
The Equity and Legitimacy of Markets for Ecosystem Services

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ABSTRACT

Markets for ecosystem services are being promoted across the developing world, amidst claims that the provision of economic incentives is vital to bring about resource conservation. This article argues that equity and legitimacy are also critical dimensions in the design and implementation of such markets, if social development goals beyond economic gains are to be achieved. The article examines this issue by focusing on two communities involved in a project for carbon sequestration services of forests in the state of Chiapas, Mexico. The perceived legitimacy of the activities and the distribution of economic outcomes and project-related information are found to be mediated by organizational allegiances and the history of social relations regarding access to property and forest resources. Political affiliation determines the project's legitimacy, while the poorest farmers and women have been excluded from project design and implementation. The authors argue that pitfalls such as these contribute to reinforcing existing power structures, inequities and vulnerabilities, and suggest that this is a product of the nature of emerging markets. Markets for ecosystem services are, in effect, limited in promoting more legitimate forms of decision making and a more equitable distribution of their outcomes.

INTRODUCTION

Ecosystems provide critical services for the functioning of natural and human systems, including those processes of cleansing, recycling and renewal of biological resources. They can also have aesthetic and recreational functions and they might be of significant importance to some populations for cultural and spiritual reasons. Advocates for the creation of markets for ecosystem services argue that these markets will result in the efficient use of natural resources and that they are a way to make explicit to decision makers the linkages between nature and human development (Daily, 1997). It is important to note that the benefits provided by ecosystem services are public goods:

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they are external to the actors involved in markets, their public benefits are not captured in prices, and those who benefit from the market exchange are not necessarily the direct resource users. Nevertheless, since the 1990s, numerous pilot projects and marketing frameworks for ecosystem services have been designed and implemented across the developing world. Considerable attention has been paid to forest services, particularly watershed regulation, biodiversity conservation and carbon management (Myers, 1997; Pagiola et al., 2002b; Swingland, 2002). The nature of pilot initiatives and the actors involved have been contingent upon the type of service, the context and the scale in which marketing frameworks have been established (Landell-Mills and Porras, 2002).

All these initiatives share the aim of enhancing direct use and commercialization of the goods and services provided by ecosystems. By these means they attempt to diversify the income opportunities of rural populations whose livelihoods depend directly or indirectly on ecosystem goods and services, particularly in the developing world (Millennium Ecosystem Assessment, 2003). In addition, these markets aim to become more economically efficient and environmentally effective than previous state-regulated conservation strategies, and it is implicitly assumed that they will provide an equitable distribution of their economic and social benefits (Bawa and Gadgil, 1997; Pagiola et al., 2002a). However, markets for ecosystem services are not like standard markets for goods, with autonomously evolving institutional arrangements and with a long evolution and maturation (Vatn, 2000). Rather, they are being created in a relative short time and their establishment is being promoted by a set of national and international parties who share common interests in the protection of the global environment through market-based mechanisms. This raises concerns about the ability of these frameworks to incorporate local socio-ecological contexts in their design and practice and to support legitimate decision-making processes and equitable outcomes across scales (Adger et al., 2001; Brown and Corbera, 2003).

This article discusses the need to explicitly consider equity and legitimacy in environmental decisions, and highlights how this need is played out in the practice of markets for ecosystem services. The critical role of property rights and common property institutions in shaping the distribution of market outcomes is also highlighted. We illustrate this argument using the example of a carbon forestry project in the state of Chiapas, Mexico, and examine the level of legitimacy and perceived equity in the selection of participants and the distribution of economic benefits and project-related information in two participating communities. We argue that the realization of legitimate forms of decision making and the provision of equitable outcomes depend on project-design factors as well as on historical configurations of common property institutions and social relations concerning access to property and forest resources.

EQUITY AND LEGITIMACY IN MARKETS FOR ECOSYSTEM SERVICES**The Importance of Equity and Legitimacy**

That the concepts of equity and legitimacy are open to diverse interpretations is clear from their philosophical roots, and their use in modern political discourse and policy (Goodwin, 2003; Schlosberg, 2003). Generally speaking, equity relates to the distribution of socio-economic factors and goods in a society according to an agreed set of principles or criteria, which often include principles such as desert and need (Dobson, 1998).¹ In contrast with the view that equity is a matter of distribution according to universal principles, some scholars emphasize that what is equitable or not is specific to particular communities and that principles for distribution are tentative and likely to vary across communities, issues and contexts (for example, Walzer, 1983).

Legitimacy, on the other hand, refers to the way in which outcomes are negotiated, administered and accepted by stakeholders and encompasses issues such as 'the recognition of stakeholders, the acknowledgement and hearing of their concerns, the participation of stakeholders in decision making, and the distribution of decision-making power' (Paavola, 2003: 8). Legitimacy is often the key to the resolution of environmental conflicts and it needs to be crafted into the institutional solutions that structure the processes of environmental decisions (Paavola, 2005). Some scholars further argue that lack of 'recognition' is intimately related to political and institutional hierarchies and that social characteristics of class, ethnicity, cultural and institutional exclusion or prior injustice by social oppression influence the ways in which decision-making processes occur and outcomes are distributed (Fraser, 1997; Young, 1990). In fact, much of the discourse on environmental planning processes that seek to be legitimate advocate involving the maximum possible number of local stakeholders, particularly the most disadvantaged, and creating equal opportunities for participation whilst ensuring that no one is made worse off in the implementation of policies or the creation of markets (Dube and Swatuk, 2002; Glicksen, 2000).

Insights into institutional dynamics of decision making also show that all environmental decisions implicitly or explicitly involve questions, as well as trade-offs, regarding economic efficiency, environmental effectiveness, equity and political legitimacy (Adger et al., 2003). All environmental

1. The principle of desert distinguishes among people's capabilities, and justifies differential rewards. It is embedded in liberal theories of justice and suggests that those who contribute more to something in either kind or money deserve more compensation in the distribution of benefits, if these have departed from an equal state of opportunity (see, e.g., Goodwin, 2003; Rawls, 1971). In contrast, a need-based approach aims to satisfy people's needs, which in turn requires defining exactly what these needs are. In this sense, putting the principle of need into practice can be 'notoriously difficult' (Dobson, 1998: 77).

decisions produce distinct sets of institutional forms with different outcomes, different degrees of uncertainty, and different trade-offs for each particular management alternative and derived outcome. Hence, environmental decision making is likely to involve a plurality of stakeholders with divergent views over these implementation alternatives and outcomes. Stakeholders' competing views are likely to be a product of their diverse socio-cultural contexts and their interests. This highlights the importance of being sensitive to this pluralism in the design and implementation of environmental decisions. Thus, issues of efficiency and effectiveness cannot be separated from those of equity and legitimacy in the creation of markets for ecosystem services, which have implications across scales and actors.

