Geoforum 39 (2008) 2073–2083

Contents lists available at ScienceDirect

Geoforum

journal homepage: www.elsevier.com/locate/geoforum

Participation in payments for ecosystem services: Case studies from the Lacandon rainforest, Mexico

Nicolas Kosoy [a,*], Esteve Corbera [b], Kate Brown [b]

[a] Institut de Ciència i Tecnologia Ambientals (ICTA), Universitat Autònoma de Barcelona Campus UAB 08193 Cerdanyola del Vallès, Barcelona, Spain
[b] Tyndall Centre for Climate Change Research and Overseas Development Group, University of East Anglia, NR4 7TJ, Norwich, UK

ARTICLE INFO

Article history:
Received 5 June 2007
Received in revised form 21 July 2008

Keywords:
Payments for ecosystem services
Participation
Biodiversity
Carbon fixation
Lacandon rainforest

ABSTRACT

Understanding people's willingness to participate in projects and programmes of payments for ecosystem services (PES) has not been a key analytical concern of the scholarly literature around this new field of environmental policy and practice. This paper analyses participation in four communities benefiting from payments for biodiversity and carbon fixation in Mexico, and contrasts the results for each case with neighbouring communities that do not receive payments. We take a holistic approach that accounts for procedural rules, actors' interactions, institutions and values, and individuals' characteristics. We show that the nature of PES rules and the effectiveness of communication with government officers and NGOs influence resource managers' ability and willingness to participate. We highlight community size, resource managers' ability to diversify livelihood activities and local perspectives on the conservation of common forests, particularly sacred values and intergenerational concerns on forest conservation, as critical participation drivers. This analysis provides insights on why and how these new institutions may be attractive for some resource managers and permits to draw some recommendations for the future design of PES projects and programmes.

© 2008 Elsevier Ltd. All rights reserved.

1. Introduction

Payments for Ecosystem Services (PES) are being promoted across the developing world to support environmental stewardship in agricultural and forest-based landscapes (World Bank, 2004; World Resources Institute, 2005), and to address the existing imbalance between consumption and resource conservation (Millennium Ecosystem Assessment, 2005). PES have been defined as 'voluntary transactions where a well-defined environmental service is being bought by at least one ES buyer from at least one ES provider if and only if the ES provider secures ES provision' (Wunder, 2006, p. 3). To date PES have often been implemented through local-scale projects involving private investors, NGOs, governments and resource managers, and focused on watershed, carbon and biodiversity-related services (Corbera and Brown, 2008; Landell-Mills and Porras, 2002). In countries such as Costa Rica and Mexico, PES projects have emerged from national policy programmes where State-based public institutions perform as service buyers and reward resource managers in exchange for a single or a bundle of ecosystem services.

Experiences marketing biodiversity have consisted of linking bird conservation with coffee production through certification processes (Perfecto et al., 2005), or developing ecotourism activities with wildlife conservation (Wilkie et al., 2001). Payments for watershed conservation have been promoted to encourage decentralisation of water delivery and sewage public services in specific river basins (Kosoy et al., 2007; Rosa et al., 2003). Projects commercialising carbon fixation by forest ecosystems have been linked to the United Nations Framework Convention on Climate Change (UNFCCC), following the rules of the Kyoto Protocol's Clean Development Mechanism (CDM) and retail-based voluntary markets. Through the CDM, governments and companies committed to reduce emissions under the Kyoto Protocol invest in reforestation projects in developing countries in exchange for carbon credits. To date, however, there are only two CDM forestry projects in the world and five others are expected to become operational in 2008 (UNEP-Risoe, 2008). The number of carbon forestry projects providing voluntary emission reductions through retail markets is higher, as companies in developed countries commit to offset their emissions through this type of project (Bayon et al., 2007).

This paper investigates why resource managers decide to join or reject a PES initiative in the context of a common property regime. We take an analytical approach which takes into account PES procedural rules, common property institutions, and pays some attention to resource managers' characteristics, such as on-farm income, level of livelihood diversification and attitude towards forest conservation in order to identify participation drivers. We argue that a more complete understanding of participation permits us to overcome the idea that resource managers follow only an

* Corresponding author.
E-mail address: nicolas.kosoy@uab.es (N. Kosoy).

0016-7185/$ - see front matter © 2008 Elsevier Ltd. All rights reserved.
doi:10.1016/j.geoforum.2008.08.007

individual rationality prior to deciding whether or not to participate in PES. Our approach stresses the importance of institutional rules and the role of Mexico's most common property regime, the *ejido*,[1] as a spatial and decision-making unit, the social and the cultural context of which influences household and collective participation. For countries such as Mexico, where PES are largely implemented through a community of resource managers, these considerations are critical, as shown in forthcoming sections.

The analysis is carried out in four Mexican rural communities receiving payments for biodiversity conservation and carbon fixation by forests. Results are contrasted with four neighbouring *ejidos* which are not involved in PES and informs policy-makers and practitioners about what institutional rules favour or undermine participation, what benefits resource managers derive from participation and why some others decide not to get involved in PES. The following section situates the research through a theoretical review of participation in PES and presents our multidimensional analytical approach. Section 3 describes the study area, and outlines the research techniques. Section 4 presents Mexico's PES national scheme, introduces the eight case studies and discusses the nature of participation in the process of procedural design and in the implementation of PES projects. Section 5 summarises the paper and concludes with some policy and research recommendations.

2. Participation in PES

2.1. Previous studies on PES participation

PES programmes and projects do not make strong claims about their participatory nature. Often, they evolve as top-down, managerial policies and projects where maximising participation whilst at the same time increasing effectiveness would be a function of setting the right procedural framework. This approach contrasts with the strong participatory claims characterising many development and environmental policies since the 1980s, which have attempted to encourage 'beneficiary involvement in interventions which affect them and over which they previously had limited control or influence' (Cooke and Kothari, 2001, p. 5). This emphasis emerged in response to the failure of top-down, expert-based and technocratic policy and project approaches of the 1960s and 1970s, although such a "participatory" stance has been thoroughly scrutinised and critiqued in recent years (Cooke and Kothari, 2001; Hickey and Mohan, 2004). Below the surface of participation, social inequalities have in certain circumstances been reinforced rather than undermined, and powerful cultural norms have been consolidated through participatory planning (Kothari, 2001).

In the context of PES, there have been few attempts to document which factors drive people's participation, despite such factors being critical in determining who is able to benefit from PES and how PES may affect social and economic development as well as environmental resource management in the longer term. Miranda et al. (2003) note that participation of poorer landowners in Costa Rica's PES scheme was limited because those families entitled to housing benefits could not access the programme. They mention that the Costa Rican National Bank System did not recognise forestry as an eligible funding activity until recently, which limited the borrowing capacity of small landowners to co-finance PES reforestation activities. In their review of eight PES initiatives in Latin America, Grieg-Gran et al. (2005) highlight that some initiatives discriminated against poor smallholders because formal land tenure titles were required to access payments. Other initiatives, however, promoted poor households' participation by targeting communities identified as having low levels of development and focusing on small farms. These contrasting cases show that the design of the PES institutional framework determined resource managers' ability to benefit from direct payments.

Other studies suggest that local participation depends on the ability of PES designers and intermediaries to set up governance structures with 'strong external leadership as well as confidence-building strategies to make sure that land users and beneficiaries will buy into the new system' (Mayrand and Paquin, 2004, p. 25). When this is the case, the existence of trade-offs between participation and the reduction of transaction costs becomes apparent (May et al., 2004). Keeping transaction costs to a minimum thus requires either bundling several projects with a high number of individual landowners or working with well-organised communities which provide ecosystem services collectively and ensure that the poorest families benefit through direct economic incentives and investment in local public goods (Mayrand and Paquin, 2004). In these cases, then, the emphasis is not so much on the nature of institutional rules as on the flexibility of the institutional system, which should have the capacity to build distinct organisational arrangements with resource managers, so that they can feel included in the PES scheme and benefit from it.

