

**Fresh Tracks in the Forest:  
Assessing Incipient Payments for Environmental Services Initiatives in Bolivia**

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## EXECUTIVE SUMMARY

As threats to the world's ecosystems grow and change, increasing attention has been focused on the important services that ecosystems provide to humans. These services include carbon sequestration and storage, watershed protection, and landscape beauty and biodiversity conservation. Worldwide, a new generation of conservation initiatives aims at creating systems in which the users of one or more environmental services compensate resource managers for improved conservation of these services. Such systems, termed 'payments for environmental services' (PES), may have the potential to protect environmental services while at the same time improving local livelihoods. This study provides an overview and assessment of environmental, economic and social effects of various PES-related initiatives as well as an overview of challenges and promoting factors to PES in Bolivia. We use five criteria to define PES systems: a voluntary agreement, a well-defined service, at least one buyer, at least one seller, and a conditional (*quid pro quo*) transaction.

We examined 17 initiatives that were either ongoing or under preparation in various parts of Bolivia. We were able to closely analyse nine of these, which we consider our primary case studies. Most of these initiatives are still fairly young, and the analyses of their effects remain preliminary. Conceptually, we found that none of the existing initiatives in Bolivia satisfies all the above-mentioned criteria. Thus, no 'pure' PES scheme currently exists in Bolivia. However, several experiences use direct economic incentives and satisfy several of the criteria. There is thus a broader family of 'PES-like' projects exhibiting some important PES elements.

Five of the nine initiatives that we analysed closely were community-based tourism initiatives that focus on landscape beauty, profiting from the growing ecotourism market in Bolivia and existing tour operations near protected areas. Watershed PES systems were the second most common (three cases) and have received substantial attention, both because of a growing scarcity of water and because of the ideological-political controversies in Bolivia about using any type of market-based system to manage watersheds. There has only been one carbon project (Noel Kempff) in Bolivia, while others are in the pipeline. Biodiversity PES systems have basically all remained incipient initiatives without taking off, probably primarily because of uncertain markets in the case of biodiversity premiums for products and uncertain land-tenure systems for conservation concessions. However, biodiversity protection is 'bundled' with six of the nine initiatives; conservation organisations with a primary interest in biodiversity protection use other services (particularly ecotourism) as an entry and leverage point for pursuing biodiversity conservation.

Our analysis of the environmental effects, which we estimated by assessing changes in environmental threats, showed generally net positive protection effects in the nine PES-like initiatives, but also a large variation in environmental protection efficiency. This is to some extent explained by the short lifespan of some of the initiatives, but otherwise mostly to be blamed on case-by-case design factors. The economic effects also varied in size, but were generally positive: all major groups participating as environmental-service sellers were made better off in economic terms—there were no trends of people being 'trapped' by PES in a negative livelihood outcome. The magnitude of gains varied according to the project age, the amount of external support and the management of the system. Some groups other than PES recipients proper could lose out from PES-like initiatives, e.g. landless labourers who had hoped to colonise land being protected in a PES system. This can also cause equity concerns

and social tensions. On the other hand, we also found a series of community-wide positive social effects, such as improved organisation and articulation vis -à-vis outside actors, and training.

Several of the PES-like initiatives could be transformed into full PES systems; certainly in some cases this is a necessity, as when sellers of environmental services exist, but donors are bridging the current lack of buyers willing to pay for these services. Our recommendations for the future design of successful PES systems include, among others, trust-building among participants and a thorough understanding of future PES demand, supply and future transaction costs. For initiatives currently underway, more efforts should be made to monitor environmental impacts, directly reward those environmental-service providers that comply with the contingent PES agreements, and keep all stakeholders well informed of the goals, challenges and progress of the PES initiative. The prospects for PES success warrant future exploration and support.

## CHAPTER 1: INTRODUCTION

### 1.1. Study Background

The concept of payments for environmental services (PES) has emerged in recent years as a potential tool for achieving ecosystem conservation and improving the livelihoods of environmental-service providers and consumers. In Bolivia, as elsewhere, considerable uncertainty remains as to what exactly environmental services are, what PES means, to what extent they are currently being implemented, and what their prospects for success are.

Loosely defined, 'environmental services' refer to the benefits that the natural world provides to people. These benefits are numerous and wide-ranging, including services that improve land, air and water quality. Although these benefits are often substantial, they are frequently ignored in resource use and management decisions. Under-investment in the protection and management of forests and other natural ecosystems results in the depletion of natural vegetation cover and soils, damaged watersheds and species extinction. These effects frequently result in substantial economic and social losses to society.

In an effort to prevent such overexploitation, some analysts and practitioners have called for the incorporation of environmental-service provision into standard economic valuations and, conversely, the use of direct incentives in conservation (Pagiola and Platais 2002; Daily and Ellison 2002). The logic of the argument underlying PES is as follows: When 'free' environmental services are made scarce by human exploitation, they obtain an economic value. External service users might want to compensate local resource managers to ensure that the services they need are provided in the future. Consequently, if such compensation is made, the local service providers receive an income for their additional protection efforts. Since the mid-1990s, PES systems have begun to evolve in many parts of the tropics, in particular, in those of Latin America.

The **objectives** of this study were:

- to provide an overview of various PES-related initiatives in Bolivia,
- to analyse their salient and critical environmental and livelihood effects (which were disaggregated into economic and social effects),
- to identify the obstacles to and factors that promote PES establishment, and
- to provide possible suggestions to improve the sustainability of PES initiatives.

This report is by no means a comprehensive impact or project assessment, neither does it aim to categorise specific initiatives in terms of their relative success or failure vis-à-vis self-declared or donor-determined objectives. Rather, our aim was to assess the likely effects of direct, contingent payments. The major effects on local livelihoods and the environment, and the possible future trends can serve as indicators for the projects themselves, and for future project developers interested in implementing PES systems in Bolivia and elsewhere.

This work is part of a CIFOR research project entitled 'Stakeholders and Biodiversity at the Local Level'. Funded by the Swiss Agency for Development and Cooperation (SDC), the project examines local benefits from biodiversity and its management in two countries, Bolivia and Vietnam. In addition to PES systems, the project will include two other innovative analytical approaches to local biodiversity management. One is Multiple Landscape Assessments, a tool used to establish local priorities in the use of biodiversity, exploring the question of which natural areas, plants, animals matter most for different

households. The second is the tool of Future Scenarios, using participatory techniques to project development trends into the future, evaluate their likely effects on local people, and explore vital choices and alternatives in terms of producing desirable outcomes.

Our **methodology** was comparative case-study analysis. We visited eight PES-related initiatives and undertook detailed analysis of documentation of one of the cases that we did not visit. We consider these nine our primary case studies. As part of a secondary analysis, we also examined an additional eight cases by reviewing documentation and, in most cases, interviewing the initiatives' implementers. It should be remembered that some of the 'initiatives' were merely attempts to establish a PES or compensation for environmental services (CES) system which did not materialise for a variety of reasons. Most visits were carried out by both authors during three weeks in March 2004; additional visits and follow-up interviews were done by the first author during April–May 2004. The cases were selected for analysis based on a desire to cover initiatives closely related to the principle of PES in various settings: different regions and ecosystems, different environmental-service markets, and different types of buyers and sellers. Some cases were identified during an exploratory visit by the second author in September 2003.

There may be important PES-related initiatives in Bolivia that we have omitted. Notably, we consciously chose not to include certified timber markets, which could be argued to constitute a PES-type scheme. We considered this type of initiative to relate more to forest products than to environmental services and that the topic was already relatively well covered in the literature. We had a particular interest in environmental services from forests, but also included selected non-forest cases when they exhibited important features illustrating the PES mechanism.

We divided the closely analysed initiatives into the four most common environmental service types (see section 1.2): carbon sequestration, watershed protection, scenic beauty, and biodiversity conservation. Some initiatives, however, aim to address several services at the same time. In order to maintain clear categories, we categorised each initiative according to its primary environmental service. We also categorised them into payment type, recognising that some initiatives use more than one type of payment structure to achieve their overall objective.

In total, we conducted 45 semi-structured interviews, lasting an average of one hour. The people we talked to were direct participants in these initiatives, donors, intermediaries, government officials, and other environmental-service stakeholders (see Annex). We combined these interviews with pre-existing secondary sources to analyse to what extent the PES initiative had helped to improve the environmental service, other aspects of the environment and local livelihoods. The spatial scope of the environmental effects is site specific and varies in scale from regional forests to national parks and watersheds. To assess environmental effects, we used the threat-reduction approach, comparing the current state of conservation threats with a probable status-quo baseline.

We also looked at basic parameters of the household economy and the broader livelihoods context of the service providers to see if there had been a (significant) payment and if this had made the environmental-service providers better off. The scope of the effects on livelihoods encompassed economic and social changes that resulted from the PES initiative for environmental-service providers. Whenever possible, economic effects were quantified to provide a range of possible income effects. We did not undertake a traditional valuation of the

environmental services, but instead examined the benefits and costs to the local actors. We sought some inspiration in the asset-classification of the Sustainable Livelihoods Approach (SLA), but did not adopt it as a general overriding framework for our analysis.<sup>3</sup>

This report is divided into three main sections. In this introductory chapter, we outline the study background and objectives, describe the PES concept and its pioneer application, and explain the Bolivian context. Chapters 2–5 present the case-study analysis of the eight projects visited and nine projects for which secondary information was gathered through off-site interviews. We group the case studies according to their environmental-service type, namely carbon sequestration, watershed protection, landscape beauty and biodiversity conservation. In Chapter 6, we give conclusions and suggestions for future PES system development.

## **1.2. What are Payments for Environmental Services?**

The emergence of direct economic incentives for the conservation of environmental services indicates a shift from the predominant use of command-and-control mechanisms (such as park establishment or logging bans) to, it is hoped, more flexible and efficient ecosystem protection (Landell-Mills and Porras 2002). Of equal merit are the potential local benefits that PES could provide to people who protect threatened environmental services. Recent studies, for example, have identified markets for environmental services as a tool for environmental protection that could also contribute to poverty alleviation (Landell-Mills and Porras 2002; Pagiola and Platais 2002; Pagiola *et al.* 2005; Grieg-Gran *et al.* in press).

Pagiola and Platais (2002) point to several advantages of PES, including more efficient, sustainable and mutually beneficial arrangements between environmental-service providers and users. Similarly, Landell-Mills and Porras (2002) show through a global case-study analysis that PES systems can, under the right conditions, result in both more conservation and improved livelihoods for poor people. Rosa *et al.* (2003) emphasise the potentially positive social outcomes that, economic benefits asides, can be achieved through increased cooperation among participants in a PES system.

Historically, the dual objectives of increased conservation and improved livelihoods have also been the focus of the so-called Integrated Conservation and Development Projects (ICDPs). ICDPs seek to link conservation with socioeconomic development of local resource users by introducing alternative sources of livelihood that reduce pressure on the environment. They operate under the assumption that removing the obstacles to sustainable development (poverty, shortages of capital, technology and skills) will encourage people to embark on pro-conservation paths. Unfortunately, many of these projects have not fully reached their objectives. Especially on the conservation side, ICDPs have also been criticised for being too expensive given the conservation outcomes they achieve. Critics attribute this failure to the unrealistic project assumptions that enhanced economic development necessarily leads directly to improved conservation outcomes (Ferraro 2001).

PES present a new approach that focuses directly on creating a conditional benefit transfer between providers and beneficiaries of an environmental service. As such, they do not

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<sup>3</sup> The SLA is a useful ‘checklist’ approach for identifying change factors impacting on people’s welfare, but is not helpful for measuring and evaluating these impacts in situations where trade-offs exist—some capital types being accumulated at the expense of others (Angelsen and Wunder 2003).



implicitly assume that natural ‘win–win’ solutions with simultaneous gains in both conservation and development always exist. On the contrary, the payment option is being pursued in recognition of existing ‘hard trade-offs’ between conservation and development, which cannot be addressed by indirect changes in the productive logic of households, but which a direct compensating PES can help to bridge. Conversely, if both service providers and users have fully overlapping *ex ante* interests, e.g. both would naturally choose to conserve the same forest areas, then there is no rationale for introducing a PES schemes. It is conflicting interests that provide the *raison d’être* for PES.

How exactly do we define the concept of PES vis-à-vis theories that have been described in the literature? One approach would be to simply say that the meaning of PES follows directly from the four words that compose the term, i.e. any spending that is somehow being made fully or partly with an ecological benefit in mind. For instance, all of the historically widespread reforestation subsidies in Latin America would be considered PES schemes, since part of their rationale was to promote forest environmental services. Spending on national parks, on ICDPs or on environmental education campaigns could also all be classified as PES.

In this report, we have not opted for such an ample definition. We believe that the principle of PES, as described in the aforementioned literature, represents the idea of something new, of a more direct approach to conservation, with economic incentives playing a prominent role. We have opted for five simple criteria (Wunder 2005), as used in CIFOR’s corresponding PES activities in other countries. In our perception, PES is :

- (1) a voluntary transaction in which
- (2) a *well-defined* environmental service (or a land-use likely to secure that service)
- (3) is being ‘bought’ by a (minimum of one) environmental-service *buyer*
- (4) from a (minimum of one) environmental-service *provider*
- (5) *if and only if* the service provider continuously provides that service (conditionality).

There are several details to note here. PES transactions are voluntary, negotiated frameworks, which distinguishes them from command-and-control instruments (1). Regarding the definition of the service (2), it must be clear what exactly is being bought. In some cases, it could be the service itself (e.g. the preservation of natural beauty around a tourist resort); in most cases, there will be a contract stipulating a certain land use that is likely to lead to that service. For instance, the downstream urban water users want regular quantities of clean water, and plan to pay upstream farmers to preserve their natural forests to try to achieve that. But many natural factors (e.g. a tropical storm) or third-party human interventions (e.g. newly arrived cattle ranchers) could jeopardise the linkage between the upstream forest and the downstream water quality and quantity. It is thus rational for the service users to pay a ‘provider’ to comply with a certain land- or resource-use that has a *probability* of achieving the service improvement—and to enter into such a deal only if that probability is high, that is if intervening natural and anthropogenic risks can be minimised. It is subject to negotiation to what extent service providers assume the risks in the production of the environmental service, for example, in the case of fire destroying the environmental-service-producing forest. One type of arrangement can be to agree on obligatory protective measures (e.g. the establishment of firebreaks by the service providers).

With respect to the number of buyers (3) and sellers (4), the widely used concept of ‘markets for environmental services’ would suggest that multiple agents interact in a competitive manner to bargain for the right price as determined by supply and demand. In real life, this may or may not be the case. If carbon credits are being traded in the Chicago stock exchange, this principle certainly does apply, but when one single service buyer pays one single provider, obviously that has nothing to do with a ‘market’. The principle here is that the two parties can negotiate a bilateral agreement that makes both better off. For this reason, for the concept of PES we also prefer the more general term of ‘payments’ rather than ‘markets’. Other terms that have been used are ‘compensations’ and ‘rewards’, though the latter with a slightly different connotation.<sup>4</sup> Note also that ‘payments’ need not always be implemented in monetary terms—they could be in-kind or a combination of different benefits to local land users.

A key feature of PES is their *conditionality* (5): payments are made only if the provision of the service is secured or the agreed-upon land-use caps are complied with on a *quid pro quo* basis. In other words, they are based on monitoring of compliance with the contractual obligations. This distinguishes them from informal agreements among parties or ICDPs that assume the economic benefits they provide through projects will result in more environmental-service protection. The conditionality is thus a feature that fundamentally distinguishes PES from the ICDP approach or from altruistic rural development projects. This also means that payments will typically be made periodically, rather than once-and-for-all up front, so as to provide a clear incentive for the provider to continue to adhere to the contractual obligations, and a possibility for the buyer to exit the system in the case of the provider’s non-compliance.<sup>5</sup>

What are the most frequently marketed environmental services, and from what ecosystems do they originate? Most attention has been focused on natural forests. First, this is because natural forests collectively provide innumerable valuable services to humans. Second, elevated threats against tropical natural forests have triggered high deforestation rates over the past couple of decades, thereby increasing attention on the need to try out innovative tools for preserving the environmental services of forest ecosystems. The broad categories of forest environmental services that are currently commercialised on a significant scale are carbon sequestration, watershed protection, landscape beauty and biodiversity conservation.

- **Carbon sequestration:** Growing trees have the ability to absorb atmospheric carbon dioxide (CO<sub>2</sub>), a major greenhouse gas that can be assumed to contribute to global warming. Markets for carbon sequestration are currently opening up under the Clean Development Mechanism (CDM) of the Kyoto Protocol, rewarding the planting of trees as a form of compensating for, or offsetting, greenhouse-gas emissions.

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<sup>4</sup> ‘Rewards’ implies an *entitlement* to be paid for any environmental service that is provided. This is problematic in the sense that if there is no pressure on the service, e.g. when provided from largely untouched areas without credible threats, then normally there will be no willingness to pay for the service. Payments are thus more related to foregone benefits that in economic language are termed ‘opportunity costs’. ‘Rewards’ can also include the transfer of more permanent rights, such as formal land tenure in the case of one South-East Asian programme (‘Rewarding the Upland Poor for Environmental Services’, van Noordwijk *et al.* 2004). However, this may conflict with the principle of conditionality (4). For these reasons, ‘compensation’ or ‘payments’ are probably more adequate terms.

<sup>5</sup> An exception is if a legal framework exists that answers compliance over time in a fully effective manner. For instance, conservation easement in the USA may stipulate that land is set aside for conservation in perpetuity. In the tropics, such legal instruments typically do not exist, which is why the temporally continuous character environmental-service provision has to be matched by a temporally continuous sequence of payments.

However, the storage of CO<sub>2</sub> in trees that would otherwise have been felled or cleared—‘avoided deforestation’—has until now not been eligible under the CDM, but experimental extra-Kyoto markets exist that reward active measures to conserve forests which one might reasonably expect to be otherwise lost.

- **Watershed protection:** Forests can provide hydrological benefits in the form of higher water quality (e.g. for drinking water or hydroelectric dams avoiding excessive sediment deposits) and, in some cases, stabilisation of water quantity (e.g. control of floods and erosion causing landslides). In some cases, forests have also been attributed functions which they do not necessarily possess, such as increasing total yearly water flow in a watershed. Many of the alleged hydrological advantages of forests depend on site-specific conditions, including the alternative vegetation cover (e.g. annual crops, perennials or pastures) or the type of management that any of these land uses is under (e.g. conventional vs. reduced-impact logging).
- **Landscape beauty:** Forests also provide landscape beauty in recreational areas, which people enjoy and value. The classical valuation of landscape beauty is the hedonic value captured in property markets, e.g. the premium price of a house with a forest panorama, compared to the neighbouring one with a view of a garbage deposit. ‘Beauty’ can here refer both to a scenic view in general, or to the likely sight of a rare and charismatic animal in the wild. Both domestic and international tourists are also willing to pay for landscape beauty, and this has been the most important value in developing countries. Tourists often reveal their willingness to pay for this beauty through both elevated travel costs of getting to an attractive site and, in some cases, additional entrance fees, higher-than-normal accommodation costs and other charges. Conversely, local people can be rewarded for the preservation or restoration of landscape beauty either directly through a share in entrance fees paid by tourists, through site-operation fees and fringe benefits paid by tourism companies, or through tourism-derived employment and petty trade (food, handicrafts, etc.) that is more highly remunerated than the locally available economic alternatives.
- **Biodiversity:** The increased attention to the intrinsic and utilitarian importance of biodiversity has prompted both private conservationists and governments to pay for its protection. Pharmaceutical companies have paid for the values of bioprospecting the biodiversity contained in certain spatially defined areas, though the payments have been low and the number of systems very limited. Governments pay for the option value of biodiversity—use values which have not yet been discovered (e.g. through the Global Environment Facility, GEF). The global wildlife enthusiast may be willing to pay for the existence value of biodiversity—the knowledge that a certain species survives although he or she will never derive a utilitarian value from this knowledge. Donations to large international conservation organisations are one way of manifesting this willingness to pay.