This article analyses questions of equity and legitimacy in the practice of markets for forest carbon. Equity and legitimacy have been largely absent in the discourse around land use change and its role in greenhouse gas emissions (Adger and Brown, 1994; IPCC, 2000). The debate has essentially focused on questions revolving around environmental effectiveness and economic efficiency. On one hand, several scholars note that active management of forest ecosystems can significantly contribute to the mitigation of greenhouse gas emissions on a global scale (Albrecht and Kandji, 2003; Houghton, 1990; Myers and Goreau, 1991), although the limitations of realistically accounting for the greenhouse gas sink capacity of forests have also been acknowledged (Goodale and Davidson, 2002; Houghton, 2002). On the other hand, carbon sequestration by forests is considered more economically efficient than other technological options for climate change mitigation in both developed and developing countries (de Jong et al., 2000; Richards and Stokes, 2004; Sedjo, 1989). Yet the cost of carbon sequestration options depends on a variety of factors, including the type of management activities implemented, project contracting and land opportunity costs, and other institutional or organizational aspects (Newell and Stavins, 2000). Consequently, some forestry management options may become more costly than other technological options in emerging carbon markets (Smith and Sherr, 2003).

It is only recently that equity and legitimacy have begun to be addressed in debates about marketing forest carbon. For example, concerns have been voiced about countries' participation in policy mechanisms promoting investment in carbon sequestration by forests, such as the Kyoto Protocol's Clean Development Mechanism, and the involvement of local people and marginalized resource user groups in project design (Rowlands, 2001; Taylor, 2002). Recent empirical studies have revealed that some carbon forestry projects in Latin America concentrate on accounting for carbon, and allocate fewer resources to ensuring the broader participation of local actors and the diversification of productive activities beyond forest planting and conservation (Brown et al., 2004; May et al., 2004). Hence we postulate that neither procedural legitimacy nor the distribution of project outcomes have been considered important criteria for analysing the performance of markets for forest carbon.

The Importance of Property Rights

Well-functioning property rights are critical to the success or failure of interventions for resource conservation and development (Brosius et al., 1998; Lynch and Alcorn, 1994). Rights are generally defined as social relationships among people that contain enforceable claims to rights in something (Fortmann, 2000) and, more specifically, they are considered to delineate rights of ownership over an asset. These rights include the right to use and consume the asset, to exclude others from the use of the asset, to change its form and substance, to derive income from it, and to transfer these rights either in their entirety or partially and temporarily (Fuchs, 2003: 44).

In studying markets for ecosystem services, property rights are important for two reasons. First, these markets implicitly represent the creation and virtual exchange of a new type of property over the public goods provided by ecosystems. Consequently, there is a need to examine the conditions of this exchange because it can reproduce unequal power relations between service buyers and suppliers. As O'Neill suggests: 'where new property-rights regimes are introduced, they are defined by those with economic and social power. To invoke "market solutions" is to invoke a particular distribution of power to determine outcomes... market solutions are mechanisms for defining and defending particular distributions of social power, and should be understood and contested as such' (O'Neill, 2001: 710). Second, existing property rights over the environmental resources providing ecosystem services may also determine who gets attributed ownership over these services and thus benefits from their commercialization. Sometimes there is no straightforward relationship between land ownership and resource ownership. For instance, a tree on a plot of land can be legally or *de facto* owned by someone who does not necessarily hold formal land ownership (Rocheleau and Edmunds, 1997), thereby making it potentially difficult to identify who is entitled to trade ecosystem services.

This article pays exclusive attention to the provision of ecosystem services in common property regimes. In this context, identifying who owns an ecosystem service is more complex than for private property. In a common property regime, property rights over environmental resources are shared by a group of interdependent users who control access to these resources and exclude outsiders from them. In turn, the ability of a member of the group to extract direct or indirect benefits from the use of environmental resources derives from a bundle of existing formally or informally-acquired rights that are regulated by common property institutions. These institutions are defined by government legislation or have their origin in customary practices. These institutions also manage the costs and benefits that emergent types of resource use can imply for members of the group (Bromley and Cernea, 1989; Ostrom and Schlager, 1996) and they are key in ensuring that resource management outcomes are perceived as collectively fair and advantageous

(Klooster, 2000). We thus suggest that common property institutions will influence who benefits from trading ecosystem services and will have a direct effect on the legitimacy of decision making and the realization of equitable outcomes (Turner et al., 2003). But we do not consider common property a sufficient condition to guarantee legitimate procedures and fair outcomes: this is crucial to bear in mind at a time when some scholars are emphasizing that common property regimes can reduce project negotiation and management costs and promote a fair distribution of project outcomes (Rosa et al., 2003; Swallow et al., 2005).

FOREST CARBON MARKETS IN MEXICO

Methods and Data

Forests are diverse ecosystems themselves; they also help regulate watersheds, act as wildlife refuges, represent significant carbon stores, and perform numerous other ecological functions. The carbon storage function is of key importance for the regulation of the global climate system (IPCC, 2000). This has recently led to terms in the Kyoto Protocol, under the United Nations Framework Convention on Climate Change (UNFCCC), to encourage investors from developed countries to fund reforestation activities across the rural developing world, in exchange for carbon credits to be traded against greenhouse gas emission reduction targets under the Protocol. In 1995, the UNFCCC promoted a voluntary pilot phase of forest conservation and reforestation projects with no accrual of carbon credits, which resulted in seventeen initiatives being set up between 1997 and 2002, mainly in Latin America and Asia (Corbera, 2005b). One of these pilot carbon forestry projects is the Fondo Bioclimático project in the state of Chiapas, Mexico, which has been acknowledged as one of the most successful projects in sequestering carbon and promoting sustainable development (World Resources Institute, 2005). This has also led to widespread enthusiasm about the possibility of replicating the project's endeavour elsewhere (Tipper, 2002).

