourse has shaped the recognition of local rights, bringing about

land titling. A market discourse, brought about by the rich resources of the region, led to economic gains and resource depletion.

- The science and social setting of carbon forestry are fundamental to external accountability and local acceptability, and approaches should seek to balance these carefully rather than prioritising one over the other.

- Operational capacity is shown to often be the determining factor in governing land use, yet strengthening these existing institutions to allow them to fulfill their remit may represent the most cost-effective route to carbon forestry.

9.2.3 Paper 3: Lessons for sub-national REDD+ resource targeting from the governance of protected areas & their buffer zones on Peru's Amazon frontier

This paper takes a more practical approach to REDD+ engagement to examine and critically compare land use governance at the two sites and draw out lessons for resource targeting. Interview data are called upon and analysed through a political ecology and sustainability science approach.

- REDD+ capacity building efforts should begin at the national level through awareness-raising of Amazonian issues, filling legislative gaps and improving coordination among ministries in the decentralisation process.

- At the regional level, political disputes have led to losses of capacity and resources, which require resolution for REDD+ to operate efficiently. Municipalities at both

sites are weak and involved in conflicts over power and resources; they are in need of both knowledge and operational strengthening.

- NGOs have brought in far greater administrative and technical capacities than local institutions have at their disposition, yet their resources have often been squandered due to a lack of coordination and local contextualisation. Consistency will be central to NGO REDD+ efforts in order to disband suspicion and build local trust.

- Tourism in YChNP benefits the local population but does little to encourage conservation; in MNP it circumvents local populations but does promote conservation. REDD+ resources should seek to balance these two outcomes. Markets have had a more profound impact in YChNP, although incomes are uncertain, creating an aperture for REDD+ financing.

9.2.4 Paper 4: Integrating REDD+ into livelihoods, land uses & preferences in strategic sites along Peru's Amazonian frontier

Moving on from the multi-scalar nature of the previous chapter, this paper adopts a local political ecology approach to evaluate the ways in which smallholders interact with their environment, and how these may influence their REDD+ preferences. Land user survey data are called upon and analysed statistically to uncover local-level heterogeneity at the two sites.

- Comparatively higher levels of social and natural capital are found among MNP inhabitants, and financial and human capital among those in YChNP. MNP's rurality has suppressed greater deforestation to date while YChNP's proximity to Lima has

led to widespread deforestation, intensive agriculture and greater expanses of fallow land.

- Preference rankings reveal the willingness of local populations to participate in systems of payments for conservation and reforestation, a leaning towards non-state institutions to manage such a scheme, and market assistance and road improvements as preferred additional benefits.

- Age and income (in MNP), and property size and deforestation to date (in YChNP) were found to be the greatest determinants of conservation and reforestation response patterns.

- REDD+ policies could reasonably aim for 50-75% forest conservation and 25-50% reforestation in these areas. While carbon funds would bring about greater efficiency in MNP, the intensity of past and current anthropogenic land use in YChNP compels the more urgent deployment of carbon finance for conservation and restoration at this site.

9.2.5 Paper 5: Rewarding, Regulating & Reshaping: Differentiating local engagement of REDD+ in Amazonian smallholder production, land use & economy

This final paper brings together interview and survey data to examine and compare the engagement of REDD+ in smallholder production, land use and economy at the two sites.

- This paper sets out an innovative framework for REDD+ engagement at the smallholder level through differentiation of the '3Rs': rewarding, regulating and reshaping.

- REDD+ opportunity costs are explored in the context of replacing and avoiding productive activities and found to be low for cattle (USD 2/tCO_2e), close to realistic for banana in MNP (USD 15 tCO_2e), but prohibitively high for YChNP's popular granadilla passion fruit (USD 68/tCO_2e).

- Existing REDD+-compatible production methods in MNP present an opportunity for rewarding of these practices. Challenges remaining in MNP are the disconnect between the population and conservation efforts, the prevalence of timber extraction and the reliance on fuel wood.

- Commercial production in YChNP compels the need for fundamental reshaping and stringent land use regulation under REDD+, yet the high risks and costs involved in agricultural production may be enough to predispose some smallholders to consider accepting rewards for changing their activities.

9.2.6 Differences between the Two Sites

In YChNP the pace of land use change obliges certain urgency for REDD+ interventions to provide livelihood alternatives and divert the current development path. Here, given the extent of deforestation, REDD+ incentives could be targeted as a priority towards restoration of the exhausted agricultural landscape. Weak decentralised state institutions require strengthening to allow them to carry out their remits and provide more

rigorous enforcement of land use regulations, including initiatives such as crop-growing licensing; while efforts to support land users could focus on providing value-added (*e.g.* organics) markets, which could reduce agricultural areas, intensities and costs.

On the surface, MNP may not present an urgent case for REDD+ – and certainly not as urgent as in YChNP. However, at the national scale, Madre de Dios (the region within which most of MNP lies) is becoming a increasingly important area for resource extraction (including gold and hydrocarbons) and continental infrastructure connectivity (with the Interoceanic Highway passing through it). There therefore exist latent threats from these *national* development processes, within which *local* social, economic and ecological sustainability become increasingly important, and which strengthen the case for local-scale REDD+ readiness.

Based on these characteristics, REDD+ faces considerable but distinct challenges at the two sites, which would define the requisite strategies, processes and methods for its effective engagement.