Some PES systems are based on payments for more than one type of environmental service, and can thus be considered ‘bundled’. Bundling often occurs when the payments for one environmental service from a natural habitat are not enough to pay for its conservation, compared to the benefits derived from alternative uses. In particular, it seems that biodiversity is an environmental service that is often bundled with other environmental services, since the willingness of local stakeholders to pay directly for biodiversity is not sufficient.

Payments for forest environmental services other than the four categories of service described here are also taking place. For instance, the protection from tropical storms or pollination services provided by natural forests are examples of other candidates that can create or protect important economic values. Until now, however, willingness to pay has been concentrated in the four areas listed above, and they also proved to be the relevant ones in Bolivia.

There are three critical questions, originally developed for carbon schemes, but that in principle can be asked with respect to any PES system.

- First, to what extent does the PES result in *additional* environmental-service protection (referred to as ‘additionality’): how much does it change behaviour compared to what would have happened without it? If so, what is the relevant baseline?
- Second, is the mechanism subject to *leakage* (inadvertent displacement of destructive activities to other areas)?
- Third, does the PES result in *permanent* improvements in environmental-service protection, or could foreseeable later changes in behaviour partially or fully negate the benefits it provides?

To the extent that the PES system does not result in an additional, net increase in environmental-service protection, its overall value to environmental-service buyers is called into question.

Where have PES systems actually been implemented? Many PES systems in developed countries have focused on regenerating forests by subsidising the abandonment of marginal agricultural areas. In the tropics, the most prominent PES system has been developed over almost a decade in Costa Rica. In the Costa Rican system of PES, landowners enrolled in the scheme agree to conserve their forests, and establish reforestation, afforestation or agroforestry areas. In return, they receive a per-hectare annual payment from a State-run national forest fund, which has received its funding from a fuel tax, from international loans and donations, as well as from specific environmental-service users such as hydroelectric dams and breweries. In other words, the State acts as an intermediary between service providers and buyers.

The Costa Rican PES scheme has been extremely valuable, but like most pioneer experiences, it also flags areas where there is significant space for improvement. In practice, the number of forest owners who apply for enrolment of areas in the scheme far exceeds the availability of funds. This is probably due to a combination of underfunding of the scheme and its lack of systematic spatial targeting. In many cases, those receiving PES funds may not have had genuine intentions in the first place of putting the land to an alternative use, thus implying limited *additionality* of the system, i.e. the PES systems buys less extra environmental protection than would have been possible with increased targeting.

There are other tropical PES experiences, many of which have been carried out in Latin America. Sparked by the evolution of the Kyoto Protocol, carbon-sequestration payments have occurred in many countries. Similarly, ecotourism is growing at a rapid pace globally as vacationers seek out pristine landscapes, and ecotourism providers benefit from increased tourist revenue. Finally, attempts to protect biodiversity have been made manifest in various schemes. Conservation concessions are systems where environmental-service providers receive a direct payment for setting aside private lands as natural habitats that would otherwise have been put to alternative uses (Rice 2003). Bird-friendly coffee in El Salvador is an example of a product being sold to environmentally conscious consumers paying a price

premium over normal coffee prices. This premium flows back to producers, financing their extra costs of producing in an environmentally friendly manner (Pagiola *et al.* 2002).

Thus, there are five basic theoretical principles underlying PES, four environmental-service areas, and a number of countries where PES systems have been piloted. How then does the reality of PES applied in Bolivia compare with these criteria in our PES definition and prototypes? In the case of Bolivia, watershed protection and landscape beauty/tourism proved to be the dominant environmental services being paid for so far. However, we did not encounter one single system that simultaneously satisfied all five basic criteria. This means that, so far, the principle of PES has not been fully implemented in Bolivia—a situation that is probably typical of the majority of developing countries.<sup>6</sup> What we did find is a number of cases of payments or benefit transfers where *some* of the five PES criteria were met simultaneously, in specific locally composed PES recipes that fitted the theoretical concept only to a limited extent. In the conclusions and discussion section (chapter 6), we will provide a typology of these real-world Bolivian-style PES initiatives.

Obviously, adherence to the PES principle is not desirable *per se*—it could well be that some combinations of PES and more traditional conservation tools provide the best answers in the Bolivian context. Avoiding a one-size-fits-all approach by tailoring tools to specific contexts is rarely a bad idea. However, we believe that the fact that no ‘purist’ PES initiatives has been carried out in Bolivia, and that many of the existing initiatives are only marginally related to the PES concept, reflects a risk-averse conservative attitude in general and a scepticism towards market-oriented tools for environmental management in particular.

### 1.3. The Bolivian Context

With 12 ecoregions spanning the Andes Mountains, Amazon Basin, Pantanal, Chiquitano, Chaco and Cerrado, Bolivia has some of the richest and most biologically diverse forests on Earth (Conservation International–Bolivia *et al.* 2004). Part of its western half comprises the highly diverse and threatened biodiversity ‘hotspot’ of the Tropical Andes and its eastern half lies within the Amazon Basin High-Biodiversity Wilderness Area (Conservation International 2005).

Bolivia’s 8.4 million inhabitants are concentrated in the western highlands and in the lowlands along a central highway that links the highland capital city, La Paz, to the fastest-growing city, Santa Cruz in the lowlands. Because of this demographic concentration, the population density in many forested areas is still low. Roughly 50% of Bolivia’s land area is still covered by forests (CETEFOR and FAO 2004). Despite these low population densities, the pressures on Bolivia’s forest ecosystems are increasing due to forest clearing by industrial agriculture (primarily soya bean), logging and colonists moving from degraded highland areas to the lowland forests. Frontier agriculture and ranching are expanding rapidly into untouched lowland forests, and loggers in search of prime tropical hardwoods and, increasingly, less valuable species are continuing to expand their operations. Adding to this pressure, the Landless Peasant Movement (MST, in its Spanish acronym) along with other peasant groups have demanded access to private forestlands and to protected areas. They claim many of these

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<sup>6</sup> In the second study country under the SDC project, Vietnam, we found even fewer PES-type experiences, due to a strong tradition of State-led command-and-control schemes and State-owned land, only recently supplemented by land allocation and economic incentives to households.

forested areas at present do not complete any 'socio-economic' function; 'land for those who use it' is the traditional slogan, initially put forward in the land reform laws of 1952.

Although deforestation has increased recently in Bolivia (Pacheco 2003), the country has also been at the forefront of environmental policy innovation. In the 1990s, Bolivia consolidated its National Protected Area System (SNAP, in its Spanish acronym) and founded the National Protected Area Service (SERNAP, in its Spanish acronym), with funding from various foreign donors, including GEF. The country's 21 national protected areas cover about 15% of Bolivia's land area, adding up to approximately 150 000 km<sup>2</sup>, a land mass slightly smaller than the size of Suriname (163 000 km<sup>2</sup>). In 1996, the government passed a new forestry law (Forestry Law no. 1700) that requires management plans for timber-harvesting. Many of timber operations implementing these plans have subsequently been certified as sustainable forestry practices. The area certified up to 2004 was 1.5 million ha (M. Vargas personal communication). In 1987, Bolivia was host to the first debt-for-nature swap, in which a minor part of its public debt was cancelled in exchange for the expansion for the Beni Biological Station in the Amazon.

At the same time, these efforts at environmental policy innovation have also been met by scepticism and in some cases a vocal counter-reaction from some sectors that view ecosystem protection as counter to Bolivia's development interests and PES agreements as imposed 'marketisation' of nature. In the case of Bolivia's only carbon forestry initiative, the allegation that the implementing NGO was 'selling oxygen to the gringos' was asserted often in the mainstream media. Similarly, the issue of watershed protection via PES agreements has been met with criticism, especially since the Cochabamba 'Water War' in 2000, when the local population protested against a water-service privatisation effort that would significantly raise the cost of drinking water to consumers. After weeks of violent protest, the private concessionaire withdrew from Bolivia, and the government cancelled the water service contract. In a conference on fresh-water management held in La Paz in December 2003, many social groups expressed aversion toward the idea of 'commercial services' being associated with water, as it implied a free-market approach to an essential life-sustaining element. In addition, the Andean vision of water as a sacred being negates its consideration as a good that could be valued monetarily (CONDESAN 2003).<sup>7</sup>

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<sup>7</sup> According to Miranda (2004), 'the Andean vision of water is very different from the eastern Bolivian vision. In 2003, Andean indigenous groups asserted that:

- Water is alive: it is the source of life that animates the universe
- Water is divine: it comes from the creator and fertilizes the earth with the continuity of life
- Water is the base of reciprocity: it gives unity to all living things, connecting nature and humans, linking families and communities
- Water is universal and communal right: it should be distributed equitably according to needs, traditions and community norms that respect the water cycle
- Water expresses flexibility: it adapts to ecosystems, circumstances and opportunities
- Water is a transformer that obeys natural laws, annual cycles and land conditions
- Water is a cohesive force that allows self-determination for peoples that respect nature
- Water is a common heritage that relates to the land and the living
- Water is a public good that is governed through local consensus.

While Andean indigenous groups base much of their water use rules on this cultural vision, focusing on equity, social participation and a long-term vision, the vision of water in eastern Bolivia is more pragmatic and utilitarian, without the Andean cosmo-vision.'

Bolivia thus presents both promoting factors and obstacles to PES establishment. Against its background of environmental policy innovation on the one hand and social conflict and disparate world views on the other, several initiatives have evolved that directly and indirectly incorporate the idea of PES.

#### 1.4. Case-Study Summary Characteristics

Before launching into a case-by-case analysis in the next chapter, we present a summary of the distribution of market types and mechanisms across all case studies. This overview will not only provide the reader with a sense of how representative our case sample is for the universe of environmental-service initiatives, but it will also serve as a backdrop for each subsequent case study.

Of the nine initiatives under primary analysis, all but one has implemented some components that satisfy one or more of the five PES criteria. Of the eight initiatives under secondary analysis (i.e. not visited by us), we only analysed one in depth as a main study because it was both applicable and advanced enough to undertake a full analysis; one was advanced, but we were not able to conduct a full analysis, due to time constraints and lack of comprehensive secondary information to examine; the other seven initiatives were still ‘in the pipeline’ and are mentioned only in order to provide a broader picture of potential future PES systems.

Tourism was the dominant type of environmental-service initiative observed (Table 1). These arrangements conceptually constitute the borderline to ICDPs; some observers see them as clearly distinct from other PES arrangements (e.g. Kiss 2004). We have included only a subset of existing community-based ecotourism initiatives; other examples exist in Bolivia. There is a fairly even distribution of initiatives across ecoregions (Table 2; Fig. 1). In terms of political regions (Table 3), the Department of Santa Cruz is the predominant ‘home’ of these initiatives, reflecting its large area, and the presence of national parks and of NGOs willing to experiment with innovative tools.

[Tables 1 and 2 near here](#)

[Figure 1 near here](#)

[Table 3 near here](#)

All but one of the projects are linked directly to conservation organisations with a primary objective of biodiversity protection. Thus, to some extent one could suspect 16 of the 17 initiatives to be ‘bundled’, with biodiversity as an explicit or implicit objective. In practice, however, the prevalence of biodiversity in the actual payment system as an explicitly addressed ecological service varies greatly.

Finally, the reader should also bear in mind that our ‘cases’ represent a sample of quite heterogeneous units, in terms of their history, number of participants, investments and geographical scale. At one extreme, we have a US\$10 million, 634 000 ha project that has been running for eight years (the Noel Kempff project); at the other extreme, we have conservationist Robin Clarke and associates trying to convince his old neighbour to conserve 50 ha of forest for a US\$30 monthly fee, in a deal that never lifted off the ground! While both

cases have interesting stories to tell about attempted PES applications in Bolivia, it is obvious that they do not count with the same weight .



## CHAPTER 2: CASE STUDIES – CARBON FORESTRY

### 2.1. Introduction

Under the Kyoto Protocol of the United Nations Framework Convention on Climate Change, those developed countries that ratified it are committed to a net reduction in greenhouse-gas emissions of 5.2% (400 million tonnes of carbon per year) below 1990 levels by 2008–2012. To add flexibility to this requirement, the Protocol also includes the Clean Development Mechanism (CDM), which allows emitters to offset their emissions by financing carbon-emission mitigation and sequestration projects, a small part of which is in forestry. Because trees take up CO<sub>2</sub> as they grow, afforestation or reforestation projects can result in a net reduction of carbon in the atmosphere. Incipient carbon trading has developed, making it possible for emitters to buy corresponding offsets on the other side of the world. Unlike watershed protection, biodiversity conservation and landscape beauty services, carbon is thus not characterised by spatial specificity—one can capture carbon anywhere on Earth, without qualitative differences in the type of service provided. This high geographical mobility and service homogeneity makes carbon much more suitable for creating a true ‘market’ than the other three services mentioned, with potential sellers competing fiercely with one another to provide a cheaper service to the buyers.

Forest carbon protection, in which alleged deforestation is averted through active conservation measures, was considered in the negotiations as a potential tool for acquiring emissions-reduction credit, but was excluded from the final agreement for the first commitment period (2008–2012). Opponents feared that too much standing forest would have been included, without achieving much ‘additionality’ in terms of active carbon sequestration. Nevertheless, critics have argued that carbon protection should receive credits in the second commitment period. In many developing countries, especially forest-rich countries in the neotropics such as Bolivia, deforestation and land-use change can be seen as part and parcel of an economic development process that is happening at considerable speed—a lot of forest is bound to disappear because it makes economic sense for the landowner to convert it.

Some carbon buyers, especially those with lateral interests in forest and biodiversity conservation, continue to fund projects outside of the Kyoto CDM framework, i.e. projects that do not produce Kyoto-eligible carbon credits. The environmental-service buyers here are typically Northern Hemisphere companies which in some way through their activities contribute to or enhance greenhouse-gas emissions, say, an electricity producer or an automobile company. Their gain from acting as service buyers is primarily in terms of ‘public relations’—a better image vis-à-vis domestic environmental pressure groups and environmentally conscious consumers. However, some actors also participate in the extra-Kyoto market to test out project modalities and position themselves in regard to possible future changes in the Kyoto rules.

Paying for the global carbon service implicitly provided by leaving a forest standing that otherwise would have been lost can make a significant strategic contribution; not paying is a lost opportunity. For instance, recent efforts at modelling Amazon deforestation and forest degradation (logging, fire, etc.) show that over the next 50 years, of the 120 gigatonnes ( $120 \times 10^9$  tonnes) of carbon stored in the Amazon, about one-quarter is likely to be removed into the atmosphere, but about half of that emission could be reduced by adopting less aggressive development policies combined with efforts of good governance (D. Nepstad

personal communication). In other words, the huge carbon implications of ongoing deforestation mean that ignoring it would seriously jeopardise the efforts of the Kyoto Protocol.

How have incipient carbon projects so far affected human livelihoods? To the extent that donors have explicitly targeted poor communities or regions, there is preliminary evidence that environmental-service sellers have derived economic benefits and assets from these projects, although they also need to pay for them with long-term land-use commitments (Milne 2000). This is usually least controversial when the projects occur on poor, marginal soils with low opportunity costs of foregone productive activities. In two specific cases, the Huetar Norte project in Costa Rica (Miranda *et al.* 2004) and the PROFAFOR programme in Ecuador (Albán and Argüello 2004), participating smallholders and communities received some asset diversification from carbon plantations, and short-run reimbursements of labour costs also made a positive contribution to livelihoods. Sales of mature timber would not take place for another 10–20 years, but the expected internal rates of return in the Ecuador case ranged from 12% to 27% over 30 years, indicating at least some healthy economic potential (Albán and Argüello 2004). However, other studies have shown that the future price and yield of plantation timber in Ecuador is highly uncertain, and thus economic returns are difficult to predict (Robertson 2002).

As we will see, the Bolivian experience remains quite limited. Although Bolivia has been host to one of the first pilot projects in carbon forestry and avoided deforestation (the Noel Kempff Project) for one and a half decades, not much new has happened. Widespread suspicion remains on the part of communities as potential buyers as to what the carbon trade is all about, and whether they could be disadvantaged by participation. For potential carbon buyers, the predominance of unclear land tenure at potential sites and a generally hostile ideological environment have been key obstacles. Nevertheless, there are a number of initiatives in the pipeline that we will describe at the end of this section.

## **2.2. Noel Kempff Mercado Climate Action Project**

In 1997, before the current CDM rules were established, Bolivia became host country for one of the first forest carbon-protection projects, the Noel Kempff Mercado Climate Action Project (NKMCA). To date, it is the only forest carbon project being implemented in Bolivia and is thus the main focus of this chapter. Because time constraints and the significant logistical obstacles for site access did not permit a visit, our analysis is based on interviews with project staff and three pre-existing project impact studies—Milne *et al.* (2001), Asquith *et al.* (2002) and Boyd (in May *et al.* 2003; and 2004).

### ***Background***

Noel Kempff National Park, in north-eastern Bolivia, is bounded by Bolivia's eastern border with Brazil, the Paragua and Tarvo Rivers to the west, and the Itenez River to the north. In 1996, the park was expanded by approximately 70%, from 889 446 ha to 1 523 446 ha, as part of a forest-carbon protection agreement. Three corporations—American Electric Power, Pacificorp and British Petroleum—paid for the 634 000 ha expansion and for various other project components aimed at preventing 'leakage' of deforestation into other forested regions, ensuring permanence of forest carbon protection, biological research, and building Bolivian Government capacity to implement other carbon projects. The Friends of Nature Foundation

(FAN, in its Spanish acronym), a Bolivian environmental NGO based in the city of Santa Cruz, coordinated the park expansion and continues to implement the project and co-administer the park with the National Protected Area Service (SERNAP).

The total project cost (as of 2002) was US\$9.5 million (Asquith *et al.* 2002). Of this total, US\$1.6 million was used to buy out the forest concessionaires who were planning to log parts of the expansion area, and a small amount was paid to buy out private property owners inside the same area. Another US\$1.25 million went to a multifaceted community development project in the three communities bordering the park and to three smaller communities. The community project's aim was both to ensure that livelihoods were not adversely affected by the park expansion and to prevent future deforestation in bordering areas. Funds were designated for microcredit lending, various basic social services and the legal establishment of the Bajo Paragua Communal Territory of Original Inhabitants<sup>8</sup> (TCO, in its Spanish acronym), among other initiatives. The rest of the project funds were allotted to various NKMCA project components, including carbon monitoring and verification, development of FAN's science department (US\$1.2 million), future park protection (US\$1.5 million), the establishment of Canopy Pharmaceuticals (a research entity exploring the potential for commercialisation of botanical pharmaceuticals), high-end ecotourism at Flor de Oro (US\$0.25 million) and institutional support for the Bolivian government's climate change office (US\$0.25 million) (Asquith *et al.* 2002).

Three communities all at the western edge of the park expansion in the Bajo Paragua River basin, with a total population of roughly 1050 inhabitants divided into 230 households (Boyd 2004), were directly affected by the park expansion—Florida, Porvenir and Piso Firme. The primary cost to the communities was the loss of employment in the local timber concessions, which had been terminated. A secondary cost was the partially lost access to the forest for subsistence-oriented extraction activities.<sup>9</sup>

While the main goal of the initiative is to conserve forests for carbon storage, it takes many roads to get there. As potential PES candidates, the various payments made appear to fall into three categories:

- (1) two one-time payments buying out logging concessionaires and landowners;
- (2) the 10-year stream of funds allotted to community development and leakage prevention; and,
- (3) the park budget support to ensure permanence of carbon protection.