The project origins can be traced back to 1994–95 when a number of Mexican and international research institutions explored the interest of the farmers' organization 'Unión de Crédito Pajal Ya'kactic' (PAJAL) in participating in a project to provide technical assistance and financial incentives to shift from agriculture to agroforestry, convert pastures to plantations, restore degraded forest, and manage natural forests. In 1994 and 1995, the carbon fixation potential of the forestry activities preferred by PAJAL-affiliated farmers, together with the potential to sell carbon, were thoroughly investigated (de Jong and Montoya, 1994; de Jong et al., 1995; Montoya et al., 1995). In 1997, the project was registered under the UNFCCC. Between 1997 and 2000, the project secured funding for the sale of 60,498 tonnes

of carbon dioxide equivalent (CO_2eq)² over thirty years at a price of US\$ 3.27/ tCO_2eq , from which a 66 per cent share (US\$ 2.18/ tCO_2eq) is allocated directly to farmers, in several payments, and the rest is used to cover project managers' salaries and project administration. Between 2000 and 2005, investors further contracted an approximate annual average of 36,666 tonnes of CO_2eq . In exchange, they receive Verifiable Emission Reductions (VERs) and provide 'carbon neutral' products and services to their clients in Europe (Phillips et al., 2002). In order to manage and administer the carbon investment, a trust fund was created in 1998, accompanied by the establishment of a professional organization, AMBIO, which promotes the project across the region, trains community technicians, and deals with administrative and monitoring procedures.

The project has grown from an initial group of forty-seven PAJAL-affiliated farmers from six communities in 1997, to over 650 farmers representing thirty-three communities and belonging to seven rural organizations in 2005 (Corbera, 2005a). All communities hold their environmental resources in common but emission reductions are provided through reforestation and forest conservation activities in either individual landholdings or collective (communally-managed) lands. Forest activities are designed according to the specific physical, ecological and geographical conditions of each community (Soto-Pinto et al., 2001). Carbon revenues have been variable according to the level of compliance and the characteristics of the management area, with some farmers experiencing higher planting mortality rates than others or lower growth rates than expected. Therefore, producers' income gain oscillates, but its maximum has been estimated at around US\$ 700 over ten years (Tipper, 2002). In the case of communities protecting an area of forest or planting collectively, income gains have also varied according to the total number of hectares planted or protected.

The research reported here is based on semi-structured interviewing, social survey and participant observation. A total of sixty-eight semi-structured interviews with farmers and project managers, ninety-five land endowment survey questionnaires, and eleven discussion groups involving 108 participating farmers, were conducted during a period of eight months in 2003 and 2004 (Corbera, 2005b). The communities were selected on the basis of their longer involvement with the project and the fact that they responded to the project in two contrasting ways. The *Mestizo*³ *ejido* of 'Yalumá' is located in the southeast of Chiapas, within the municipality of Comitán de Domínguez. It has 2,170 inhabitants, 556 households, 156 *ejidatarios* and occupies an area of 3,067 hectares. Forty-two households reforest on their individual

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2. Measurement unit equalling the concentration of carbon dioxide that would cause the same amount of temperature change in the climate system as the given mixture of carbon dioxide and other greenhouse gases.
 3. *Mestizos* are descendants from indigenous ethnic groups and Spanish colons, and they constitute the majority of the Mexican population.

landholdings. The *Tzotzil*⁴ *ejido* of ‘Rincón Chamula’ is located in the north-west of Chiapas, within the municipality of Pueblo Nuevo Solistahuacán. It has 5,525 inhabitants, 1,141 families, 176 *ejidatarios* and occupies an area of approximately 4,000 hectares. The community protects and reforests lands managed in common.

Ejido became the legal term to define a productive group of people with land given by the government for common ownership after the 1910 Mexican Revolution. Selected members of the group called *ejidatarios* receive access to an individual parcel of land, which remains under communal ownership, with no rental or sales of land allowed. *Ejidatarios* can only bequeath their rights of access to their parcel of land to a single descendant, which in practice implies that *ejidos* have several members with no formal land access rights. *Ejidos* usually have an area of forest and pasture set apart and managed in common, to which all community members have access. Every month, the community assembly brings together all *ejidatarios* and other non-formal rights holders to discuss the management of collective resources and other issues concerning socio-political life within the *ejido*. At present, a great number of *ejidos* across the country are changing their socio-political and property configuration as a result of a 1992 constitutional reform which gave them the right to reallocate land between common property and individual parcels, and to incorporate new members, through a land titling programme known as PROCEDE⁵ (Muñoz-Piña et al., 2003).

Contested Property and Weak Collective Action

Yalumá was established in 1954 by families who bought their land from local *finqueros*.⁶ Before then, those who had more economic power were able to acquire more land and fence it to legitimate their property and exclude others from accessing it. Even after the establishment of the *ejido*, land was not internally redistributed; fenced property remained, conflicts among community members escalated, and only some scattered areas of common

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4. *Tzotziles* are an indigenous Mayan group in Chiapas. They have predominantly occupied the state’s highlands but, as their population grew in number during the last century, land became scarce, and internal religious conflicts spread within *Tzotzil* communities, some groups migrated to the north of the state. Unfortunately, these migrations are not very well documented in the local literature and we have had to rely heavily on local testimonies and few written resources.
 5. *Ejidos* aiming to join the programme are subject to a series of rules and requirements, including a majority vote in the *ejido* assembly to initiate the programme; public posting of land assignments to accommodate disagreements; signed recognition of boundaries by owners of lands surrounding the *ejido*; and majority approval in the community, with a 66.6 per cent quorum (Registro Agrario Nacional, 1993a, 1993b).
 6. *Finqueros* used to have large tracts of land (*fincas*) in which indigenous and *mestizo* people used to work in exchange for basic goods, permission to build houses in the *fincas*, and the *finqueros*’ military protection (Ruz, 1992).

forests were established to meet inhabitants' needs for timber and fuelwood. Yalumá was formed by the integration of legal and *de facto* private properties into a common ownership regime and this is still reflected in the community landscape, with its scattered households and the predominance of posts and wires along the boundaries of each family property. Fences identify productive lands, exclude others from the use of land resources, and denote the extent of the owner's property and his economic status.