9.3 Wider Implications of Research

9.3.1 Theory: Political Ecology & Geography

9.3.1.1 Evaluation of Chapter Sub-Theories

This thesis applied a political ecology lens to its examination of the engagement of REDD+ on Peru's Amazonian frontier. In doing so, it sought to place forests and land use at the centre of the analysis, working outwards and upwards to provide a place-based and historically-contextualised analysis of political and ecological processes shaping human-environment interactions through chains of explanation (Blaikie & Brookfield, 1987).

In Chapter 4 this framework was applied to uncover multi-scalar land use governance structures and actors at work in the Central Selva region, and link these to processes of globalisation in the form of REDD(+). Political ecology worked particularly well for this paper through its emphasis on power relations and how these bring about land use outcomes, and set the scene for the subsequent chapters of REDD(+) as an emerging process of globalisation which political ecology can constructively engage with. I set out the considerable challenges facing local REDD(+), but offer targeted solutions. Going back to the literature, the position to emerge from this paper is in contention with Vandermeer and Perfecto's (2005) position that the anti-globalisation movement holds the solution to curtailing deforestation. Rather, I suggest that the engagement of some processes of globalisation – such as REDD+ – is at least worth consideration and investigation in the face of other, potentially more socially and ecologically damaging effects of globalisation that are entering rural regions of resource-rich countries, such as 'informal' mining, large-scale commercial agriculture and hydrocarbon exploration and extraction.

Chapter 5 took a more post-structural turn within the political ecology tradition (cf. Peet & Watts, 1996) to reveal how divergent processes of economic development discourse – often determined by geography – have shaped outcomes, actor roles and the nature of the emergence of sub-national REDD+ initiatives. I felt political ecology worked effectively in this context and informed a rich and incisive analysis, pursuing forces upwards through Blaikie and Brookfield's (1987) chains of explanation to uncover the emergence and influence of powerful discourses at work shaping land use governance and change. This paper presents an analysis of the local manifestations of discourses, largely concordant with Adger *et al.*'s (2001) assertion that policy-making actors and institutions are distanced from resource users and that local environmental management operates within a distinct dynamic. Through this approach, the paper offers a new theoretical understanding of REDD+ adoption and discursive moulding in rural developing country settings.

For Chapter 6, political ecology was combined with a sustainability science approach (cf. Clark & Dickson, 2003) to analyse the dynamic and divergent interactions between society and nature across scales. This represented a more practical adoption of political ecology to draw out practical lessons for policy and practice from land use governance at the two sites, in a sense following the tradition of what Rocheleau (2008) referred to as 'political ecology in the key of policy'. Here, the political ecology lens provided a critical understanding of power relations which shape and/or constrain human-environment interactions, following Vatn's (2010) assertion that PES are about building upon existing institutional infrastructure rather than building entirely new and untested ones. This was complemented by the sustainability science approach which facilitated the recognition of the multifaceted and complex nature of these interactions and its pursuit of practical solutions to inform the paper's policy recommendations. This paper's conclusions are consistent with Corbera *et al.*'s (2009) finding that capacity considerably influences PES, but goes further to emphasise the need for practical and efficient REDD+ resource targeting.

Chapter 7 adopted a 'local political ecology' (cf. Warren *et al.*, 2001) to offer a more context-situated approach to scale and greater sensitivity with respect to micro-scale human-environment relations. Here political ecology improved the spatio-temporal resolution and thereby reduced analytical losses of detail, lending important explanatory understanding to the analysis and providing the focused local-scale processes at one end, while linking them to global forces – REDD+ and carbon markets – at the other. To a considerable extent, this paper followed the approach taken by Batterbury (2001) to quantitatively analyse livelihoods and land use, though in a Latin American context. In his conclusion, Batterbury (2001:457) describes how geographers must combine broad political landscape perspectives with analyses of livelihood dynamics and everyday resource use to "understand local realities of resource access and livelihoods, the contexts in which these negotiations take place, and broader processes and institutions." Chapter 7 responds to and reinforces the need

for this type of approach by highlighting the role and influence of spatial heterogeneity in the grounding of global processes, captured through preference rankings.

Of all the chapters, the theoretical application of political ecology was less directly relevant to the analysis in Chapter 8, where the focus is on engaging REDD+ in the local economies at the two sites and the approach drew more from microeconomics. Nevertheless, through this approach this chapter integrates the political economy of production and land use into the wider political ecology framework of the thesis, providing critical insights into the physical and economic viability of local REDD+. It also makes important place-based contributions to literatures on local Amazonian economies, resource use and land use change (*e.g.* Brown, 2008; Coomes & Burt, 2001; Coomes *et al.*, 2000; Perz *et al.*, 2006).

This thesis has used political ecology to illustrate how environmental changes on the Peruvian Amazon frontier are intrinsically linked to political and economic processes. Land use change at both sites has been in part influenced by national-level policies, such as those of the 1960s and '80s driving the colonisation of the Peruvian Amazon. Yet the scale of economic influences have shifted over time, from international demands for rubber, timber and pelts in the first half of the 20th century, to the more recent regional-level effects where the closest major cities are the end sale point for agricultural produce and, to a greater extent in MNP, timber. In this context I concur with Bryant and Bailey's (1997:28) assertion that "environmental problems cannot be understood in isolation from the political and economic context within which they are created", yet think the findings make a case for going further and recognising the importance of identifying the scales at which these processes act.