By ceding their rights to exploit the forest, the logging companies, property owners and communities incurred opportunity costs from the park expansion that were either partially, fully or excessively compensated for by payments and, in the case of the communities, by development projects. The case of (1) is a direct compensation payment, not a PES—rather than buying a flow of future service provision, one purchases full control over land and resource rights by once-and-for-all buying out external, potentially conflictive rights (logging concessions, land ownership). The case of (2) is an indirect series of payments to the

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<sup>8</sup> TCOs have existed as a basis for titled land claims for indigenous groups since the INRA (National Institute for Agrarian Reform) law was passed in 1996. TCO status enables indigenous groups to formalise their land rights and thus be able to exclude external actors from land colonisation and resource extraction within their territory.

<sup>9</sup> A census conducted by Catari *et al.* in 1998 (cited in Asquith *et al.* 2002) showed that 131 families were cultivating 224 ha in the entire expansion area.

communities. They are not contingent upon any local obligations, and could thus be characterised as compensatory ICDPs rather than as a PES. For instance, the ecotourism operation at Flor de Oro is funded by the project, but it is located far from the communities and not linked to local people's land-use; rather, the benefits are considered as part of the development activities. There is a separate ecotourism project being implemented directly in the affected communities, but this project is not funded by carbon payments.<sup>10</sup> The case of (3) is a direct payment that is made in a non-contingent way; it does not depend on monitored, future protection and resembles traditional protected-area financing, with the distinction that the money comes from environmental-service investors (carbon buyers). In other words, none of the three payment types are PES in a strict sense.

In order to distinguish between the compensated actors, we divide the assessment of environmental and economic effects below into three sub-categories—concessionaires, absentee landowners and communities. Overall, the NKMCAP, through reaching agreements with these three groups, has had positive environmental effects in storing carbon and reducing threats in the park. The regional environmental effects are less certain, due to possible leakage of forest threats from the expansion area to other forested regions. With regards to economic and social effects, it appears that the NKMCAP compensation to forest concessionaires and to private landowners was sufficient, if not in excess of their opportunity and sunk costs. The overall effects on the communities are more complex, but appear to be positive overall.

### *Environmental Effects*

Before discussing the project's specific environmental effects, the debate over the legal and economic context in which these effects are analysed requires further background explanation. In 1996, the National Forestry Law (Ley Forestal No. 1700) suddenly required forest concessionaires to submit management plans for sustainable harvest. The new harvest restrictions, especially on rare mahogany and cedar, changed the economics of timber extraction in the remote Noel Kempff area—possibly in a way that would, partially or fully, have shut down timber operations, regardless of the NKMCAP. Detractors of this argument maintain that the law, which mandates a sustainable harvest, has also sparked a dramatic rise in certified sustainable timber harvest in Bolivia at a time when global demand was rising and few other countries could supply certified wood. In combination with the restrictions on mahogany and cedar cut, these legal and economic factors pushed Bolivia to the front of the certified suppliers market and stimulated an expansion of the Bolivian timber market to include new and less valuable species that could be certified as sustainably harvested. Since the 1990s, the prices for certified timber have risen. Some of the species are found in the NKMCAP region and might have been exploited as a result of the increased profitability—though transport costs from such a remote area are high, there is still profit to be made (R. Mancilla personal communication).

In the end, the fact that the project paid the timber companies to leave the area shows that the project implementers predicted that logging would have continued. Weighing these counterfactuals, it seems safest to assume that some logging would have occurred even under the new forestry law, but probably at a lower scale and with reduced profitability. If logging and related economic activity would have declined anyway, this implies on the one hand that

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<sup>10</sup> Because we were unable to visit this community ecotourism initiative, we do not describe it as a separate case study. However, we recognise that it could be considered a PES for landscape beauty (in the same category as the cases detailed in Chapter 4) that is affecting the local environment and livelihoods.

the NKMCAAP's carbon-storage and biodiversity-protection additionality is less than what is claimed; and, on the other hand, some economic agents may have been overcompensated.

### **Logging**

Logging in the expansion area has clearly stopped, and this conservation gain is substantial. In carbon terms, however, there is debate about how much the NKMCAAP has and will result in actual carbon storage and offsets. Though we will not enter into an in-depth carbon discussion, the issue of 'leakage' is worth exploring.

The contract between FAN and the logging concessionaires stipulates that the companies must not only leave the area, but also not intensify future logging operations elsewhere. This measure was included to avoid leakage of logging from one area to another, which would, when analysed from a global perspective, negate any gain in carbon storage from Noel Kempff. Indeed, the leakage dilemma is a profound one for any carbon storage project. From the information gathered about the ex-concessionaires in Noel Kempff, it is not clear what follow-up measures were taken to ensure the future closure. More importantly, any contract stipulations that extend to future operations of a concessionaire appear difficult, if not impossible, to enforce. San Martín is the only concessionaire that continued to operate at the time of field research (May 2004), but it claims that it has not been approached by FAN since the deal was signed (J. Abuawad personal communication). Overall, such a method of leakage avoidance appears unfeasible, as does any potential measure on a large scale.

Nevertheless, the potential of such leakage occurring should not overshadow the real conservation gain that the NKMCAAP has produced in terms of biodiversity conservation. The park is now larger and able to protect more of the rare and diverse species and ecosystems of the region. The extent to which leakage is occurring is unclear, but even if it is significant in terms of carbon, we cannot determine that the 'leaked' logging is affecting forests of the same very high conservation value as those of the Noel Kempff National Park.

### **Landowners**

In order to consolidate the expansion area, the NKMCAAP also purchased the property of at least three landowners. They had already invested in some small constructions and infrastructure in the area that were taken into account in the compensation package. It appears that the payment was set high in order to ensure that the landowners would leave. Had they not, the project would have had to resort to expropriation and compensation. Because such a deal would not have been voluntary, it would have made it even further removed from a PES than it already appears. The political pressure exerted on the logging concessionaires also highlights this point.

From an environmental standpoint, however, it is unknown how much additional conservation occurred, especially in carbon terms. There was no leakage-prevention extension to the agreement, so the landowners may have used the payment to clear new forest in another place.

Our previous statement about leakage of concessionaires applies here as well: certainly, the park was made more contiguous, an important requirement for its integrity. This means that at least the biodiversity gains can be taken for granted. In any case, even carbon leakages from landowners could be very small—we simply do not know. We mention this mostly to highlight the complexity of land-purchase impacts on conservation.

## Communities

To examine how the overall NKMCAP has affected the impacts of communities on the environment, two related questions must be separated and examined: What are the environmental effects of the overall park expansion (not including the community projects), with respect to changing communities' impact on the environment? What are the environmental effects of the community support component of the NKMCAP?

With regards to the first question, the sign (positive or negative) is uncertain, though the degree is likely to be minimal. Before the expansion of the park, community members cleared some land for farming and exploited various natural resources for domestic uses, such as timber, artisanal heart-of-palm production and wildlife. All of these activities had some environmental impacts before the park expansion, and the expansion limited these traditional use rights. However, a pre-expansion environmental impact baseline with which to compare current exploitation does not exist. Furthermore, the extent to which some low-grade land use is permitted in the expansion area is still unclear. Subsistence hunting and fishing are permitted to a certain degree, but the scale and scope of these limits are unclear and have been interpreted differently by community members, FAN and the park (Milne *et al.* 2001; Asquith *et al.* 2002).

Thus, because both the pre-expansion baseline and the current rules are unknown, the impact of the park expansion on community environmental impacts is unclear. The fact that little attention has been given to this impact indicates it is likely to be quite low.

The environmental effects of the community support project in the context of the larger NKMCAP project are also unclear. In addition to alleviating the adverse economic impacts of job losses, the project's community support component was created to prevent 'leakage' of destructive, forest-clearing activities to areas outside of the park. Depending on the assumed baselines and measured leakage, the environmental effects are very different. Discussion of these factors highlights part of the larger CDM debate about carbon forest protection projects, as well as the ICDP discussion about how much local support in environmentally sensitive areas can contribute to or negatively affect environmental protection measures (in this case, the expansion of the Noel Kempff National Park).

Initially, project representatives asked community members what type of project they would like, but did not open the discussion of how much money would be invested or what the obligations of the communities would be. However, there is no conditionality that prevents local people from carrying out forest-destructive activities. Rather than following a PES principle, they implicitly assumed that the synergy of improved livelihood and decreased threat to forests—this makes the community project component a 'compensatory ICDP'. No *quid pro quo* arrangement between FAN, the sponsors and the communities has been established. Direct cash payments to communities were never considered because of the unsustainable 'boom' phenomenon they could have produced (R. Vaca personal communication).

So, what have been the environmental effects of the community support projects? If the 'no community support project' baseline is assumed to be a decrease of the local population as the local timber economy petered off, the environmental effect of the community support project has probably been slightly negative. With no community support project, local inhabitants would likely have sought work in other regions where logging still takes place, or perhaps even migrated to the cities. Instead, local inhabitants have stayed in the region to work with

the community support projects, and their continuance may be negatively affecting the local environment as the stress on the area's natural resources (through farming and hunting) is maintained. Thus, in a strict environmental sense, it is difficult to justify the community projects, given the lack of certainty that any leakage would have occurred and the persistent local impacts on the environment. The degree of this environmental stress, however, is likely to be quite small. In the worst case scenario, the population and its consequent impact could actually grow as people from other parts of the region migrate to the project-supported communities. However, such a phenomenon has not been observed.

The 'no community support project' baseline, under which the NKMCAP is operating, assumes the population would have remained the same in the region despite the loss of logging jobs. Under such a scenario, community expansion (i.e. leakage) into other forested areas may have occurred as the local communities moved within the region in search of access to natural resources. It is this type of expansion that the community support project was and is aiming to avoid. To the extent that the project has succeeded in keeping people from such expansionary activities, the environmental effects of the community project (assuming this baseline) may be positive. The economic analysis below shows probable slight and perhaps unsustainable gains in the local economies, and thus potential for minimal leakage avoidance under this assumed baseline.

The net effect on carbon storage, biodiversity and forest ecosystems of the restrictions on community activities and of the community support project thus depends on many assumptions and vague data. That the positive environmental effects of the community projects are so uncertain and only likely to be minimal if at all positive, points to the extreme complexity of the NKMCAP. Without more data on environmental effects (present and future) of community activities as well as migration to and from the region, no definite conclusions can be drawn. The community project was, however, a key component to alleviate the economic impact of the buy-out and, through the lens of local economics, it has had much more of a noticeable impact which is discussed in the following section.

### **Summary of environmental benefits**

The overall environmental benefits of the park expansion are increased biodiversity and carbon protection, both as a result of avoided deforestation in the 634 000 ha expansion area. Part of the US\$1.5 million park endowment has been invested in additional park infrastructure and protection, including more personnel. If this endowment is properly managed it will be sufficient to fund park protection in the long term.

The actual magnitude of additional carbon storage (and thus forest threat reduction) provided by the expansion is debatable, based on different estimations of baselines and future carbon leakage both in the region and in the country as a whole. According to the NKMCAP, 6–8 megatonnes (= millions of tonnes) of carbon will be protected over the 30 years (Brown *et al.* 2000). More recent calculations suggest this estimate may be too high, and it has been adjusted downwards (however, the magnitude of this adjustment was not discovered during the writing of this report). Given the differing estimates of future harvests from the indigenous territory and follow-up monitoring of company activities, this calculation should be treated with caution. In addition, secondary leakage, which refers to the Bolivian market compensating for the timber 'lost' to conservation by increasing timber prices and making it more profitable to log other areas, has just recently been calculated. The estimates range from 3% to 42% (Sohnngen and Brown 2004). Nevertheless, though the additional forest protection

is unclear, the project still appears to have had a positive conservation effect, even when taking in the additional leakage factors (Table 4).

[Table 4 near here](#)

### ***Economic Effects***

#### **Logging concessionaires**

The payment agreement with the logging concessionaires was reached through a series of negotiations between them, FAN, The Nature Conservancy (TNC) and the Bolivian Government. The payment amount was based to some extent on a calculation conducted by FAN in 1994 (Moreno 1994), which estimated both fixed investments and opportunity costs. An amount was agreed upon with each concessionaire separately; they did not negotiate as a block. According to the largest concessionaire, San Martín, pressure from high levels of the government to accept the payment was significant and became the determinant factor in the agreement, rather than the adequacy of the payment itself (J. Abuawad personal communication). San Martín claims it had invested large amounts of money in the road which was not fully taken into account. At the same time, other analysts have criticised the FAN calculations for overestimating losses due to the changes caused by the new forestry law.

#### **Private landowners**

The appraisal of the land and infrastructure value was conducted by a FAN team in 1995, and all landowners were content to sell at the offered price (Table 5; R. Vaca personal communication). Thus, overall, this payment was also direct and one-time.

[Table 5 near here](#)

In addition, a summary report indicates that other property owners near the area approached FAN to request appraisal of their properties for subsequent purchase, but were denied because they were not in the expansion area (FAN 1997). Thus, it appears that the payment was most likely in excess of the overall value of the property to the landowners.

#### **Communities**

The economic losses that resulted from the park expansion can be categorised into two broad categories: employment losses and restrictions on natural-resource extraction.

The community support project has mobilised substantial funds and undergone substantial changes since its inception. FAN has implemented two phases of the community project. Initially, the Community Support Project was funded for five years (1996–2001, US\$850 000). However, the environmental-service buyers agreed to fund five more years of community projects (US\$500 000) in light of the continued need to establish viable livelihood alternatives for communities and prevent leakage. The projects include agroforestry, animal husbandry and planting of commercial palms. According to at least one assessment, the projects have had very limited economic success (Boyd in May *et al.* 2003). The project has now been redesigned to invest more strategically in long-term sustainable projects. This is a marked change from the initial approach of attempting to implement some of the community members' wish list (M. Ortiz personal communication).

The economic gains from the initiative include employment and incomes from community projects and microcredit. But what is the bottom line? Two studies, by Milne *et al.* (2001) and



Asquith *et al.* (2002), estimate and compare economic gains and losses to the affected communities. Milne *et al.* (2001) present a range of best and worst case scenarios that lie between the net gains of US\$260 695 and US\$92 782, respectively. Asquith *et al.* (2002) state that measurable, direct net gain summed for all years between 1999 and 2002 has been US\$128 580. It would therefore seem that the communities have clearly benefited from the NKMCA: for a population of 1050 people this corresponds to per-capita gains in the range US\$100–250. In a remote, cash-poor region, this is not a trivial amount. But what are the main assumptions behind these calculations? At a more disaggregated level, are there still both winners and losers to be found? The remainder of this section will provide some details.<sup>11</sup>

Before the park expansion, the Moira timber concession employed most of the men in Florida, one of the three communities. For 10 months of the year, 20 men from Florida earned between US\$66 and US\$133 per month (Asquith *et al.* 2002). The loss of logging jobs and their multiplier effects on the local economy thus had the most negative effects specifically in the 27-household community of Florida. During the first year after the park expansion, unemployment was very high, causing emigration and significant hardship for those who stayed (R. Vaca personal communication). Other community members who had earned income from associated businesses, such as laundry services and food production for the loggers, also suffered losses. With a total population of 144 individual (27 households), the total estimated annual income loss in Florida was the largest and amounted to between US\$13 200 and US\$26 000 during the year immediately following park expansion (Asquith *et al.* 2002). For comparison, the community of Piso Firme, with 452 individuals and 105 households, lost 10 logging jobs and total lost income was about half of that suffered in Florida (Milne *et al.* 2001). No jobs were directly lost in El Porvenir (the largest community with 466 inhabitants and 94 households).

As mentioned above, the loss is difficult to calculate because the park expansion occurred around the same time as the National Forestry Law would have restricted logging anyhow. The above figures do not take this expected decline into account, so they are likely to overestimate losses and underestimate net gains.

In addition to lost timber employment, other jobs were lost because of the drop in heart-of-palm extraction in concessions within the park. The overall extent of this job loss is substantially less than that resulting from the lost timber concessions, though the net magnitude is still disputed. While Milne *et al.* (2001) claim that a significant number of jobs related to heart of palm were lost because of the expansion, Asquith *et al.* (2002) note that the community was subsequently given rights to extract heart of palm from 11 000 ha outside the park. The reduction in heart-of-palm activities after expansion may thus reflect a period of poor management, lowering of world prices, and overharvesting, rather than a park-expansion-induced loss of the resource base. More information is needed to understand the net loss to heart-of-palm harvesters.

With regards to infrastructure, Moira had maintained, prior to the park expansion, the road out of Florida for 10 months of the year and provided free daily transportation to Santa Cruz,

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<sup>11</sup> To make more explicit the economic benefits of the increased conservation on a regional and national level, FAN plans to undertake an economic valuation that will factor in not only potential carbon gains, but also ecotourism and potential sale of pharmaceuticals. At the time of preparation of this report (April 2004), the study had not yet begun (FAN 2004; R. Vaca personal communication).

500 km away (Asquith *et al.* 2002). Moira's departure thus disrupted trade and overall economic activity in the village.

Another significant economic effect has been the park expansion's effect on local natural-resource use (see Environmental Effects above). The limitation of traditional use rights as a result of the park expansion affected the level and extent of several economically important activities, including farming and hunting. The extent to which such use is permitted in the expansion area is still unclear. Subsistence hunting and fishing are permitted to a certain degree, but the exact limits are unclear and have been interpreted differently by community members, FAN and the park (Milne *et al.* 2001; Asquith *et al.* 2002).

To ameliorate these initial losses, the project cast a wide net of activities to the three communities. Employment losses were partially offset by the creation of 12 new permanent positions for community members as park guards (S. Añez personal communication) and some 80 temporary positions for forest surveyors (Asquith *et al.* 2002). At least six community members were trained as tourist guides for Flor de Oro. To address the restrictions on natural resources, the project facilitated the establishment of the Bajo Paragua TCO adjacent to the park and has funded management plans to enable community timber and heart-of-palm extraction from there. To make up for the infrastructure losses, the project has contributed to road maintenance and provides some transport. A microcredit project of approximately US\$50 000 was implemented, investing for instance in improved agriculture, heart-of-palm processing and handicrafts. Only 26% of these loans were paid back, thus making the loans essentially a subsidy (Milne *et al.* 2001). The programme has now come to a halt (FAN 2000, cited in Milne *et al.* 2001). Finally, various agricultural projects were initiated, but had very limited success (Boyd, in May *et al.* 2003).

The initial flaw of many of the micro-enterprise projects is the haphazard way in which they were decided upon: FAN staff visited the communities and created lists of desired projects (M. Ostria personal communication). While the community input is the fundamental component of any project, the parameters of the project were not clearly established. As a result, many local stakeholders viewed the projects as outside 'gifts', rather than viable potential future income generators to which they should dedicate their time (Asquith *et al.* 2002). Thus, their sustainability is likely to be low from the outset. Finally, the project does not appear to have 'fine tuned' the compensation package to compensate the community hardest hit in terms of loss of employment, Florida (Milne *et al.* 2001; Asquith *et al.* 2002; Boyd 2004).

Though the Milne *et al.* (2001) and Asquith *et al.* (2002) studies weight the various economic effects differently to arrive at these estimates, they appear to agree that there are net gains at some level for the communities. At the same time, the data is short term and factors in the community support project subsidies. Assuming the community support will phase out in four years, the communities could potentially suffer serious decreases in economic livelihoods when the external support leaves, if favourable timber sales and ecotourism conditions do not materialise.

### ***Social Effects***

The primary social cost incurred as a result of the project appears to have been the loss of healthcare. The Moira timber company funded the services of medical doctor for half a day per week and subsidised medicines. The project has attempted to compensate by establishing

better health and education facilities. No information was available to determine how these compared with previous services provided by the concessionaires.

