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Regime-building for REDD+: Evidence from a cluster of local initiatives in south-eastern Peru

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ABSTRACT

Experience with forest management interventions has shown that the design, strategic context and implementation of projects at the local level are key determinants of intervention success. Gaining a strategic understanding of local REDD+ initiatives is therefore important for the further development and governance of the international REDD+ regime. This article reports on an exploratory comparative analysis of 12 REDD+ projects in the Madre de Dios watershed of south eastern Peru. Using a framework drawn from innovation strategy, we focus on the founding and organizational strategies of the different initiatives, thus allowing us to compare across the 12 cases and to explore how these local initiatives link with the emerging national REDD+ architecture in Peru.

Our results point to the importance of hybrid institutional logics, the key role played by highly networked individuals in pushing project-level REDD+ forward, and of understanding the construction of the REDD+ credit value chain as the fundamental innovation taking place; the development of standards, technologies and other norms are complementary to the basic task of defining and reconfiguring roles on this chain. We suggest that decision makers should continue to encourage the 'bottom-up' construction of REDD+ as a strategy to encourage innovation and flexibility, and facilitate research into the governance and transnational systemic nature of the emerging value chain.

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1. Introduction

Considerable uncertainty remains about the implementation, effectiveness and comparability of national REDD+ schemes, in view of the fact that the approach remains largely exploratory and speculative, with little systematic evidence about how REDD+ is implemented in practice and scant attention given to date to institutional and political economy issues (Corbera et al., 2009; Vatn, 2010). Experiences with other

forest management interventions shows that the design, strategic context and implementation of projects at the local-level are vital for determining project success (Blom et al., 2010). Though pilot REDD+ schemes are emerging in many regions (Bond et al., 2009; Cenamo et al., 2009), we know very little about what REDD+ initiatives look like 'on the ground' within a local context.

As the number of projects increases globally, we begin to have a basis for comparing across institutional contexts, core

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actors, and the basic policy and market ‘infrastructure’ of the nascent REDD+ regime (Corbera and Schroeder, 2010, this issue; Fligstein, 2002; Santos and Eisenhardt, 2009). This applies equally whether the resulting national schemes have a prescriptive focus (compliance to environmental targets or national laws) or are more incentive-based (performance based subsidies or market-based payments). However, in order to better understand and manage the development of the international REDD+ regime, we need to develop a deeper understanding of projects at the local level, a key site for REDD+ innovation.

Recent research on strategy and innovation argues that today ‘strategy is no longer a matter of positioning a fixed set of activities along a value chain... the right business, the right products and market segments, the right value adding activities. Instead, the focus is the value-creating system itself... The key strategic task is the reconfiguration of roles and relationships amongst this constellation of actors in order to mobilise value creation in new forms and by new players’ (Ramirez, 1999). We develop this central insight about purposeful actors by analyzing the anatomy of a cluster of REDD+ initiatives in the Cusco and Madre de Dios regions of south eastern Peru. We study 12 different projects developing REDD+ credits, five of which are at feasibility and seven at early implementation stages. We focus on ‘implementation’ as it is expressed in the early organizational and network strategies used to develop the projects. The data includes detailed interview and archival sources that document the kind of actors involved in the projects, the configuration of these actors, and the network linkages they initiate. The focus on such founding strategies allows us to compare across the 12 cases and also to explore how these local strategies link with the emerging national REDD+ architecture in Peru. We use a framework drawn from innovation strategy to analyze these elements. We make explicit the value chain of the emerging REDD+ space in Peru and use our insights into the proximate outcomes of the different initiatives to suggest future areas for environmental policy research.

1.1. *The broader context: the nascent REDD+ architecture in Peru*

REDD came to light in Peru following extensive efforts to develop incentives in support of Clean Development Mechanism (CDM) afforestation/reforestation projects in the mid-2000s (Scriven, 2010). As the complexities involved in the development of CDM projects became apparent, many policy advocates and others directly involved in the projects became disillusioned and abandoned the CDM approach. Key actors in Peru therefore initially approached REDD with skepticism. However, progress in international negotiations at Bali in 2007, and news of pioneering early initiatives in Brazil, helped to start building interest. That same year, the World Bank’s Forest Carbon Partnership Facility (FCPF) and the United Nations REDD Programme (UN-REDD) started to engage the Peruvian environmental authorities, with Peru submitting its Readiness Plan Idea Note (R-PIN) to the FCPF in June 2008. At the same time, conservation and social development organizations began to see REDD as an opportunity to fund their work for the long-term, something notoriously difficult to

achieve in conservation and development spheres (Blom et al., 2010). A few commercial organizations also started to become involved in order to realize the potentially large financial upside from engaging in pre-compliance projects. Support began to increase across State, business and civil society actors, at both the national and regional levels, leading to the ‘Tarapoto Declaration’ in October 2008 (Tarapoto, 2008). The Declaration is regarded as the first mayor collective agreement to work on the key issues for REDD+ implementation in Peru. It outlines REDD as a conservation and forest management tool, advocating the development of multi-actor pilot projects and multi-level capacity building, in line with the ‘Nested Approach’ to REDD (Pedroni et al., 2008)¹ and multi-level Payment for Ecosystem Services (PES) approaches (Bond et al., 2009; Phelps et al., 2010). The process of legitimization has been bolstered through the formation of a national, cross-sectoral REDD working group – the Mesa REDD – which currently has over 60 institutional members. The creation of full-time REDD positions in the Ministry of Environment and the formation of a REDD+ Technical Group in early 2009, under the umbrella of the National Committee for Climate Change, has added to the momentum. In some regions (San Martin, Madre de Dios, Piura, Cusco), the Regional Government is now chairing Regional REDD Working Groups, public-private partnerships to agree deforestation baselines, monitoring and other technical methodologies. This has helped to move the national position over two years from that of wary newcomers to recognized innovators of the ‘Nested Approach’ (Blaser, 2010).

2. Study area

The study area covers just over 95,000 km² of the Madre de Dios watershed in the Amazon regions of Cusco and Madre de Dios in southeastern Peru. With a surface area of 85,403 km² and a population of 97,000, the Madre de Dios region is one of the largest and least populated regions of Peru. Although this region experienced the rubber boom in the 19th Century and timber extraction since the 1940s, it remained very much a forgotten backwater of the Peruvian Amazon until 1970. The discovery of alluvial gold in the 1970s in the Inambari and Colorado River headwaters led to the first large wave of Andean migrants, followed by successive waves of miners, loggers, and small scale farmers that continue to this day.

The region is an important study site for the emergence of REDD+ for several reasons. In the first place, we identified twelve different initiatives working on REDD+. There is therefore an opportunity to explore variation in sources and forms amongst these initiatives on key dimensions. Second, the region is partly within the Tropical Andes Hotspot, one of the most biodiverse and threatened habitats on the planet

¹ The ‘Nested Approach’ to REDD integrates project-level and sub-national REDD schemes into national-level accounting, with the aim of achieving meaningful reductions in GHG emissions from improved forest governance and management, while allowing for an immediate and broad participation by developing countries, civil society and the private sector.

(Myers et al., 2000) and partly within the southwestern Amazonia eco-region (Olson et al., 2001), which retains more than 95% of primary rainforest cover. It contains several ethnic indigenous populations, including some of the last voluntarily isolated, nomadic indigenous groups on earth (Huertas Castillo, 2004). There are therefore important ecological and ethical considerations as to why it is important to 'get REDD+ right' in this region. Finally, Madre de Dios is currently undergoing a new gold rush due to the high price of gold, renewed hydrocarbon exploration activity and several mega-development projects, including the completion of the Southern Interoceanic Highway (Van Dijck, 2008) and a 1.4 gigawatt hydroelectric dam on the Inambari River (EIU, 2008). The new wave of deforestation accompanying these developments underscores the urgency of REDD+ activities in this region.