9.3.1.2 Political Ecology in REDD+ Research

Analysing REDD+ in terms of its theoretical components has lent this research a critical edge in understanding the conditions under which it may engage effectively with

institutional structures, livelihoods and economies. Political ecology guided the analysis to great theoretical and practical effect in three main ways. The first is the importance it places on power relations and the outcomes they bring about, which was key to untangling institutional linkages, social relationships and understanding their impacts on land use and forestry. The second is the perspective political ecology provides on issues of scale, which improved explanations of both societal dynamics and interrelations of social and ecological systems (Mauro, 2009). The third way, linked to the scale issue, is the preoccupation of political ecology (within geography) with the economic and political impacts of globalisation and its engagement with local processes (cf. Bebbington, 2001; Bridge, 2002). Through this research I have uncovered the ways in which local processes respond to and engage with national and global influences, such as markets, development projects and tourism; but more significantly have inversed this relationship and used political ecology to understand how REDD+ may be effectively engaged in local rural settings.

A contribution of this thesis to the understanding of markets for nature, illustrated through the analyses of land use governance at the two sites, is the extent of the social construction of nature. This suggests that the commodification of nature is perhaps to a greater extent a process of engaging (developed country) markets with (developing country) institutions, discourses and practice rather than simply the environment. Another theme of the thesis, local heterogeneity, has also been shown to be largely shaped by society through the actions of people who, influenced by a diversity of forces, attempt to secure and improve their livelihoods, which in these rural settings often involves some degree of alteration of the surrounding natural environment. This underscores the importance, then, of the process of dialogue between north-south societies and stakeholders in constructing these markets and understanding of historical context.

Yet through the political ecology set out in this thesis I do not profess to call for epistemological or methodological transformation or new theory. Rather, my more modest

proposal is that the creative and critical interdisciplinary hybridisation of existing methods and tools is an effective way to uncover new questions and frontiers in political ecology, markets for nature and the study of global environmental change.

9.3.2 Policy & Practice

During this research the 'REDD+' concept has evolved rapidly in the policy field. As I began to develop my data collection methods, REDD (minus the '+') was being considered alongside, but separately from, reforestation in policy circles. Believing the most effective approach to this field would be merging such concepts together, I bundled them under the concept of 'carbon forestry' – notably in the preference rankings which presented both forest conservation and reforestation exercises. The emergence of the REDD+ concept allowed me to rename my approach using more recognised terminology, and provided a unified policy and academic field which this thesis hopes to contribute to. Nevertheless, this illustrates the challenge I encountered in keeping pace with policy developments with a three-year research project.

The on-the-ground reality at the two sites – with REDD+-type projects being developed during and following my periods of data collection – illustrates the enthusiasm with which practitioners are attempting to harness carbon finance to meet their institutional objectives (as shown in chapter 5 (paper 2) in Manu). Although these developments are driven by the idea that this new mechanism can have a fundamental impact on livelihoods and biodiversity in rural (and predominantly poor) developing country settings, the pace of development risks not learning from lessons which are already there to be learned (cf. Blom *et al.*, 2010). Poorly executed efforts ultimately threaten to disappoint local populations (again) and jeopardise the long-term prospects for REDD+. The nested approach to REDD+, which has now gained broad popular support as the most likely post-Kyoto forest

mechanism (Angelsen *et al.*, 2008; Cortez *et al.*, 2010; Nepstad *et al.*, 2010; Phelps *et al.*, 2010a), presents a solid framework for national-level lesson learning from local initiatives.

A central theme of this research has been the examination of the extent of local heterogeneity, be it institutional, social, economic or ecological. This is an important area of analysis for REDD+, and well as other forms of PES, since variation could result in payment inefficiencies or limit the chances of local acceptance. In a cross-country comparison, Southgate *et al.* (2009) illustrate how household-level differences between Ecuador and Guatemala compel the need for conservation payments to vary among recipients. This research goes further, showing how and why the extent of *intra*-national heterogeneity in tropical countries can necessitate differentiated practical approaches to maximise efficiency.

Another important outcome of this research has been the demonstration of local condition and preferences in these strategically important areas, which translate into two important implications. Firstly, many local people had encountered – predominantly in unfavourable ways – conservation-development efforts undertaken by NGOs, which had left them feeling fooled by empty promises and unfulfilled commitments. This study has illustrated – perhaps unsurprisingly – that more collaborative, participative and long-term approaches are likely to build more trusting local relationships and as a result be more successful. NGOs have important roles to play in these types of rural areas, notably at the two case study sites because of their superior logistical capacities, scientific knowledge and operational flexibility, but would do well to consider the long-term view before engaging populations. A second implication from local preferences is the widespread welcoming of alternatives by land users at both sites to their current practices under REDD+-type initiatives. As is so often the case at the smallholder level, land use changes result from a lack of livelihood options, highlighting the importance of providing alternative livelihood options under any sub-national REDD+ design.