In addition, several social benefits have been realised through the project. The primary benefit is the establishment of the TCO of the Bajo Paragua, comprised of the communities of La Florida, Piso Firme and Porvenir. In 1998, the Bolivian President recognised the claim of the three communities. They are currently in the process of designing a management plan. The project contribution to the establishment has averaged about US\$10 000 per year since 1999 (S. Añez personal communication). According to project representation, the establishment of the joint Communal Territory has helped unite the communities and improve their community organisation (Milne *et al.* 2001), not to mention the benefits of secure access to the land and its resources.

### ***Discussion***

The Noel Kempff project is an instructive PES-related experiment that highlights many of the potential benefits and costs incurred by the various actors in carbon forestry projects. On the one hand, direct one-time payments to the logging companies and landowners were carried out. From a conservation point of view, these ‘golden handshake’ compensation payments seem to have worked well—most recipients seemed to accept them because rather generous amounts were offered. On the other hand, local communities were not able to negotiate a ‘contract’, but were offered ICDP activities as a compensation. It is likely that the economic gains have offset the initial losses to the communities. For the long term, however, this offset is less certain, because the project still subsidises many components of the local economy. In the same vein, there could be a long-term risk of leakage from the exploitation and clearing of forests outside the park by community members that have stayed in the region. Though leakage is unlikely to nullify the level of gained protection, it is still substantial enough to warrant consideration of changes in project design.

The community support project could be providing incentives for residents to stay in the region by subsidising their livelihoods. If the project can switch the productive logic away from the pressures on forests in the long term, then the community support has reached a primary objective of protecting the park, and there is little reason to introduce a PES system. The project could, however, just be temporarily offsetting these pressures—when the funding for projects ends, the same demands for natural resources such as timber, farmland and bush meat may put pressure on the park’s resources. In such a scenario, there is room for thinking about PES.

To what extent is the NKMCAP really a PES scheme? Table 6 provides our evaluation. Since actually all the cases under analysis in this report were *voluntary* agreements, we excluded this first criterion in this and in the following evaluation tables, concentrating only on the four remaining PES criteria from above. There is certainly a well-defined service—carbon storage and, more implicitly, biodiversity conservation. Money has also changed hands from buyers (foreign investors) to providers of environmental services, in terms of a one-time cash payment for loggers and landowners, and a continuous provision of ICDP benefits to communities. However, the alleged ‘sellers of environmental services’ probably did not perceive themselves as such. This is because the fifth criterion, PES conditionality, was not fulfilled. What loggers and landowners sold in a genuine *quid pro quo* deal was not the promise to continuously deliver an environmental service; rather they sold their fundamental rights to exist in the extension area (and maybe beyond), i.e. the right to log and to own land.

The communities received their benefits as a compensation (probably, overcompensation) for lost revenues, but with no strings attached—the benefit transfer does not depend on any of their actions.

#### Table 6 near here

In order to decrease these uncertainties for long-term livelihoods and environmental effects, it might be appropriate to experiment with tools that are more compatible with the genuine principle of PES, introducing elements of conditionality into the community payments. As suggested by Asquith *et al.* (2002), future project developers could consider a PES contract that directly links development benefits to limitations on the communities' right to exploit forest within the project area and in the TCO, so as to avoid leakage.

A direct contractual approach could potentially meet with resistance from the communities, which are now accustomed to unconditional support. However, this could be allayed by demonstrating that benefits could be received beyond the closure of the current project. The most obdurate resistance would likely come from stakeholders in the contract (the government, FAN and the companies) that had not envisioned such an allocation of funds. Yet, if the linkages between forest protection and the project's development activities are not direct, forest protection and the project overall could run the risk of failing to improve livelihoods and failing to ensure long-term environmental protection. Given that the sustainability of the project is still a live issue, and could be ensured and enhanced by such a contractual change, these ideas are worth thorough consideration.

For project implementers one lesson is clear: it is not enough simply to purchase and lock up land in order to protect the environmental service; close (and costly) follow-up and monitoring is necessary in order to understand clearly what the environmental effects are, and how threats have changed over time. In terms of community relations, another lesson appears to be that project implementers should make clear to all parties the amount of funds available for community support, over what time horizon it plans to distribute them, and what its measures of success will be for community support. This up-front transparency could help to avoid the creation of a relationship of dependency.

### 2.3. Carbon Forestry Initiatives in the Pipeline

Following in the wake of NKMCAP and more recent international climate-change negotiations, there are two proposals for new carbon forestry projects in Bolivia, in the regions of the Chapare and Inquisivi. These proposals were developed by outside NGOs in conjunction with the Bolivian CDM Office and were submitted to the Biocarbon Fund of the World Bank in 2003. At the time of writing of this report (2004), their prospects for World Bank support were still unknown.

#### *The Chapare*

The Department of Cochabamba lies in the middle of Bolivia and forms the bridge between the highlands and the lowlands of the country. It is a centre of population growth and agricultural expansion, which has resulted in high rates of deforestation. In 1999, the Cochabamba departmental council approved the Forestry Programme for the Tropics of Cochabamba, which includes investment in forest carbon projects as a priority project area.

Under this programme, the Food and Agriculture Organization of the United Nations (FAO), the Bolivian Government's CDM office and the Forestry Technical Centre (CETEFOR, in its Spanish acronym) have developed three proposals for forest carbon projects in the Chapare, one of Cochabamba's most forested tropical regions. Two projects involve afforestation and reforestation that fit within the requirements of the Kyoto protocol's current CDM. The third is an extra-CDM forest carbon conservation project ('avoided deforestation'), similar in nature to the NKMCAAP.

The first project proposal in the Chapare is to establish 10 000 ha of tree plantations on previously cleared agricultural land. According to the proposal, this would capture 3.3 million tonnes of CO<sub>2</sub> (0.9 million tonnes of carbon) over the 30 years of the project. According to the project description, living standards of the project's 5000 participants would improve through employment in plantation establishment, and revenues captured from sales of carbon credits and harvested forest products. Indirect livelihood benefits would accrue from training in improved land use and natural-resource management. The project itself would cover 70% of the costs and the landowners the remaining 30%. The total project cost would be in the range of US\$4–7 million.

The second proposal is to change the local land management systems from three-year rotational burning cycles to reforestation and regeneration of fallow fields. The project would fund the replanting, aided regeneration and management of about 10 000 ha of secondary forests and predicts that the 'enriched' forest would store an additional 3.1 million tonnes of carbon over 30 years at a value on the carbon market of US\$4–7 million (assuming a price of about US\$2.40 per tonne of carbon). There would be livelihood benefits from the sale of carbon credits.

The third proposal involves sustainable management and conservation of native primary forests in the Multiple-Use Forest Area of Cochabamba, in addition to improved agroforestry and silvopastoral systems. The project would pay landowners for each hectare of primary forest conserved under their forest management plans. Agroforestry and silvopastoral practices would be expanded and enhanced, thus reducing the pressure to clear additional primary forest. On land already cleared, soil-conservation practices would be introduced as an alternative to slash and burn. The project claims that these combined activities would prevent deforestation of 25 000 ha of primary forest, reduce deforestation by 60% in the project area, and benefit 2800 families with a 50% increase in incomes from agroforestry and forest management activities—or US\$630–930 per family per year. The emission of 10 million tonnes of CO<sub>2</sub> would be prevented over 30 years, at an overall market value of US\$8–14 million (assuming about \$2.40 per tonne of carbon).

### *Inquisivi*

The province of Inquisivi lies in the highlands, 80 km north-west of La Paz. It is an impoverished area, even by Bolivian standards, and is currently experiencing emigration as a result of deteriorating soils and lack of economic opportunities. Forest cover is being lost and some eucalyptus has been planted. The project proposal suggests planting of an additional 16 000 ha of eucalyptus over 31 years to capture 3.5 million tonnes of CO<sub>2</sub>. The project also claims it will avoid the loss of 2.3 million tonnes of carbon to deforestation by protecting remaining forests.

### *Some Comments about the Two Projects in the Pipeline*

While we will not undertake an analysis of the two projects described above, a cursory view of them brings to light some of the major challenges they will face if undertaken. First, the project assumptions about carbon being stored or captured could be subject to downward revisions, bearing in mind the complexity of measuring the carbon ‘additionality’, as revealed by the experience of NKMCAAP. This is particularly true for extra-CDM projects that claim to avoid deforestation. For the reforestation and afforestation project, further challenges include:

- planting and maintaining large extensions of plantations in an area where few exist;
- creating the incentives in the local economy to maintain the new plantations instead of replacing them with other land uses;
- creating a mechanism by which profits from potential carbon sales are distributed among a large number of shareholders.

For the Inquisivi project, challenges include changing a long-established land use system in the short term with the hopes that future sales will make it worthwhile.

For the proposed forest conservation component, changing land use by bringing agroforestry to the same level of profitability as environmentally destructive activities might be difficult. All of the proposed projects would aim to reverse local land-use change trends driven by economic interests. We suspect that a direct incentive mechanism as embedded in the PES principle, linking local income generation directly to the objectives of carbon services (additionality, permanence, leakage prevention), may be the most promising pathway to secure successful implementation.

## CHAPTER 3: CASE STUDIES – WATERSHED PROTECTION

### 3.1. Introduction

Watershed protection is rapidly becoming the most important of the four types of environmental-service payments in Latin America. Increasing water shortages in many areas of high consumption have triggered the search for alternative ways to enhance supply. FAO recently brought together Latin American experts and practitioners in this field for a meeting in Arequipa, Peru (FAO 2004) and followed up with an electronic-conference discussing some of the emerging issues in depth (Manon 2004). In Bolivia, many leaders of PES initiatives focusing on watersheds have recently come together for two workshops in Santa Cruz and La Paz, organised within the framework of a global comparative watershed PES project coordinated by the International Institute for Environment and Development. Each of the initiatives, along with other implementers of projects focusing on watershed management without PES and scientists and policy leaders, presented the issues and lessons learned from their work.

A unique feature of watershed PES systems is that, except for some transboundary watersheds, they do not involve payments across national borders. The transaction is not the global 'North' paying the global 'South' for environmental-service protection; rather interested parties within the 'South' sharing watersheds are arriving at PES arrangements for specific services that are strategic at the local (e.g. downstream agricultural users), regional (e.g. urban water supply) or national (e.g. hydropower plant) scale. This certainly raises a challenge in terms of finding the necessary 'willingness to pay' within less affluent economies. For instance, the ability of poor downstream users to pay for upstream environmental-service protection is usually low. In principal, however, once established these systems could also prove to be more sustainable, since financially they do not depend on the changing fashions of external donors. Nevertheless, as we will see below, cashing in on that willingness to pay is politically controversial, especially in Bolivia. For the same reason, the implementers of watershed PES initiatives and other watershed-protection project initiatives have so far drawn mainly on external donors for financing their activities, with the hopes that local payers will step in over time.

Among the four environmental services currently being paid for, watershed protection is, in biophysical terms, the most controversial. To scientifically prove the linkage between a certain preferred land use and the additional provision of a water-related service (increased or stabilised average flow, dry-season flow, water purity, erosion protection) vis-à-vis a pre-defined baseline can be very complicated, and sometimes to prove such linkages scientifically can be more expensive than the alleged value of the service itself. The lack of scientific clarity also means that there has been room for a number of myths and half-truths about the forest–water linkage not only to persist, but in some cases to gain significant influence on policies and natural-resource management practices (Kaimowitz 2004).

What is 'myth' versus the scientifically most likely relationship (at current state of knowledge) about the watershed functions of forests? Overall, there is a widespread general belief that forest cover, compared to most alternative vegetation cover types, will always increase average runoff, regulate flows, increase dry-season flows, reduce erosion rates, provide clean water and diminish the risks of downstream flooding. In other words, many people believe that *any type of* forest cover is conducive to *any type of* watershed protection.

In fact, considerable scientific doubts remain on most of these linkages, and many of them are highly complex and dependent on site-specific conditions. Scientific assessments have shown the following regarding these claims (Chomitz and Kumari 1998; FSIV and IIED 2002; Johnson *et al.* 2002; Bruijnzeel 2004).

1. *Belief 1: 'Forests increase surface runoff'*: Normally forest cover actually *decreases* average run-off, compared to agricultural soils—sometimes significantly so, since trees (especially deep-rooted ones) consume and evaporate more water than crops. Trees also increase filtration, which can help recharge groundwater deposits. Furthermore, this reduction in runoff is usually more accentuated for natural forests than for forest plantations, *inter alia* because of lower quantities of leaf litter and humus in the plantations. A rare counter-example is high-altitude cloud forests that can genuinely 'produce' water by capturing cloud-born moisture. The fact that the popular belief about forests and water runoff is refuted by empirical evidence has particular importance for water services that depend on high runoff amounts, such as hydroelectric plants and irrigation users.
2. *Belief 2: 'Forests increase dry-season flows'*: In fact, forest can either *increase* or *decrease* dry-season flows, compared to agricultural soils. This is because two opposite effects are at work: higher evapotranspiration from forests with a negative effect (as described in 1 above) versus higher infiltration and water storage with a positive effect. Which of the two effects dominates is highly site-specific. In South Africa, for instance, tree cover has been clearly shown to reduce dry-season flows. However, the water runoff stabilisation effect, with an alleged increase in dry-season runoff, is often the most powerful argument for forest protection in watersheds. The Bolivian case is no exception in that respect.
3. *Belief 3: 'Forests reduce erosion rates and sedimentation'*: In some but not all cases, this assumption holds. Forests are effective in reducing sheet erosion, but for gully erosion and landslides the effect is less clear. Forests may have little comparative protection effect on relatively flat lands (where erosion rates are negligible) as well as on extremely steep slopes (where rates are high independent of land cover), whereas they can make a real difference on intermediately sloped areas. However, the effects of forest cover also depend much on what alternative vegetation cover one is comparing it with. Certain crops and pasture types may reduce erosion almost as much as forests do. It may also depend on vegetation-cover management, e.g. whether (and how) that forest at some stage will be logged, which can dramatically increase erosion.
4. *Belief 4: 'Forests help provide clean water'*: If we extend the argument under erosion and sedimentation to the filtration of contaminants and nutrients affecting the quality of, for instance, urban drinking water, there is relatively good evidence that 'forests are good for providing clean water'. (Other natural vegetation types could also provide similar services.) This characteristic is more valid for the conservation of natural forests than for reforestation. In addition to urban potable-water plants, breweries and mineral-water producers are also among the private-sector actors willing to pay for forest protection in upper watersheds.
5. *Belief 5: 'Forests reduce risks of flooding'*: Research confirms that during heavy storms in small watersheds, storm-flow volumes are higher from bare land or logged slopes than from areas where natural forests remain intact. However, this effect tends



to dissipate in larger watersheds (more than 50 km<sup>2</sup>), because floods in various small individual watersheds with variable rainfall patterns are equalled out rather than accentuated when adding to a single larger stream. Also, there is evidence that flood frequency is relatively robust, and perhaps less affected by vegetation cover *per se* than by how that vegetation is managed.

In summary, the evidence on forest–water linkages is in some cases clearly contrary to common belief (e.g. the ‘forests increase runoff’ myth), in others indeterminate (e.g. ‘forests increase dry-season flow’). In some cases (e.g. the ‘forests reduce erosion’ and ‘forests reduce flooding’ beliefs), the environmental service is more dependent on general vegetation cover and its management rather than on forest cover itself. How ‘good’ forests are for a certain service provision also depends on scale effects and to what vegetation cover one compares forests cover with. There is not always a clear scientific answer to the question of what the linkages between vegetation cover and hydrological services are. Moreover, the necessary studies are often too complex, time-consuming and resource-demanding.

Overall, it appears to be up to scientists to design more rapid assessment methods that can provide quicker (though perhaps somewhat less reliable) answers to the basic biophysical questions behind a potential watershed PES deal. More simple assessment methods would reduce the ‘transaction costs’ of providing basic knowledge for a PES initiative. However, in some cases of scientific uncertainty, where the standing forest nevertheless has proven to provide a satisfactory delivery of services in the past, the buyers may opt for the promotion of forest conservation from a precautionary principle: it is safer to maintain a large share of vegetation cover as it is, when the consequences of erring regarding the impact of land-use and cover change could potentially be disastrous.

In Bolivia, there are three PES -type systems for watershed protection at different stages of development; two are spearheaded by environmental NGOs—Fundación Natura Bolivia (or simply, Natura) and the Environmental Protection of Tarjia (PROMETA, in its Spanish acronym)—and the third led by a rural development NGO—the Eastern Training Institute (ICO, in its Spanish acronym). A fourth project is in the preliminary, exploratory phase and is headed by FAN, the NGO implementing the Noel Kempff project. Because the latter is similar in concept to the PROMETA project, we will describe it briefly in the PROMETA section.

### **3.2. Los Negros River Watershed – Los Negros and Santa Rosa Villages**

#### ***Background***

Natura’s environmental-service payment initiative is centred in the Los Negros River watershed in the zone of the department of Santa Cruz referred to as Los Valles, or ‘the Valleys’. The watershed, spanning roughly 25 000 ha, borders Amboró National Park. Santa Rosa is a town in the uppermost region of the watershed that includes part of the headwaters of the Los Negros River, sharing an extensive and disputed borderline with the park; Los Negros is a downstream community in a prime agricultural area. In 2004, the average annual income for a farmer in Santa Rosa was approximately 8000 Bs per year, or US\$1024 (Vargas 2004). Compared to other rural parts of Bolivia, it is a fairly well off region. Los Negros was more prosperous with an average annual income of 11 400 Bs or US\$1459.20 per household (Vargas 2004).

The Los Negros River is vital to the agricultural economy of the area. Because the climate is semi-arid, irrigation is necessary for year-round production of vegetables, the main cash crop. All of the irrigation water comes from the river and, over the past 10 years, inhabitants of the region have noted a decrease in its water level in both the rainy and dry seasons (Vargas 2004). The decrease has been attributed by some farmers in Los Negros to both a spread of irrigation channels upriver, reflecting increasing upriver water demand, and deforestation at the headwaters of the river. Much of the forest that is being lost is cloud forest, one of the few forest types that can 'capture' water in net terms, i.e. increase water flow compared to agricultural land, despite the quantities of water being consumed by the trees themselves (Calder 2000; Bruijnzeel 2004). In the early 1990s, conflicts over the river resulted in clashes between Los Negros and the community closest to the head waters of the river, Santa Rosa. According to local residents, inhabitants of Los Negros (referred to as 'Negreños') blamed the Santaroseños for the decreased water levels, claiming that they were diverting too much water for irrigation and clearing the forests that were vital to river protection.

The main threat to the forests of Santa Rosa is agricultural expansion by native inhabitants of Santa Rosa and by recently arrived colonists. The agricultural system is a combination of permanent agriculture on flat areas and itinerant slash-and-burn cultivation on steeper hillsides. Farmers typically clear land during the dry months of July to October. According to Vargas (2004), the average land cleared is 1.5ha/year per family. Farmers clear either virgin forest or secondary forest, depending on availability.

In 2002, Natura began to work with the communities of Los Negros and Santa Rosa to create a PES system in which the irrigators of Los Negros pay those farmers of Santa Rosa who voluntarily agree to sign a contract obliging them to protect a certain share of their forests. Natura had received funding earmarked for bird-habitat protection from the US Fish and Wildlife Service to establish a PES system that would protect both bird habitat and the vital watershed. In this sense, this PES initiative is actually a *de facto* bundled scheme—it tries to take into account both watershed benefits (as potential and main-target buyers) and biodiversity conservation (as current, pilot-phase buyers).