Wunder (2006) emphasises that farmers' participation in PES schemes is influenced by PES contribution to household income and land opportunity costs, and notes that PES incentives have contributed up to 30% of household income in a variety of experiences across Latin America (Albán and Argüello, 2004; Echavarria et al., 2004; Miranda et al., 2003). Notwithstanding, Wunder also acknowledges that the economic value of ecosystem services is often set by service users rather than providers, which indicates that these initiatives are governed by power asymmetries. Interest of local communities in PES schemes is also explained by the provision of non-monetary benefits, including an increase in land-tenure security, improvements in internal organisation, and increased visibility of the community for donors and the international community (Corbera et al., 2007; Mayrand and Paquin, 2004; Rosa et al., 2003).

Pagiola et al. (2005) systematise a series of factors which explain resource managers' involvement in PES schemes. These can be grouped in three categories: factors that affect *eligibility* to participate, which depend on PES targeting rules; factors that affect households' *desire* to participate; and factors that affect their *ability* to participate (Pagiola et al., 2005, p. 242). A given household would thus follow a sequential reasoning process before getting involved in a PES scheme. Initially, it would consider whether it meets PES eligibility requirements (e.g., if it is located in target areas and follows the required resource management practices), if PES practices are profitable and fit in the current farming system, if the household has secure tenure and is able to meet investment needs, and if it is able to perform PES practices on the basis of available credit and technical assistance. Pagiola and colleagues also highlight that the economic incentives provided are 'an essential element of participation decisions' (Pagiola et al., 2005, p. 243) and they note that landowners with highly productive land are more unlikely to participate than farmers in marginal lands. However, they also recognise that that this may not be the case in regions where rich landowners hold secure property rights over large tracks of unproductive lands. For this reason, they suggest that the farming system structure greatly determines the ability of rural households to participate in PES, jointly with secure land tenure, investment and technical capacities.

2.2. A multi-dimensional approach to participation in PES

As shown above, studies on participation in PES have been few and their emphasis has been in understanding how programme

[1] An *ejido* system is a territory held in common by a group of families, and comprises two kinds of property rights: individual landholdings held in usufruct by families for production purposes, and common lands where all community members have access and use rights often subject to local resource management regulations.

rules determine resource managers' involvement. However, very rarely this has been accompanied by a holistic reflection on why this happens beyond procedural rules and including contextual and behavioural factors. This paper thus provides a novel approach to examining participation in PES, which provides insights on how to design such initiatives so that they involve a greater number of resource managers and support people's social development and forest conservation in the longer term. Moreover, the paper is unique in the sense that it pays attention to how Mexico's most common property regime, the *ejido*, which counts with its own decision-making procedures and resource management rules, influences participation in PES. We propose a three-tiered analytical approach which draws from three distinct approaches to understanding participation in environmental policies, programmes and projects:

(i) A *rules* based approach, which considers that high participation levels are a product of cautious thought at the policy design stage (Hogwood and Gunn, 1986). Significant emphasis is put into reducing transaction costs that it is expected to translate into policy acceptance and adoption. We take from this approach the idea that policy rules are key determinants of people's ability to join PES initiatives, not only through reducing transaction costs but also through allowing local adaptation of policies.
(ii) A *process-based* approach which focuses on how distinct social actors participate in policy design and practice and seek to achieve their goals (Murdoch and Marsden, 1995). Participation is seen as an ongoing *process* of coevolution between policy makers, NGOs, lay people and others (Latour, 1991). Our framework is thus sensitive to how resource managers are able to shape PES institutional rules, and how their own social perceptions of nature and local institutions shape their (un)willingness to develop a PES project.
(iii) A *behavioural* approach, such as that adopted to understand participation in agri-environmental schemes, mainly in the UK (Brotherton, 1989; Wilson, 1997). This recognises landowners as independent environmental managers, who make decisions on their farms independent from government officers. It emphasises the importance of income and individual characteristics such as age, education and farm area to explain people's willingness to participate in environmental schemes (Gintis, 2000).

We suggest that such a multi-scale approach to understanding participation challenges the individual rationality, which has dominated previous work. Nevertheless, we acknowledge that this research is limited in the exploration of individuals' perceptions and focuses mostly on the first two tiers. For this reason, we encourage more research along these lines and in multiple sites and contexts.

3. Methods

3.1. Research context

Mexico has become one of the world's leading advocates of PES, jointly with Costa Rica. During the early 2000s, Mexico's National Forestry Commission (CONAFOR) designed a forestry policy agenda with PES occupying a privileged position (Muñoz et al., 2006; Rojas and Aylward, 2003). However, in contrast to Costa Rica, PES projects in Mexico are developed by *ejidos* who hold in common approximately 80%[2] of Mexico's standing forests.

[2] Although this figure is often noted in the literature about the Mexican forest commons (Klooster and Masera, 2000), the amount of forest – however defined – in the hands of rural *ejidos* is unknown, and the spatial distribution and management regimes of forests vary across the country's regions (Bray et al., 2005).

3.1.1. Land tenure in Mexico: the ejido

Since the mid 1930s and until the end of the 1980s, thousands of *ejidos* were created throughout Mexico. Their creation followed formal land petitions to the State by groups of rural families. Household heads (known as *ejidatarios básicos*) were entitled to a parcel of land within *ejido* lands, which could only be bequeathed to one single descendant or spouse. The petitioners were also granted another area of communally owned forests and pastures (hereafter referred to as forest commons) over which a series of management regulations applied (Robles Berlanga, 1999). Legally, *ejido* governance is organised around three main bodies: the *asamblea ejidal* or *ejido* assembly, the *comisariado ejidal* or *ejido* authority and the *consejo de vigilancia* or surveillance council.

The assembly regulates access to and use of the forest commons and is composed of all *ejidatarios*, who have voting rights, and other household heads who do not have voting rights. Its functions consist of formulating and modifying the internal rules of the *ejido*, providing *ejido* members with information about productive, social and political activities, informing the State of the *ejido*'s economic accounts, deciding on the acceptance of new *ejidatarios* and further division of *ejido* lands, and approving contracts with third parties for the use of the forest commons. The *ejido* authority is responsible for executing the assembly's agreements, organising collective work in the forest commons, proposing programmes for productive and organisational development, contracting third parties which can give professional and technical service to the community and ensuring that smallholdings are regularly cultivated. Finally, the council oversees the authority's governance tasks, and comprises of a president and two secretaries who are elected every 3 years. There can also be a representative for each of the *ejido*'s neighbourhoods, who is chosen every year and helps to disseminate the authority information to all households in the neighbourhood. Other important figures in the *ejido*'s governance include the judge, who arbitrates conflicts among community members, and religious authorities.

The Agrarian Law of 1992 provided the means for *ejidatarios* to become fully owners of their land and to rent and sell their land to third parties, including mercantile societies. The law encouraged non-formal land right-holders to legalise their property with the objective to promote land security and transparent property transactions. This had to be done through *ejidos*' participation in a land certification programme known as PROCEDE. Rules of use and access to the forest commons were still contingent on the *ejido*'s internal regulations, but the new law legalised the practice of dividing this area into smallholdings, which could then be privatised. The forest commons could now be sold to a third party but the activities developed by the buying party had to be economically and socially equitable, as well as environmentally sound. Official statistics show that 92% of all Mexican *ejidos* have joined PROCEDE (Registro Agrario Nacional, 2006), but only three percent of all these *ejidos* have opted to convert their smallholdings and forest commons into private properties and dismantle their traditional system of community governance (Robles Berlanga, 1999). This means that the system of governance outlined above is still prevalent in most *ejidos*. Non-participation in PROCEDE has been attributed to unresolved internal and boundary-related conflicts over land resources or to a lack of confidence over government agencies (Registro Agrario Nacional, 2004). The latter explains the case of Chiapas, which has the highest index of programme rejection – 39% of total *ejidos* and agrarian communities have rejected the programme as a result of the economic and political instability characterising the state's history since colonial times (Pérez Mota, 1998). Only three out of the eight *ejidos* analysed in this research have subscribed to PROCEDE.