A final contribution of this thesis to policy and practice is the articulation of the 3Rs framework, a simple but effective means to evaluate local engagement of REDD+, which could contribute to improving cost effectiveness and resource allocation efficiency in policy and project design and practice. REDD+ presents a critical paradox in its implementation: how do you raise people out of poverty (by implication, building their financial capital) while ensuring carbon-emitting land use changes which were previously suppressed by their poverty do not come about? The 3Rs framework offers a means to tackle this issue by providing the flexibility to alter the balance between the three aspects depending on local circumstances.

Among the greatest challenges to REDD+ implementation are likely to be issues surrounding land use governance in the global south, in the form of weak governments and institutions, forest and land use conflicts, corruption, temporary and inappropriate international NGO efforts and bad development practice. Moreover, local diversity, brought about by distinct histories, geographies and cultural practices, is such that broad-brush regulatory mechanisms are likely to encounter design misfits, exclusion of some over others and rejection by populations. Long-term REDD+ sustainability may therefore be greatly enhanced by practitioners and policy makers harnessing local knowledge and experience to inform locally-appropriate strategies.

I now turn briefly to the wider perspective of nested REDD+ to evaluate the role of national government. The local is doubtless critical for sub-national implementation and ensuring the sustainable and effective realisation of REDD+ objectives, but the national State is responsible for creating an appropriate regulatory framework for REDD+, ensuring adequate means of enforcement and giving weight to the market approach to nature conservation. The Peruvian State is no doubt currently lending considerable weight to the market approach to the Amazon, seeking as it has since the 1960s administration of Fernando Belaunde (admittedly on-and-off since then) to see some profits being made from

their vast rain forest territory. The present administration of Alan Garcia has, in particular, been notable for its nurturing policies towards Amazonian hydrocarbon extraction (Finer & Orta-Martinez, 2010), which raises questions regarding how 'development' in the context of conservation vs. extraction will play out in the region. An indication of national priorities may be reflected in the manner in which the hydrocarbon concession 'Lot 76' was granted over territory of the indigenous ACR and the MNP buffer zone in Madre de Dios, outlined in chapter 5. Nevertheless, as change comes in 2011 with a new president and administration (and therefore perhaps new policies) and (likely) setting of international rules by the UN surrounding REDD+, the Peruvian State will need to make decisions and trade-offs regarding their approach to the Amazon, and the extent to which they can realistically govern and regulate the mechanism at different scales.

9.4 Potential Areas for Future Research

The development and implementation of an efficient, effective and equitable nested Peruvian REDD+ programme will require a wide and diverse range of academic investigation, practical piloting and policy development. A selection of potential research areas for future REDD+ research to specifically emerge from this study is listed below.

- *Governance*. Land use governance is clearly an issue of concern for REDD+ in rural Peru. Practical research is needed to inform and balance the effective and efficient decentralisation of power and resources away from Lima with the improved harnessing of NGOs and markets to support and consolidate the state at the local level. Specific questions might include: *How can REDD+ effectiveness be optimised through a combination of multiscalar state and non-state governance regimes for the*

Peruvian Amazon? What trade-offs and synergies are brought about through state–non-state hybridised REDD+ governance across scales?

- *Livelihoods.* The participative methods used in this research were very popular with smallholders and successful in the collection of important information and opinion which would have otherwise remained absent. This highlights the importance of, and need for, greater use of participative methods in REDD+ livelihoods research in order to yield locally contextualised findings. Questions might include: *What is the optimal REDD+ contract (land percentage, prices, contract length, benefits) from the local community perspective and how do these differ over space (*e.g. *using a simple choice experiment)? How do REDD+ preferences differ between social groups,* e.g. *migrants* vs. *indigenous communities and what effect does this have on environmental efficiency and distributional equity?*

- *3Rs*. The 3Rs framework presents a simple method for the evaluation of local REDD+ engagement which could be used in other settings, both within and outside of Peru. Using participative methods, it would also be interesting to evaluate local perceptions of the framework as an explanatory tool for introducing REDD+ into rural settings.

- *Peruvian Amazon*. This research has demonstrated the social and natural diversity found in the buffer zones of two protected areas on Peru's Amazonian frontier. The methods applied in this study could be extended across Peru's Amazonian protected area network in order to fully capture and contrast the extent of diversity found in this important region. Specifically, areas such as El Sira Communal Reserve, Pacaya

Samiria National Reserve and Cordillera Azul National Park and their buffer zones warrant attention from REDD+ researchers and practitioners.

- *Beyond the Amazon*. Despite the prominent importance of the Amazonian region to global terrestrial carbon stocks and REDD+, Peru's Andean region also holds great potential for carbon forestry, particularly from reforestation. Moreover, the harsh environmental conditions, poverty and scarce resources (notably wood fuel and water) (cf. Kristjanson *et al.*, 2007; Schady, 2002), mean that REDD+ co-benefits could make an important difference to livelihoods. This warrants research into how REDD+ could effectively engage and yield co-benefits in the Andean region.

9.5 Concluding Thoughts

Looking forward, an important question in the study and practice of human-environment interactions is how to enact a comprehensive yet sustainable shift in market logic to internalise the cost of services provided by the natural environment. REDD+ and its carbon forestry predecessors have begun this process for carbon sequestration and storage ecosystem services, yet moving from the mechanism's conceptualisation to implementation presents some considerable challenges, as explored by this thesis. A central tension surrounding the mechanism is the urgency for emissions reductions and the need for methods to be developed upon a sound scientific basis, in order to maximise participation and co-benefit realisation. Nevertheless, REDD+ presents an important opportunity – not least because it is among the only issues international climate change negotiators can currently agree upon, but also because of the potential local social and ecological benefits it could generate.