During a series of negotiations between the environmental committees of both communities in late 2002, the details of the first PES agreement were determined. By negotiation, the payment was conceptualised in kind rather than cash: each year, one artificial beehive was to be given by the Los Negros inhabitants to those landowners in Santa Rosa that voluntarily agreed to set aside 10 ha of primary forest for conservation. In principle, the agreement is designed as a direct, contingent, monitored PES. According to the contract design, which was created after this first agreement was reached, property owners who do not comply will not be eligible for future payments.

Moving from design to PES implementation has presented several challenges and problems. First and foremost, the purported buyers in Los Negros did not contribute any funds to the first round of payments, which occurred in September 2003. A survey conducted by Natura in July 2003 (Vargas 2004) had shown that 70% of farmers in Los Negros would be willing to pay something for forest protection, and that the aggregated annual amount would be in the range of US\$12 487–19 728, corresponding to an average of about 2% of household income. Despite this purported willingness to pay, actual contributions did not come through for the first round. Apart from general doubts about the usefulness of contingent methods in developing countries, we can only speculate about the specific reasons for this hesitancy to

pay. It is probable that the Negreños could afford a wait-and-see attitude because they suspected Natura would be able to find PES seed money from elsewhere—which actually occurred. The Negreños expressed mistrust that the Santaroseños would hold up their part of the deal. As potential future buyers of PES, the Negreños wanted a demonstration that the Santa Rosa ‘providers’ would indeed deliver *before* they delivered the money. Additional underlying reasons could be the organisational weakness among the irrigator groups, scepticism about the forest–water connection, and a deep-grown aversion to paying for irrigation water which is currently free; it is likely that many feared that supporting watershed protection was a first step to being charged for water.

In order to ‘get going’ and demonstrate that environmental-service payments could be effective and the system could be enforced, Natura agreed to pay the first rounds of payments, in the hopes that the irrigators of Los Negros would later acknowledge the positive results and contribute to the PES system, as they had said. Recent discussions (November 2004) with Natura indicate some opening on behalf of the Municipal Government to commit at least a small amount of money to the PES system (N. Asquith personal communication). If this happens, it would be a path-breaking event, increasing the chances of the PES system becoming financially sustainable.

The second problem was that land-tenure insecurity in Santa Rosa has been an obstacle to the enrolment of land in the PES system, in terms of defining exact boundaries. Some formal titles exist dating back to the most recent land reform in the 1970s, but the exact borders often remain unclear, land has since been sold or divided among heirs, and immigrants have occupied land. Ownership is *inter alia* demonstrated by ‘active use’ of the land, i.e. cleared areas where a farmer has invested time and money. Ownership of primary forest is thus insecure, as it could potentially be invaded by neighbours or squatters who perceive the forest to be unclaimed. The leaders of the landless peasants’ movement have promised new colonists that they will be granted ownership of forestlands to clear in the near future. This pledge poses an imminent threat to landowners who claim ownership over primary forest areas. While the exact borders between neighbours may be fuzzy, it is broadly understood among the most established community members which forest belongs to whom. Enrolment of forestland into PES is seen by landowners as a potential means to strengthen tenure claims (see below).

The third problem was that the initial building of trust among the parties to the PES agreement was a cumbersome process. The introduced concept of contractually binding land-use provision was initially met with much suspicion in Santa Rosa. This resistance is hardly surprising from those people who were clearing land in a way that could potentially be illegal or who do not own land. Some of the land-clearers saw the increased attention focused on conservation as the first step to increased general regulation of land use. They also saw it as a potential means of expanding the already controversial park boundary. There was some wariness that signing individual land-use contracts with a nature-conservation organisation, in a context of generally weak land tenure and people–park conflicts, could be a first step to lose land-property rights entirely. The landless people predicted that they could lose out under a PES system because they could not occupy land as planned. In addition, one might suspect that some options to work as farm-hands would be diminished from the additional conservation (if the scheme is effective), since this is an ‘activity-restricting’ PES system—in spite of the new beekeeping activity, the net effect on employment of restricting agricultural expansion is bound to be negative.

It took Natura a lot of time and effort to start building trust in Santa Rosa, first to be allowed to work in the community, then to initiate negotiation and formalise contracts. Consequently, the value of the proper in-kind payment for one year was a factor of 10 less than the combined side costs (negotiation, training, monitoring, etc.). This underlines the very high transaction costs of setting up the system.<sup>12</sup>

Despite these hurdles, the PES scheme has taken off. In September 2003, the first payments were made to five property owners. The surface area under the first conservation contracts totals 562 ha, i.e. with an average of 112.43 ha per owner, but spanning a range of 3–390 ha. The forest areas were mapped using a Global Positioning System (GPS) and contracts were drawn up with each landowner. A week-long beekeeping training seminar was given to the participants and, since then, several harvests of honey have taken place. At least eight additional forest owners have expressed interest in entering into a similar contract since October 2003, now assured that the contract was meant in earnest and was not some bogus promise by an outside NGO. By November 2004, seven additional farmers enrolled, while four of the five previous ones prolonged their contract for another year. This brought the total area under conservation contract up to about 1000 ha (N. Asquith personal communication).

Is this a truly contingent system, in the sense that non-compliance is being effectively sanctioned? It is certainly being designed as such, but the monitoring system is still under development. At the time of writing, not all violations may have been detected, and nobody has been sanctioned. In principle, once a violation is documented, the beehives should be returned to Natura. As the implementers note, however, fully enforcing that rule would have very high political costs. Instead, they would thus choose to simply not prolong the contract with the respective participant. This ‘softened’ management practice may be a realistic approach in this potential conflict setting. At the time of writing, it did not seem to severely jeopardise the efficiency of the incentive system. Obviously, as participants over time learn about the existence of this softened practice, basically any forest owner, even those planning firmly to deforest their land during the contract year, would want to enrol in the system to receive the first-year beehive(s), which would thus become a public-relations oriented ‘welcome gift’ for subscribing to the system, rather than a truly contingent reward.

### ***Environmental Effects***

Evaluating the effects of the PES scheme after only 18 months obviously amounts to a preliminary stock-taking of short-term effects, which are not necessarily precise indications of where the system is heading in the future. Since the first round of payments, the system of land selection has evolved and is explained below. In this pilot stage, the overall reduction of threats to the forests of Santa Rosa has probably been minimal. For the forests within the ‘conservation areas’, there may be some reduction of threats to the forests. In terms of land-use change, the land currently put under conservation contracts is not the most threatened by agricultural clearing, if it is in danger at all. This likely lack of ‘additionality’ has to do with the combination of rewards offered and selection of land areas. As we will show below, the per-hectare reward offered in the form of beehives represented economic values that correspond only to approximately 2–10% of the opportunity costs for setting aside agricultural land. At the same time, for the first round, farmers were free to choose which primary forest areas to offer to the scheme as set-asides.

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<sup>12</sup> If one includes the apicultural training element as part of the benefit transfer, the value of which is about equal to that of the beehive itself, the ratio of transaction costs to transfer would be reduced to 1:5.

In this situation, what is the rational response from the farmer's point of view? One might initially be led to believe that nobody would enrol in the scheme, since the rates offered were uncompetitive. However, most farmers have areas of forestland where no plans of conversion exist for the future, at least in the short term; thus, the opportunity costs of fully and formally protecting the land for the current year are close or equal to zero. The rational response for the farmer is thus to enrol these lands into the forest protection schemes, receive the beehives as a type of petty grant, and otherwise do business as usual. In addition, if minor productive activities were foreseen on that land, they could always be moved elsewhere on the property, drawing attention to the possibility of 'on-farm leakage'. Also, since some higher-elevation forest areas are still unclaimed, they could move their farming into these regions, producing 'off-farm leakage'.

At the same time, it would be premature to say that the scheme has had no effect on land use at all. First, some planned degradation from clearing in forests within the conservation areas may have been avoided in marginal areas with extremely low opportunity costs, although a rigorous monitoring system to ensure this protection is not yet in place (see below). Second, a small threat reduction may occur as a result of the scheme's ICDP-type effect, i.e. the labour diversion effect that honey production could have—it is estimated that a farmer will have to spend some time tending bees rather than doing other things, including agriculture and possibly clearing forest. Third, the scheme gives increased local recognition of unused forestland as a potentially income-generating asset. This status can increase perceived tenure security for those farmers who want to keep their land under forest cover, including as an option value for future uses, but who are nervous that it might be occupied by squatters. It is indicative that some of the enrolled landholders, when asked about the preferred modality of PES payments, responded that rather than additional beehives they would next year like to receive barbed wire and other assistance in delimiting their forestland so that they could enforce their tenure rights with greater clarity and determination (see below). We should clarify that enrolment into the PES system in no way changes the *legal* status of any tenure claim. There is also the issue of whether any strengthening of the present occupant's tenure perception is fair, equitable and socially desirable. We simply state that in the *landowners' own perception*, a *de facto* strengthening of land tenure is perceived as an attractive feature of PES participation.

What has the system likely achieved in terms of environmental effects? Table 7 provides a summary of these effects. Since most of the land enrolled so far would not have been cleared anyhow, the current environmental additionality remains very limited. In terms of the declared objective to change local landowners' behaviour by providing forest conservation incentives, the PES initiative may not be performing so far, perhaps except for a minor diversion of labour to beekeeping—an unintentional side-effect. In the future, if the stipulations of the contracts are changed, there may be less forest degradation due to reduced cattle grazing inside of forest areas. Paradoxically, the most important additionality of the scheme may be that the establishment of contracts helps institutionalise *de facto* tenure security, at least as perceived by the owners of primary forests, thus raising the probability of resisting invasion by landless squatters. A critical issue is what happens if the PES intervention creates a land-tenure system that is parallel to the (largely non-functional) official land-tenure process; problems of process legitimacy and opposed interest could lead to increased social tensions.

[Table 7 near here](#)

## *Economic Effects*

For a farmer receiving one beehive as a payment for enrolling 10 ha of forestland into the Natura protection initiative, the main economic benefit is the corresponding market price of that beehive, i.e. approximately 275 Bs (US\$35). In addition, Natura has also provided some basic training, providing the new beekeeper with the skills to obtain a better return from this new asset. Tentatively (based on a cursory review of the training costs), we value the training at a 'guesstimate' of similar value to the beehive itself (US\$35), so that an approximate total value for the first 10 ha enrolled would be about US\$70, and US\$35 for any subsequent 10 ha enrolled (US\$3.5–7/ha per year).

Why are in-kind payments being used for this initiative instead of cash? Many would state that cash is a superior option for the recipients as it provides greater flexibility in the use of resources. However, the beehive form of payment was agreed upon in the negotiations between the Santa Rosa and Los Negros environmental committees, and the property owners themselves in many (though not all) cases preferred in-kind transfers. As one of the farmers put it, 'If people receive a cash payment, they will probably spend it quickly. What we want Natura to do is help us develop something that can give us some lasting benefits'. In this sense, there is actually a *recipient demand* for traditional project activities—an observation that is remarkable vis-à-vis the generalised opinion among economists that PES payments are best done as a cash transfer. This 'paternalistic' demand may well be a rational preference if local capacities of saving, investment and entrepreneurship are limited. Another and perhaps more cogent reason is the social and political perception of cash payments. As one farmer stressed, 'If we are paid in cash, people will suspect that Natura or Los Negros is trying to buy the forest and will later foreclose'. Indeed, many farmers stated that mistrust still persists about the true objectives and nature of the PES initiative, and it is likely that this has also influenced the structure of the payments. Table 8 presents the advantages and disadvantages of both in-kind and cash payment systems.

[Table 8 near here](#)

For some of the members of the Los Negros environmental committee and for Natura (interested not only in a well-functioning PES, but also in biodiversity conservation synergies), a perceived advantage was the additional conservation incentives arising for forest as bee habitat. Also, the visible beehive 'demonstration effect' was claimed to bring them more mileage in terms of local goodwill than small, corresponding cash payments would have done. This observation is supported by psychological science claiming that low-value in-kind payments can be more effective than low-value cash payments in stimulating effort, since recipients are more likely to view in-kind transfers as compatible with reciprocal exchange and 'social markets' (Heyman and Ariely 2004).

However, at the same time there were also local voices against the beehives, calling for a change to more flexible in-kind or even cash payments. These voices stressed the low flexibility of beehives as an asset, and the labour and skill requirements of beekeeping implying that less-dedicated beekeepers would receive low or zero returns. For Natura, providing training in beekeeping constitutes an extra cost. Some local recipients predicted that they would *sell* the next hives to those in the village specializing in bees, thus creating an 'intra-village secondary market' to exchange beehives for cash. Others said they would prefer in-kind alternatives, e.g. barbed wire to fence off their land and strengthen tenure.

How much benefit do local recipients derive from the beehives? One box will yield on average 20–30 kg of honey per year and current market price of honey is 15 Bs (US\$1.92) per kilogram, yet most of the honey is currently consumed domestically. As a subsistence product, using the urban market price would give an overestimation of value, and the transport costs would not be relevant. If the beehive is managed correctly, gross income from honey production is approximately US\$38–57 per year. If the honey was to be sold, transportation costs to the nearest purchaser (roughly 70 km away) is about 2 Bs/kg (one trip for every 20 kg), making the income net of commercialisation US\$31–46/hive per year (J. Torrico personal communication). Thus, for every 10 ha conserved, a farmer can receive an investment upfront equivalent to US\$35, plus US\$35 worth of training, and with these assets make a gross annual income of approximately US\$31–46/hive.

Another way of looking at the benefits is to assume that the PES project brings unique benefits which the farmer would not have been able to access on his or her own. If this assumption is valid, one should estimate the expected future net returns from beekeeping; the costs of labour must be factored out of the gross income. The labour costs include an upfront labour investment of 10 days for the management course, capture of the queen bee and apiary establishment. At the going local wage rate of 25 Bs per day, this amounts to 250 Bs (US\$32). The labour input for recurrent beehive management is 1.5 hours/hive per week (including transport time) once the box is equipped and the bees stable. In one year, this amounts to seven days of labour. At the wage rate of 25 Bs/day, this amounts to US\$22<sup>13</sup> per hive and US\$3.3/ha per year. The total income is US\$31–46/hive per year minus start-up costs of US\$32 and running costs of US\$22. The first-year return is thus negative [US\$31–46 – US\$32 – US\$22 = –(US\$8–23)], implying that the labour costs of working with the beehives in the first year outweigh the benefits. In the following years, the net return is US\$31–46 – US\$22 = US\$9–24/hive per year, or US\$0.9–2.4/ha per year (1 hive per 10 ha of conservation land). If we assume that the rough average expected lifetime of a beehive is 15 years and that the discount rate is 8%, then the net present value per hectare will be in the range of between –(US\$15.25) (negative value) and US\$12.66/ha.<sup>14</sup> In simple words, this means that the skilful and lucky beekeepers could make a PES return of US\$12.66/ha, but the less fortunate ones would have negative returns, meaning that returns to labour would fall short of the local wage rate. This calculation underlines the lack of competitiveness of the PES scheme, and it helps to explain why some PES recipients want to exchange their beehives for cash.

We thus have two alternative PES values, one using the direct annual value of beekeeping assets provided to the participants (US\$3.5–7/ha per year), and one incorporating the discounted returns from the activity (US\$–15)–13/ha per year). Thus, the PES scheme's livelihood effects are normally positive, but minor in size and effect. The beehives have been received in a positive manner, providing Natura with a locally visible trademark. However, the gains are minimal, and our rough calculations show that those recipients that do not happen to be skilful beekeepers may at the extreme be losing money because they could potentially allocate their labour to more remunerative activities.

How do these values compare to the opportunity costs of the land? The foregone production costs of keeping land under conservation vary greatly. A hectare of farmland can provide a

<sup>13</sup> Bs 25/7.9 (Bs to US\$) × 7 days a week = US\$22 per hive per year.

<sup>14</sup> For year 2 to year 15, the discounted value will be US\$(0.9–2.4) × 8.61 (annuity of 8% discount over 14 years) = US\$(7.75–20.66). Subtracting the first year negative labour value range (–(US\$8–23)), this provides a net present value ranging from –(US\$15.25) to US\$12.66.

net return of up to US\$100/ha per year without irrigation and US\$400/ha per year with irrigation (Vargas 2004). There will be substantial up-front land-clearing costs of bringing a hectare of forestland under agricultural cultivation. Even so, it is clear that even the most skilful and lucky beekeepers will only derive a benefit that is a small portion of the actual opportunity costs. It is thus not surprising that most of the land put under conservation is on steep slopes that would not be adequate for agriculture, and thus has an opportunity cost close to zero. As one of the landowners admitted, he would actually not have cut any of the forest which he put under conservation last year. This illustrates that the current additionality of the scheme with respect to local farmers' land-use change decisions is close to zero.

### ***Social Effects***

The PES system has had quite marked social effects (positive and negative) in Santa Rosa. The formation of the Environment Committee has attempted to create a communal forum to explicitly address previously acknowledged problems. The discussions with Los Negros have also started to build a bridge where only resentment and bitterness between the two communities existed before. People in both communities acknowledged in numerous meetings that the progress made to date has been both encouraging and surprising.

However, the PES system has also caused substantial conflicts within Santa Rosa. People sceptical of the project, in particular those without land, have called for the project's dissolution. They claim that payments to one group within the community are unfair and regressive, as those who have land are generally better off to begin with. As mentioned above, those who do not have land argue that the forestland is not owned by anyone; they have a clear and vested interest in keeping access to this land open. These sharpened divisions of interests have spilled over into other aspects of community functions, such as the school board and the land titling process.

A key issue here is the clarification of *de facto* rights—a *sine qua non* for any PES system. To the extent that Natura's land-conservation contracts, with maps explicitly showing boundaries and owners, come to substitute the lethargic land-tenure process of the corresponding public authorities, there seems to be an outcry from those that feel disadvantaged by those divisions and those who have a vested interest in continued tenure insecurity. These actors would argue, not without reason, that the process is non-transparent and lacks the legitimacy of public authority. However, under the present context of an open forest frontier with landless settlers seeking a homestead, one should remember that any conservation initiative trying to effectively reduce open access to the land and slow down deforestation is most likely going to have a catalytic effect increasing social tensions.

### ***Discussion***

The small-scale Natura initiative in Santa Rosa and the Los Negros Watershed is the payment initiative in Bolivia that comes closest to the 'purist' principle of PES (see Table 9). The main reason is that it is actually designed as a truly conditional scheme. As with most pioneer systems, the Natura initiative faces serious challenges. While the NGO started out with an approach focused on immediate conservation effects of 'stopping agricultural frontier expansion' into the forest and conservation of bird habitat, the implementation process has revealed the complexities of introducing a contingent PES system. Lack of user payments, land tenure insecurity, the need for technical studies and slow trust building have emerged as the main obstacles. As a result, Natura's emphasis has shifted somewhat towards 'process



management', i.e. establishing the trust and institutional framework necessary for a well-functioning payment system to operate, and has made important headway in establishing the PES principle locally as a mechanism for natural-resource management.

[Table 9 near here](#)

Is the environmental service well defined? This initiative is *de facto* a bundled scheme (watershed and biodiversity). The alleged watershed protection effect has not been studied so far, which contributes to the 'Achilles' heel' that beneficiaries so far do not pay. The biodiversity effect of some degree of increased cloud-forest protection seems in this particular area more apparent. However, some forest areas are probably more important for biodiversity, others for watershed protection, while some may essentially be less important for both. The initiative, at the time of preparation of this report, did not make any explicit spatial differentiation, and paid a flat rate for any forest patch. At the same time, conservation opportunity costs are highly variable in space. Since the funds are limited and the PES is not spatially targeted, only symbolic fees have been paid to landowners, covering only a fraction of the average land opportunity costs that PES would need to compete with to have a significant effect. The current additionality of the scheme vis-à-vis farmers' planned land-use changes is thus bound to be close to zero: most farmers currently enrolled in the scheme probably would have left their forest alone anyhow, although their lands may now be better protected against invasions. In principle, the system is contingent on landholders' compliance, but the monitoring system to ensure this is still under development. The contingency question will only stand its test under a scenario of true additionality, i.e. once landholders are forced to actually change their economically best land-use plan in reward for receiving PES. The critical question will then be how to effectively sanction non-compliance without losing too much hard-won local goodwill—a balancing act that any PES scheme needs to perform.