3.1.2. PES in Mexico

In October 2003, the Mexican government established a 5-year programme to provide economic incentives in order to preserve forest ecosystems located in critical watersheds, known as *PSAH* (Payments for Hydrological Environmental Services Programme). This resulted from the country's modification of Article 223 in Mexico's Law of Rights and a series of negotiations between government ministries and other regional authorities, which established an annual 2% transfer from the National Water Commission to PSAH derived from large water consumers' revenues (e.g., bottling companies, chemical industries). The Mexican Forestry Fund was created to manage and disburse these funds. Later in November 2004, the government established a programme to develop markets for biodiversity conservation, carbon fixation by forests and agroforestry services (*PSA-CABSA*). Unlike PSAH, the PSA-CABSA budget is negotiated every year in Congress and hence does not have stable, long-term funding.

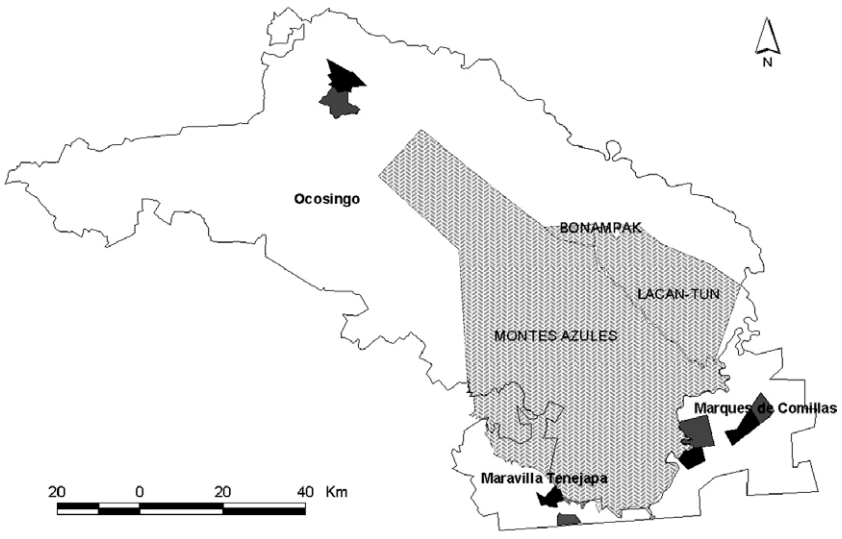
Ecosystem service providers in Mexico are predominantly *ejidos*. Under PSA-CABSA, CONAFOR acts as an intermediary and principal ecosystem service user, funding project design and implementation for up to 5 years. Nevertheless, CONAFOR is now encouraging providers to sell their ecosystem services to national and international investors. Ecosystem service promoters are environmental professionals who help providers to write PES applications, design projects, facilitate knowledge transfer, build local capacities, and deliver project progress reports to CONAFOR. Finally, CONAFOR sets, monitors and enforces the contractual agreements through a number of ecosystem service verifiers, who are hired to evaluate project development on-site.

In this study we analyse four pairs of participating and non-participating *ejidos* in the Lacandon rainforest, in the Mexican state of Chiapas: one in the Municipality of Ocosingo (Puerto Bello Metzabok and Nueva Esperanza), one in the Municipality of Maravilla Tenejapa (Peña Blanca and San Andres), and two in the municipality of Marques de Comillas (Reforma Agraria, Lopez Mateos, La Corona and La Victoria) (Map 1). Each *ejido* fulfils the condition of having eligible land to participate in PSA-CABSA, which implies that non-participation and forms of participation should be explained by other factors. There are three PES promoters in the Lacandon rainforest area, two in charge of biodiversity projects and one in charge of carbon fixation projects. However, there is just one ES verifier in charge of monitoring and following up the four case studies.

The study area is located in Chiapas, a highly contested state, both politically and socially. It concentrates Mexico's highest percentage of indigenous populations, the highest levels of rural poverty and marginalisation, and is the site of a permanent yet silent indigenous upheaval since 1994. The *Ejercito Zapatista de Liberación Nacional* (EZLN) occupied different cities and communities across the state on the first of January of 1994, the day that NAFTA came into effect. Hundreds of Zapatista farmers settled onto private properties, demanding the re-establishment of the pre-existing national land distribution policy. In consecutive years, federal and state authorities negotiated with Zapatistas and private landowners to normalise the situation. Through what became known as *Acuerdos Agrarios* (rural agreements), the State purchased land for the majority of landless peasants (Pérez Mota, 1998). This process, however, did not dissipate the Zapatistas' struggle as a form of indigenous resistance. Over the past decade, violent episodes have occurred in Chiapas, involving farmers, the army and, occasionally, paramilitary groups, representing other political allegiances (Weinberg, 2000). As of 2005, there were 33 autonomous municipalities, which did not accept any governmental support and were organised according to traditional Mayan institutions.

3.2. Research techniques

To assess participation dynamics under these conditions, we conducted 18 interviews with federal and state government officers, ES promoters, verifiers and NGOs to collect information on the design process of PSA-CABSA and the role of scheme-related criteria in facilitating or undermining participation. At the *ejido* level, focus groups and surveys were the core of our research activities. Eight focus groups with *ejido* authorities, including the president, the treasurer and members of the surveillance council, allowed us to capture the extent to which community rules and farmer characteristics influenced their (un)willingness to participate. The nature and size of the group allowed us to have a more relaxed atmosphere for discussion than if we had put together a bigger group, or if we had involved other *ejidatarios* and non-right holders. Certainly, we acknowledge that focus group outcomes are influenced by group size, sensitivity to the topic, location, and



Map 1. Location of the studied communities in the Lacandon rainforest, Chiapas. Protected areas with their names are shown in textural grey. Communities participating in PES are shown in grey. Non-participant communities are shown in black.

whether the participants know each other (Hopkins, 2007). And for this reason, to address the inherent bias in the information provided by empowered individuals and to capture farmers' divergences and contrasting viewpoints, we also attended four assemblies and conducted eight questionnaires with other *ejido* members.

Questionnaires collected information on education, on-farm income, most important cultivated crops and common forest use. The number of questionnaires per *ejido* was low due to the difficulty in surveying in a militarised area. Furthermore, since some of the *ejidos* are grassroot-*zapatistas*, people were often reluctant to participate in surveys, resulting in different numbers of surveys per *ejido* (i.e. in some *ejido*s, 10 surveys were administered while in others just three). The quantitative information was used alongside secondary information derived from national and regional population statistics (National Institute of Statistics, INEGI from its Spanish acronym). In particular, on-farm income was estimated as total production multiplied by the average price of products, minus the cost of inputs and the cost of labour, including imputed (own) labour, in a year. Total income was estimated as remunerated labour plus on-farm income. Both estimates were compared to those published by INEGI. When our data were orders of magnitude lower or higher than reported statistics, the latter was used. Finally, we also collected information on PES contracts and project budgets.

4. Results and discussion

4.1. The PSA-CABSA scheme

PSA-CABSA originated from the lobbying activities of various peasant and forest-based organisations. The National Rural Agreement (in Spanish, *Acuerdo Nacional para el Campo*) between the government and a large number of Mexican rural organisations was ratified in November 2003 (Government of Mexico, 2003). It outlined a development plan for the Mexican countryside, which included a number of strategic sectors for policy development and funding priorities, such as the development of a policy programme 'to implement payments for ecosystem services: (i) on carbon fixation by forests to halt climate change; (ii) for rural communities who support biodiversity conservation; and (iii) for the development of agroforestry systems, specifically for shade-grown coffee plantations' (Government of Mexico, 2003, p. 37, authors' translation). Several workshops were put together during the first half of 2004, organised by CONAFOR and including the participation of various NGOs, social organisations, and other government ministries, and where the procedural rules of PSA-CABSA were discussed and agreed.