Among the anticipation, though, it is important that REDD+ be seen in its context in order to remain realistic and avoid creating false expectations at multiple levels. Not all deforestation can be prevented and neither should it necessarily be sought to. Perhaps the greatest opportunity REDD+ offers is a tool for the sustainable and strategic planning and management of tropical landscapes, allowing space for agriculture, forest extraction, infrastructure and biodiversity conservation. The key to this will be the efficient targeting of resources within the three concepts covered by this thesis. Good governance ensures oversight, transparency and accountability, as well as environmental and social sustainability; the integration of existing livelihood practices and the provision of alternative livelihoods maximises local acceptability and efficiency; and economy secures sustainable and equitable incomes. It is hoped that this thesis provides a step towards this realisation.

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ANNEX 1

Co-Author Statements

20th August 2010

Dear Prof. McDowell,

RE: Co-authorship of a scientific paper comprising a thesis submission

I confirm that the majority of the work undertaken for the scientific paper "Nature, people and capital: Discourses shaping land use governance and carbon forestry initiatives in the Peruvian Amazon" represents the work of the first author, Joel Scriven.

Yours sincerely,

Mr. Frank Hajek
Visiting Research Fellow
Environmental Change Institute
University of Oxford
South Parks Road
OX1 3QY

20th August 2010

Dear Prof. McDowell,

RE: Co-authorship of a scientific paper comprising a thesis submission

I confirm that the majority of the work undertaken for the scientific paper "Nature, people and capital: Discourses shaping land use governance and carbon forestry initiatives in the Peruvian Amazon" represents the work of the first author, Joel Scriven.

Yours sincerely,

Prof. Diana Liverman

Senior Research Fellow
Environmental Change Institute
University of Oxford
South Parks Road
OX1 3QY

August 20th 2010

Dear Prof. McDowell,

RE: Co-authorship of a scientific paper comprising a thesis submission

I confirm that the majority of the work undertaken for the scientific paper "Lessons for REDD+ from governance of protected areas and their buffer zones on the Peruvian Amazon frontier" represents the work of the first author, Joel Scriven.

Yours sincerely,

Prof. Yadvinder Malhi

Professor of Ecosystem Science
Environmental Change Institute
University of Oxford
South Parks Road
OX1 3QY

ANNEX 2

Confirmations of Submission to Journals

International Society of Tropical Foresters

Yale School of Forestry and Environmental Studies

370 Prospect Street, New Haven, Connecticut, USA ; 06511 http://www.yale.edu/istf

April 24, 2009

Joel N. H. Scriven
Environmental Change Institute
University of Oxford
South Parks Road
Oxford OX1 3QY

RE: Publication of Conference 2009 Proceedings "Conflict and Cooperation: Tools for Governing Tropical Forests."

Dear Joel Scriven,

Thank you for submitting your manuscript titled "Preparing for REDD: Forest Governance Challenges in Peru's Central Selva" to the *Journal of Sustainable Forestry*. The manuscript has been sent out to reviewers, and we will make sure that it receives fair consideration for publication. If you have questions or concerns about the status of your paper at any time during the review process, please feel free to contact us. Your submission is valued and most appreciated.

Sincerely yours,

Gillian Sarah Paul
Editorial Assistant
Journal of Sustainable Forestry

for

Graeme P. Berlyn, Ph.D.
Professor of Anatomy and Physiology of Trees
E.H. Harriman Professor of Forest Management &
Editor of the *Journal of Sustainable Forestry*

7th April 2010

Dear Mr. Joel Scriven,

We have received your article "Nature, People and Capital: Discourses shaping land use governance and carbon forestry initiatives in the Peruvian Amazon" for consideration for publication in Geoforum.

Your manuscript will be given a reference number once an editor has been assigned.

To track the status of your paper, please do the following:

1. Go to this URL: http://ees.elsevier.com/geoforum/

2. Enter these login details:
Your username is: joel.scriven
If you need to retrieve password details, please go to:

http://ees.elsevier.com/geof/automail_query.asp

3. Click [Author Login]
This takes you to the Author Main Menu.

4. Click [Submissions Being Processed]

Thank you for submitting your work to this journal.

Kind regards,

Elsevier Editorial System
Geoforum

26th August 2010

Dear Author,

This is an automatically generated response indicating that your submission entitled "Lessons for sub-national REDD+ resource targeting from the governance of protected areas and their buffer zones in the Peruvian Amazon frontier" has been received by the Editorial Office of Forest Policy and Economics.

The Editorial Office will contact you with a manuscript reference number and further details of the review process in due course.

Thank you for submitting your work to our journal.

For further assistance, please visit our customer support site at http://epsupport.elsevier.com. Here you can search for solutions on a range of topics, find answers to frequently asked questions and learn more about EES via interactive tutorials. You will also find our 24/7 support contact details should you need any further assistance from one of our customer support representatives.

With kind regards,

Forest Policy and Economics

21st August 2010

Article Title: Integrating REDD+ into livelihoods, land uses and preferences in strategic sites along Peru's Amazonian frontier
Global Environmental Change

Dear Mr Joel Scriven,

Many thanks for submitting the above paper to
Global Environmental Change. I will now pass it on to the Editors and on their recommendation, send it out for review.