What could be the next steps in developing this initiative further? As part of continuing research, our written feedback to and dialogue with Natura has already affected the planning and implementation of activities. Indeed, some of the suggestions given in the following 10-point list are already in the process of being taken into account and, in some cases, implemented. The following recommendations for next steps are, at least in part, applicable to other PES initiatives, which is why they are presented here.

1. Study the forest-water linkage vis-à-vis other factors affecting annual and seasonal water availability in the Los Negros River.<sup>15</sup>
2. If the results of the hydrological study are favourable to the basic PES -underlying hypothesis (i.e. 'forest conservation significantly increases water availability in Los Negros'), then use this as the key point of leverage to show downstream beneficiaries why they should contribute financially to promote forest protection.
3. If the results prove the basic hypothesis is a myth, then possibly redesign the scheme and funding strategy to become a pure biodiversity-conservation scheme. In any case, give the biodiversity provision more explicit attention in the system.
4. Make a spatial analysis of priority areas for conservation of forests for watershed protection (provided that the basic PES hypothesis is upheld) and biodiversity protection. Overlay the two 'environmental-service yield maps' to find out where in space conservation is most important (a 'priority map').

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<sup>15</sup> In this respect, CIFOR is cofinancing a 'rapid hydrological assessment' in the Los Negros watershed at the time of preparation of this report.

5. Make a simple but realistic and spatially specific assessment of land opportunity costs ('opportunity cost map'). Use a 'land rent' approach—deducting from earnings not only variable input costs, but also normal returns to own labour. Include cattle grazing as an opportunity cost element. Consider the landowner's PES-triggered extra monitoring and protection costs vis-à-vis external threats as a potential opportunity cost element (e.g. patrolling, fencing). Integrate community members in this mapping exercise.
6. Assess past spatial land-use trends—where has deforestation occurred recently, and for what alternative land use? Which areas are likely to be threatened in the near future? Generate the 'threat map'.
7. Overlay the 'opportunity cost map' with the 'threat map' and the 'priority map'. Assuming a given, fixed PES budget, analyse where in the landscape PES would be able to make a difference for additional service provision. We assume strategic incentives to 'tip the balance' of land-use decision-making could particularly be provided in areas (a) likely to be threatened, (b) that have high environmental-service returns, and (c) have moderately low opportunity costs. Natura believes this strategic area may turn out to be a 'spatial band' between the cloud forest and the Yunga forest, but this will ultimately be an empirical question.
8. Target PES contracts to these 'strategic areas'. Use spatially differentiated instead of flat PES rates, i.e. offer higher payment for those areas that are more important for service provision. Evaluate the local political acceptability and likely behavioural impacts of reducing or phasing-out PES in non-strategic areas that are unlikely to provide additionality.
9. Refine the monitoring system and combine it with a credible sanction system that maintains the PES scheme as a genuine *quid pro quo*.
10. Under the constraint of incremental administrative costs, consider offering a menu of payment options (cash, different in-kind choices) that take into account individual preferences on the part of the recipients: more beehives for bee-lovers, barbed wire for those who want to protect their land, and cash for those who want greater flexibility.

### 3.3. The City of Tarija – Sama Biological Reserve

#### **Background**

In the Department of Tarija, which lies across several ecoregions including the dry Chaco region of south-east Bolivia, the NGO Environmental Protection of Tarija (PROMETA, in its Spanish acronym) is building upon the links between the Cordillera de Sama Biological Reserve and the water it 'provides' to the city of Tarija. As an associate of the US-based The Nature Conservancy (TNC), PROMETA states that the ultimate goal of the PES system is to 'finance the protection of Sama and its watersheds in perpetuity' (Molina Carpio *et al.* 2002). While no proper payment system has been established, PROMETA has begun to lay the groundwork and the initiative is 'in the pipeline'. In 2000, PROMETA began to establish a conservation fund for the two watersheds of which the Sama is a part. The interest generated from this trust fund would be used to protect these watersheds and the Sama Reserve (TNC 2004; R. Aguilar personal communication). If established, the trust fund would be funded by a tax on urban water consumption, along with possible external donations from foreign donors. The relative proportions of these contributions have yet to be determined. The fund would be spent on fire control, reforestation, control of soil erosion and improved agriculture, among other actions. For now, the funding for such activities is purely external.

Initially, PROMETA and TNC hoped to create a payment system within the entire, binational Bermejo River watershed, which spans over 123 000 km<sup>2</sup> in Bolivia and Argentina, a proposal which has been referred to in Landell-Mills and Porras (2002). Faced with both political and logistical difficulties, however, the project was redesigned and scaled back to include only the city of Tarija and the Sama Reserve watersheds. In this section, we examine the groundwork that PROMETA has laid for PES in Tarija, the implementation obstacles encountered, and the potential environmental and livelihood effects of a future PES system.

The city of Tarija, with a population of about 145 000, lies in the Central Valley of the Tarija Department with an annual rainfall of only 600 mm. The city is experiencing 4% annual population growth and a consequent increase in demand for water. Most of the city's households pay a flat rate of 20 Bs (US\$2.56) per month for water; the water is metered only in the centre of the city. Demand for irrigation water in agriculture is also increasing—significantly faster than drinking water consumption, in absolute terms. Finally, water is important for electricity. The San Jacinto hydroelectric dam provides 25% of Tarija's electricity, as well as additional irrigation water for farmers. The irrigators who use the water from the dam pay very little (US\$0.008 per cubic metre), if anything at all, for the water they use.

Where does the water come from? Located 30 km from the city's centre, the Sama Reserve contains the majority of two important watersheds for the region—the Victoria and the Tolomosa Rivers. Seventy-five per cent of Tarija's potable water comes from the Victoria River via a cement-covered canal. The Tolomosa River, to the west, provides at least 30% of the irrigation water to farmers in the Central Valley. The San Jacinto Dam on the Tolomosa receives 80% of its water from the Sama Reserve.

Established in 1991, the Sama Reserve spans 108 500 ha and is one of Bolivia's five internationally recognised Ramsar<sup>16</sup> wetland sites. Lying between 1900 and 4700 meters above sea level (m.a.s.l.), Sama contains four ecoregions with endemic and endangered species, including three species of flamingo (PROMETA 2004). The reserve status permits human habitation and exploitation of natural resources for subsistence use within the protected area. About 25 communities live inside the reserve, with a total population of 4000 inhabitants (R. Aguilar personal communication). Most are exclusively farmers and ranchers, and subsist on approximately US\$400 per year per household (Molina Carpio *et al.* 2002). In 1999, PROMETA began a cooperative arrangement with SERNAP to help with the management of the reserve, which SERNAP co-administers with an umbrella organisation of farmer communities found within the reserve (R. Aguilar personal communication).

The main threats to the Sama's ecological integrity are overgrazing and uncontrolled burning, allegedly triggered by unattended rancher campfires (R. Aguilar personal communication). In August 2002, a fire burned roughly 15 000 ha of the reserve. Over 100 inhabitants were displaced and the river from which the potable water was taken was black with ashes and non-potable for weeks afterwards (R. Aguilar personal communication). Cattle grazing is extensive, and is degrading grasslands, forests and waterways. The cattle are owned by both local inhabitants and outsiders who rotate their cattle through the reserve at certain times of

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<sup>16</sup> The Convention on Wetlands, signed in Ramsar, Iran, in 1971, is an intergovernmental treaty which provides the framework for national action and international cooperation for the conservation and wise use of wetlands. There are presently 142 Contracting Parties to the Convention, with 1397 wetland sites, totalling 122.7 million hectares, designated for inclusion in the Ramsar List of Wetlands of International Importance.

the year (R. Aguilar personal communication). In some regions, illegal logging poses a minor threat to the forests.

When PROMETA began to explore the possibility of incorporating payments into its trust fund, it formulated a strategy based on demand. To provide a basis for the establishment of the PES system, PROMETA began an environmental education campaign, institutional strengthening of Tarija's water cooperative, a reforestation project, and a fire control project. PROMETA also conducted both a hydrological study (based on existing data entered into predictive hydrological models) and an economic study, quantifying both water-consumers' willingness to pay for watershed protection and the economic losses that would be incurred without protection. These components comprise a solid groundwork for PES-system establishment in the watershed.

The environmental education campaign targeted urban consumers, emphasising the 'big picture' of their water system: that their water comes from forested regions beyond the water cooperative's control. PROMETA said that without public knowledge of the origin of the city's water and the threats to the watershed, a PES system would lack support.

To help improve the institutional management of the water cooperative, PROMETA has encouraged it to incorporate into a larger water management body, the Association for the Protection of Water Sources of the City of Tarija and Surrounding Communities (PRO-AGUA, in its Spanish acronym), which is described below. The cooperative has a 40-year concession to supply water to Tarija, and it is currently responsible for water collection, treatment and distribution. Over the past 10 years, it has been entrenched in corruption allegations (R. Aguilar personal communication). As a result, public confidence is extremely low and unlikely to improve significantly in the short term. This lack of trust will make the implementation of a PES system difficult and is one reason why PROMETA decided to incorporate other, more highly regarded institutions into the process.

In an attempt to show that reforestation is both possible and beneficial, PROMETA implemented a two-year reforestation project with native species at the headwaters of the Victoria River, financed by USAID and TNC. The project implementers predicted that the increased vegetation would stabilise water flow and improve water quality. PROMETA has already helped implement a fire-monitoring system that has been quite successful. In 2003, for example, 25 fires were spotted and controlled before they could cause significant damage (R. Aguilar personal communication).

The project ran a hydrological model in 2002 to extrapolate how changes in land use would affect water quantity and quality. The study predicts that further deforestation (mostly through uncontrolled burning) and land-use degradation of natural grassland and shrublands (from expanding agriculture, ranching and population growth) would have substantially adverse effects on dry-season flow. The findings for the main watershed, the Victoria, are shown in Table 10. The model applies to the entire watershed, not just the Sama Reserve.

[Table 10 near here](#)

The most important difference for urban residents and irrigators is that of dry-season water flows. With a growing Tarija populace, decreases in overall water availability in the dry season could be highly problematic. For irrigators, reduced water availability limits irrigation

and therefore crop yields. The sedimentation difference is most important for the dam, as more sedimentation will decrease its lifespan.

The important land–water linkages should be revisited here in order to highlight the importance of PROMETA’s main finding that the ‘with protection’ scenario, which involved both forest protection and reforestation, will lead to decreases in sediment runoff and increased dry-season flows. As explained in the introductory remarks to this section, such an effect should not be taken for granted because, in many cases, the opposite effect occurs.

The economic study carried out two valuation exercises on the protection of hydrological services: a contingent valuation measuring water consumers’ willingness to pay (WTP) for watershed protection, and an avoided cost method study calculating the value of erosion protection for the hydrological dam. The latter was done by imputing the alternative costs that would be triggered if the dam reservoir dipped below its functioning capacity due to decreased dry-season flow.

The contingent valuation study, conducted after two years of environmental education, showed that Tarija residents and surrounding rural communities whose water comes at least in part from the Sama Reserve<sup>17</sup> would be willing to contribute an annual average of US\$15 per urban household and 24 work-days per lower-income rural household to a watershed protection fund (Brezó and Crespo 2004). The water-protection fund would invest in various watershed-protection activities such as reforestation, enclosure and patrolling of protected areas. The total WTP of urban users is US\$381 026 annually—an amount about 50% higher than the 20 Bs (US\$2.56) per month currently paid for domestic water use. For rural residents total WTP is US\$103 198, assuming one day of labour is equivalent to a US\$3.15 contribution—rural users currently do not pay for water, so they were not asked for potential monetary payments, but most stated they would be willing to contribute labour for protection. The monetary value of this labour is greater than the urban contribution on a per-capita basis. According to this method, the total calculated value of the environmental service provided by Sama to the urban and peri-urban rural consumers is US\$484 134 per year.

Secondly, calculations of the costs incurred in the ‘protection’ scenario determined the financial losses to the water cooperative and the hydroelectric company that would occur as a result of less water to sell in the dry season and insufficient water in the dam to generate electricity, respectively. Brezó and Crespo (2004) show that with a 15% decrease in water level in the Victoria watershed, the water cooperative would lose US\$22 283 in annual revenues. The Tolomosa watershed dam, used by the San Jacinto hydroelectric company, requires a minimum level of water in order to generate electricity. If the water flow drops the projected 28% in the dry season for the ‘without protection’ annual scenario (see Table 10), the dam would not reach the critical level it needs in order to function. As a result, the dam would lose approximately US\$236 832 in revenue during the dry months in the ‘without protection’ scenario. In 2002, the critical water level was not reached and the dam did in fact incur major revenue losses. The dam is also threatened by sediment accumulation, which could be a significant cost, but this has not been quantified. Summing the two opportunity costs from protection for the water cooperative and San Jacinto, the value of the environmental service of vegetation protection is calculated at US\$259 115 per year.

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<sup>17</sup> The authors interviewed 147 urban residents and 118 rural residents, asking participants to state the monthly amount they would be willing to contribute to a fund or the monthly labour they would volunteer for protection of the watershed.

Regarding future developments, PROMETA has not opted, in the short term, for adopting a user-fee based on a financing model or conditional payment system of the PES type. This is despite the fact that hydrological and economic data seem to show a favourable setting for a PES system. Instead, PROMETA is moving towards a less incentive-driven strategy for watershed protection. It is spearheading the creation of PRO-AGUA, a private, not-for-profit entity comprised of four public and four private institutions, including the water cooperative. According to PROMETA, short-term funding would come from the proper member institutions and from foreign donors. The main objective of PRO-AGUA is to direct funds to a wide array of watershed management projects, including fire control, reforestation with native species, soil conservation, substitution of firewood with gas, organic agriculture, and improved livestock management (Crespo 2004). The prefecture of Tarija has recently committed to funding two key components of environmental education, and prevention and control of fires. In early 2005, the Water and Sewage Service Cooperative of Tarija (COSAALT, in its Spanish acronym) formally incorporated the Department of Conservation of Water Sources and Environment into its structure. It is hoped that this department and PRO-AGUA will coordinate closely with each other. Finally, in order to widen the discussion about watersheds and inform PRO-AGUA's strategies and actions, PROMETA has coordinated an inter-institutional forum on water sources. These new inter-institutional linkages could help promote the long-term viability of PRO-AGUA's efforts.

In what sense is PROMETA currently shying away from implementing PES, and what are the reasons? On the one hand, PROMETA is wary of the political repercussions of imposing a new tax on water consumption, and is thus reluctant to try to cash in on the water consumers' willingness to pay. Indeed, the public's aversion to increased taxes in part fuelled the protests that led to President Sanchez de Lozada's downfall in October 2003, and this reaction is at the forefront of PROMETA's strategic planning (A. Blanco personal communication). If it becomes more politically feasible, a system driven by user fees could certainly be an option in the long term (R. Aguilar personal communication).

There is not only reluctance to charge the users of environmental services, but also reluctance to pay the providers—even if the resources were available. Local communities who live and practise agriculture inside the reserve and ranchers who graze their cattle there would be the prime candidates, but the idea of compensation payments has not yet been explored. Indeed, it was not even mentioned in the WTP questionnaire. PROMETA regards direct payments as unfeasible, because unclear property rights with overlapping claims prevail (R. Aguilar personal communication).

### ***Discussion***

The NGO PROMETA in the southern city of Tarija has done quite a successful job in laying the groundwork to create a local PES watershed-protection system. Compared to Natura's efforts in the Los Negros watershed, PROMETA has opted for a more research-based strategy of careful information gathering. So, there is a clearly defined environmental service (Table 11)—more clearly than in most of the cases in this report—as well as a demonstrated range of WTP for some sort of watershed protection mechanism. At the same time, there is also a much more cautious, risk-averse (some would say conservative) strategy in terms of implementing direct-payment systems and using economic incentives. Until now, PROMETA has been raising money from institutional sources, mainly foreign donors, to carry out traditional conservation and reforestation projects in the Sama Biological Reserve. These actions are motivated by interest in both biodiversity protection and watershed-protection

needs. Some of the project activities provide employment and other benefits to local communities, but there is no effort to offer direct incentives to communities or cattle ranchers.

[Table 11 near here](#)

The reluctance to use PES components relates to two strategic decisions that should be analysed separately: a disinclination to charge service-users the cost of protection, and an unwillingness to pay the service-providers. There are pros and cons for both of these strategic decisions—arguments that also are likely to change weights over time as the political context and the type and degree of pressures on natural resources are changing.

Let us first examine the issue of user payments. Given the present political momentum in Bolivia, and the debacle of the water privatisation effort in Cochabamba in particular, imposing a higher user fee on water and electricity users is risky and could negatively affect poor consumers of these services, as has been observed elsewhere in Latin America (Rosa *et al.* 2003). On the other hand, such taxation may be needed for the long-term survival of the environmental service; it is highly unlikely that foreign donors will continue to pay perpetually for the protection of local water resources—the present sources of funding are not sustainable in the long term. To the extent that loan-financing is used, costs are passed on to the national economy, where someone has to repay the money in the future. In other words, while the foreign financing can be a convenient way of initiating a scheme—just like in the case of the Los Negros watershed—local finance is necessary as a long-term source of funding.

At the same time, to become an efficient system of water allocation, it is also important that all significant user groups contribute. It is not viable to concentrate all efforts on economising on urban water uses and making these ever more expensive, if at the same time groups of irrigators continue to have free access to water without any incentives to economise. Indeed, to have some groups unilaterally ‘pay for the party’, while others are free-riding, is possibly also a recipe for political unrest.

The second strategic question is whether or not to channel protection funds, regardless of their source, directly and conditionally to the upstream service-providers. This would bring with it the advantage of providing direct incentives for the providers that have a clear and measurable environmental result. At the same time, there are probably two types of situation where this could be problematic. First, to the extent that the land-use practices of these agents that jeopardise environmental services are illegal, the practice of paying them not to do these practices while ignoring the land-use restrictions that already apply may provide perverse incentives to demand payments for obeying the law. Second, if the agent and his or her spatial claim inside the reserve are not clearly defined (an absentee cattle rancher, for instance), payments could exacerbate land conflicts and provide incentive for third-party encroachment onto the protected land and extortion.

If these problems can be overcome, then PES may be a desirable supplement to the traditional watershed management activities. Next steps to address these problems would include the following.

- Clarification of the law regarding what is permitted and what is prohibited, so that the PES system can determine what conservation measures are legally additional and thus worthy of compensation.

- Legalisation of land claims in which stakeholders, in tandem with the sponsoring agencies, must enter the legalisation process, clarifying these and excluding unresolved areas of high conflict from compensation. Enforcement of land rights must be improved if third-party encroachment is to be prevented.

The case of Tarija–Sama highlights the central importance of both public perception and institutional credibility in the establishment of PES systems in Bolivia. Despite the thorough studies showing both the connection between the environmental service and land use, and a willingness to pay among the users, these more nebulous and, ultimately, more influential social misgivings towards PES may prevail. The new water management institution, PRO-AGUA, is likely to become the driving force in watershed protection efforts, but its success will depend much on its institutional capacity, credibility and strategy.