PSA-CABSA rules have changed three times since the programme's establishment in November 2004. Original rules had a common procedural framework with provisions for its four components (carbon, biodiversity, establishment of agroforestry systems, and enhancement of agroforestry systems) and then specific rules for project design and implementation under each component. In this paper, however, we focus on carbon and biodiversity as these are the services provided by our case studies. Early eligibility rules included that applicants must not be receiving support from any other PES component or programme (PSAH), must show proof of property rights, of long-term commitment to PES through a community forest management plan or an assembly act, and must demonstrate that the PES area is included in the list of eligible areas defined by CONAFOR in the programme rules. Applicants received up to 400,000 Mexican pesos (Mx$) [1USD = 10.89 Mx$, 8 January 2008] for project design, and implementation funding depended upon the project's scoring according to pre-defined evaluation criteria.

In carbon projects, for instance, funding oscillated between a guaranteed price of 50 Mx$ to a maximum of 98 Mx$ per tonne of sequestered carbon if the project area was located in the buffer zone of a protected area, included species at risk of extinction, or the project applicants belong to an ethnic group with a high level of social marginalisation. In the case of biodiversity, applicants were granted a maximum of 500,000 Mx$ for implementation over a 5-year period. On top of this funding, PSA-CABSA applicants could be granted up to 150,000 Mx$ for annual verification of project activities, to be undertaken by an external verifier or community technicians; another 150,000 Mx$ for capacity-building activities at the local level, to be undertaken by an external party approved by CONAFOR; and up to 250,000 Mx$ for technical assistance and project follow-up, to be provided by a community technician or an external party, as decided by the applicants. CONAFOR must communicate through its regional state offices the contents and scope of PSA-CABSA to all potential beneficiaries and it must undertake an internal evaluation process, as well as commission an external evaluation of the programme. Communities' failure to comply with project activities would result in CONAFOR cancelling payments.

In the rules of 2006 and 2007 all PES schemes were integrated under a common framework of Payments for Forest Services, which included all national forestry programmes. General eligibility rules did not change much, but specific rules under each PES component became substantially different. Carbon eligibility rules, for instance, evolved to make projects comply with the rules established for small-scale afforestation and reforestation projects under the CDM, and requiring a minimum of 500 ha for project development (and a maximum of 3000 ha for the rules of 2007). Applicants for biodiversity payments in 2006 had to show proof of at least 10 years commitment to conservation (through e.g. a forest management plan, a communal land-use plan, a conservation unit), which was reduced to 5 years in 2007. Payment amounts also changed substantially and they were set according to the Mexican minimum daily wage and differed according to the size of the project. Contractual flexibility rules became stricter so as to oblige applicants to return payments in case of non-compliance.

4.2. The case studies

When fieldwork was conducted, there were only four PSA-CABSA projects under implementation in Chiapas. Two concerned carbon fixation through conservation and reforestation activities, and the other two developed biodiversity conservation activities in the forest commons. We were thus interested in understanding why these *ejidos* developed these projects in the first place and to contrast their experience with neighbouring *ejido*s, which did not participate, as a means of "control and contrast sample".

Puerto Bello Metzabok is an *ejido* located in the Municipality of Ocosingo. During the 1960s, property rights were granted to Metzabok over a large communal land area and nine hectares per family were allocated for productive purposes. The PES project was initiated in 2005 in order to create economic incentives for the conservation of local natural resources by establishing an eco-tourism site for bird watching. The community will receive 500,000 Mx$/year over 5 years, which translates into approximately 27,000 Mx$/household/year. To date, however, PES income has been used to cover PES promoters' expenses, equipment acquisition and forest patrols' salaries. Some PES income has also been used to support the eco-tourism project by expanding and improving existing bungalows. *Ejido* Nueva Esperanza neighbours Puerto Bello Metzabok and was established in the mid 1960s. Most of its land is divided to individual plots, including 500 hectares of forest commons, which were collectively managed in the past but

were recently divided between local families for agricultural purposes.

Peña Blanca is an *ejido* located in the municipality of Maravilla Tenejapa and established in the late 1970s. In 2002, the assembly agreed to establish a private reserve for the protection of birds. In 2004, they started a PES project for securing financial support for the development of this reserve. The community will receive 325,000 Mx$/year over 5 years, which, if divided equally, would represent 15,500 Mx$/household/year. However, PES income has been used so far to fund the construction of a new house to host the local assemblies and social events. It has also funded the expenses of forest patrols and birdlife censuses, which have included hiring an external expert. *Ejido* San Andres neighbours Peña Blanca and was established in the mid-1970s. Community agreements to protect local forests were put in place when the *ejido* was established but the need for increasing agricultural production has translated into the expansion of agricultural land at the expense of standing forests.

Ejido La Corona was established in the 1980s and is located in the Municipality of Marquez de Comillas. In 1999, a local NGO helped the community to improve productive activities and the community assembly agreed to reforest 24% of degraded pasture lands. In 2005, the same NGO promoted a carbon PES, and secured 600,000 Mx$/year over 5 years to preserve 1450 ha of fragmented common forests, which will represent around 10,500 Mx$/household/year. PES income has been equally divided between all *ejidatarios*, although some funds have been also dedicated to cover the expenses of an NGO which acts as a PES promoter. Since remaining forests in this community do not exist in just one patch but are dispersed across the *ejido*, their protection is the responsibility of those *ejidatarios* who have land just beside the forested patch. *Ejido* La Victoria neighbours La Corona and was established in the early 1980s. Forests are collectively managed, and used for fuel-wood, timber and medicinal plants, and occasionally for animal hunting.

Ejido Reforma Agraria was formed by a group of migrant families from Oaxaca who settled on the edge of the Lacantun River in the 1970s in the Municipality of Marquez de Comillas. A carbon PES project supports the protection of the forest commons, with annual transfers of 618,000 Mx$ over a 5 year-period. Some of the PES income supports a community patrol whose members are designated by the community assembly. As in the other cases, payments have also covered the expenses of PES promoters, who in this case have provided technical assistance on cattle production and feeding, eco-tourism, firebreak establishment, and have helped the community to build a community house where assemblies and social events are held. Finally, *ejido* López Mateos neighbours Reforma Agraria and was established during the 1960s. About 1900 ha are still forested and the remaining land has been divided in agricultural plots for each household.

Table 1 summarises the characteristics of these *ejidos*, including population, land extension and household income, as well as the formal acquisition of property rights and the rules governing the forest commons. Table 1 also implicitly shows that there is no clear relationship between joining PROCEDE and participating in PSA-CABSA.

Table 1
Key characteristics of the case study *ejidos*

Ejidos	PSA-CABSA	Population (no of people)	Total land (ha)	Forest cover (ha)	Income (Mx$/household/year)	Main productive activities	On-farm income (%)	Legal property rights acquisition/PROCEDE	Forest commons rules
Puerto Bello Metzabok	Biodiversity	65	3300	2780	40,000	Subsistence agriculture, wooden and textile handicrafts	40	1960s/NO	Forest protection
Peña Blanca	Biodiversity	290	2400	1700	64,000	Subsistence agriculture and pineapple plantations	80	1970s/YES	Forest protection
La Corona	Carbon sequestration	350	2250	1450	29,000	Subsistence agriculture and cattle ranching	100	1980s/NO	None
Reforma Agraria	Carbon sequestration	200	2453	1521	200,000	Cattle ranching and seasonal eco-tourism	60	1970s/NO	Forest Protection
Nueva Esperanza	N.A.	800	1250	500	24,000	Subsistence agriculture, coffee plantations and cattle ranching	100	1960s/YES	Future land distribution
San Andrés	N.A.	350	1602	676	250,000	Subsistence agriculture, pineapple plantations and textile handicrafts	50	1970s/NO	None
La Victoria	N.A.	400	3800	2700	50,000	Subsistence agriculture and forage crops	100	1980s/YES	Agricultural expansion and land distribution
Lopez Mateos	N.A.	500	4112	1900	190,000	Cattle ranching and land leasing	100	1960s/NO	Future land distribution

N.A. reads as "does not apply".