3. Methods

3.1. Theoretical framework

We conceive of REDD+ as an unsettled, multi-level PES scheme with international, national and local actors (Angelsen and Wertz-Kanounnikoff, 2008), which aims to create incentives to align individual and collective land use decisions with the social interest in the management of forests (Muradian et al., 2010). We analyze the unsettled, emerging structure of REDD+ at the local project level with the TMO (Technologies, Markets, and Organizations) Innovation Framework (Ventresca and Hajek, 2010). TMO's main claim is that regime building is a result of the interplay between organization capabilities, evolving market structure and technological development, within the context of broader developments in the political, scientific, environmental, legal, economic and social spheres, as represented schematically in Fig. 1. TMO integrates research approaches from economic sociology, governance regimes, organizational capacity and innovation, and enables

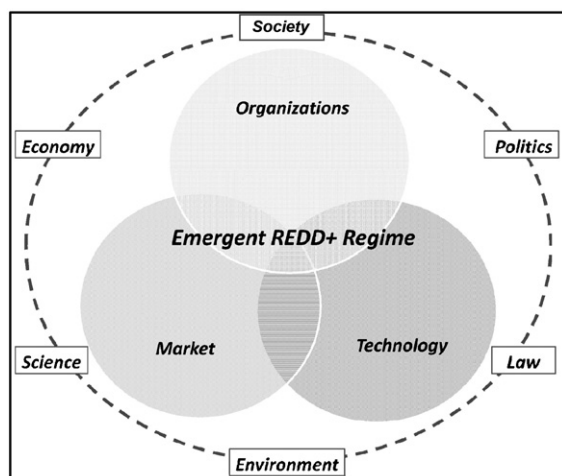


Fig. 1 – The TMO (Technology, Markets & Organizations) Framework: A tool for understanding regime-building for REDD+.

Adapted from Ventresca and Hajek (2010).

us to explore empirically the nascent REDD+ regime through an integrated assessment of technology, market and organizational innovation. These innovations comprise institutional, political, and technological assemblies that vary in origins and impacts (Fligstein, 2002; Rayner, 2009) that are deeply embedded in regulatory and social transformation processes (Lounsbury et al., 2003; Gómez-Baggethun et al., 2010; McDermott et al., 2010).

3.1.1. Organizations

TMO proposes that successful organizations are those that identify, occupy and exploit structural holes in the emergent networks of new markets and regimes, and that bring with them capabilities for innovation as opposed to capabilities for the management of established tasks. Key areas of entrepreneurial activity should include the configuration of the value chain, co-production of value with other actors and the continuous redesign of business systems (Ramirez and Wallin, 2000; Santos and Eisenhardt, 2009; Kaplan and Murray, 2010). Questions asked in order to assess the role of organizations in the REDD+ initiatives studied included: Who are the key actors involved? What institutional logics are present in the different projects? What are the types and sources of capital and which are the key partnerships being developed? What key competences do different organizations bring?

3.1.2. Technology

REDD+, like other forms of PES, is characterized by incomplete information and uncertainty, particularly regarding causal relationships between project interventions and the delivery of services; this poses a major challenge for the REDD+ concept (Muradian et al., 2010). However, advances in remote sensing, ecosystem modeling and information technology are allowing organizations to improve their understanding of how ecological and social systems function and interact (Daily, 1997; Daily and Matson, 2008), and hence reduce the uncertainty in the delivery of reduced emissions, as well as co-benefits, from REDD+ projects. In TMO we conceive of technology not only as comprising technical software and hardware, but also of the less tangible knowledge and human know-how to operate these systems. Questions asked in order to assess the role of technology across the initiatives included: What are the main technologies being used on the ground? Are we seeing radical or incremental technology innovation? Who holds key technology know-how? Who is setting the standards that technologies must conform to?

3.1.3. Markets

TMO shows how markets get built by entrepreneurs and intermediaries, who through the management of uncertainty and the reduction of ambiguity create comparable products and establish behavioral norms (Fligstein, 2002; Lounsbury et al., 2003). In relation to PES schemes, we conceive of the market as a specific institutional arrangement consisting of rules and conventions that make possible a large number of voluntary transfers of property rights on a regular basis. Questions asked in order to assess the role of the emerging market for REDD+ included: What does the emerging value

chain for REDD+ credits from south-eastern Peru look like? What certification, validation and registry micro-structure is being built and utilized? In which markets are projects aiming to sell their credits?

3.1.4. System building and the broader context

Organizations working on REDD+, as in other nascent regimes, are working in an institutional environment marked by high levels of ambiguity (Meyer and Rowan, 1977; Fligstein, 2002). Ambiguity, defined as the lack of clarity about the meaning and implications of particular events or situations (Santos and Eisenhardt, 2009), arises from a lack of recurrent, institutionalized patterns of relations and actions. It normally leads to confusion and multiple potential interpretations of reality. Ambiguity, unlike uncertainty, is not amenable to be managed through technical means. Reducing ambiguity is dependent on social processes of norm setting, value framing and other forms of leadership. These leaders, also referred to as institutional entrepreneurs or system builders (Hughes, 1989), are people that bring significant skills, networks and resources to the table, and who are used to working in cross-cultural, multidisciplinary settings where reducing ambiguity, finding common ground for collaboration and inventing organizational and institutional solutions in the face of obstacles, resource constraints, and legacy system remnants is vital. In applying TMO we are tasked with identifying and querying the role of these key individual actors.

3.2. Data sources and treatment

We made use of both original interviews and a review of published and internal project documents to obtain data. The interviews were carried out at two broad levels: (1) with national and international elites involved in the development of REDD+ in Peru, including state, civil society, and business actors, and (2) with local actors involved in the REDD+ projects in the study area, again across state, civil society and business spheres. Hajek made four visits to the region (January, August, October and December 2009) for direct observations and interviews in the context of his MBA thesis and ongoing research initiatives (Hajek, 2009). He interviewed 18 national and international elites, and 19 local actors. The interviews centered on the questions outlined in the preceding paragraphs. Scriven visited the region in July 2008 and July/August 2009 and conducted interviews within the context of his doctoral research (Scriven, 2010). He interviewed 9 national elites, and 35 local actors. Interviews were conducted in the cities of Lima, Cusco, and Puerto Maldonado and at field sites. Several actors were interviewed on more than one occasion. A total of 102 interviews were carried out lasting between 40 and 180 min, with an average duration of 104 min. All interviews were carried out using an open-ended interview protocol. Additional insights were gained by Castro in the course of his work as REDD+ Coordinator at the Ministry of Environment. A summary of all interviews conducted is provided as supplementary information.

Interviews were transcribed, with relevant statements and quotes extracted and categorized by theme. The interview and

archival data were then combined to generate summaries of the 12 REDD+ initiatives. We analyzed these data with the theoretical framework presented in Section 3.1. As the basis of our enquiries into market structure we used a forest carbon market actor typology and value chain proposed by Ecosecurities (Ecosecurities, 2009).

4. Results

4.1. The projects

A total of twelve projects working on REDD+ were identified in the study area. Of the twelve, seven were at early development/implementation and five were still at a feasibility/origination stage. For purposes of identification, the projects were numbered sequentially and given a short name related either to the location of the project or to one of the main organizations involved. The location of the projects can be seen in Fig. 2. In ten of the projects, we identified two organizations central to originating and developing the project and which we named the core project actors. The core project actors consisted of an Asset Holder – an organization or community with formal rights to an area of forest and a claim to its carbon sequestration services – and a Project Developer – an organization dedicated to structuring and building the networks necessary for project execution. The remaining two projects were at a feasibility stage and the Project Developer organization had yet to formally engage with an Asset Holder. From the interviews it became apparent that the core actors had relationships predating the project with many of the other organizations engaged in the work, and that these prior relationships were an important part of the social capital that each actor brought to the project.

Key features of the initiatives studied are summarized in Table 1, including the core actors, the need being addressed by the project, the status and the deforestation reduction approach adopted, the spatial extent, and the key outstanding challenges highlighted by the interviewees. Although a large variety of outstanding tasks and challenges were mentioned in the interviews, we present in the table those issues that were mentioned more often or that were perceived by interviewees as vital for the project to be successful. Challenges were grouped into the four inquiry areas of the TMO approach: organizations, markets, technology and the broader context (legal, social, and political aspects).