According to local interviewees, internal struggles over the distribution of property rights explain why there has never been a strong sense of collective action. During the *ejido*'s establishment, family alliances were strategic. Families feared that they could lose their existing *de facto* land rights if other communities claimed their properties. They did not have land titles and the revolutionary government was pressing communities to adopt the common property regime. But weak collective action was also explained as the result of growing religious differences. In the past, all community members used to be Catholic but, over the past three decades, other religions and Christian faith cults have been adopted by community members (Jehovah's witnesses, Adventists and Evangelists). Nevertheless, religious heterogeneity was not found to be a determinant factor in local people's willingness to join the carbon project. Among project participants there were members of each religious group, and interviewees agreed that religion divided people in other aspects of community life but had not played a role in influencing participation in the project. As discussed below, organizational allegiances were more important in this respect.

In Yalumá, each family organizes its livelihood around three basic productive activities: maize cultivation, cattle grazing (mainly oxen and a few sheep), and their home gardens, where poultry and fruit trees are found. The short wet season and the lack of piped water restrict irrigated agriculture. Oxen are used for ploughing the land and helping families in household tasks, such as water or fuelwood transportation. There is a clear gendered division of labour. Men work in agricultural fields and are involved in fuelwood collection either in the commons or in the household woodlands. Women manage the home garden and only occasionally join men in maize cultivation, cattle grazing and fuelwood collection activities. The allocation of maize cultivation and cattle grazing activities throughout the family landholding depends on intra-household dynamics and environmental conditions, including the number of individuals in the household, the productive quality of the land for agriculture, and the total set of economic activities in which household members are involved.

The forest commons are located within the limits of existing properties, with a major area of around 50 ha located on the *ejido*'s northwestern border, over an hour's walk from the most populated neighbourhood. Access to fuelwood and oxen grazing is unrestricted in the forest commons, but rules for timber extraction have always existed. A maximum of two pine trees per family per year were allowed for extraction until 1999, when an assembly

agreement forbade further extraction because remaining pine stands were thin and scarce. However, interviewees concur that there has never been a strong interest by the *ejido* authorities to enforce the rules for timber extraction and collectively manage the forest commons. Farmers suggest that it is likely that the forest commons will soon be divided and granted to landless families.

Collective Migration and Strong Collective Action

Rincón Chamula was founded between 1915 and 1920, when groups of indigenous families from the state central highlands migrated to the northern region due to political conflicts and land scarcity in their communities of origin (García de León, 1997). The *ejido* was legally established in 1952 and land was distributed across four neighbourhoods, but neither these areas nor the family allocations were or are currently fenced. Historically, property conflicts have involved disputes over territorial boundaries with neighbouring *ejidos* and some of these have only recently been resolved through the mediation of state agrarian activities and the community participation in PROCEDE.

The historical configuration of Rincón Chamula is thus different from that of Yalumá; it was formed on the basis of a collective migration by a number of families of the same ethnic origin, who were expelled from their original villages as a result of violent political and religious conflicts. These families bought land properties together and claimed the establishment of an *ejido*. Over time, households which had an initial endowment of approximately 10–15 ha divided their land endowment among descendants. When land scarcity became a problem, new properties to be expropriated were found outside the community boundaries, externalizing property rights conflicts towards neighbouring *ejidos* and private properties. All of these aspects have contributed to maintaining the sense of collective action and to respecting the traditional system of decision making through the community assembly. To date, religion has also acted as a socially cohesive factor: with the exception of one neighbourhood inhabited by Christian Adventists, the whole of the community is Catholic. The Christian Adventists are well-respected members in the community and participate in local collective institutions in the same way as other households. However, they do not form or belong to any other type of collective organization because their religion forbids them to do so.

Households in Rincón Chamula organize their production in cultivation plots that comprise areas of maize and vegetables, including tomatoes, lettuce, carrots and chilies. The rainy season is relatively long and enables the cultivation of vegetable cash crops. Households practise a sequential grazing system. Livestock, including horses, donkeys, cows and sheep, graze in maize plots, utilizing crop residues, during the dry season

(November–April). When the rainy season starts and all land is cultivated, livestock graze on the commons. Fruit trees and poultry are found in home gardens. Women often accompany men in agricultural activities, including planting and harvesting. They are in charge of sheep herding and fuelwood collection, as well as actively managing the home gardens, live fences and the borders of community paths. However, they are not involved in decisions regarding the forest commons; these are made through the male-controlled community assembly. This represents the classic productive and social organization of the indigenous *Tzotzil* groups who inhabit the central and northern area of the state (Alvarez et al., 1996; Collier, 1976).

The forest commons in Rincón Chamula have been actively preserved. There is one key reason for this protection: as family landholdings are totally occupied by maize, beans and vegetable cultivation, it is important to maintain these common forests for livestock grazing and extracting fuelwood and timber. The forest commons encompass an area of 180 ha located in the southwestern part of the community (where different patches have been reforested with carbon funds), and have been governed by strict rules of access and management since the 1980s, particularly in relation to timber extraction. These rules include obtaining the permission of local authorities to extract up to three mature pines per family per year and the undertaking that timber will only be used for house-building purposes. Commercial extraction is forbidden and fuelwood collection must not result in the destruction of young trees. The community assembly regulations disregard the management of other species which women utilize and actively manage, such as oak (*Quercus sp.*) or willow trees (*Salix sp.*) (Silva, 2002). In addition, there are rules regarding the use of slash and burn techniques in cultivation areas surrounding the forest commons. If these rules are deemed to have been broken, then *ejido* members are subject to economic sanctions. The community also has another conservation area of 1,800 ha in the northeast border, which is under strict protection through carbon funding and it is ecologically well-preserved because its steep slopes make it inaccessible for cultivation or cattle grazing.