4.3. Understanding participation in PSA-CABSA projects

4.3.1. Procedural rules and programme management

Since PES started, the number of applications per year has been high (Table 2). It is worth noting the increase in biodiversity applications in 2006 and 2007, but the progressive reduction for carbon. Both components show a high percentage of rejections due to several factors, which include missing documentation, non-fulfilment of eligibility criteria, lack of funding and lack of environmental additionality in the case of carbon projects. Overall, the results

Table 2
Number of project applications for carbon and biodiversity PES in Mexico 2004–2006

Year	Component	Applications	Approved for design	Approved for implementation	Rejected
2004	Biodiversity	211	79	12	120
	Carbon	220	69	2	149
2005	Biodiversity	194	5	3	186
	Carbon	149	5	6	138
2006	Biodiversity	324	26	7	291
	Carbon	75	13	0	62

Source: adapted from Corbera et al. (2008).

show that early procedural rules, including payment amounts, were positively considered by the applicants and encouraged participation. However, the high rate of rejection reveals that most applicants did not understand eligibility criteria and that developing a PES project is a complex process (Corbera and Brown, 2008).

We argue that CONAFOR officials and PES promoters have found it difficult to communicate the principles of PES projects to potential beneficiaries which, in turn, is explained by the unfamiliar concepts underpinning these initiatives, such as baseline, additionality, priority areas, monitoring, and markets for PES, among others (Ruiz, 2007). Some interviewees acknowledge that CONAFOR cannot improve the effectiveness of PES outreach because the agency is only entitled to use four percent of its overall funds to administer, monitor and evaluate forestry programmes. To address these problems, PES programmes have recently received financial support from the Global Environment Facility and the World Bank to extend their 5-year lifespan, increase CONAFOR outreach and evaluation capacities, and promote a more effective and efficient commercialisation of ecosystem services through the strengthening of monitoring systems and the establishment of well-functioning market-schemes (World Bank, 2006).

We suggest that the large number of rejected applications contradicts Pagiola et al.'s (2005) idea that beneficiaries analyse PES rules *before* deciding whether to participate. In fact, our data show that applicants often did not meet eligibility criteria and their applications omitted important documentation, which insinuates that their motivation to apply for PES was driven by their relationship with government officials and PES promoters, who either provided them with the wrong information or encouraged them to apply regardless of whether they complied with eligibility rules. Applicants' decisions to participate in a PES project result from a social interaction process in which communication flows between farmers, community authorities, CONAFOR and ES promoters are central. The PES economic incentive may also attract applicants but, as we show below, it is not the most important motivation in the four participating *ejidos* analysed in this study.

Interviewees also suggested that in some successful applications PES promoters and applicants were unable to design the project effectively and move it forward, causing frustration and resentment among resource managers (e.g. *ejidatarios*). In this sense, Table 2 shows that from 79 and 69 proposals approved for biodiversity and carbon project design in 2004, only 6 and 10 are currently being implemented. In unsuccessful proposals, CONAFOR did not provide sufficient information to the applicant so that the *ejido* could identify another promoter and re-start the design process. To this end, the publication and delivery of a document including all service providers and verifiers across the country may be necessary to increase applicants' decision-making power in front of the PES promoter. In relation to all these shortcomings, a PES verifier noted that:

> Some of the *ejidos* which got funding for project design but which then did not get money for implementation got really upset with their PES provider. In some cases, they have even threatened him... These *ejidos* did not understand why they had paid him so much money and now they did not get their project running... A lot of money has been lost in unsuccessful PES project design proposals.

In our study, we interviewed three PES promoters, whose professional fees varied from 20% to 50% of the project design total budget. They promoted local capacity building through training of community technicians and patrols, which was positively considered by all *ejido* members in our four case studies. We also observed that the *ejidos* investigated considered that their relationship with CONAFOR and ES verifiers had to be strengthened in order to avoid jeopardising their long-term commitment to the project. *Ejido* leaders noted that they faced difficulties to meet the PES project requirements, which was further aggravated by their lack of contact with government officers and the region's PES verifier, who was in charge of 10 other PES projects. As expressed by one of the interviewees:

> You [referring to the ES verifier] are our direct link with CONAFOR. We have been implementing forest conservation activities and bird population censuses since last year. However, until today we had not received any feedback from CONAFOR. How can we perform conservation activities when CONAFOR has abandoned us for an entire year? We invite you to visit us at least twice a year, and only then our efforts and your monitoring activities will be fully congruent with what CONAFOR is expecting.

4.3.2. Community dimensions

Participating *ejidos* are less densely populated than neighbouring ones, although they live on almost the same area of land. This would suggest that smaller sized *ejidos* may be more able to participate in PES than larger ones but our small sample size does not allow us to be conclusive. It is often noted that small-sized communities are more successful at collective action despite facing large costs associated with enforcing their appropriation rights (Ostrom, 1990). Nevertheless, Agrawal and Goyal (2001) argue that medium-sized communities are able to protect and monitor their resources more effectively than small and larger ones because these often lack conservation funds or suffer from cooperation problems, respectively. In this sense, our case studies reveal that smaller *ejidos* have difficulties in securing their land rights against trespassing and, in this context, PES promotes enforcement activities even if it does not favour cooperation between *ejidos*. In *ejido* La Corona, for instance, reforestation efforts are limited since there is constant trespassing into the forest commons, with firewood being withdrawn and saplings being trampled. However, since PES funds are divided among *ejidatarios*, there is no funding for patrolling and individual actions against trespassing remain scattered and do not provide an incentive to stop illegal wood extraction. In the remaining participating *ejidos*, control and enforcing conservation measures in communal forests are organised in patrols funded with PES income and supported by the *Ejido* Assembly.

In our case studies, the assemblies played an important role in creating consensus around the use of the forest commons and the authorities acted as a knowledge transfer mechanism. At this regard, Wilson (1997) includes community leaders within the 'information environment' and emphasises their influential role in promoting participation, specifically in *ejidos* with low organisational skills. In *ejido* La Victoria, the main obstacle for PES participation was lack of consensus due to large cultural differences and a diversity of interests concerning land-use, as observed in the following quotation (*Ejido* authority):

> Our community has over 400 people, most of us from different ethnic groups. When we heard from the PSA-CABSA, I was really excited with the idea of participating, and I even contacted the PES promoter working in La Corona. However, when we proposed the idea in the assembly we could not reach a consensus; it is difficult for us to agree in certain issues when some of our right-holders are willing to expand the agricultural land in forested areas.

Another factor explaining *ejidos*' unwillingness to participate in PES relates to people's inability to self-organise to access information and develop project applications. As noted by a local farmer (non-participating PES *ejidatario*):

> For most of us it is very difficult to have access to information coming from CONAFOR. We need to travel 2 days and stay at least a day in town so as to visit CONAFOR, and most of us cannot leave our lands unattended otherwise our crops would be lost and our families would not have enough food to eat.

We found important differences in collective rules between participating and non-participating *ejidos*. While every participating *ejido* had rules in place for the protection and maintenance of forest cover long before the arrival of PES, non-participants did not have an agreement concerning forest protection and instead favoured the present and future distribution of land for agriculture and cattle ranching purposes. Political affiliation did not seem to matter much in the eight case studies examined. Only one individual interviewed in one of the non-participating *ejidos* noted that people were against participating in PES because of their sympathy towards the Zapatistas. However, this contrasts with the case of a participant *ejido* which has many pro-Zapatista members.