4.2. Organizations: actors, logics, and capital

A rich cross-section of actors is participating in the REDD+ initiatives of the Madre de Dios watershed. Amongst the field based actors in Peru we have (1) non-profit conservation groups well established in the region, for example, the Amazon Conservation Association (ACA) and the World Wildlife Fund-Peru Office (WWF), (2) non-profit natural resource management organizations that have arrived in the area to work specifically on REDD+, like the Asociación para la Investigación y el Desarrollo Rural (AIDER), (3) Peruvian forestry businesses starting up in the ecosystem services and

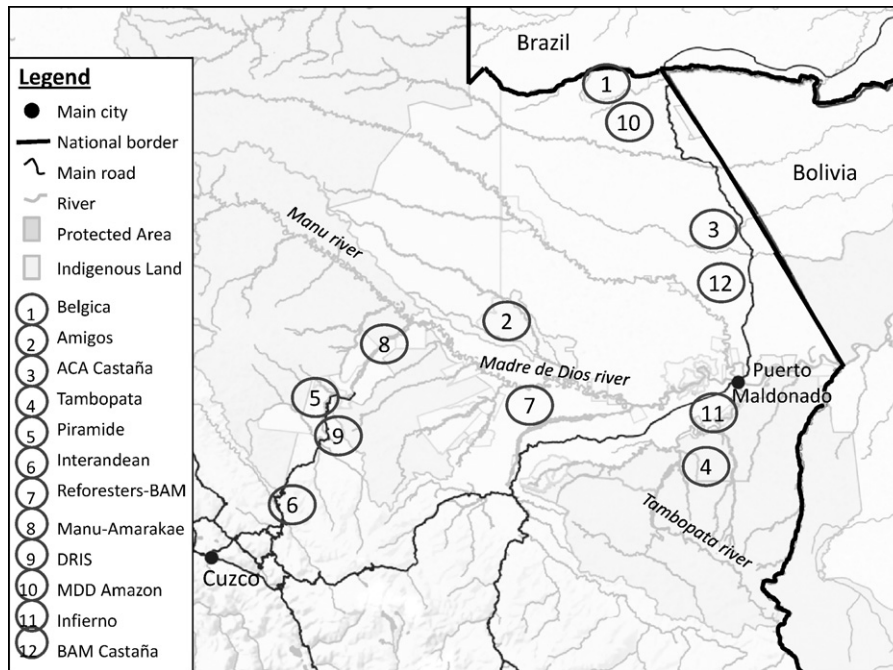


Fig. 2 – Location of REDD+ projects in the Madre de Dios watershed of southeastern Peru.

REDD+ space, such as Bosques Amazonicos (BAM) and Maderacre, (4) Peruvian financial boutiques experimenting from scratch in natural resource management, like Asesorandes and Ecosystem Services, (5) indigenous communities from several different ethnic groups, (6) grassroots organizations representing local forestry interests, like the Brazil nut association (ASECAM) and the foresters association of Madre de Dios (FEPROCAM), and (7) the Peruvian Government through national, regional, and local level institutions, most significantly the Forestry Department of the Ministry of Agriculture, the Ministry of Environment and the Office of Natural Resources of the Regional Government of Madre de Dios.

Another set of organizations is engaging from the international arena in service provision and market intermediary roles. These include (1) technical consultancies like Carbon Decisions and Winrock International, (2) standards organizations such as the Climate, Community and Biodiversity Alliance (CCBA), and the Voluntary Carbon Standard (VCS), (3) registry organizations like Market Environmental, (4) accredited project verifier organizations like Scientific Certification Systems (SCS) and the Rainforest Alliance, (5) information providers, due diligence experts, and incubators like Forest Trends, New Forests and the Katoomba Ecosystem Services Incubator respectively, and (6) financiers, for example Sustainable Forestry Management Ltd.,² and SEM-Chile.

The network of organizational relationships in each project was ascertained for all projects. By way of illustration, we present in Fig. 3 below the network identified in the Belgica project. From this network and those of the other projects, the multiple connections of asset holders and project developers

became apparent, as well as the nodal position occupied by standard organizations such as the CCBA and market intermediaries such as Carbon Decisions.

We identified three dominant institutional logics that are providing orientation and meaning to the action of organizations engaging in REDD+ and that shape their views of what constitute legitimate objectives and how they may be achieved (Scott, 1994; Porac et al., 2002; Suddaby and Greenwood, 2005). The logics identified included a conservation logic, a social development logic and a commercialization logic (Scriven, 2010). Organizations with a dominant conservation logic aspire to effectively sustain forests in the long term. The preservation of biodiversity and tropical rainforest is enshrined in their goals. Biologists and ecologists make up a large proportion of their staff, including at the senior level. Organizations with a dominant social development logic emphasize governance, capacity building and the importance of equitably addressing the needs of the people whose livelihood depends on forest ecosystems. They included community-based organizations as well as human rights and development organizations. Organizations with a dominant commercialization logic tend to emphasize efficient management of projects and the need to ensure profitability in order to grow the business. They included commercial and grassroots natural resource management organizations. In most cases the asset holder and the developer contribute different logics (eight out of ten projects) and different levels of natural, social and financial capital to the project. A summary of the logics and the different forms of capital contributed by the core actors in each initiative is presented in Table 2. A social development logic was most common amongst asset holders (six out of ten projects), while a commercialization logic was most common amongst project developers (six out of twelve projects).

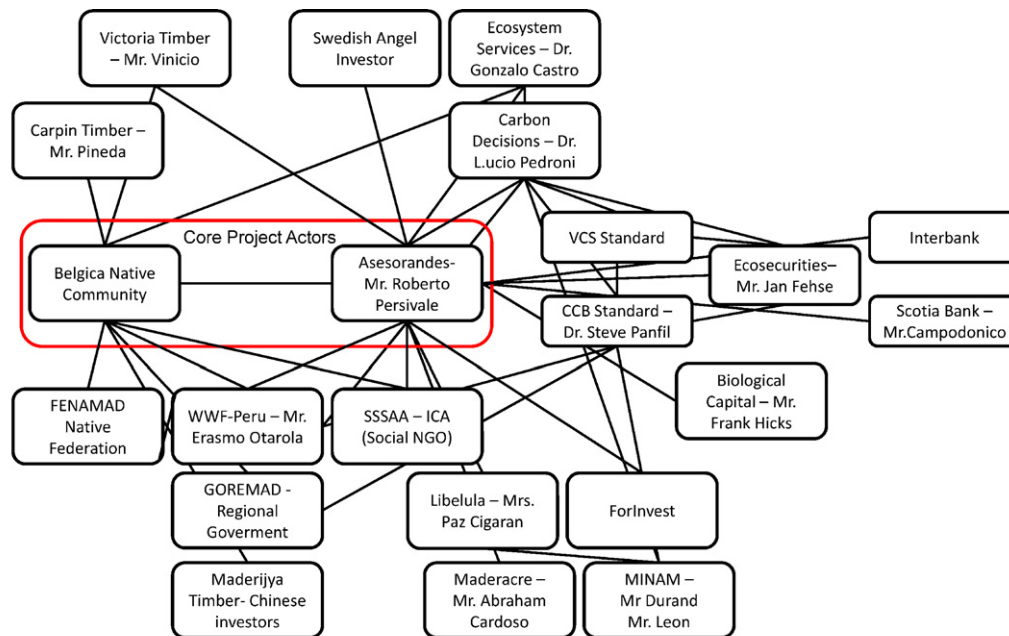
² This company has since ceased to operate.

Table 1 – Key features of REDD+ initiatives in the Madre de Dios Watershed.