LEGITIMACY AND EQUITY IN PRACTICE

The contextual analysis of Yalumá and Rincón Chamula *ejidos* reveals quite different histories and distinct ecological, social and political dynamics. This makes them interesting sites in which to examine how carbon forestry activities are mediated by distinct local realities in a common property context, and how such realities affect project design and implementation (Dietz et al., 2003). In this section, we examine the Fondo Bioclimático project's level of legitimacy and equity, in particular the inclusion of multiple resource users in decision making, and the distribution of both economic benefits and project-related information, through the experiences of these two *ejidos*.

Contested Legitimacy: Organizational Allegiances and Property Rights Claims

In Yalumá, project managers approached the community through a regional rural organization named 'Unión de Ejidos Lucha Campesina' (UELC), which was receiving political guidance and financial support from PAJAL, its umbrella organization. As noted earlier, PAJAL financed rural development activities in the state and was the first organization approached by project managers in the mid-1990s. However, the existing relationship between project managers and UELC undermined the participation of the majority of Yalumá's community members in the carbon project, as a result of a historical mistrust between the community members and UELC which dated back to the 1970s. At that time, UELC's development projects in the region involved the supervision of external agents who aimed to collectivize the community's lands against the interest of many households. This conflict was further aggravated during the 1980s and early 1990s, when UELC-affiliated members and other community members competed directly over the provision of transport facilities between Yalumá and the town of Comitán de Domínguez. When the carbon project started in 1997, conflicts had lessened and UELC-PAJAL had limited membership support in the community. Nevertheless, only twenty-two out of forty-five UELC-affiliated families agreed to plant trees for carbon fixation on their landholdings and it was not until 1999, when the local project leader withdrew from UELC, that another twenty households joined the project.

In contrast, project managers approached the community of Rincón Chamula through an organization with wider social support in the community and the region itself. The 'Unión Regional de Ejidatarios Agropecuarios, Forestales y de Agroindustria de los pueblos Zoque y Tzotzil del Estado de Chiapas' (UREAFA) was created in 1992 with the objective of promoting agricultural development projects, as well as participating in the struggle to reclaim land, a task that was being led in the state by the national political organization 'Central Independiente Obrera y de Acción Campesina' (CIOAC). Although not all community members were affiliated to UREAFA or CIOAC, the community assembly accepted the carbon project because of general sympathy towards the work of these organizations in the region. The assembly's acceptance allowed project managers to deal progressively with local authorities and bypass UREAFA. This was especially important when the links between project managers, UREAFA and community authorities deteriorated in the period 1998–2000 as a result of the UREAFA's community representative going on temporary leave. To date, there have not been any internal conflicts regarding the development of the carbon project, which has never been challenged by the community assembly.

In Yalumá, we found that organizational affiliation was not the only factor explaining the project's lack of legitimacy at the community level. Non-participants believed that project participants were selling *ejido* lands to carbon investors or to foreign governments, and some called for a firm stance

against the privatization of natural resources and against the carbon project. Participants reacted by claiming that the project was a vehicle for ensuring future rainfall, which would then enhance agricultural productivity and ultimately benefit the *ejido* and future generations.⁷ Participating farmers also stressed that the project was legitimate because it was developed on family landholdings and fit into their productive practices:

The carbon project complements other efforts that some of us have been making by planting fruit trees. No one obliged us to work in the project. We plant in our family plot, so everything is voluntary . . . The project is open to everybody; anyone can change his cultivated crops and plant trees instead. And it is not a project that harms people; we just get organized to help people economically. (Interview, carbon project participant in Yalumá, April 2003)

Conflicts in Yalumá about the need for and the purpose of establishing conservation and forest management areas, driven by external actors, on communal lands, echo the conflicts documented during the establishment of protected areas in Mexico and elsewhere (Ghimire and Pimbert, 2000; Haenn, 1999). The concerns of the farmers about the risk of privatizing land and locking up land use systems is also related to the Zapatistas struggle and the historically contested political economy of Chiapas (Harvey, 2001). Nearly all rural communities, even those which do not belong to the Zapatistas themselves, have gained discursive insights through rural civil organizations and religious meetings about the exploitation of the rural poor for the benefit of transnational global capitalism.⁸ This creates a dual challenge for project managers. On the one hand, there is the question of how to enhance internal co-operation among community members who have a history of conflictual personal and organizational relations. On the other hand, there is the question of how to overcome community members' lack of confidence over a project which they see as connected to global development projects which attempt to alienate local property rights and local people's self-determination.

Equity Outcomes: Gender, Land Endowment and Information Bias

The recognition that different productive spaces have different resource users and different effective managers over the resources and the benefit streams associated with these resources is crucial. There is much evidence to highlight women's critical role in managing forest resources (Rocheleau and Edmunds, 1997), and the importance of widespread participation to ensure successful ecosystem management (Smith and Sherr, 2003). If forests are

7. It is a common strategy to make claims that appeal to some wider social process which confers legitimacy on the claims and offers some protection to the claimants (Vira, 2001).
8. Observation derived from discussions with farmers and regional rural organizations, April–July 2003.

spaces in which women — and other marginalized resource users — conduct a set of important productive activities for household and community development, it becomes compelling to pay attention to their needs in relation to carbon forestry and identify which tree species better accommodate their interests and which other productive spaces, such as home gardens, favour their development expectations. In doing so, markets for ecosystem services could effectively contribute to ameliorating processes of wealth accumulation by individual families and minimizing the risk of exacerbating inequalities across and within households (Vatn, 2001).

As noted above, women in Yalumá do not play a significant role in the management of the household and communal forest resources. These are essentially male-dominated productive spaces. However, most women exercise an effective role in the management of their home gardens. For this reason, when the carbon project had a more development-related orientation in its early years, women from this community were involved in discussions and showed interest in planting fruit trees in their home gardens or in adopting improved cooking stoves (Corbera, 2005b). However, as the project moved from a development orientation towards a narrower focus on extensive tree planting in agricultural lands or pastures, women's suggestions were not prioritized and they dropped out of project meetings (for a review of this transition, see Nelson and de Jong, 2003). In Rincón Chamula, although women effectively play a role in both the management of home gardens and the management of common forest resources, they appear not to have been included in the project management framework. In discussion groups held with local farmers it was acknowledged that women's attendance was low because they did not participate in tree planting and felling activities. Neither did they have a voice in negotiating which forest species they would prefer in the plantations. This shows that the carbon project had limited capacity to affect local processes of non-recognition and gender exclusion regarding forest management, as observed in carbon projects in other locations (Boyd, 2002).