**Insert text -box 1 alongside preceding paragraphs (ending before 3.4)**

### **3.4. Eastern Training Institute, *Instituto de Capacitación del Oriente***

#### ***Background***

In the semi-arid valleys (*Los Valles*) of Santa Cruz province, water is an increasingly scarce resource, as farmland under irrigation expands, populations grow and other intervening factors such as deforestation and climate change affect water levels. Water quality is also deteriorating as cattle ranching expands, soils are compacted and cow waste contaminates potable water sources. In 1985, the Eastern Training Institute (ICO, in its Spanish acronym) was founded and began working with the small 24-household community of La Aguada to construct a potable water system. In 1993, water users identified the need to protect the headwaters of the watershed by fencing areas bordering the river or creek, thus impeding access in particular by cattle. Since these areas are often either privately owned or used by cattle ranchers, there are opportunity costs to this type of watershed protection, which is where a potential for PES comes into the picture. On the other hand, some vegetated areas near waterways have a general protection status, which the ICO initiatives have relied on in their persuasion techniques, although in the past this law has often not been enforced.

Since the inception of the La Aguada project, ICO has expanded the protection activities to 14 other micro-watersheds. The model became known as the ‘Water Planting Project’ (*Siembra del Agua*, in Spanish). In Vallegrande province, nine communities have created conservation areas around their water sources with the help of ICO. The ICO projects are the only PES-type projects in this overview of Bolivia that are not in or near a larger protected area and supported by a conservation-oriented NGO. The focus is thus purely on water-users. The number of water-users benefiting from the nine established conservation areas totals 2084 (ICO 1999). The total surface area protected is 534 ha divided among 562 households, which corresponds to 0.95 ha per household.

In 2003, ICO initiated a parallel project in the municipality of Mairana, in the province of Florida, bordering Vallegrande to the north.<sup>18</sup> The three new conservation areas in Mairana will add over 200 beneficiaries to the total (H. Arce personal communication). Building on its experience in Vallegrande, ICO plans to take a further step in Mairana in establishing the

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<sup>18</sup> These projects are within 30 km of the La Yunga ecotourism project, discussed in section 4.5.



protected areas: the legalisation of each protected zone as a Private Reserve of National Heritage (RPPN, in its Spanish acronym) (E. Rocha personal communication). This legal category has recently been formalised, and thus the ICO effort will be pioneering.

Our assessment focuses on the La Aguada project, as it is the only watershed in the Water Planting Project in which a cash payment from environmental-service beneficiaries was made to environmental-service providers. The payment is following a direct, one-time purchase of land for environmental-service protection. The relevant aspects of other watershed arrangements are mentioned when pertinent.

Basing the project design on the assumption that less grazing and more natural vegetation cover around the headwaters of the river would lead to more stable and better quality water, ICO and the community enclosed land surrounding the headwaters of La Aguada with barbed wire, so that cattle could no longer contaminate the water, compact the soil and consume understorey plants. Several attempts were made to reforest the enclosed areas with native species. However, low success rates led the project to abandon the planting effort and allow the land to regenerate naturally, which is an approach that has been successful at other sites.

All 24 households in La Aguada are members of the local water cooperative. Before the establishment of the domestic water system, community members carried water up to 2 km each way in buckets from the headwaters. In the immediate vicinity, cows gathered to drink, defecate and urinate directly into the water. According to one community member, the urine could be smelled and tasted in the water (A. Salazar personal communication). In the larger upstream area, cows consumed the plant life and trampled seedlings, resulting in soil degradation and a loss of vegetation cover.

When funds were acquired for the establishment of a water catchment and delivery system, the community considered prompting a change in land use in the area of influence. Because the land was being used for both grazing and as a route for cattle to access water, the opportunity cost of creating a conservation area was substantial for the family that had cultivated part of their 30 ha of land near the headwaters and the cattle ranchers. It is estimated that 700 cattle from roughly 20 owners used the area for grazing and access to the stream (A. Salazar personal communication). Though no formal titles existed, the use of the area was understood locally as proof of ownership or use rights. After a series of negotiations with landowners and ranchers facilitated by ICO, the water cooperative arrived at a one-time compensation payment of US\$700 for the 30 ha of private land that would be enclosed. Importantly, the original landowners still maintained ownership of the property (an issue examined further in the Discussion section below).

Compensation to the cattle ranchers, whose cows would no longer be able to drink from the stream, was the building of a drinking trough located outside of the enclosed area and supplied with stream water at all times. ICO covered the cost of the trough and its construction, roughly US\$200. The project then enclosed and conserved a 63 ha area around the stream's headwaters (the 33 additional hectares were cultivated land), which corresponds to 2.48 ha of protected land per household.

Alternative methods were used in the eight other watersheds of the ICO's Water Planting Project where conservation areas were created. These methods included a donated transfer of properties from private owners to the communities, secession of private property for the protected area while maintaining private formal owners (a type of conservation easement),

and complete expropriation by the community, which could occur even without compensation given the low level of formal and respected smallholder-farmer private property rights (E. Rocha personal communication). In total, seven communal agreements were signed, three of which included specified and maintained property rights for the original owner (R. Rueda personal communication). Overall, the origins of the PES systems are demand-driven, and the results, at least from La Aguada, appear to be both positive and sustainable (Table 12).

[Table 12 near here](#)

### *Economic Effects*

The economic effects of the La Aguada PES system appear to be minimal for the environmental-service providers. The landowners who were paid to abandon their crops or pastures have continued to farm and ranch in a nearby area, and the trough used to replace the lost access to water for cows seems to be providing enough water. These outcomes suggest that the land enclosure incurred some opportunity cost, but did not jeopardise providers' basic livelihoods. We were not able to interview the landowners and ranchers, however, and so do not know how the negotiation process proceeded and how fair they perceived the payments to be. Certainly social pressure from other residents was brought to bear and may have been a key factor, rather than the payment alone. Nevertheless, the service-providing landowners have also benefited from the scheme in their double role as service users, in terms of receiving clean water (suitable for drinking).

If it is true that there has been more water since the establishment of the protected area, then irrigators may benefit from an increase in water for their crops. According to ICO (1999) the water flow increased by 38% over 31 months in the La Aguada stream. This effect could be because of reduced soil compaction. However, more thorough hydrological studies are needed to confirm this positive effect.

### *Social Effects*

The health benefits of the decreased water contamination for water users have not been measured, though they are likely to be the most significant positive effect of the project. In La Aguada, there was, according to ICO, clean water 24 hours a day in 2004 (A. Salazar personal communication). A comparison of current health problems and expenses to other towns that do not receive water from a protected area would provide the basis for valuation of such benefits.

On the negative side, as with other protected areas, the establishment of the system also created tension among some community members, although in La Aguada they proved to be temporary. According to one published testimony by one community member in La Aguada, 'At the beginning of the work, [the project] created problems over land among neighbours' (quoted in ICO 1999). Since everyone appears to be benefiting now, there is probably little remaining tension. However, tensions appear to have been more marked in other areas where ICO is implementing similar watershed projects and where land disputes are more prevalent (H. Arce personal communication).

## Discussion

The ICO projects are of particular interest because they are not driven by conservation, but exclusively by the demand for cleaner water and a more stable water supply. The results have shown that, at least in La Aguada, the land use change led to improved water quality and consequent positive environmental effects. For now, the protected area in La Aguada is under no immediate threat, and thus the arrangement is likely to persist. Livelihood benefits occurred for the water users—it is likely that health has improved from the access to clean drinking water. There are several reasons why the initiative has been successful. First, the environmental-service providers were at the same time beneficiaries and thus had an internal incentive to protect the watershed. They were also living in the same community as the service users, thus being exposed to subtle social pressure to comply. That situation is very different from, for instance, the one in Los Negros where the watershed linkage is *between* villages, without many social ties that would provide pathways for social pressure to give priority in land-use decisions to the collective water good. Second, the link between land use and water quality was clear in the La Aguada case. Third, the landowners affected were few, and the payments and in-kind compensations provided to them and the cattle ranchers were sufficient to cover the opportunity costs so that no conflicts arose; this tranquillity may also be attributed to the small number of actors that have maintained unity for other, exogenous reasons.

To what extent are we talking about a genuine PES system in the ICO case? The environmental service (cleaner drinking water) is fairly well defined (Table 13)—there could be higher water flow, possibly in the dry season, but this is theoretically dubious and empirically untested.<sup>19</sup>

[Table 13 near here](#)

With the exception of the case of La Aguada, the environmental-service buyers did not compensate landowners for the land that they ceded for compensation, which was ‘procured’ via expropriation and social pressure. Furthermore, this payment was paid as a one-time compensation for giving up land rights continuously for providing an environmental service.

That the landowner still owns some rights to the land makes it more like a classical easement. Possibly social and legal concerns played a part in their decision, beyond of the size of the compensation. The fact that the monetary compensation option was only applied in one site out of many indicates that it is not the favoured approach. Indeed, it raises doubts about the viability of inter-village recurrent PES payments from water users to upstream landowners as a realistic option, if not for any other reason than the lack of a tradition of paying for protection of drinking-water sources.

Nevertheless, it may be that ICO faces much more significant challenges at other sites. In its new project in Mairana, according to the field technician, disputes over land are more pronounced and more actors have objected to the project development. In some key areas, the

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<sup>19</sup> Another clarification about environmental services should be made: while the primary positive effect of the establishment of a conservation area has been to protect the soil as well as eliminate pollution from cow waste, it should be noted that exclusion or prevention of pollution is not an ‘environmental service’ *per se*. An environmental service is a service that the environment provides which can be destroyed by human activity; it is not the absence of pollution. Thus, if a polluting source is stopped, this creates an environmental benefit that sometimes is compensated for, but it is not a PES.

active colonist movement has refused to give up land for conservation. What is more, the water cooperative has not been willing to pay for land-use change and does not trust that it will result in cleaner water or that the environmental-service providers will complete their end of the deal. In other words, the model of La Aguada may not be easily transposable. How ICO moves forward with the establishment of the legalised reserve will be a good indication of how feasible the idea of watershed-based PES is, and what factors are 'make or break' for PES-like systems in Bolivia.

## CHAPTER 4: CASE STUDIES – LANDSCAPE BEAUTY AND RECREATION

### 4.1. Introduction

Ecotourism is a nascent industry in Bolivia that has demonstrated rapid growth of 15% over the past five years (Alcoba 2004). From the establishment of the National Protected Area System in 1999 to 2002, numbers of visitors have doubled, from roughly 35 000 to 70 000 (J. Alcoba personal communication),<sup>20</sup> and the vast majority of these visitors are foreign. At the same time, both the government and various conservation NGOs have encouraged the incorporation of local stakeholders in the protected area system through ecotourism. The National Protected Area Service (SERNAP, in its Spanish acronym) and ecotourism proponents hope that ecotourism will improve livelihoods through increased incomes and strengthen local organisation, while at the same time creating local pro-conservation actors who defend protected areas (Alcoba 2004).

In the tourism literature, the concept of ecotourism has been used as a certified product label for a ‘responsible tourism’ that would have the following, allegedly desirable, impacts<sup>21</sup> (e.g. Boo 1992):

1. Minimal physical and social impacts on the visited area
2. Ecological education of the tourist at the natural site
3. Notable economic participation by local residents.

In the following, we will *not* use these narrow ecotourism criteria, but refer to the broader family of ‘nature-oriented tourism’. For our purposes of identifying PES-type structures, it does not matter if the tourist receives on-site ecological education (2). What does matter is a notable economic participation of local residents (3) and to what extent this participation is closely tied to an environmental service of maintaining ‘natural beauty’. If the tourists visit a site mostly for the quality of accommodation and food, for the convenience of transport and for non-natural attractions (e.g. a casino and a famous discotheque), then obviously any environmental service provided is sidelined. On the contrary, if scenic beauty, wildlife viewing options and the tranquillity of a destination are the prime attraction, i.e. if the natural assets are perceived as ‘the hen that lays the golden eggs’, then the incomes received from this type of tourism will come very close to PES—although they remain embedded in a tourism ‘package’ in which food, lodging and transport parameters still have importance.

What are the modes of tourism-derived payments for natural beauty? At one extreme, one could have models of tourism where all responsibility is in the hands of an externally based commercial operator. This company could directly make contracts with local communities to preserve natural beauty, e.g. in order not to practise hunting in an area that is used particularly for wildlife viewing. This is what comes closest to a ‘purist’ PES for tourism-derived natural beauty.<sup>22</sup> A less direct channel within the same model would be for the tourism company to

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<sup>20</sup> At the same time, it should be noted that international tourists are likely to be highly sensitive to in-country political instability. This has not yet been measured, but is qualified by anecdotal evidence presented after civil unrest in Bolivia, especially during October 2003.

<sup>21</sup> One might question whether these criteria are fully coherent; for instance, a notable local economic participation (3) will almost inevitably also trigger significant social impacts at the local level (contra 1).

<sup>22</sup> One scenario where this type of PES has been carried out is in the village of Zancudo, Cuyabeno Reserve, Ecuador (see Wunder 2000).

locally contract labour, foodstuff, etc., at a remuneration rate that is higher than the alternatively available local production options. The remuneration premium between tourism-derived incomes and the best possible alternative remuneration could thus also be viewed as a form of PES.

At the other extreme is community-based tourism, where local people are not only employed and subcontracted for delivered products and services, but are managing the tourism operation through self-administered companies. Often this occurs in cooperation with external operators that have a role in marketing the tourism product, thus also opening up for joint ventures and other hybrid modalities that lie in between the two stylised models. In the second case, profits derived from the operation, in excess of the remunerated production factors, could also to a significant extent be attributed to the environmental asset, as a type of 'landscape-beauty rent'. It is the community-based type of nature tourism that is clearly dominating in Bolivia, though with different modalities of community cooperation with external actors.

In what way could nature-based tourism and the local income flow it provides possibly be expected to promote conservation? Potentially three different causal pathways could be at work, either independently or simultaneously (Wunder 2000). First, the income from tourism can provide local people with more incentives to protect their natural assets vis-à-vis external threats (e.g. loggers, squatters, gold miners). Second, these incomes can also provide incentives for local people to change their own natural-resource management towards enhanced conservation (e.g. reduce agricultural conversion, hunting, wood extraction). Both of these effects are the types of impact one would expect from a PES scheme. A third effect is an impact derived from tourism-triggered changes in the local economy, and thus more indirect in nature: tourism causes local incomes and purchasing power to rise, new goods are bought in from outside, infrastructural investments are made, labour becomes scarcer and is diverted from other activities, etc. Several of these changes could work towards productive substitutions that alleviate pressures on the environment, e.g. less time available for hunting and money available for buying meat externally can together cause local hunting to decline. One could say that these indirect effects are more similar to the conservation impacts one would expect from an ICDP, compared to the direct incentive effects from PES.

Finally, the linkages to conservation make it crucial to scrutinise each of the case studies to determine what specific environmental service is being bought: is it the narrowly defined natural beauty of the visitation area that the tourists can perceive, or is it also the wider biodiversity conservation benefits of spatially much larger areas? It is obviously with this second purpose in mind that several conservation organisations have engaged in ecotourism initiatives, hoping 'to buy more than they pay for'. There can obviously be some linkages between the two types of environmental services, especially in the long term. For instance, if tourists come mainly to see large mammals, then these mammals appearing in the lucky tourist's slide show will typically need to interact with much larger populations and habitat ranges than the visitation area proper in order to stay genetically healthy. On the other hand, the example of successful nature-based tourism development in Costa Rica shows that ecotourism can indeed thrive in fragmented landscapes in an advanced stage of deforestation; ecotourism does not in and of itself 'justify' the protection of huge pristine land areas. In the following, we will try to shed light on these hypotheses and questions using five Bolivian ecotourism cases.

## 4.2. Chalalán Ec lodge

### *Background*

Bolivia's most well-known community-run ecotourism enterprise is the Chalalán Eco lodge of the community of San José de Uchupiamonas. Both the lodge and the community lie within the Integrated Management Area of Madidi National Park along the Tuichi River, in Bolivia's Amazon region. The gateway town to both the park and Chalalán is Rurrenabaque, a rapidly growing ecotourism hub.

Madidi National Park was established in 1995 and is one of the most biologically diverse areas of South America. Prior to the park's establishment, the area was being logged for mahogany and cedar. Forest clearing by colonists and hunting added to the main threats to conservation, as did medium-term plans to construct a large dam. In addition, petroleum and mining concessions covering 19% and 2% of the park area, respectively (Hamilton 2004) indicate that future disputes over extraction rights are likely to occur. Given the shifting influences of opposing interests of extractive industries, indigenous people and conservationists, it is unclear how such disputes will be resolved.

At the time of park establishment, the population of San José had reached a low point of 250 inhabitants due to continuous emigration; today more than 600 people live in the village. The lack of local employment options in an isolated area, combined with better opportunities elsewhere, were the main factors driving emigration. Nearly all the men combined subsistence agriculture with extractive activities. The latter included small-scale gold mining and forest extraction activities, such as hunting and, previously, fur trade. In the early 1990s, some inhabitants were employed by the logging companies, an employment which by then provided the village's main cash source. A rough estimate of average household monetary income in the mid-1990s was a meagre US\$50 per year (C. Pastor personal communication).

Members of San José became interested in the idea of ecotourism in the early 1990s, when external tour operators, based in Rurrenabaque, began bringing tourists to nearby areas. This included the extraordinarily attractive Lake Chalalán, which offers exceptional wildlife viewing. The lake, 2 hours downriver from the village, lies within the claimed territory of San José. Some community members served sporadically as guides for the operators, but no major local employment opportunities were created. This arrangement changed slightly when the community made an agreement with the La Paz based travel agency Colibri. The villagers received a percentage of revenues, but also started to feel the desire and growing capacity to develop their own tourism project (G. Mamani personal communication).

The park's creation meant not only an exclusion of external logging companies, but also the loss of the associated wage employment, and thus declining monetary income for local villages. In a counter-attempt to gain local support for the new park, Conservation International began working with San José in 1994. Both groups recognised ecotourism as a means of alternative income and an enterprise with great potential for growth in the heart of Madidi. Community members of San José, having learned from past ecotourism efforts, took the initiative to propose a community-run enterprise. Conservation International facilitated both the design and grant-application process; at the same time it bought out timber concessionaires that were planning to operate in the area, which the San José community supported. Three years later, the Inter-American Development Bank granted US\$1.4 million to San José for the construction of an up-market ecolodge and for local tourism training, with

Conservation International assuming a counterpart role to jointly implement the project in its first phase.

The history of collaboration between these two disparate actors was not uncomplicated (personal communications with M. Flores, CARE project coordinator in Rurrenabaque, 1994–97; G. Mamani, Chalalán Manager; C. Pastor, Conservation International, La Paz). For instance, the village wanted to disburse as much money as possible locally, while they could not see the necessity for expensive external consultants and trainers. Similarly, the villagers preferred to use precious and durable woods like mahogany for lodge construction, while Conservation International opposed the choice for ecological reasons. Despite these disagreements, in 1998 the construction of the Chalalán Ecolodge was completed and it started operation. In February 2001, the ownership rights of the lodge were formally transferred to the community. The community formed a corporation (*sociedad anónima*) that now owns the lodge.

Currently, most household heads are represented in the community tourism enterprise, which has 75 business shareholders—this represents 70% of the households in the village. Under the current administrative structure, part of the profits are reinvested in the company and distributed to the shareholders, while the rest goes to a community fund managed by the village authority.

The significant economic benefits that the village of San José derives from tourism are thus accruing through four different channels: dividends paid out to community shareholders (associates), investments for future tourism enterprise (shareholders), profits allocated to a communal fund for collective spending (whole village), and rotational wage employment (salaried workers); the model implemented in San José has paid out little cash profits to private shareholders and instead has focused on the other three categories. In all of these, substantial benefits have been derived, with a fairly equal distribution within the village. There have also been social and cultural benefits, some of which are linked to the tourism-derived income flows while others are not. Finally, the tourism operation has had on balance positive environmental effects, mostly in terms of increasing local incentives to actively defend the park and its buffer zone against external threats.