Project	Core project actors	Need addressed by project	Status and intervention approach	Extent (hectares)	Key challenges identified by actors
1 – Belgica	Asset holder: CN Belgica (indigenous community). Developer: Asesorandes (for-profit business)	Reduce deforestation and improve livelihoods from standing forests in Belgica indigenous community	Status: early implementation Approach: increase revenue and strengthen local governance to mitigate impacts of SIH ¹	53,394	Organizational: contractual framework, benefit distribution, resilience to 'fast-profit' actors. Context: clarification of carbon rights, fast increase in social pressures
2 – Amigos	Asset holder: Amazon Conservation Association (NGO) Developer: Bosques Amazónicos (for-profit business)	Reduce deforestation pressures on Rio Amigos Concession and secure a US\$1 million injection for renewal of Concession rights	Status: early implementation Approach: support research, forest protection and local livelihoods to guard concession	145,918	Technical: lack of region-wide deforestation model. Market: uncertainty, compliance REDD market remains distant. Context: lack of clarity legal terminology
3 – ACA Castaña	Asset holder: Association of Brazil Nut Producers (grassroots NGO) Developer: Amazon Conservation Association (NGO)	Reduce deforestation and agricultural conversion in Brazil nut concessions	Status: feasibility Approach: improve nut seller revenues and therefore improve economics of Brazil nut industry	379,000	Organizational: alignment of concessionaire associations. Benefit distribution to actors complex. Technical: lack of region-wide deforestation model
4 – Tambopata	Asset holder: Asociación para la investigación y el desarrollo (NGO) Developer: Bosques Amazónicos (for-profit business)	Reduce deforestation pressures on Tambopata National Reserve emanating from buffer zone	Status: early implementation Approach: REDD sales to finance development of sustainable economic activities in buffer zone	574,690	Technical: technologies as yet experimental. Market: REDD methodology not yet approved. Context: National ecosystem services law pending
5 – Piramide	Asset holder: Forestry Concessionaire (Not yet engaged) Developer: CREES Foundation (NGO)	Reduce deforestation and degradation pressures in piramide forestry concession	Status: feasibility Approach: new revenues through ecosystem services concession to finance sustainable local business	21,868	Market: complexity of sales, multitude of standards, high costs of certification. Context: lack of regulation and clarity as to who holds carbon rights
6 – Inter Andean	Asset holder: Japu, Pilco Grande & other Andean communities Developer: Amazon Conservation Association (NGO)	Reduce land-use and fire practices that lead to the loss of elfin forests surrounding Manu National Park	Status: early implementation Approach: REDD income to finance reforestation which will then generate future revenues	Over 23,000	Organizational: urgent community needs require immediate, short term solutions. Context: clarify rights & responsibilities of communities in new ES & forestry laws
7 – Reforesters – BAM	Asset holder: Reforestation Committee MDD (Grassroot NGO) Developer: Bosques Amazónicos (For-profit business)	Reduce deforestation resulting from invasion of forestry concessions by gold miners and illegal loggers	Status: feasibility Approach: increase concession competitiveness by building a wood treatment plant	80,000	Organizational: nascent associations, time intensive work. Context: Viability of reforestation concessions contested, local short term gain mentality

8 – Manu-Amarakaeri	Asset holder: CN Diamante & Shipetiari (indigenous communities) Developer: Servicios Ecosistémicos Perú (NGO)	Reduce deforestation resulting from Itahuanía-Colorado road and strengthen local economy	Status: early implementation Approach: strengthen governance, education, inclusion & pro-forest businesses	56,000	Organizational: much capacity building. Context: clarity of carbon rights in ES and Forestry Law needed and in operational procedures of regional government.
9 – DRIS	Asset holder: Andean Settler Communities (not yet engaged) Developer: Integral Rural Sustainable Development (NGO)	Reduce deforestation arising from inadequate agricultural practices and poverty.	Status: feasibility Approach: strengthen technical agro-forestry development as route to improve livelihoods	Not yet defined	Organizational: development carbon expertise. Context: people renouncing to their rights to carbon need clarity how they will be compensated
10 – MDD Amazon	Asset holder: Maderacre-Maderijya Concessions (for-profit) Developer: GREENOXX (for-profit business)	Reduce deforestation by addressing logging and immigration impacts of SIH ¹	Status: early implementation Approach: secure additional revenue streams for FSC Certified forestry concessions	98,900	Organizational: ensuring continuity under ownership and management changes. Context: Changing legal framework and rapidly increasing pressures due to SIH ¹
11 – Infierno	Asset holder: CN Infierno (indigenous community) Developer: Asociación para la Investigación y el Desarrollo (NGO)	Reduce deforestation and improve livelihoods in infierno community	Status: early implementation Approach: formalize ecosystem service rights to mitigate logging and immigration impacts of SIH ¹	11,165	Context: clarity of rights and responsibilities of asset holders. Dependent on international and national progress regarding REDD+
12 – BAM Castaña	Asset holder: Federation of Brazil nut producers (grassroots NGO) Developer: Bosques Amazónicos (for-profit business)	Reduce deforestation and agricultural conversion in Brazil nut concessions	Status: feasibility Approach: building treatment plant and improve competitiveness of Brazil nuts	Not yet defined	Market: uncertainty regards to regulated market. Context: clarity of carbon rights. Regional Government must develop supportive policy to REDD

SIH: Southern Interoceanic Highway infrastructure project.



Connecting lines indicate regular communication and flow of information between two actors, but not necessarily a contractual or formal work relationship. This figure should be seen as a minimum expression of the actual relationships in this project, as interviews were not designed to record an exhaustive list of such relationships.

Fig. 3 – Organizations and key individuals involved in the Belgica project.

4.3. Technology: measuring, modeling and monitoring

Advances in remote sensing, data management and computer modeling are at the core of the REDD+ initiatives studied. The basic programme of activities inherent to REDD+ projects (accurate quantification of forest carbon stocks, followed by the determination of rates of loss and the establishment of a program of activities to reduce such loss) is closely linked to these technologies. Four distinct technical tasks were identified across the initiatives:

- (i) Measurement of forest carbon stocks – The Madre de Dios REDD+ initiatives studied include several sites where the RAINFOR project (Malhi et al., 2002) has been monitoring forest carbon dynamics for more than two decades, providing an archive of peer-reviewed data for the estimation of carbon stocks in project areas and well established forest plots which serve as calibration sites for more recent forest biomass estimation technologies, like for example combined CLASlite-LIDAR (Asner et al., 2009). A large scale pilot of CLASlite-LIDAR technology was carried out in Madre de Dios in 2009, with the support of several REDD+ project actors (Tollefson, 2009). It is expected that this should enable more accurate carbon stock estimation and the monitoring of forest degradation at a fraction of the cost than when relying solely on plot-based measurements and traditional satellite image analysis.
- (ii) Spatial data management with Geographic Information Systems (GIS) – a small group of conservation and natural resource management organizations, including Conservation International and the National Protected Areas Authority, started using GIS in Madre de Dios in the mid

1990s. It is now an established natural resource management tool, with several of the REDD+ projects relying on an in house GIS technician for this type of work and GIS courses available at local education facilities. The program ArcGIS, and the predecessor packages produced by ESRI, is the software of choice for this task.

- (iii) Analysis of forest cover with remote sensing images – monitoring of historical and current deforestation in Madre de Dios has been piloted by the National Protected Areas Authority as early as 2002 (INRENA, CDC et al., 2003) and allows for changes in forest cover and landscape uses to be detected in a consistent manner at a fraction of the cost than with previous methods (Broich et al., 2009). Although the trend appears to be towards free public access of available imagery and technical tools to analyze deforestation (Moore, 2010), only 2 of the organizations engaging in the 12 REDD+ initiatives (ACA and AIDER) had in-house capacity for deforestation analysis, while the others relied on published data or outside technical expertise to obtain this information.
- (iv) Deforestation Modeling – modeling future deforestation with stochastic simulation programs, principally the DINAMICA EGO package developed by the Federal University of Minas Gerais (Soares-Filho et al., 2006; Nepstad et al., 2009), is a central task for establishing ‘without REDD+’ and ‘with REDD+’ deforestation scenarios and crediting baselines, and therefore estimate the value of REDD+ activities. In the Madre de Dios initiatives, deforestation modeling has been carried out principally by service providers, like Winrock International and Carbon Decisions, under contract by two project developer organizations, ACA and BAM respectively. Outsourcing

Table 2 – Institutional logics and capital contributions by core project actors.