In Yalumá, the implementation of carbon forestry activities on smallholdings within a common property regime also raises the immediate question about which households participate in the project, and to what extent participation is determined by land endowment and household production dynamics. Indeed, total land endowment, the quality of the land, and the ownership of oxen by the household appeared the most critical factors determining the adoption or rejection of these activities by individual households. The project apparently favoured households which were able to allocate land for tree planting in addition to maintaining several hectares for maize cultivation and grazing. There was also a minority of participants who, despite being constrained in land and economic resources, reforested 1 or 2 ha because they did not have any oxen to maintain. In its early years, the project minimized the risk of concentrating all reforestation activities in households with large land holdings by limiting planting to 1 ha (Tipper, 2002). However, this

strategy no longer applies because project managers need to meet a rising carbon demand and have decided to increase the number of hectares with those farmers who have shown a higher degree of commitment to project activities.

The poor recognition of women as resource managers and the difficulties in involving the poorest smallholders in the project have been accompanied by a progressive deficit in the level of knowledge transfer concerning forests, climate change and carbon trading. The interaction between project management and participants in Yalumá has been mediated through a local farmer who has been involved in the project since its origins, while in Rincón Chamula this interaction occurs through community authorities. These local representatives attend monthly and biannual meetings at project managers' headquarters in the town of San Cristóbal de las Casas. They report on the state of project development at the local level to project managers, who in turn inform them about project development issues, such as frequency of payments, seedling delivery, or monitoring schemes, among other issues. This arrangement has been an effective way to communicate with both communities and maintain a local leadership structure. In both communities, most interviewees considered local representatives as those who held more detailed information about the project, those who understood it best and, as a result, those who were better positioned to make decisions on behalf of the group. At the same time, however, farmers raised concerns about the need to reconfigure the existing communication arrangements between project managers and the communities. In Yalumá, for instance, some of the participants stressed that, now that the project had been consolidated, there was a need to allow other members of the group to take up the leadership in project management meetings. In Rincón Chamula, several farmers proposed the creation of a local committee responsible for the community's forestry practices in which authorities, agents and those who have decision-making power in the community could be periodically brought together to discuss issues related to the conservation of common resources and the carbon project. Thus, information on the carbon project would no longer be centralized in community authorities.

In both communities the means and ends of the carbon project (such as where the money comes from, when payments are delivered and what is carbon) are generally poorly understood. Even so, the number of educational visits to local communities has been reduced due to the expansion of the project and the lack of human and financial resources for frequent visits to local communities. These visits now emphasize carbon accounting and monitoring, rather than the role of land-use change in the carbon cycle or the role of carbon trading. As a project manager puts it: 'The carbon project needs to make a stronger effort in providing more workshops to local communities. We lack emphasis in environmental education. When we visit the participants, we only talk about payment deliveries and carbon monitoring procedures' (interview, AMBIO project managers, January 2003).

Nevertheless, we also found that an increase in the number of site visits to local communities may not necessarily be welcomed by all participating farmers. In Yalumá, for instance, some farmers already complain about the number of meetings they have to attend, particularly during the busy agricultural season. The case of Rincón Chamula is somewhat different because site visits are often programmed to coincide with the community assembly, which is held once a month and which all farmers attend. In this context, the current authorities see a relative increase in the number of site visits positively, so that the rest of the community members can become more knowledgeable about the role that their forest commons play in the global climate.

Finally, it is worth highlighting that payments have contributed to increase individual and collective welfare in both research settings. In Yalumá, participating households have spent the carbon income on a number of household goods, including agricultural tools, fertilizers and medicines. Payments for carbon sequestration have thus helped to diversify participants' incomes and have provided an opportunity to extract revenue from economically unproductive land. In Rincón Chamula, because project activities are developed in the commons and through the community assembly, community authorities have ensured that the benefits derived from selling forest carbon do not accrue to individual households but are invested in collective goods, such as the improvement of community roads, the payment of the community annual land tax, the purchase of a microphone for community meetings, and buying spades and wheelbarrows. To date, all households have participated equally in planting and felling activities with approximately two days of collective labour per year.

COMMON PROPERTY AND MARKETS FOR ECOSYSTEM SERVICES

So far we have shown that the legitimacy of the project in these two communities has been influenced by the organizational allegiances shaping the management arrangements between project managers and local communities, and context-specific property rights struggles. From an equity standpoint, we have highlighted that the project has lacked sensitivity to the gendered nature of resource use and to existing inequalities in access to land and forest resources. Information about the means and ends of the carbon project still remains scarce at the local level, and is mostly concentrated with the community leaders, which in turn makes it difficult to establish more representative systems of decision making between project managers and communities, as well as within communities themselves. These findings allow us to further discuss how markets for ecosystem services interact with common property regimes and what outcomes may derive from such interaction.

Table 1. Conditions Influencing Collective Action in the Forest Commons of Yalumá and Rincón Chamula

Condition	Yalumá	Rincón Chamula
Homogeneity of land entitlements before and after <i>ejido</i> establishment.	High heterogeneity. Historical inequities in access to property.	High homogeneity. Equal land endowments in the establishment of the <i>ejido</i> .
Dependence on the forest commons for household activities.	Low dependence. Reliance on the forest commons and household woodlands for fuelwood extraction.	High dependence. Exclusive reliance on the commons for fuelwood extraction.
Agro-ecological conditions reducing the profitability of agricultural crops and grazing activities.	Unsuitable conditions. High risk of drought and lack of water for irrigation. Households dedicate their endowment to subsistence production.	Suitable weather conditions for vegetable production and commercialization. Households dedicate all their endowment to subsistence and market-oriented crops.
Social homogeneity	Seven religious groups	Two religious groups
Political and organizational homogeneity.	Various organizations with either none or distinct political affiliations.	Only one political organization + women's organized groups.
Existence of clear, respected, and enforced rules for the management of the forest commons.	Only for timber and not always enforced.	Rules for timber extraction, grazing activities and fire management in place. Enforced with the support of the community assembly.