Kind regards,

Neil Jennings
.....
Assistant Editor
Global Environmental Change
Zuckerman Institute for Connective Environment Research
University of East Anglia
Norwich
NR4 7TJ

Phone: 01603 591379
Fax: 01603 593901
Email: gec@uea.ac.uk

10th September 2010

Dear Mr. Scriven,

Your submission entitled "Rewarding, Regulating and Reshaping: Differentiating local engagement of REDD+ in Amazonian smallholder production, land use and economy" has been received by Ecological Economics.

You may check on the progress of your paper by logging on to the Elsevier Editorial System as an author. The URL is http://ees.elsevier.com/ecolec/.

Your username is: joel.scriven

If you need to retrieve password details, please go to: http://ees.elsevier.com/ECOLEC/automail_query.asp

Your manuscript will be given a reference number once an Editor has been assigned.

Thank you for submitting your work to this journal.

For further assistance, please visit our customer support site at http://epsupport.elsevier.com. Here you can search for solutions on a range of topics, find answers to frequently asked questions and learn more about EES via interactive tutorials. You will also find our 24/7 support contact details should you need any further assistance from one of our customer support representatives.

Kind regards,

Anne Carter Aitken
Managing Editor
Ecological Economics

ANNEX 3

Interviewee Affiliations

Institution	Location	Date
Government		
FONDEBOSQUE (Fund for the Promotion of Forest Development)	Lima	07.07.2008
FONAM (National Fund for the Environment)	Lima	02.07.2008
INRENA (National Institute for Natural Resources)	Lima	08.07.2008
CONAM (National Council for the Environment)	Lima	02.07.2008
INRENA, Madre de Dios	Puerto Maldonado, Madre de Dios	14.07.2008
Madre de Dios Regional Government	Puerto Maldonado, Madre de Dios	12.07.2008
Municipal Government of Manu	Salvacion, Madre de Dios	22.07.2008
Municipal Government of Manu	Salvacion, Madre de Dios	22.07.2008
Madre de Dios Regional Government	Salvacion, Madre de Dios	22.07.2008
Manu Technological Institute	Salvacion, Madre de Dios	22.07.2008
Agrarian Agency, Manu	Salvacion, Madre de Dios	22.07.2008
INRENA Forestry	Oxapampa, Pasco	16.10.2008
Pasco Regional Government	Oxapampa, Pasco	20.11.2008
INRENA Protected Areas	Oxapampa, Pasco	27.10.2008
FONDEBOSQUE	Oxapampa, Pasco	14.11.2008
Oxapampa Municipal Government	Oxapampa, Pasco	11.11.2008
Pasco Regional Government	Oxapampa, Pasco	4.11.2008
Oxapampa police	Oxapampa, Pasco	3.11.2008
Ministry of the Environment	Lima	28.08.2009
Consultant to Ministry of Agriculture	Lima	26.08.2009
Yanachaga-Chemillen National Park	Lima	19.06.2009
Intercooperacion (Swiss Foundation for Development and International Cooperation)	Lima	19.06.2009
Kosnipata Municipal Government	Cusco	22.06.2009
Kosnipata Municipal Government	Pilcopata, Kosnipata, Cusco	24.07.2009
Manu Municipal Government	Salvacion, Madre de Dios	10.07.2009
Madre de Dios Regional Government	Salvacion, Madre de Dios	10.07.2009
Manu Municipal Government	Salvacion, Madre de Dios	20.07.2009
Agrarian Agency, Salvacion	Salvacion, Madre de Dios	10.07.2009
INRENA Forestry, Pilcopata	Pilcopata, Cusco	24.07.2009
INRENA Forestry, Salvacion	Salvacion, Madre de Dios	10.07.2009
Manu National Park	Salvacion, Madre de Dios	28.06.2009
Manu National Park	Cusco	6.08.2009

Non-Govermental Organisations (NGOs)		
SPDA (Peruvian Society for Environmental Law)	Lima	03.07.2008
IIAP (Institute for Research of the Peruvian Amazon)	Puerto Maldonado	16.07.2008
WWF Peru	Lima	08.07.2008
ProNaturaleza (Peruvian Foundation for the Conservation of Nature	Lima	07.07.2008
Conservation International	Puerto Maldonado	14.07.2008
ACCA (Association for the Conservation of the Amazon Basin)	Puerto Maldonado	15.07.2008
AIDER (Association for Integrated Research and Development)	Lima	07.07.2008
AIDER (Association for Integrated Research and Development)	Lima	07.07.2008
The Nature Conservancy	Lima	08.07.2008
IBC (Institute for the Common Good)	Oxapampa, Pasco	17.10.2008
PROSOYA (Association for the Promotion of Support to Youth and the Communal Development)	Huancabamba, Pasco	30.10.2008
IBC	Oxapampa, Pasco	20.10.2008
ProNaturaleza	Oxapampa, Pasco	29.10.2008
ProNaturaleza	Oxapampa, Pasco	29.10.2008
SPDA	Lima	18.06.2009
ACCA	Cusco	22.06.2009
DRIS (Sustainable Rural Development)	Cusco	22.06.2009
Frankfurt Zoological Society	Cusco	22.06.2009
Casa Machiguenga	Cusco	07.08.2009
CEDIA (Centre for the Development of Amazonian Indigenous People)	Cusco	3.8.2009
Private Sector		
REFOLASA (Latin American Reforestation)	Lima	1.07.2008
Box-maker	Oxapampa, Pasco	3.11.2008
Sawmill owner	Oxapampa, Pasco	11.11.2008
Sawmill owner	Oxapampa, Pasco	11.11.2008
Wanamei (Indigenous tourism company)	Cusco	9.07.2009
Tour guide	Salvacion, Manu, Madre de Dios	9.07.2009
CONSULFOR (forestry consultancy)	Salvacion, Manu, Madre de Dios	13.7.2009
Reforestation company, Manu	Salvacion, Manu, Madre de Dios	24.10.2009
Smallholders		
Smallholder	Mansilla, Manu, Madre de Dios	20.07.2008
Smallholder	Mansilla, Manu, Madre de Dios	20.07.2008
Smallholder	Mansilla, Manu, Madre de Dios	20.07.2008
Smallholder	Los Aguanos, Manu, Madre de Dios	20.07.2008
Smallholder	Los Aguanos, Manu, Madre de Dios	20.07.2008
Smallholder	Los Aguanos, Manu, Madre de Dios	20.07.2008