Project number/name	Core project actors					
	Asset holder			Project developer		
	Natural capital	Human capital	Financial capital	Natural capital	Human capital	Financial capital
1 – Belgica	<i>Belgica Indigenous Community (logic: social development)</i>			<i>Asesorandes Ltd. (logic: commercialization)</i>		
	Access to 55,000 hectares through land deed and forest use rights awarded by State	Community still holds traditional forest management & biodiversity knowledge.	Not currently foreseen to contribute financial capital	Does not contribute natural capital	Experienced team of project management staff, with broad, flexible, professional network	US\$100,000 cash and man-hours investment in structuring project, and feasibility studies
2 – Amigos	<i>Amazon Conservation Association (ACA) (logic: conservation)</i>			<i>Bosques Amazónicos Ltd. (BAM) (logic: commercialization)</i>		
	Management rights to 145,918 hectares forest on 40 year concession awarded by State	Experienced, reputable team of conservationists and researchers from Peru and US.	With over US\$7 million invested to date, ACCA has capacity to raise more funding.	Does not contribute natural capital	An experienced forestry team with both business and non-profit backgrounds in Peru	A US1 million cash investment giving option to commercialise credits and retain % profits
3 – ACA Castaña	<i>Brazil Nut Producers Association (ASECAM) (Logic: Commercialization)</i>			<i>Amazon Conservation Association (ACA) (logic: conservation)</i>		
	Forest use rights to over 370,000 hectares, concessions of individual members	Grassroots legitimacy. Broad membership (400+) ensures continuity & ground presence.	Each concession holder contributes working capital on annual basis.	Does not contribute natural capital	Experienced, reputable team of conservationists well bridged with market & policy in US	Funds to carry out the feasibility studies
4 – Tambopata	<i>AIDER (logic: social development)</i>			<i>Bosques Amazónicos Ltd. (BAM) (logic: commercialization)</i>		
	Administration rights to 574,690 hectare National Reserve on 7 year contract	Experienced conservation, social development and forestry team in Peru.	US\$1,177,00 financed through GPAN Project, financed by Germany's KfW.	Does not contribute natural capital	An experienced forestry team with both business and non-profit backgrounds in Peru	A US1 million cash investment giving option to commercialise credits and retain % of profits
5 – Piramide	<i>Local forestry concession holders, not yet engaged</i>			<i>CREES Foundation (logic: social development & conservation)</i>		
	—	—	—	May hold the Forestry Concession rights	A small team of Peruvian and UK educators, development and tourism entrepreneurs	Seed capital (approx. US\$10,000) to carry out feasibility study
6 – Interandean	<i>Andean communities Japu, Pilco Grande, and others (logic: social development)</i>			<i>Amazon Conservation Association (ACA) (logic: conservation)</i>		
	Ancestrally held 5000 hectares over which they now have full title	Rich cultural and livelihood association with the land, local knowledge of biodiversity.	Not currently foreseen to contribute financial capital.	Does not contribute natural capital	Experienced, reputable team of conservationists well bridged with market & policy in US	US\$500,000 from NORAD to initiate project. Larger funding (approx US\$2 million) secured
7 – Reforesters-BAM	<i>Forestry and Reforestation Committee of MDD (CEFOREMAD) (logic: commercialization)</i>			<i>Bosques Amazónicos Ltd. (BAM) (logic: commercialization)</i>		
	40 year forestry & reforestation concessions covering approx. 80,000 hectares	CEFOREMAD association brings legitimacy, members have local forestry know-how.	Not currently foreseen to contribute financial capital.	Does not contribute natural capital	An experienced forestry team with both business and non-profit backgrounds in Peru	A cash investment giving option to sell carbon credits and retain 70% profits
8 – Manu-Amarakaeri	<i>Diamante and Shipetiari indigenous communities (logic: social development)</i>			<i>Servicios Ecosistémicos Peru (SePerú) (logic: conservation)</i>		
	Freehold land deed and forest use rights to nearly 56,000 hectares awarded by State	Community still holds traditional forest management skills.	Not currently foreseen to contribute financial capital.	Does not contribute natural capital	A diverse team with education, business and non-profit backgrounds in Peru	US\$120,000 invested in feasibility, capacity building and implementation

Table 2 (Continued)

Project number/name	Core project actors					
	Asset holder			Project developer		
	Natural capital	Human capital	Financial capital	Natural capital	Human capital	Financial capital
9 – DRIS	—	Andean settler communities, not yet engaged		Integral Rural Sustainable Development (DRIS) (logic: social development)		
				Does not contribute natural capital	An experienced rural development team with previous experience in area	A non-specified amount of funding from European cooperation agencies
10 – MDD Amazon	Maderacre and Maderija Forestry Concessions (logic: commercialization)			GREENOXX (logic: commercialization)		
	Two forestry concessions totaling 98,000 hectares on renewable 40 year lease	An experienced group of foresters, amongst the first to obtain FSC certification in Peru.	Ongoing management of timber concessions contributes significantly to covering costs.	Does not contribute natural capital	A new REDD project structuring company based in Uruguay	Has covered the costs of the Project Development Document and CCBA validation
11 – Infierno	Infierno indigenous community (logic: social development)			AIDER (logic: social development)		
	Land deed and ecotourism concession totaling 11,165 hectares	Successful ecotourism initiative and remnants of traditional forest management skills.	Not currently foreseen to contribute financial capital	Does not contribute natural capital.	Experienced conservation, social development and forestry team in Peru	Support from local office with US\$351,900 secured via ITTO for first three years of project
12 – BAM Castaña	Federation of Brazil Nut Concessionaires (FEPROCAM) (logic: social development)			Bosques Amazónicos Ltd. (BAM) (logic: commercialization)		
	230 Concessionaires with approx. 200,000 hectares of forest	Grassroots legitimacy, broad membership (230) ensures continuity & ground presence.	Each concession holder contributes working capital on annual basis.	Does not contribute natural capital	An experienced forestry team with both business and non-profit backgrounds in Peru	A cash investment giving option to sell carbon credits and retain 70% profits

of this central task by project developers responded both to a shortage of in-house technical skills, as well as the decision of leaving this work to a recognized 'impartial' third party.

From the four core technical tasks observed in this study, we see that REDD+ technology in Madre de Dios builds upon the legacy of biodiversity and conservation programs in the region, not only in terms of scientific knowledge but also in terms of the human capital developed by these earlier programs, tracing back its roots to the establishment of the first forest ecology plots in Tambopata National Reserve's Explorers Inn and Manu National Park's Cocha Cashu Biological Stations in the 1970s, now part of the RAINFOR forest carbon dynamics network (Malhi et al., 2002). Well established conservation organizations like ACA have the capacity to perform all four technical tasks in house. Other organizations have to buy in this expertise from technical service providers. One project developer has reportedly already spent over US\$200,000 developing a deforestation model for Madre de Dios. These are significant costs, which represent a significant entry barrier to less capitalized organizations like CREES, SePeru, Asesorandes, and local asset holders. Technology innovation and the setting of standards to which technical products must conform is not being led by Peruvian organizations, but rather by the service provider and certification companies involved in the projects. There are legacy elements here as well, as foreign institutions and individuals have traditionally played a key role in

biodiversity research and conservation innovation in Madre de Dios.

4.4. The emerging market: the value chain and the role of intermediaries

Based on the individual organizational actors, intermediation roles and work relationships observed in this study, we propose a structure for the REDD+ credit value chain in south-eastern Peru as depicted in Fig. 4. In contrast to other authors (Ecosecurities, 2009), we suggest that financing, risk management, advisory and other institutional interventions are services necessary at different points along the chain, rather than specific nodes of the chain at which a change in the value of the credit materializes. We suggest that the sequential transfer of rights, in exchange for monetary or non-monetary compensation, is the core characteristic of the REDD+ value chain. At origination the project feasibility is assessed. This node is the locus for behavioral change with respect to governance and land-use of the forest asset. At the development node the REDD+ credit is 'formed' through a multi-actor activity programme. At certification the credit is quality checked, approved (or not) and registered. At the sales node the credit is made part of a client offering (promotion, bundling, etc.), before progressing to the final purchase node where utilization of the credit takes place.

At present, the different organizations in the REDD+ arena in Madre de Dios are positioning themselves along the chain. Some organizations are clearly positioned at only one node of