Collective and Individual Provision of Forest Carbon

In the two communities analysed, we can identify a number of conditions which enable or facilitate the existence of co-operative and well-functioning common property institutions (see Table 1). These conditions include the existence of shared norms for the conservation of common resources, the homogeneity of interests, the degree of dependence by group members on the resource system, the existence of locally devised access and management rules, and the possibility of sanctions. These conditions tally with those found by other common property scholars to explain collective action in common property regimes for sustainable resource management (Agrawal, 2002; Ostrom, 1990, 1999). We argue that these conditions explain the way in which legitimate decision-making processes and equitable outcomes have been negotiated in our two case studies.

The case of Rincón Chamula illustrates the strong relationship between a collective legitimization of project activities and a fairer distribution of project outcomes. The income generated by the sale of ecosystem services benefits all households equally, either through the production of collective goods or the division of the carbon income among the households who participate in planting and monitoring. Nevertheless, it would be wrong to assert that the existence of well-functioning and locally respected common property institutions guarantees that all resource users who have a stake in the trading

of ecosystem services become effectively involved in such trading. This case study shows that just as traditional institutions are blind to the gendered nature of resource management, so too are carbon activities. This exemplifies the dilemma facing markets for ecosystem services which operate through common property — whether to uphold locally rooted, yet unfair, distributive rules, or to establish more inclusive and locally challenging decision-making systems. The latter could be done, for instance, by consulting and involving existing women's community groups in making decisions about which species should be planted and where.

On the other hand, the case of Yalumá shows that when collective action is already compromised due to a higher degree of social heterogeneity based on historical, religious and/or political reasons, markets for ecosystem services can only develop on the basis of individual landholdings and thus it becomes difficult for households to benefit if they do not have sufficient land to participate in tree planting. Nevertheless, the marketing of ecosystem services through individual landholders can contribute to supporting individual property rights in contexts of contested property, to enhancing social bonds among participants, and to strengthening the agency of individuals and organized groups *vis-à-vis* other community members and community-based institutions. When this occurs, social conflict may emerge and project managers then face the challenge of how to address and manage such conflict.

The two case studies illustrate that marketing of ecosystem services in a common property context can take place through either collective property rights, that is, when the environmental resources providing the services are held in common, or individual property rights, when the environmental resources are held by a single owner or household. More importantly, they also show that the development of carbon activities in the Fondo Bioclimático project has not been conditional on the existence of formal property rights. Participating farmers and community authorities sign a letter stating that they understand and voluntarily commit to undertake reforestation or forest conservation activities, and they can abandon project activities without facing any economic penalty. The voluntary character of the contractual relationship between carbon suppliers and buyers in Fondo Bioclimático is one of the factors behind the relative success of the project throughout the state. In Yalumá, the community's decision not to participate in PROCEDE in 2003 implied that *de facto* right holders were not able to formalize their property rights. This decision was backed by a number of powerful individuals, mainly *ejidatarios*, who feared that PROCEDE would make them contribute to the annual land tax in proportion to their landholding size (to date the land tax is split equally among community members). Competing views and conflicts over PROCEDE suggest that when formal land titling programmes exist or are put in place, their success is by no means guaranteed. Therefore, although evidence from similar emerging markets indicates that secure rights are critical to ensure that farmers can perform the agreed land-use change activities in the market contract and that projects are sustained in the long term

(Manguiat et al., 2005; Swallow et al., 2005), the participation of non-formal property rights holders in the Chiapas project challenges such a belief.

In effect, however, markets for ecosystem services are becoming mechanisms by which property rights are formalized. Some pilot carbon projects and watershed protection initiatives have focused on promoting land titling processes so that local resource users' access to project activities and their benefits can be guaranteed (Landell-Mills and Porrás, 2002; May et al., 2004). In some countries, such as Indonesia, land titles in new social forestry agreements are provided if farmers commit to a series of land management options which guarantee the provision of ecosystem services (Suyanto et al., 2005). Other national schemes promoting the commercialization of ecosystem services in Mexico have made formal land titling a condition for participation, in the expectation that interested communities and farmers will formalize their land rights in order to access these emerging financial mechanisms (Corbera, 2005b). However, land titling initiatives may not be successful in all settings, and markets for ecosystem services which make formal land titles a precondition for participation could exclude entire populations in developing countries (Grieg-Gran et al., 2005).

Another implication of operating the project through individual or collective rights for project management relates to monitoring and information costs. Mexican *ejidos* have a long history of successful timber management through Common Forestry Enterprises (Bray et al., 2003), and the implementation of future carbon projects through these organizations may reduce transaction costs, specifically in relation to tree planting training and contract management issues. In the Fondo Bioclimático case, for instance, the costs of working with individual farmers are higher because plantations are scattered across the landscape and monitoring activities are more costly and time-consuming. In contrast, developing plantations on grazing and forest commons allows for larger and more concentrated plantations, which are less costly to monitor and evaluate. The advantages notwithstanding, working through common property institutions requires a greater effort in communication and environmental education than working through individual farmers. In Rincón Chamula, project managers emphasized the importance of maintaining a continuous dialogue with community authorities, particularly when the latter change every three years. Ensuring that incoming authorities understand the project's ultimate objective and its management aspects, and that they are willing to encourage other *ejido* members to participate in planting, felling and forest protection activities, will be key to longer-term success. Project managers also perceive that general knowledge about the carbon project is often less accurate in communities operating collectively. This is because farmers feel more detached from project activities than individual participants, who implement the project on their own landholdings and thus need to pay greater attention to project managers' instructions.

In terms of natural resource management, it is still too early to judge whether there are differential levels of commitment to the Fondo Bioclimático

project between those who develop the project individually and those who implement the project collectively. At this point, no one can say whether the trees planted in Yalumá and Rincón Chamula will survive or whether they will be cut down before the end of the project lifetime. This is likely to be contingent on context-specific population dynamics, new market opportunities, and future changes in the configuration and behaviour of common property institutions. Boyd et al. (2005) suggest that carbon forestry projects should include carbon budget buffers to account for changes in tree stocks due to natural causes or changes in farmers' land-use activities. The Chiapas project holds 10 per cent of investors' funding in a contingency fund in order to compensate for any unexpected reduction in carbon sequestration rates or a release of carbon stock (for example, as a result of forest fires or farmers' withdrawal).