When asked about environmental values, forests and PES, participants underlined the importance of forests as providers of indirect benefits, including the regulation of climate, watershed protection, and scenic beauty. However, bequest values also appeared to be important. Concerns about what would be left to future generations were common (Lacandon indigenous *ejidatario*):

> Our forests are not only our sources of firewood and wild-meat, but most importantly they are sacred to us. They provide us with water, shelter and food; they are also our temples, we worship our deities who reside in caves in our forests.
>
> When we moved in to this area in mid 1970s, we found a land full of forests and agreed to preserve some of these. We want our children to enjoy the forests as much as we do, we do not want them to live in a barren-land such as the land we left more than 30 years ago.

These comments illustrate that pre-existing conditions and positive perceptions about environmental conservation encourage participation. These findings are in line with other studies concerned with the political economy of forest management in Mexican *ejido*s, where non-consumptive environmental's values play an important role in resource manager willingness to protect the forest and manage it sustainably (Klooster, 2000). Previous research has demonstrated the importance of traditional and western knowledge in sustaining ecosystem services and biodiversity in communal land. Becker and Ghimire (2003), for instance, demonstrate the existing synergies between forest conservation and traditional ecological knowledge in multi-stakeholder projects concerning indigenous communities in Ecuador. Moreover, the concept of cultural capital defined as 'the aptitude or inclination of a group or society to behave in a certain way' (Cochrane, 2006) provides us with insights on how natural and human-made capital are mediated. Culture lies between natural and human-made capital hence influences management objectives, process efficiency and demand for commodities. Cultural capital has thus a strong influence on the sustainability outcomes of any project, which in turn implies that communities with existing environmental values and conservationist behaviour will be more eager to participate in PES than those whose culture does not encourage environmental conservation.

4.3.3. Household insights

As noted in Section 4.2, livelihoods in the *ejidos* studied are predominantly based on cattle-ranching and agriculture, which provide a constant source of income all year-round. Traditional cash-crop prices in Mexico have steadily declined since the NAFTA agreement, leaving farmers in remote areas with few alternatives for income generation (Barbier, 2000). If we understand poverty as the result of deprived capabilities rather than low income (Sen, 1999), then increasing compensation levels in PES may not necessarily translate into higher participation levels. Activities such as eco-tourism and handicraft production represent a significant share of the total income in participating *ejidos* and their households. For example, according to our research, Puerto Bello Metzabok households receive up to one third of their total income from selling handicrafts in tourist markets. However, access to alternative income generating activities is not common, which results in the migration of younger generations to urban areas or even foreign countries. As a community leader remarked:

> We are concerned with the future of our forests, particularly if our children prefer to migrate to the cities with the hope of finding a job better remunerated compared to our cattle or maize and beans plantations.

Rosa et al. (2003) assert that PES schemes can promote and improve product marketing using the environmental attributes and values of PES participants. PES income can financially allow for the consolidation of alternative income generating activities rather than creating new ones or simply improving income levels through direct subsidies. PES may thus support the permanence of future generations in rural areas by strengthening alternative employment sources. In our case studies, if PES financial incentives are compared to on-farm income per household, they represent more than 10% of on-farm income, an important share of total household income. Thus, our results would intuitively mean that low-income households would be more prone to participate in PES, although our small sample size does not allow us to be conclusive. In fact, as highlighted in the previous section, the decision regarding the allocation of PES funds falls to the assembly, where right-holders vote over how to invest PES income: dividing it among *ejidatarios*, investing collectively or both. In the PES *ejidos*, all except one have invested in collective goods and all have agreed that future PES income should be dedicated to improve land productivity and establish new productive activities. In this regard, it is important to note that we did not observe any individual opposition to PES in the formal assemblies. We recognise, however, the limitation of this approach and we suggest that future research should explore voices of opposition to PES through personal surveys.

4.4. Discussion

So far, we have identified a set of factors which have influenced *ejidos'* participation in PES. At the procedural level, the evolution of PES rules in Mexico reflects an ongoing learning process in CONAFOR, which has tried to reduce the costs of programme development through procedural simplification over time, addressing the early pitfalls in the 2004 PSA-CABSA rules. In the original rules for carbon fixation by forests, projects were encouraged to follow

UNFCCC and CDM procedures (which only contemplated as eligible activities afforestation and reforestation on land deforested before 1990), yet they would pay more to those projects developed within conservation sites (often with existing forest cover). This contradiction has been explained by the fact that most organisations participating in the design of PSA-CABSA, including CONAFOR, were not knowledgeable about CDM rules. Nevertheless, changes in procedural rules can also undermine future participation. The attempt to make the rules compatible with the rules negotiated internationally for carbon forestry projects explains the lower number of applications over the past 2 years (Corbera and Brown, 2008).

The information provided to resource managers has been critical to encourage participation and explains the important number of applications to the PES programme per year. However, the subsequent high rejection rate reveals that eligibility criteria were not well explained to resource managers; in other words, that government extension officers failed to communicate effectively the programme's rules. For approved applications, our research has shown that follow-up and monitoring of project design by PES promoters are important to secure projects' approval. When this has not happened, conflicts have occurred and people's enthusiasm for PES has diminished. Our findings coincide with Burstein and colleagues' (2002) view that intermediary functions, such as those related to project design, technical assistance, research and project management, are critical for the successful functioning of PES. They also acknowledge that the relationships between intermediaries and ecosystem service managers can be conflicting due to divergences in opinion about the economic value of intermediaries' services.

The involvement of several actors in the rule-design process translates into a procedural framework where all interests are taken into consideration and a compromise is forged. Mexico's experience contrasts with the more centralised Costa Rican programme, in which the design and management of PES schemes rests with a fund (FONAFIFO) managed by three government members and two people from the private forestry sector (Pagiola, 2008, p. 713). Furthermore, Mexico's PES programme has recently created a 'multistakeholder body' (Berkes, 2002) known as the Technical Advisory Council, involving rural organisations, NGOs, academics and government officers. This body, which meets periodically and provides advice to CONAFOR on how to improve the programme, including the mechanisms for increasing resource managers' involvement, has to be seen as a positive step towards improving communication among actors and, at least indirectly, involving resource managers in rule-design (Corbera et al., 2008). In the future, it will be important to analyse the extent to which the TAC's advice is taken on board by the government and the views of resource managers are indeed heard because "sharing through participation does not necessarily mean sharing in power" (White, 2000, p. 143).

At the community level, our study highlights the role of *ejidos*' assemblies and leaders in the creation of consensus regarding the use of the forest commons and the PES project. This may not preclude the existence of conflicting opinions regarding PES participation. We acknowledge that collective choices within the formal structure of decision-making may mask divergent viewpoints and inherent conflicts (Agrawal and Gibson, 1999). We found that each *ejido* attributed different values to their forests, some of which were linked to basic needs provision and cultural values while others were related to the use of the forest as a source of marketable products. We also estimated that *ejidos*' size may be an important factor promoting participation, and showed that smaller *ejidos* seemed more prone to get involved than larger ones. Additionally, we found that PES finance supports alternative income-generating activities and often translates in collective goods. We also showed that internal rules concerning natural resource management critically influence participation. These rules establish a set of norms for social behaviour and contribute to balance individual rights and collective responsibilities (Bowles and Gintis, 2002; Pretty and Ward, 2001). While participating *ejidos*' rules were closely linked to the conservation of forest resources for present and future generations, non-participating *ejidos* have developed internal rules for the distribution of land which consider forests as marginal lands to be cleared for agricultural purposes. In this context, then, our findings suggest that rules favouring forest conservation and granting resource access to future generations may encourage PES adoption. In addition, such rules may contribute to reducing the costs of defining, protecting and enforcing property rights over these services and their associated resources (North, 1990; Ostrom, 1990).