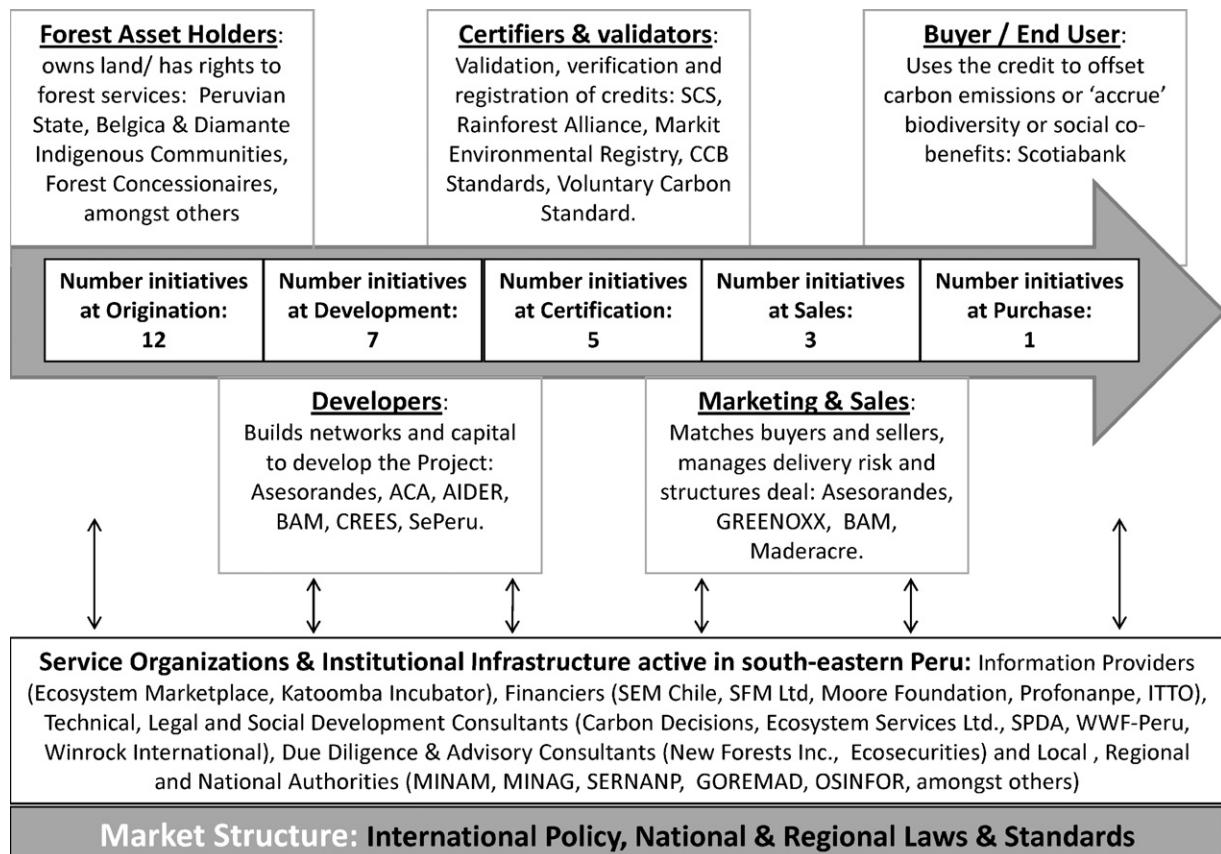


Fig. 4 – Structure and positioning of actors on the emerging REDD+ credit value chain.

the chain, as is the case with indigenous community asset holders, while other organizations are at multiple nodes. For example, the NGO Amazon Conservation Association (ACA) is at the forest asset holder node of the Amigos REDD project and at the developer node for the Interandean REDD project. Another example is the companies Asesorandes and Bosques Amazonicos (BAM) who are active at the project developer node, but also at the marketing and sales node of the chain. We observed a funnel effect along this chain. Of the twelve REDD+ projects studied, seven have entered the development stage, of which five have undergone or are undergoing validation to an internationally recognized standard. Three of the projects are actively engaging in trying to sell credits, of which to date only one, the Maderacre REDD project, has sold REDD+ carbon credits.

All twelve projects indicated that they were aiming to sell credits on the voluntary markets initially and in compliance markets once these materialize. Ten out of the twelve projects said they were or would be working towards certification to the CCBA standard and nine of these projects were or would be working to obtain VCS certification. Interviewees in three of the projects pointed to the absence of a validated VCS certification methodology as the most important bottleneck preventing them from advancing their work.³ In this study, Project Description Document (PDD) development by technical service providers like Carbon Decisions and Winrock International and project validation to CCBA Standards by certification companies like SGS and Rainforest Alliance were mentioned to cost an average of US\$153,200 (n. projects = 5, min = US\$46,000, max = US\$350,000)⁴. Several of the projects have taken well over a year to complete their PDD's and others are still ongoing two years after starting. A field manager expressed clear sentiments about this process: 'it is sometimes in a consultant's interest to make things as complicated as possible'.

4.5. The broader context: system building and the REDD+ regime

The assembly and ambiguity-management work of system builders of varying backgrounds is evident in local REDD+ initiatives in Madre de Dios. The work of these institutional entrepreneurs is best described with a few examples. Adrian Forsyth, Founder of ACA and Vice-President for Programs of the US-based Blue Moon Fund, is a case in point. He is well connected to political, business, and conservation circles in Peru and in North America. Although working for a foundation himself, he is not satisfied with the *status quo* of funding for tropical forest stewardship, having pioneered the conservation concession model in Peru. He is advancing with REDD+ as a strategy to increase the financial resilience of conservation work in Madre de Dios and other parts of the Amazon. Roberto Persivale, founding partner at Asesorandes, also shows traits of system building. He is permanently exchanging information amongst the different Madre de Dios projects, using his

extensive business network to pull in financial players from the U.S., lawyers from Lima, and politicians from Puerto Maldonado. At the same time he is working to develop capacity with indigenous asset holders. He pulls resources together, understanding that at this emergent stage, cooperation is more valuable than competition.

Not all system builders are at the development node of projects. Lucio Pedroni, founder of the technical consultancy Carbon Decisions, is also playing a key role in building the Peruvian REDD+ regime. He has linked several of the Madre de Dios initiatives with the VCS and CCBA standards and the international REDD+ process. He leads the creation of one of the key technological artifacts of the system, the region-wide deforestation model which, if approved, will partially set the revenue generation envelope for all projects. He is co-author of the CCB standards, co-lead author of the guidance for REDD of VCS, and author of several CDM-approved methodologies and therefore contributes to the architecture in which all the projects develop. In Cusco and Madre de Dios, the Regional Government is now chairing 'REDD Technical Groups', public-private working groups to agree deforestation baselines and technical methodologies to be used by all REDD+ projects in their jurisdiction, as well as address common governance and financing matters. In turn, the existence of these working group helps to advance Peru's position with respect to the Nested Approach to REDD+. The Groups are supported by resources and expertise mobilized by the organizations participating in the REDD+ initiatives. Forsyth's ACA holds the Group's secretariat in Cusco and BAM, which is working closely with Pedroni, holds the secretariat in Madre de Dios. Without this financial and technical facilitation it is unlikely that these public-private working groups would have materialized. International funding bodies like the Gordon and Betty Moore Foundation and service providers like Carbon Decisions, partners to several of the Madre de Dios initiatives, are also key supporters of the national government efforts to advance REDD, providing an important unifying thread to REDD governance discussions, in which the interests of the early initiatives are represented and defended.

Key to REDD governance and viability are two regulatory processes currently in progress in Peru; a new national ecosystem services law and a revision of the existing national forestry law (MINAG, 2010a,b; MINAG, 2010a,b). Gaps and a lack of clarity in the regulatory framework were mentioned as key challenges for REDD+ in ten of the twelve projects. Specific issues mentioned included: (i) a lack of clarity as to who holds the carbon rights under different forms of land tenure, and what royalties, taxes will be due (ii) inconsistent use of terminology and delays in the approval process, and (iii) no guidelines as regards the distribution of benefits arising from REDD credit sales. Commercial and NGO actors participating in early REDD+ initiatives have been very active in the public consultation and congressional review processes of these laws. At least one project developer has actively encouraged the asset holder of his project to participate and lobby in this consultation. As a result, amendments in the proposed texts have been made in order to incorporate private participation in emerging ecosystem services payment schemes, including REDD+.

³ VCS REDD+ methodologies have been validated in 2010, after the end of the field work period on which this paper is based.

⁴ These figures are based on interview answers rather than on a revision of project accounts.

5. Discussion

5.1. Organizations

We have shown that local REDD+ initiatives in south eastern Peru are bringing together a diversity of local and international for-profit and not-for profit actors and that significant organizational experimentation is taking place in the projects. Criteria for ensuring equitable, effective and efficient outcomes of REDD+ have been presented in the literature and espoused within policy circles engaged with REDD+ in Peru (Angelsen and Wertz-Kanounnikoff, 2008; Rendon Thomson et al., 2009). In practice, organizations pioneering REDD+ initiatives work towards satisfying these criteria within the boundaries of their institutional logics. It seems plausible to suggest that the requirement for equitable, effective and efficient outcomes is one of the reasons why organizations with differing logics are coming together to implement REDD+ initiatives. It remains to be seen which projects have brought together the necessary logics and competences to be successful in the longer term.