Limits to Legitimacy and Equity in Emerging Markets

The evidence presented above suggests that securing the provision of legitimate decision making and equitable outcomes through marketing of ecosystem services in a common property regime context is not straightforward. Local conditions are dynamic due to reconfigurations in common property institutions, property relations, and changes in project management. Internal conflicts can emerge or fade away depending on changes in local authorities and changes in the relationship between community authority, groups, and external organizations. So far, the Fondo Bioclimático project has failed to build more participatory mechanisms for project management and decision making which grasp local dynamics and complexities and promote more legitimate and equitable outcomes. These could potentially counteract the concentration of income and knowledge, and incorporate marginalized resource users. Continuous debate about how to maximize resource managers' participation in project design and how to guarantee a fair distribution of project outcomes is necessary.

Discussions held with project managers indicated that the project was severely affected by the loss of additional non-carbon funding programmes at the end of the 1990s. As a result, there was a greater emphasis on accounting and monitoring procedures and on increasing the number of communities (in order to meet the carbon demand), and a shift away from issues and activities concerned with better communication or more inclusionary dialogue in the communities. Project developers' early view of the carbon project as a potential vehicle towards 'community well-being and sound environmental practices' was transformed into a view of a contract-based project in which 'farmers can contract to deposit carbon and withdraw payments' (Nelson and de Jong, 2003: 25–6). More recently, however, project managers have increasingly perceived the need to strengthen their relationship with participating farmers and communities, particularly with those who joined the

project in 1997 and are about to finish the ten-year cycle of carbon payments. There is concern that these farmers may abandon the project in forthcoming years if they do not receive further technical support to maintain the plantation. For this reason, new strategies through which the project can be complemented with other training and development activities are being designed. These include the development of new research projects which can balance the carbon project, and the establishment of co-operation arrangements with other NGOs which can provide training to local farmers on new productive activities. Project managers have also considered the possibility of establishing a new trust fund within the organization, which could be constituted by some of the organization's savings and consultancy revenues. The fund would provide micro-credit to participant farmers for the development of farming and plantation management activities (interview, project managers, August 2004).

These management transitions indicate that it is difficult to balance carbon demand levels with inclusionary decision making and equitable outcomes. The more the project needs to grow to accommodate carbon demand, the less effective it becomes at providing other outcomes beyond economic incentives and specific training activities. The higher the number of communities involved, the more difficult it is to create a decision-making system which allows for open discussion about the means and ends of the carbon project. The price paid per tonne of carbon sequestered in Chiapas is insufficient to provide the project with the necessary economic resources to encourage farmers to design forest management plans which incorporate a greater variety of local species and productive spaces and to set up the appropriate means to do so (such as a project tree nursery). This is not an isolated case: in other carbon sequestration projects, the price paid per tonne of carbon has also been insufficient to complement planting with other development activities. Carbon forestry projects have, at best, provided the necessary resources for establishing forest plantations, increasing farmers' forest management skills and providing some employment. But project managers have generally lacked the resources and the capabilities to enhance local environmental knowledge, to actively support local people in other development activities and to transform power relations into strategic and co-operative decision making (Brown et al., 2004; May et al., 2004). Emerging evidence thus illustrates the risks involved in constructing a carbon market which serves the agendas of global investors driven by an economic rationale and meets the objective of global carbon mitigation, but jeopardizes the market's social development objectives.

CONCLUSION

If markets for ecosystem services are to help rather than hinder local development, they need to recognize the competing views and diversity of

actors in environmental decision making. Yet markets are blunt instruments with respect to issues such as procedural fairness and equitable distribution of project outcomes. In this article we have examined the creation of markets for ecosystem services surrounding carbon which, through the climate change international regime, have made ambitious claims as to their potential to promote economic efficiency, environmental conservation and social equity. This article focuses on legitimacy and equity issues at the local scale in communities implementing a project for carbon management in Mexico. These cases illustrate the challenges that this type of market faces when attempting to attain local legitimacy and equity in common property regimes with diverse historical and socio-political configurations.

The carbon project that we examined has made explicit trade-offs in addressing issues of effectiveness, legitimacy and equity within local communities; we acknowledge that ongoing efforts are being made to tackle these problems. Legitimate decision making requires that poorly-endowed households and women be involved in project design and management decisions, as well as guaranteeing that the mediating organization (involved in establishing the market scheme) is trusted by community members. Equitable outcomes are more likely to be achieved when there is communal ownership of forest land and when economic power prior to the creation of the market scheme is fairly evenly distributed within a community. When collective action is weak, project activities can benefit only those who have larger land properties and can lead to the exclusion of poor households and the landless. However, our research also shows that strong collective action does not guarantee procedural fairness, as women's interests in tree planting can still be ignored over a preference for fast-growing species in communally owned forests.

In conclusion, this study highlights the contextual dynamism of the meaning and practice of legitimacy and equity in markets for carbon and the allocation of their potential outcomes. We expect markets for ecosystem services to have diverse and often unexpected impacts on environmental governance and decision making when parachuted into complex resource management situations, particularly in common property regimes. We acknowledge that markets for specific ecosystem services can potentially generate external revenue and promote conservation and direct utilization of those services and functions, but this can easily be at the expense of non-utilitarian values for these resources and can 'crowd out' stewardship and related behaviour on which social resilience depends. Moreover, the global-scale disruption of the carbon cycle and the urgent requirement to reduce emissions of carbon to the atmosphere could result in an almost infinite demand for carbon management in every aspect of human resource use. For this reason, in focusing on markets in resource situations such as multiple use forests, it is important that the legitimacy and equity dimensions of these actions are made central to discussions that affect large-scale environmental changes and significant marginalized populations. Otherwise, emerging markets may only contribute

to reinforcing existing inequalities in access to environmental resources and decision making.

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