Finally, at the household level, our results suggest that promoting diversification of productive activities through PES exerts as a participation driver. In this sense, PES may like to follow the example of certification strategies which have helped to consolidate "new kinds of collaboration among actors along commodity networks, giving rise to new levels of organization with important implications for alleviating rural poverty" (Mutersbaugh et al., 2005, p. 386). Yet, we have shown that our case studies have preferred to invest in collective goods rather than dividing PES income equally among households so that these could invest in their own preferred activities (e.g., agricultural production, tools, food and clothing). Other PES initiatives have been implemented on private lands (Pagiola, 2008) thus rendering individual motivations very important to understand people's willingness to participate. However, Mexico's PSA-CABSA operates predominantly on common forests, which in turn are governed through collective institutions. Current research on social behaviour accounts for collective rationality motivating decision-making in strategic interactions; in other words, "it is not uncommon for people to set aside their individual self-interests and to make decisions in what they judge to be best interests of their families, or the companies that employ them, or their departments or universities, or the religious, ethnic, or national groups with which they identify themselves, sometimes fervently, and a comprehensive understanding of strategic interaction needs to recognize and understand this mode of decision making" (Colman et al., 2008). This implies that collective decisions over PES prevail over household choices, and may mask, however, some potential individual opposition or lack of interest in PES. In fact, we recognise that future research should benefit from a comparison between collective motivation and individual preferences, specifically regarding the acceptance of PES and the distribution of PES income. Table 3 presents a summary of the key factors determining participation in our case studies.

Table 3
Key factors driving participation

	Key factors
Procedural and management levels	– Simple rules – Procedural flexibility – Information outreach levels – Social participation in rules-framing – Effective communication between resource managers, intermediaries and government
Community	– Forest management rules – Collective conservationist values – Consensus around the use of PES income and the allocation of responsibilities – Small community size
Farmer	– Contribution to household income – Consolidate and diversify productive activities – Grant access to research and development projects

5. Conclusion

Most PES schemes and their ensuing projects are found in Latin America but it is expected that many other regions and countries will follow suit (Wunder, 2007). In this context, our analysis identifies factors influencing resource managers' willingness to join these initiatives. The research approach goes beyond the limited perspective of a behavioural approach, considers the *ejido* a decision-making unit and highlights the implications of institutional and contextual rules in shaping collective and individual responses to PES. In Mexico's PSA-CABSA, participation in PES is the result of the interaction of various characteristics, some related to the procedural nature of the scheme itself (e.g., eligibility rules, payment amounts, verification visits) and others related to community institutions (e.g., assembly agreements, forest management traditional values) and household characteristics (e.g., income needs, employment sources), with the latter playing a less important role. Unfortunately, however, it was beyond the scope of this research to analyse the cognitive and relational mechanisms through which the concept of PES has permeated the discourse and practice of social organisations, resource managers and their local institutions, as well as to explore any likely divergences among *ejido* members regarding participation and distribution of PES income.

Markets and payments for ecosystem services are designed and implemented in different ways. Their underlying assumption is to internalise externalities, and therefore, improve management decisions. However, our paper shows that monetary compensations through PES provide a moral incentive for forest conservation but may not necessarily improve the overall economic efficiency of the resource management system (Kosoy et al., 2007). PES should be viewed as a window of opportunity, allowing for a coexistence of value systems rather than imposing a language of valuation. Monetary compensation should come hand in hand with transfers (in the broadest sense) tailored to the requirements of ES providers and users. For this to happen, the active involvement of various stakeholders in the design and actual implementation of PES projects under PSA-CABSA must be further fostered. Moreover, needs and expectations of ES providers around PES should be carefully examined and compensations adjusted accordingly, hence improving the robustness of the incentive system.

To conclude, we would like to stress the fact that, in order to understand *ejidos* and resource managers' willingness to participate in Mexico's PSA-CABSA projects, it is necessary to pay attention to the interface between *ejidos* and PES promoters, including government officials, but more importantly to the socio-political and environmental dynamics which shape *ejido* institutions, as these contribute to explain collective behaviour. As our paper points to and others have suggested (Klooster, 2000; Corbera et al., 2007), understanding *ejidos*' interest in common forest management and resource conservation (with or without PES) requires looking beyond the existence of rules for forest management and their enforcement. It is important to look beyond the idea of "incentives" to move towards that of "motivations". Involvement in PES may not be then a matter of compensating for opportunity costs, as it is often perceived and discussed by environmental economists, but rather a question of how non-monetary individual and collective motivations, such as the need for technical capacity training, biodiversity conservation for intergenerational equity, and reaffirmation of property rights among others, can be further strengthened and supported through PES programmes.

Acknowledgements

The authors thank the Mexican National Institute of Ecology (INE) and the National Forestry Commission (CONAFOR) for logistic support during fieldwork periods. We are grateful to Professor Joan Martínez-Alier for his comments on an early draft of this paper. Nicolás Kosoy thanks ICTA-UAB for financial support to develop the paper. Esteve Corbera and Katrina Brown acknowledge the Tyndall Centre's Programme on International Development and the British Academy of Sciences Research Grant SG-44018 for financial research support.

References

Agrawal, A., Gibson, C.C., 1999. Enchantment and disenchantment: the role of community in natural resource conservation. World Development 27 (4), 629–649.

Agrawal, A., Goyal, S., 2001. Group size and collective action: third-party monitoring in common-pool resources. Comparative Political Studies 34 (1), 63–93.

Albán, M., Argüello, M., 2004. Un análisis de los impactos sociales y económicos de los proyectos de fijación de carbono en el Ecuador. El caso de PROFAFOR-FACE. International Institute for Environment and Development, London.

Barbier, E., 2000. Links between economic liberalization and rural resource degradation in the developing regions. Agricultural Economics 23, 299–310.

Bayon, R., Hawn, A., Hamilton, K., 2007. Voluntary Carbon Markets. An International Business Guide to What They Are and How They Work. Earthscan, London.

Becker, C.D., Ghimire, K., 2003. Synergy between traditional ecological knowledge and conservation science supports forest preservation in Ecuador. Conservation Ecology 8 (1), 1.

Berkes, F., 2002. Cross-scale institutional linkages: perspectives from the Bottom-up. In: Ostrom, E., Dietz, T., Dolsak, N., Stern, P.C., Stonich, S., Weber, E.U. (Eds.), Drama of the Commons. National Academy Press, Washington, DC, pp. 293–321.

Bowles, S., Gintis, H., 2002. Social Capital and Community Governance. The Economic Journal 112, 419–436.

Bray, D.B., Merino-Pérez, L., Barry, D., 2005. Community Managed in the Strong Sense of the Phrase: The Community Forest Enterprises of Mexico. In: Bray, D.B., Merino-Pérez, L., Barry, D. (Eds.), Community Managed in the Strong Sense of the Phrase: The Community Forest Enterprises of Mexico. University of Texas Press, Austin, pp. 3–28.

Brotherton, I., 1989. Farmer participation in voluntary land diversion schemes: some observations from theory. Journal of Rural Studies 5, 299–304.

Burstein, J., Chapela, G., Aguilar, J., De León, E., 2002. Informe sobre la Propuesta de Pago por Servicios Ambientales en México. PRISMA, San Salvador.

Cochrane, P., 2006. Exploring cultural capital and its importance in sustainable development. Ecological Economics 57, 318–330.

Colman, A., Pulford, B., Rose, J., 2008. Team reasoning and collective rationality: piercing the veil of obviousness. Acta Psychologica 128, 409–412.

Cooke, B., Kothari, U. (Eds.), 2001. Participation. The New Tyranny? Zed Books, London.