Smallholder	Mansilla, Manu, Madre de Dios	20.07.2008
Smallholder	Salvacion, Manu, Madre de Dios	20.07.08
Smallholder	Navarra, Oxapampa, Pasco	10.11.2008
Smallholder	San Alberto, Oxapampa, Pasco	25.10.2008
Smallholder	San Alberto, Oxapampa, Pasco	20.11.2008
Smallholder	Navarra, Oxapampa, Pasco	21.11.2008
Smallholder	Santa Cruz, Manu, Madre de Dios	28.06.2009
Smallholder	Masquitania, Manu, Madre de Dios	10.07.2009
Smallholder	Masquitania, Manu, Madre de Dios	10.07.2009
Smallholder	Pilcopata, Kosnipata, Cusco	25.7.2009
Smallholder	Mansilla, Manu, Madre de Dios	15.07.2009
Former timber worker	Salvacion, Manu, Madre de Dios	21.7.2009
Smallholder	Indigenous Community of Shintuya	19.07.2009
Smallholder	Salvacion, Manu, Madre de Dios	26.06.2009
Smallholder	Salvacion, Manu, Madre de Dios	30.06.2009
Smallholder	Salvacion, Manu, Madre de Dios	27.06.2009

ANNEX 4

Smallholder Surveys

ENTREVISTA NUMERO: **FECHA:**

IDENTIFICACION BASICA			
1.1	GPS / Posición		
1.2	Edad & Genero		
1.3	Número de miembros de su familia		
1.4	Lugar de nacimiento		
1.5	¿Hace cuanto tiempo vive en este pueblo?		Años
1.6	¿Qué nivel de educación tiene usted?	1. No educado 2. Primaria 3. Secundaria 4. Estudio técnico 5. Universitaria	
1.7	¿Eres parte de algún gremio?	1. SI 2. NO	

PREGUNTAS INTRODUCTORIAS			
2.1	¿Cuál es su nivel de satisfacción con las condiciones de vida que produce su chacra?	1. No me gusta para nada 2. No me gusta 3. Me gusta, pero es insuficiente 4. Me gusta 5. Me gusta mucho	
2.2	¿Sería capaz de cambiar sus prácticas agrícolas sin apoyo externo?		1. SI 2. NO

USO DE LA TIERRA				
3.1	¿Cuál es el estado de titulación de su chacra?		1. Titulado 2. En Proceso 3. Alquilado	
3.2	Número de personas trabajando la tierra de forma constante:			
3.3	¿Cuántas hectáreas tiene en TOTAL?			Ha
3.4	¿Que tiene en su chacra, y cuantas hectáreas de cada uno?	Agricultura Pastales Bosque Reforestación		
3.5	¿Cuánto bosque tenía cuando llego en la chacra?			Ha
3.6	¿Tiene previsto tumbar bosque en su chacra?			1. SI 2. NO
3.7	¿Cuál es la principal razón por lo cual piensa tumbar parte de su bosque?			
3.8	¿Cuánto de su bosque conservará?			Ha
3.9	¿Cuál es la principal razón por lo cual piensa conservar parte de su bosque?			
3.10	¿Cuánto de su chacra reforestará?			Ha
3.11	¿Cuál es la principal razón por reforestar parte de su tierra?			
3.12	¿Con cuales especies piensa reforestar?			
3.13	¿Periodo desde plantar hasta aprovechar?			