5.2. Technology

Four main technical tasks were identified for the development of credible REDD+ credits: (i) forest carbon biomass estimation, (ii) management of large amounts of spatial data, (iii) deforestation and forest degradation monitoring, and (iv) modeling future deforestation. Recent advances in technology appear to be one of the key enablers of REDD+, allowing organizations to quantify and monitor forest attributes, and therefore value forests, more systematically and at lower cost than previously possible. At the same time, technology represents one of the main barriers to entry for actors with less human and financial capital, especially indigenous people and their organizations. Additionally, due to the dynamic nature of tropical forest carbon stocks, the inherent limitations of deforestation models to accurately predict both the 'Business as usual' (BAU) and 'with REDD+' deforestation baselines and differing 'expert' opinions regarding the accuracy of the technologies themselves, important challenges will remain regarding the incorporation of uncertainty into the reduced emissions benefits of any single project (Griscom et al., 2009).

5.3. Market

Other studies of PES (Corbera et al., 2009; Vatn, 2010) reveal that intermediaries emerge as dominant agents in the value chain and that a substantial part of total flows of funds can be captured by the intermediaries (validators, verifiers, registrars, commercialization agents and consultants) — often more than 50% (Corbera et al., 2009).

If this situation were to materialize in the case of REDD+, then the local expectations for equitable distribution of REDD+ benefits may not materialize. A failure to deliver on equity criteria may lead to failures on effectiveness and efficiency criteria, as presented by Angelsen and Wertz-Kanounnikoff (2008), jeopardizing the sustainability of REDD+ projects. Intermediation activities like PDD development and project

validation to CCBA Standards have accounted for a significant part of project costs to date, and it will be important to monitor what share of revenues accrue to intermediaries as more transactions materialize.

In the absence of multiple transactions, it is difficult to know what the profit margins at each stage of the chain will be and hence where the attractive profit pools will emerge. The activities and expertise being developed by Peruvian actors is so far concentrated on the initial credit development section of the chain. Although certification and commercialization actors are working in Madre de Dios, they are, at present, all international organizations. If, like with many other commodities, value creation and appropriation is concentrated on the right of the chain (Kaplinsky, 2004), Peruvian asset holders and project developers would do well to ensure participation in the certification and commercialization parts of the REDD credit value chain, and like this keep their revenue options open.

5.4. The broader context: system building and the REDD+ regime

We have seen that system builders are active in local REDD+ initiatives. They have highly bridged networks and their core attribute, rather than technical or market expertise, appears to be the capability to marshal resources to the challenges they encounter and broker knowledge amongst different actors. Be it the purchase of technology, a meeting with regional authorities, or the hiring of a key player from a local community, they do what is necessary in order to keep the REDD clock ticking forward in Madre de Dios. A common desire to develop a local economy that adequately values standing forests, a task much larger than any one organization or individual alone can achieve, appears to be the thread that unites these system builders.

As a result of the co-evolution of national, regional and local initiatives, Peru's approach to REDD+ is beginning to incorporate 'bottom-up' elements and the necessary flexibility to allow progress at different rhythms, a key issue under the diverse social and cultural circumstances of the country (Blaser, 2010). Though incipient, REDD+ projects and the national REDD+ approach are starting to take into account how the REDD mechanism could interact and support other regional development and forest conservation measures in the country, specifically by engaging with actors from other sectors like the Ministry of Agriculture and land-use planning authorities. As local REDD+ initiatives have developed strategies to engage with local people, piloted technologies to quantify forest assets and developed methodologies and documents to certify their projects, they have become the main advocates and the de facto testing ground for further developing Peru's Nested Approach to REDD+.

Despite the progress described, important governance challenges remain for REDD+ in Peru with respect to bridging divergent national discourses and meaningfully engaging indigenous people. Nationally, widely divergent views of Amazonia prevail. It is either constructed by business elites as a vast and abundant source of forest resources, often through narratives of wilderness and isolation, or by conservation elites as a fragile, biodiverse ecosystem that needs,

above all, to be protected. Within this context, REDD is viewed by conservation elites as a means to protect nature from the increasing anthropogenic threats of deforestation and by business elites as a means for Peru to benefit from new investment models in the forestry sector. At the local level themes of poverty and resource scarcity are dominant, especially in areas proximate to protected areas where this feeling is often compounded by a sense of exclusion and access restriction, with many local and indigenous representatives viewing REDD+ with suspicion and as a means for international intermediaries to benefit from their forest resources (AIDSESP, 2010; FENAMAD, 2010). State and private actors need to pay more attention to the social dimensions of REDD+, including promoting Free, Prior and Informed Consent (FPIC) processes and benefit sharing aspects.

6. Concluding remarks

For REDD+ to deliver on its considerable potential for CO₂ emissions reductions, a virtually unprecedented international, cross-cultural, cross-sectoral implementation regime has to emerge (Corbera and Schroeder, 2010, this issue). This kind of 'epistemic regime' (Haas, 1990; Adler and Haas, 1992) is one in which policy expertise, development actions, market forces and a broad cross-section of actors in society align themselves towards a common long-term goal (Angelsen and Atmadja, 2008), and yet manage to remain flexible to the considerable ambiguities and experimental nature of the road ahead. In this paper we have set out to show that a detailed understanding of the intent and execution of local projects is a key towards achieving this kind of regime. In line with the strategic insights of Ramirez (1999), we suggest that the social construction of the REDD+ value chain is the fundamental 'innovation' taking place and that the development of standards, technologies and other norms are complementary to the basic task of defining and reconfiguring roles on this chain.

If REDD projects in Madre de Dios are able to deliver on their promise of generating revenue streams which are comparable to the revenue streams of competing extractive economic activities, like logging and agriculture, and manage to put in place the necessary social contracts for these revenues to be distributed equitably between local asset holders, project developers and market intermediaries, then significant incentives for forest conservation and management will be created (Kanowski et al., 2010, this issue). As the population of Madre de Dios has already made a significant pledge towards a forest based economy, by setting aside over 80% of their territory as Protected Areas and forestry concessions, it is likely that these economic incentives would be very well received and create significant local goodwill on which to continue building a vision for Madre de Dios where biodiversity and local development needs co-exist.

Due to the recent nature of most of the projects and the ongoing nature of international REDD+ negotiations, much remains to be seen about how local Peruvian initiatives will contribute to an eventual REDD+ regime. We suggest policy makers should continue to encourage the 'bottom-up' construction of REDD+ as a strategy to encourage Innovation and flexibility, important characteristics for success in nascent

markets. We hope this exploratory study has laid a baseline for further work regarding the role of organizations, institutional logics, system building and technology in the emerging REDD+ regime. Further research into these areas, as well as into the dynamics, governance and transnational systemic nature of the emerging value chain may have significant implications for REDD+ outcomes in Peru and globally.

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REFERENCES

- Adler, E., Haas, P.M., 1992. Epistemic communities, world order, and the creation of a reflective research program. *International Organization* 46 (1), 367–390.
- AIDSESP, 2010. Pronunciamiento: Sin Territorios, Derechos y Consulta Indígena no puede haber concesiones REDD, forestales, petroleras y de servicios ambientales. Lima, Peru: 1.
- Angelsen, A., Atmadja S., 2008. What is this book about? Moving Ahead with REDD: Issues, Options and Implications. A. Angelsen. Bogor, Indonesia, CIFOR: 156.
- Angelsen, A., Wertz-Kanounnikoff, S., 2008. What are the key design issues for REDD and the criteria for assessing options? Moving Ahead with REDD A. Angelsen. Bogor, CIFOR, pp.11–21.
- Asner, G.P., Knapp, D.E., et al., 2009. Automated mapping of tropical deforestation and forest degradation: CLASlite. *Journal of Applied Remote Sensing* 3, 033543.
- Blaser, J., 2010. Peru Readiness Preparation Proposal Synthesis Review June 2010, Forest Carbon Partnership Facility, p. 20.
- Blom, B., Sunderland, T., et al., 2010. Getting REDD to work locally: lessons learned from integrated conservation and development projects. *Environmental Science and Policy* 13 (2), 164–172.
- Bond, I., Grieg-Gran, M., et al., 2009. Incentives to sustain forest ecosystem services: a review and lessons for REDD. *Natural Resource Issues* No. 16, International Institute for Environment and Development, London, UK; CIFOR, Bogor, Indonesia; World Resources Institute, Washington D.C., USA.
- Broich, M., Stehman, S.V., et al., 2009. A comparison of sampling designs for estimating deforestation from Landsat imagery: a case study of the Brazilian Legal Amazon. *Remote Sensing of Environment*.
- Cenamo, M.C., Pavan, M.N., et al., 2009. Casebook of REDD Projects in Latin America. IDESAM, Manaus, Brazil.
- Corbera, E., Soberanis, C.G., et al., 2009. Institutional dimensions of payments for ecosystem services: an analysis