Corbera, E., Brown, K., 2008. Building institutions to trade ecosystem services: Marketing forest carbon in Mexico, doi:10.1016/j.worlddef.2007.09.010.

Corbera, E., Brown, K., Adger, W.N., 2007. The equity and legitimacy of markets for ecosystem services. Development and Change 38 (4), 587–613.

Corbera, E., González Soberanis, C., Brown, K., 2008. Institutional Dimensions of Payments for Ecosystem Services: An analysis of Mexico's carbon forestry programme, doi:10.1016/j.ecolecon.2008.06.008.

Echavarria, M., Vogel, J., Albán, M., Meneses, F., 2004. The impacts of payments for watershed services in Ecuador. Emerging Lessons from Pimampiro and Cuenca. International Institute for Environment and Development, London.

Gintis, H., 2000. Beyond Homo economics: evidence from experimental economics. Ecological Economics 35 (3), 311–322.

Government of Mexico, 2003. Acuerdo Nacional para el Campo. Government of Mexico, Mexico D.F.

Grieg-Gran, M., Porras, I., Wunder, S., 2005. How can market mechanisms for forest environmental services help the poor? Preliminary lessons from Latin America. World Development 33 (9), 1511–1527.

Hickey, S., Mohan, G. (Eds.), 2004. Participation: From Tyranny to Transformation? Exploring New Approaches to Participation in Development. Zed Books, London and New York.

Hogwood, B.W., Gunn, L.A., 1986. Policy Analysis for the Real World. Oxford University Press, Oxford.

Hopkins, P.E., 2007. Thinking critically and creatively about focus groups. Area 39 (4), 528–535.

Klooster, D., 2000. Institutional choice, community and struggle: a case study of forest co-management in Mexico. World Development 28 (1), 1–20.

Klooster, D., Masera, O., 2000. Community forest management in Mexico: carbon mitigation and biodiversity conservation through rural development. Global Environmental Change – Human and Policy Dimensions 10 (4), 259–272.

Kosoy, N., Martinez-Tuna, M., Muradian, R., Martinez-Alier, J., 2007. Payments for environmental services in watersheds: insights from a comparative study of three cases in Central America. Ecological Economics 61 (2-3), 446–455.

Kothari, U., 2001. Power, Knowledge and Social Control in Participatory Development. In: Cooke, B., Kothari, U. (Eds.), Participation. The New Tyranny? Zed Books, London and New York.

Landell-Mills, N., Porras, I., 2002. Silver Bullet or Fools' Gold? A Global Review of Markets for Forest Environmental Services and Their Impacts on the Poor. International Institute for Environment and Development, London.

Latour, B., 1991. Technology is society made durable. In: Law, J. (Ed.), A Sociology of Monsters. Essays on Power, Technology and Domination. Routledge, London.
May, P.H., Boyd, E., Veiga, F., Chang, M., 2004. Local Sustainable Development Effects of Forest Carbon Projects In Brazil And Bolivia: A View From The Field. International Institute for Environment and Development, London.
Mayrand, K., Paquin, M., 2004. Payments for Environmental Services: A Survey and Assessment of Current Schemes. Unisfera International Centre, Montreal, Canada.
Millennium Ecosystem Assessment, 2005. Millennium Ecosystem Assessment Synthesis Report. Pre-publication Final Draft Approved by MA Board on March 23.
Miranda, M., Porras, I., Moreno, M., 2003. The social impacts of payments for environmental services in Costa Rica. A Quantitative Field Survey and Analysis of the Virilla Watershed. International Institute for Environment and Development, London.
Muñoz, C., Guevara, A., Bulas, J.M., Torres, J.M., Braña, J., 2006. Pagar por los Servicios Hidrológicos del Bosque en México. In: Pagiola, S., Bishop, J., Landell-Mills, N. (Eds.), La venta de servicios ambientales forestales. Instituto Nacional de Ecología, Mexico DF, pp. 165–206.
Murdoch, J., Marsden, T., 1995. The spatialization of politics: local and national actor-spaces in environmental conflict. Transactions of the Institute of British Geographers 20, 368–380.
Mutersbaugh, T., Klooster, D., Renard, M.C., Taylor, P., 2005. Certifying rural spaces: quality-certified products and rural governance. Journal of Rural Studies 21 (4), 381–388.
North, D., 1990. Institutions Institutional Change and Economic Performance. Cambridge University Press, Cambridge.
Ostrom, E., 1990. Governing the Commons. The Evolution of Institutions for Collective Action. Cambridge University Press, Cambridge.
Pagiola, S., 2008. Payments for environmental services in Costa Rica. Ecological Economics 65, 712–724.
Pagiola, S., Arcenas, A., Platais, G., 2005. Can payments for environmental services help reduce poverty? An exploration of the issues and evidence to date from Latin America. World Development 33 (2), 237–253.
Pérez Mota, L.E., 1998. Algunas presiones económicas y sociales sobre la tierra en Chiapas. Revista Estudios Agrarios, 10.
Perfecto, I., Vandermeer, J., Mas, A., Soto Pinto, L., 2005. Biodiversity, yield, and shade coffee certification. Ecological Economics 54, 435–446.
Pretty, J., Ward, H., 2001. Social capital and the environment. World Development 29 (2), 209–227.
Registro Agrario Nacional, 2004. PROCEDE. Avance General Operativo. <www.ran.gob.mx> (accessed 16.07.04, Website update: January 2004).
Registro Agrario Nacional, 2006. Programa de Certificación de Derechos Ejidales y Titulación de Solares. <www.ran.gob.mx/programas_sustantivos/ran_procede.html> (accessed 21.07.08).
Robles Berlanga, H., 1999. Tendencias del campo mexicano. Revista Estudios Agrarios 13, 31–60.
Rojas, M., Aylward, B., 2003. What are We Learning from Experiences with Markets for Environmental Services in Costa Rica? A Review and Critique of the Literature. International Institute for Environment and Development, London.
Rosa, H., Kandel, S., Dimas, L., 2003. Compensation for Environmental Services and Rural Communities in the Americas: Lessons from the Americas and Key Issues for Strengthening Community Strategies. Programa Salvadoreño de Investigación sobre Desarrollo y Medio Ambiente, San Salvador.
Ruiz, F., 2007. Experiencias en la formulación de proyectos forestales de captura de carbono. Presentation given at the Workshop "Payments for Ecosystem Services in Mexico: Current Status and Future Objectives", organised by the Tyndall Centre and the National Institute of Ecology. Mexico City, July 18–19, 2007, Mexico City.
Sen, A., 1999. Development as Freedom. Oxford University Press, New York.
UNEP-Risoe, 2008. CDM Pipeline Overview.
Weinberg, B., 2000. Homage to Chiapas. The New Indigenous Struggles in Mexico. Verso, London and New York.
White, S., 2000. Depoliticising development: the uses and abuses of participation. In: Pearce, J. (Ed.), Development, NGOs, and Civil Society. Oxfam GB, Oxford.
Wilkie, D.S., Carpenter, J.F., Zhang, Q., 2001. The under-financing of protected areas in the Congo Basin: so many parks and so little willingness-to-pay. Biodiversity and Conservation 10, 691–709.
Wilson, G.A., 1997. Factors influencing farmer participation in the environmentally sensitive areas scheme. Journal of Environmental Management 50, 67–93.
World Bank, 2004. Sustaining Forests: A Development Strategy. World Bank, Washington DC.
World Bank, 2006. Environmental Services Project. The World Bank, Washington, DC.
World Resources Institute, 2005. World Resources 2005. The Wealth of the Poor. World Resources Institute, Washington, DC.
Wunder, S., 2006. Payments for Environmental Services: Some Nuts and Bolts. CIFOR, Bogor, Indonesia.
Wunder, S., 2007. The Efficiency of Payments for Environmental Services in Tropical Conservation. Conservation Biology 21 (1), 48–58.