PRODUCCION Y ACCESO A MERCADOS			
4.1	¿Cuáles son las tres actividades productivas principales de su chacra, en orden de importancia, y cuantas hectáreas ocupan cada uno?	1. 2. 3.	Ha Ha Ha
4.2	¿Lleva usted control de gastos de producción?	1. SI	2. NO
4.3	¿Cuánto gana de cada actividad al año (en bruto)?	1. 2. 3.	
4.4	¿Tiene ingresos afuera de la chacra?	1. SI	2. NO
4.5	**SI**: ¿De dónde provienen ingresos de afuera de la chacra? ¿Cuánto?		
4.6	¿Qué tipo de productos del bosque aprovecha?		
4.7	¿Qué tan difícil es vender sus productos? (*1 = fácil; 2 = difícil*)	1. Mercados locales 2. Mercados nacionales	
4.8	¿Cuáles son los 3 mayores riesgos que enfrenta la producción en su chacra?	1. 2. 3.	
4.9	¿Ha oído de la agroforesteria?	1. SI	2. NO
4.10	¿Tiene usted agroforesteria en su chacra?	**1. SI**	**2. NO**
4.11	**SI**: ¿Cuanto terreno dedicado a la agroforesteria?		Ha
4.12	**SI**: ¿Cuánto recibe de este terreno por año?	S/.	/Año
4.13	**SI**: ¿Recibiendo apoyo para la agroforesteria?	1. SI	2. NO
4.14	**SI**: ¿Le gusta el sistema?	1. SI	2. NO
4.15	**SI**: ¿Que tan difícil es vender productos de la agroforesteria?	1. Fácil 2. Igual que otros productos 3. Difícil	
4.16	**NO**: ¿Le gustaría implementar agroforesteria?	1. SI	2. NO
4.17	¿Tienen sus vecinos agroforesteria en sus chacras?	1. SI	2. NO

LA REGION			
6.1	¿Tiene usted algún rol en el manejo del Parque Nacional?	1. SI	2. NO
6.2	¿Cuál es su rol?		
6.3	¿Quien vino a hablar con usted sobre ese tema?		
6.4	¿Ha visitado el Parque Nacional?	1. SI	2. NO
6.5	¿Con que frecuencia?	1. Una sola vez 2. Cada año 3. Cada 6 meses 4. Cada mes	
6.6	¿Porque lo visitaste?		
6.7	¿Cómo le afecta vivir en la zona de amortiguamiento?	1. Me limita – ¿cómo? 2. No me afecta 3. Es un beneficio – ¿cómo?	
6.8	¿Han venido organizaciones para hablar sobre la conservación de los bosques o reforestación?	1. SI	2. NO
6.9	¿Quién(es)?		
6.10	¿Qué paso luego de que se fueron?	1. Algo pasó / acción	2. Nada
6.11	En relación a su chacra o los bosques, ha tenido	1. Gobierno nacional	

	contacto con: (1. SI 2. NO)	2. Gobierno regional 3. Gobierno municipal	
6.12	¿De qué se trataba la visita?		

PROYECTOS: CONSERVACION Y REFORESTACION PERMANENTE

¿Ha oído alguna vez de "Pagos por Servicios Ambientales"? 1. SI 2. NO

SI: ¿De dónde?

"Pagos pos Servicios Ambientales son incentivos para evitar la deforestación para que no se sequen los ríos y quebradas, y así conservar los recursos naturales para futuras generaciones."

I. Niveles de compensación preferidos (*1-4*) en un proyecto de **conservación de bosque**

25% de su terreno boscoso para S/. 200 por hectárea por año	
50% de su terreno boscoso para S/. 250 por hectárea por año	
75% de su terreno boscoso para S/. 300 por hectárea por año	
100% de su terreno boscoso para S/. 350 por hectárea por año	

Para mi participación necesitaría:	% de mi terreno por S/. /ha/año

¿Ha oído alguna vez de la reforestación permanente? 1. SI 2. NO

"La reforestación permanente con especies nativas se usa para recuperar áreas boscosas perdidas, para capturar carbono y así reducir el calentamiento global y cambios climáticos. Los arboles no se aprovechan."

II. Niveles de compensación preferidos (*1-4*) en un proyecto de **reforestación permanente con especies nativas** de su chacra

25% de su terreno no-boscoso para S/. 400 por hectárea por año	
50% de su terreno no-boscoso para S/. 500 por hectárea por año	
75% de su terreno no-boscoso para S/. 600 por hectárea por año	
100% de su terreno no-boscoso para S/. 700 por hectárea por año	

Para mi participación necesitaría:	% de mi terreno por S/. /ha/año

III. Preferiría participar en (*1 a 3*):

Un proyecto de pago por la conservación de áreas boscosas de su chacra	
Un proyecto de pago por la reforestación permanente de su chacra	
Un proyecto de pagos por conservación y reforestación permanente	

No sé al momento □ Ninguno □

IV. ¿Cual entidad preferiría para ser el encargado de un proyecto? (*1-5*)

Gobierno nacional: Ministerio del Ambiente	
Gobierno municipal	
Gremio agrario	
Organización no-gubernamental (ONG) peruana	
ONG internacional	

- ¿Por qué?

V. ¿Cuales **beneficios regionales** que brinde un proyecto valuaría mas altamente?

Programa de ayuda para seguro médico	
Mejoramientos de caminos	
Capacitación para alcanzar el mercado para sus productos	
Reforzamiento de regulaciones contra la tala ilegal	
¿Otro?	

VI. ¿Cuales elementos considera más importantes de un proyecto (*1-4*)?

Precio por hectárea	
% de su tierra	
Entidad encargada	
Beneficios regionales	

¿Qué le pareció este cuestionario? (Elija uno)

Fácil para entender y responder	
Bastante fácil pero demasiadas preguntas	
Bastante fácil pero la clasificación fue difícil / no me gusto	
Difícil para entender y responder	
¿Otro?	

¿Algún comentario sobre el cuestionario?