- of Mexico's carbon forestry programme. *Ecological Economics* 68 (3), 743–761.
- Corbera, E., Schroeder, H., Governing and implementing REDD+, *Environmental Science and Policy* (2010), this issue, doi:10.1016/j.envsci.2010.11.002.
- Daily, G.C., Matson, P.A., 2008. Ecosystem services: from theory to implementation. *PNAS* 105 (28), 9455–9456.
- Daily, G.C., 1997. *Nature's Services: Societal Dependence on Natural Ecosystems*. Island Press., Washington D.C.
- Ecoscurities, 2009. In: Fehse, J (Ed.), *Transaction Structures and Actors in Forest Carbon Markets*. Ecoscurities, Oxford.
- EIU, 2008. What's new in your industry. *Business Latin America*, Economist Intelligence Unit, 43, pp. 7–7.
- FENAMAD, 2010. Propuesta de la Federacion Nativa del Rio Madre de Dios y Afluentes (FENAMAD) a los hermanos indigenas de Peru y la Amazonia – REDD Indigena. Puerto Maldonado.
- Fligstein, N., 2002. *The Architecture of Markets: An Economic Sociology of Capitalist Societies in the 21st century*. Princeton University Press, Princeton, NJ.
- Gómez-Baggethun, E., de Groot, R., et al., 2010. The history of ecosystem services in economic theory and practice: from early notions to markets and payment schemes. *Ecological Economics* 69 (6), 1209–1218.
- Griscom, B., Shoch, D., et al., 2009. Sensitivity of amounts and distribution of tropical forest carbon credits depending on baseline rules. *Environmental Science and Policy* 12 (7), 897–911.
- Haas, P.M., 1990. *Saving the Mediterranean: The Politics of International Environmental Cooperation*. Columbia University Press, New York.
- Hajek, F., 2009. The 'Invisibility' of Nature and Ecosystem Services Markets: Insights into market creation from an emerging market in Reduced Emissions from Deforestation and Degradation (REDD) in Peru. Saïd Business School, Oxford University. MBA research thesis, p. 36.
- Huertas Castillo, B., 2004. *Indigenous Peoples in Isolation in the Peruvian Amazon*. International Work Group for Indigenous Affairs, Copenhagen, Denmark.
- Hughes, T.P., 1989. *The Evolution of Large Technological Systems. The Social Construction of Technological Systems*. W. Bijker, T.P. Hughes and Pinch, The MIT Press, pp. 51–82.
- INRENA, CDC, et al., 2003. *Hacia un sistema de monitoreo remoto ambiental estandarizado para el SINANPE*. Lima, INRENA, p. 78.
- Kanowski, P.J., McDermott, C.L., Cashore, B.W. 2010, this issue. Implementing REDD+: lessons from analysis of forest governance. *Environmental Science and Policy*, doi:10.1016/j.envsci.2010.11.007.
- Kaplan, S., Murray, F., 2010. Entrepreneurship and the creation of value. *Research in the Sociology of Organizations* 29, 107–147.
- Kaplinsky, R., 2004. Spreading the gains from globalization. *Problems of Economic Transition* 47 (2), 74–115.
- Lounsbury, M., Ventresca, M.J., et al., 2003. Social movements, field frames, industry emergence: cultural-political perspective on US recycling. *Socio-Economic Review* 1 (1), 71–104.
- Malhi, Y., Phillips, O.L., et al., 2002. An international network to monitor the structure, composition and dynamics of Amazonian forests (RAINFOR). *Journal of Vegetation Science* 13 (3), 439–450.
- McDermott, C.L., Cashore, B., et al., 2010. *Global Environmental Forest Policies: An International Comparison*. Earthscan, London.
- Meyer, J.W., Rowan, B., 1977. Institutionalized organizations: formal structure as myth and ceremony. *American Journal of Sociology* 83 (2), 340–363.
- MINAG, 2010. *Ley Forestal y Fauna Silvestre – Version Preliminar Junio 2010*: 43.
- MINAG, 2010. *Política Nacional Forestal y de Fauna Silvestre – Version Preliminar Junio 2010*, p. 17.
- Moore, R., 2010. "Introducing Google Earth Engine". Retrieved Monday 13th December 2010, from <http://blog.google.org/2010/12/introducing-google-earth-engine.html>.
- Muradian, R., Corbera, E., et al., 2010. Reconciling theory and practice: an alternative conceptual framework for understanding payments for environmental services. *Ecological Economics* 69 (6), 1202–1208.
- Myers, N., Mittermeier, R.A., et al., 2000. Biodiversity hotspots for conservation priorities. *Nature* 403, 853–858.
- Nepstad, D., Soares-Filho, B.S., et al., 2009. The end of deforestation in the Brazilian Amazon. *Science* 326, 2.
- Olson, D.M., Dinerstein, E., et al., 2001. Terrestrial ecoregions of the World: a new map of life on earth. *Bioscience* 51 (11), 933–938.
- Pedroni, L., Dutschke, M., et al., 2008. Creating incentives for avoiding further deforestation: the nested approach. *Climate Policy* 8.
- Phelps, J., Webb, E.L., et al., 2010. Does REDD+ threaten to centralize forest governance? *Science* 328, 2.
- Porac, J.F., Ventresca, M.J., et al., 2002. *Interorganizational Cognition and Interpretation. Companion to Organizations*. J.A.C. Baum, Blackwell.
- Ramirez, R., 1999. Value co-production: intellectual origins and implications for practice and research. *Strategic Management Journal* 20, 49–65.
- Ramirez, R., Wallin, J., 2000. *Prime Movers*. John Wiley and Sons, Chichester.
- Rayner, S., 2009. In: Graedel, T., van der Voet, E. (Eds.), *Human Capital Social Capital and Institutional Capacity Linkages of Sustainability*. MIT Press.
- Rendon Thomson, O.R., Baker, T.R., et al., 2009. Criterios e indicadores para proyectos REDD, Proyecto 'Fortalecimiento de Capacidades para Pagos por Servicios Ambientales (carbono y biodiversidad) en la Amazonia Peruana', University of Leeds.
- Santos, F.M., Eisenhardt, K.M., 2009. Constructing markets and shaping boundaries: entrepreneurial power in nascent fields. *Academy of Management Journal* 52 (4), 643–671.
- Scott, W.R., 1994. In: Scott, W.R., Meyer, J.W. (Eds.), *Institutions and Organizations: Toward a Theoretical Synthesis. Institutional Environments and Organizations: Structural Complexity and Individualism*. Sage Publications, Thousand Oaks, pp. 55–80.
- Scriven, J.N.H., 2010. *Markets and payments for ecosystems services: engaging REDD+ on Peru's Amazonian frontier*. Environmental Change Institute, University of Oxford, UK. Doctoral (D.Phil.) thesis.
- Soares-Filho, B.S., Nepstad, D.C., et al., 2006. Modelling conservation in the Amazon basin. *Nature* 440, 520–523.
- Suddaby, R., Greenwood, R., 2005. Rhetorical strategies of legitimacy. *Administrative Science Quarterly* 50 (1), 35–67.
- Tarapoto, D.d., 2008. *Un compromiso y un plan de acción para la Reducción de Emisiones Derivadas de la Deforestación y la Degradación de Bosques en el Perú*.
- Tollefson, J., 2009. Counting carbon in the Amazon. *Nature* 5.
- Van Dijck, P., 2008. Troublesome construction: the rationale and risks of IIRSA. *Una construcción problemática: Razones y riesgos de IIRSA* (85), 101–120.
- Vatn, A., 2010. An institutional analysis of payments for environmental services. *Ecological Economics* 69 (6), 1245–1252.
- Ventresca, M.J., Hajek, F., 2010. *Technology-Market-Organization (T-M-O): Strategies for Study, Policy and Action in Dynamic Technology Fields*. Course Note, Saïd Business School.