### ***Environmental Effects***

The environmental impacts of ecotourism need to be assessed against threats to the area that exist at various levels. In this section, we distinguish between three spatial zones: the national park, the lodge area and the village area. As mentioned above, principal threats to forest integrity and conservation in the Madidi area include land clearing for agriculture, logging, hunting, new roads, mining, oil and gas exploitation, and a possible hydroelectric dam. Since the mid-1990s, the threat regime has changed in each of the spatial zones (Table 14), and some of the reductions can arguably be attributed to the establishment of the Chalalán Ecolodge.

[Table 14 near here](#)

### **The park**

Most significantly, land colonisation of the park itself has been diverted more effectively, as a result of San José's indigenous land tenure being formalised, a process that was financed by resources derived from tourism (see below). This has significantly reduced external threats.



There is now an articulate land-tenure interest being defended by a small but very active community with an important stake in conservation. Since many of the park's areas previously appeared to be open-access zones to loggers and squatters, this is an important gain for those interested in conserving the biological diversity and physical integrity of Madidi National Park.

It is important to emphasise that the area used by tourists is small compared to the entire buffer zone and much area could still be exploited without jeopardising tourism. In spatial terms, there is thus a core tourism zone providing the service of natural beauty, but this is only a small part of the area that is being protected for biological diversity reasons. Although there are some long-term links between the provision of the two services, ecotourism in Chalalán (and elsewhere in the park) does not by far 'justify' the protection of the entire Madidi National Park.

The conservation gains made so far could potentially be reversed if the village was to use its more secure tenure to exploit timber, provide access to colonists, etc., while restricting tourism to a smaller part of their indigenous territory. However, so far the people of San José have protected the area in its natural state. It seems that their main motivation is that it is dangerous to provide access to other interest groups; the lodge operation is so valuable that it is strategic to maintain a large 'buffer zone' protection area where no other groups have access.

As a significant reduction of threat to biodiversity, the Chalalán Ecolodge has also helped to halt the construction of a large hydroelectric dam, at least in the short term. San José has been a significant voice against dam construction, as it would have essentially destroyed the future of ecotourism at the lodge. It helped that the community could demonstrate how many top-end tourists visited the area, and thus also bring in foreign exchange to the national economy. Opposition to the dam has consisted of both conservation groups and local communities in the area, which joined forces to draw political attention to the ecological, economic and social damage the dam would have caused. In 2000, the plan was put in abeyance and remains in that state for the time being.

#### **The lodge area**

The area in the neighbourhood of Chalalán Ecolodge is most evidently and directly protected by tourism. There is a clear perception in the village that the attractiveness of the tourism operations depends on the maintenance of wildlife resources, which is why hunting is prohibited in the areas where tourists hike. Hunting pressure has decreased substantially in the lodge area as hunters from San José have realised the importance of wildlife for tourism. Interviewees claimed that more wildlife is now present in the area, although no formal censuses have been conducted to measure wildlife population changes.

#### **The village area**

Conversion pressure on the forests near the community has increased, due to the doubling of the population. Had it not been for the significant tourism incomes, the previously ongoing emigration would almost certainly have continued. There are no signs of significant changes in staple-crop consumption or production patterns, in spite of the increased monetary incomes. Since the default vegetation cover near the village is forest, this means that the higher population has probably resulted in a linear increase in cultivated area at the expense of forest. According to community members, roughly two hectares are needed to feed an average household, and one plot will produce food for 1–5 years. A household will typically

keep four hectares of fallow for every one hectare being cultivated. When the cultivated plot is no longer fertile, either primary forest or secondary forest/forest fallow is cleared. Thus, to feed the additional population of 350 people, we estimate that a total increase in land used (cultivated areas and non-forest fallows) would total approximately 440 ha.

It is possible that hunting pressure in the vicinity of the village also has decreased, in spite of the population increase. Several of those interviewed stated that the availability of bushmeat around the village had increased, due to less hunting than before. Bushmeat has traditionally made up 70% of the protein in the local diet (Conservation International 2000). Livestock ranching, even for subsistence needs, remains negligible in San José, mainly due to disease problems. If dependence on bushmeat has declined somewhat, this seems to be due to changes in consumption patterns. Unlike for staple crops, beef and chicken meat is now being bought from Rurrenabaque on a supplementary basis. Since about 20 men are employed in lodge activities, they have less time to hunt, which is typically a time-consuming activity. This confirms that labour diversion effects are at work, at least in this particular field.

### *Economic Effects*

Since the lodge opened in 1998, there has been a sustained growth in tourist arrivals. Annual visitor numbers rose from 200 tourists in 1998 to 700 tourists in 2000 and 1160 tourists in 2002 (G. Mamani personal communication). There was a decrease in 2003 due to the political turmoil in Bolivia (Table 15), but there were signs of recuperation from this 'bust' already in early 2004 (G. Mamani personal communication).<sup>23</sup> Almost all tourists pay between US\$205 and 400 to Chalalán for an all-inclusive package tour to the lodge, depending on group size and number of nights stayed (two to three nights are standard). They may pay more if they buy the package abroad or in La Paz, where about 15 agencies sell the Chalalán package, and are authorised to add their own commercial margins (usually 10–15%). Exact figures for sales and costs were not made available to us, but Table 15 gives a rough estimate of gross tourism revenues. There was a steady growth in revenues until the political crisis in 2003.

#### **Table 15 near here**

The operational costs include mainly labour, food, fuel and operation of a sales office in Rurrenabaque. These running costs make up about 60% of the gross sale revenues of the tourism enterprise. Of the remaining 40%, a relatively large share of 25–30% is set aside for maintenance costs and depreciation of Chalalán's high-value infrastructure (lodge, boat motors, etc.). There are also some costly new investments within the company that demand resources, like the planned construction of new cabins with private bathrooms. Profits net of running costs, maintenance, depreciation and new investments are, as indicated in several interviews, about 10–15% of the gross revenues. In absolute terms, this would be in the range of US\$32 000–49 000 for 2003.

How are these net profits spent? About half of them are set aside in a communal fund for general public consumption and investment (see below); the other half is distributed about equally between dividends paid out to the 75 community shareholders and new tourism investment, such as new cabins being built in San José for a more culturally oriented tourism. We did not receive confirmed information about the size of net profits being paid out to shareholders. Calculating with the cautious, lower-range estimate of US\$32 000 net annual

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<sup>23</sup> These figures do not match exactly with other recently published estimates (Pastor 2004)—there is a difference of up to 150 visitors in the sum total number of tourists for all three years.

profits, 25% of that corresponds to US\$8000, or US\$107 yearly for each of the 75 shareholders. This is a 'guesstimate', since the information was not made available.

In any case, the net profits are not the main benefit for the local economy. The lodge is currently the only source of steady employment in San José, providing important wage incomes (Table 16). About 60 community members work there at one time or another during the year. The employment system is rotational and the pay is per-diem based for all positions, except for the motorboat drivers and the administrative staff. In the high season (April to September), the lodge employs about 30 people, which drops to 15–20 in the low season. Interviewees estimated that 30–50% of adults of the community are involved in some way as employees in the lodge operation.

#### Table 16 near here

In addition to net profits and wage incomes, farmers from San José sell their products to the lodge and artisans sell their artwork. Due to time constraints, we did not gather quantitative data on these local sales of goods. While the artisan trade seems to remain fairly restricted, and some of the food comes from outside, we would expect that the sale of basic foodstuff to about 1000 annual visitors (around 3500 person-days) could be a significant source of local income generation.

Finally, the tourism operation does not generate only local incomes. Associates of Chalalán point out the lodge's contribution to the national economy. Though no calculations of the total foreign exchange and income effects of the lodge have been made, they are likely to be significant. Bolivia's nascent ecotourism industry has few up-market options to offer, so the existence of Chalalán has likely drawn some higher-spending tourists to the country who otherwise would not have chosen Bolivia as a destination. The Chalalán Ecolodge reportedly paid US\$95 000 in taxes to the Bolivian state between 2000 and 2002 (Pastor 2004).

#### *Social Effects*

As mentioned above, 50% of the net revenues from the Chalalán Ecolodge are 'taxed' into a communal fund administered by the local village authority. Revenues are used for community spending on public services. Notably, this has included improved education facilities for 150 students. A new school house has been built and additional teachers were hired. Students can now study locally up to 12th grade without having to move to Rurrenabaque, the larger town that offers higher education to the region. This is likely to have a lasting effect on the average education level in the village.

The communal fund has also helped to pay for the travel expenses of community leaders who have lobbied (successfully) for an improved health post, telephone service and road improvement. The Chalalán project has put San José on the 'donor map' and given it the credibility and outside connections to attract more funds. For example, community leaders are hopeful that they will be able to attract donations for a technical school to train ecotourism professionals (G. Mamani personal communication).

Not all of these gains are, however, a direct result of income. Some gains are related to a greater visibility—the community is widely known for its tourism project. Another benefit is the improved local capacity to be effective lobbyists on behalf of the village and to be competent counterparts in the implementation of other projects, outside the realm of tourism.

In part, this 'development capacity' has been built by the ample training that was provided in the start-up phase of the Chalalán project; in part, it is probably the result of 'learning by doing', including improved internal organisation. It is also apparent that the engagement in tourism has enhanced local 'entrepreneurial spirit'—a business-oriented thinking within the community.

As a result of the increased employment opportunities, public services and income effects of the elevated cash flow into San José, many emigrants have returned to the community after years of absence. As mentioned before, the population of San José has more than doubled since the establishment of the lodge. Interviewed participants identify this return migration as a positive sign: the community is consolidating and families are once again reunited.

In addition, inhabitants also point to an increase in cultural and communal pride, attributable to ecotourism. The huts currently being constructed near San José are to be seen as an effort to diversify the community's tourism product from a purely nature-oriented into an 'ethno-cultural' direction. As part of the Chalalán tour package, tourists who currently visit the village (roughly 20% of visitors make a one-day trip there) are invited to a full-day programme with a demonstration of farming techniques and a 'cultural night' with traditional art, music and dancing. The outside interest in their culture and lifestyle has already made San Joseños, especially the youth, more proud of their heritage. As one communal leader expressed it: 'Before, the youth were ashamed to play the flute and the drum. It was embarrassing. Now, they are proud to do it.'

On the other hand, there is a cautious local perception that an excessive integration with tourists could potentially have negative side-effects, from illnesses and the use of drugs to changes in their traditional way of life. This is why both the currently used provisional tourist hut, and the new ones that are under construction, are physically located somewhat apart from the village.

The economic and cultural consolidation of San José has also served as a launching pad for the formation of the Communal Territory of Original Inhabitants (TCO). As explained under the Noel Kempff case study (section 2.2), TCOs have existed as a basis for titled land claims for indigenous groups since the INRA (National Institute for Agrarian Reform) law was passed in 1996. TCO status enables indigenous groups to formalise their land rights and thus be able to prevent land colonisation and resource extraction by external actors within their territory. The legal process to gain TCO status is time- and cash-demanding. Since 2003, San José has used revenues generated from Chalalán to consolidate their TCO—amounting to more than US\$20 000 by March 2004 (Z. Limaco personal communication). Without the profits from the lodge, this effort would probably not have been possible.

Not only is tourism the all-dominating source of monetary incomes in the village, all households also benefit from it to some extent. On the one hand, that benefit is secured through the shareholder mechanism and the public spending; on the other hand, almost all households are in one way or the other selling goods or services to the enterprise (Z. Limaco personal communication). The job-rotation system is an important equalising mechanism, especially in view of the importance of wages in the total benefits that the village receives.

Yet, in spite of these explicit distributional safeguards, we also heard some voices that 'not everybody is satisfied' with the current distribution of benefits. With the sudden flow of large profits into an extremely cash-scarce economy, that scepticism is hardly surprising. Gaps in

wages, e.g. between the administrators and the cleaning personnel, can create resentment. Beyond of the question of ‘who receives how much’, not everybody seems to agree on the current overall policy to reinvest the bulk of the profits—some shareholders would prefer to receive a larger share of the cake and to raise their current spending.

### ***Discussion***

The above analysis shows that the Chalalán Ecolodge has provided substantial livelihood benefits to the community of San José, both in economic and social terms. These benefits have accrued through various channels and have reached most, if not all, families to a significant degree. The list presented in the box, based on Pastor (2004), gives an overview of income flows and public goods being created to the benefit of San José village, thanks to the Chalalán Ecolodge. The same author estimates that the accumulated value of these benefits to date totals US\$155 031. Our crude cash-flow analysis showed that this estimate is probably too conservative. In particular, reinvestments in the tourism business are not being counted as assets. However, long-term benefits to shareholders as well as other local benefit recipients will likely increase significantly when the major investments in new cabins and infrastructure, both in Chalalán and in San José, start to generate revenue.

**Insert text -box 2 near here**

To what extent can we characterise the Chalalán experience as a genuine PES system? Table 17 summarizes our evaluation. The type of tourism operation that is implemented in Chalalán is strongly oriented towards the appreciation of natural beauty. It is fair to say that a significant share of the upmarket price paid by tourists is a ‘beauty premium’, linked to the extraordinary environmental attraction and quality of the site. This service is well-defined and conditional; if the Chalalán Lake area was subject to environmental degradation (logging, hunting, conversion, etc.), there can be little doubt that many tourists would stay away, or that the high price level could not be sustained.

**Table 17 near here**

In addition to the explicit landscape-beauty service, both the large initial grant by the Inter-American Development Bank and the continuous technical-assistance subsidies for the operation from Conservation International were clearly made mainly to preserve biodiversity. These donor ‘payments’ were obviously more implicit, not directly conditional, and the ‘service’ provided by the community was less well defined. Since the community has taken over the operation, these subsidies have stopped, so this is exclusively a retrospective consideration. Nevertheless, there can be little doubt that had Chalalán not been strategically located vis-à-vis the mega-diverse Madidi National Park, the luxurious Chalalán Ecolodge would never have been financed.

A major question that arises is to what extent the Chalalán model can be replicated in other communities. For most analysts, the answer is very little, because no other community has or will receive a US\$1.4 million grant. Without such a sum, not even the most entrepreneurial village or efficient project implementer would be able to build such a luxurious lodge that nets over US\$300 000 in revenue, not to mention implement community capacity-building and marketing for the lodge’s long-term success. In the same vein, an entrepreneurial spirit already existed in San José, which greatly facilitated the formation of a business.

Nevertheless, there are certain lessons that can and are being applied from the Chalalán experience, such as, a better analysis of tourist demand, a better understanding of the cost structure, fewer consultants, more integration of women. More concretely, Conservation International is aiding in the formation of a community-run ecolodge in the indigenous Tacana community of San Miguel de Balas, which has already formed its TCO. One project implementer has referred to it as the 'Child of Chalalán'. A two-hour closer boat ride from Rurrenabaque, San Miguel already has a notable commercial advantage over Chalalán. With a grant 15% of that of Chalalán (US\$400 000 from Conservation International and IUCN combined), community members are constructing cabins with private bathrooms, and they hope to open the lodge in 2005.

The central question remains, however, whether livelihood benefits from more 'humble' lodges can ever equal those from Chalalán. For the time being, the answer is no. In a recent exchange with two other community ecolodge ventures in Ecuador and Peru, it was evident that Chalalán was the only 100% community-owned enterprise. The most active participants in Chalalán have considered starting their own consulting business for community-run ecolodges, and this increase in information exchange may help other lodges reach the same level, at least organisationally, as Chalalán. If tourism picks up significantly, lodges like San Miguel may be able to capture more visitors at a lower cost. The following section, describing the Mapajo experience, will highlight the financial and social advantages that Chalalán has enjoyed.

### **4.3. The Mapajo Indigenous Ecotourism Lodge**

#### ***Background***

The Mapajo Indigenous Ecotourism project began in the mid-1990s, and is implemented by the Tsimane and Masetén ethnic communities that comprise the Pilon Lajas Indigenous Territory and Biosphere Reserve (TCO). Constructed in 1999, the ecolodge lies just outside of the TCO's largest community, Asunción de Quiquibey, which has 26 households (Comunidades Mosten y Chiman del Rio Quiquibey 2002). This is also the community with most involvement in tourism; five other villages are participating to a lesser degree (see below). One of the main attractions of Mapajo, which sets it apart from other tours out of Rurrenabaque, is its cultural offerings. The lodge is close to the community, and visitors can take a cultural tour of the community and witness traditional activities, such as weaving, carving and food preparation. The community organised this tour to add variety to standard offerings of nature hikes and boating along the Quiquibey River.

The idea of constructing and operating an ecolodge was sparked by the rising tourism activity in Rurrenabaque, two hours down river. As in the case of Chalalán, various tour operators were bringing tourists to the Pilon Lajas Reserve, but the communities received no benefits other than occasional employment as trekking guides. With technical assistance, mainly from the Regional Support Program for the Indigenous Villages of the Amazon Basin (PRAIA in Spanish), and funding from four external donors, the communities built the lodge and founded a business, Mapajo Ecoturismo Indígena Ltd. This community-based company has an executive council and a management committee to administer the lodge (Comunidades Mosten y Chiman del Rio Quiquibey 2002). They have opened an office in Rurrenabaque, where tours are booked. The total funding support amounted to over US\$123 000 between

1999 and 2001 (Schulze 2001). Additional funding of approximately US\$75 000 for further commercial development has been offered by other donors.

The Masetén and Tsimane live throughout the Beni Province, but Pilón Lajas is their only legally titled territory. Immigrants have colonised part of their traditional land. Before the 1970s, both groups were nomadic hunter-gatherers. Since then, they have become more settled. Although agriculture is now their main activity, most Tsimane and Masetén still hunt and fish regularly. Data collected from our interviews show that the average monetary income is low, due to the subsistence focus, and hovers around 3100 Bs per household per month (US\$397) (N. Cuata personal communication). Farmers grow rice, bananas and cassava, primarily for subsistence. They may sell staple-food surpluses and fish for cash.

The 400 000 ha Pilón Lajas Biosphere Reserve was created in the 1980s, but did not become an official protected area in Bolivia until 1992. In 1997, the government titled the land as a TCO, with stated goal of preserving the Tsimane and Masetén territory and culture. Twelve communities are dispersed throughout the TCO, with the six main ones lying along the Quiquibey River, a tributary of the Beni River. In total there are 290 inhabitants in the TCO (Schulze 2001). Pilón Lajas is the only reserve in Bolivia with dual status (Biosphere and TCO), and is currently coadministered by SERNAP and the TCO.

The mandates of sovereign indigenous land use and conservation could potentially converge or diverge in confronting different conservation threats. However, the main threats to the Pilón Lajas Reserve are external and come primarily from squatter colonisation and logging, indicating that generally there is more scope for synergy than conflict. The protection declaration banned new logging concessions in the area, but some old ones continue to operate. Furthermore, though community members said halting indiscriminate logging by outsiders was a goal of biosphere reserve and TCO establishment (C. Caimani personal communication) and the consolidation of the TCO has enabled the Masetén and Tsimane to legally exclude outsiders, some TCO members have recently opted to sell timber to loggers and land to immigrants from the highlands (L. Chavarro personal communication). Often illegal loggers first purchase the valuable woods and leave, while the immigrants log secondary species and later clear the land for farming (N. Cuata personal communication). This colonist pressure also appears to be mounting as the landless peasant movement gains strength in the region.

Initially, Pilón Lajas was open to outside tour operators. In 2000, Conservation International estimated that there were 13 640 visitors (Miranda 2002). In 2000, the TCO decided to restrict access, giving the Mapajo project exclusive right of entry to the reserve. Thus, the only tourism in the reserve is now led by Mapajo.

### *Environmental Effects*

The environmental effects of the lodge are still difficult to estimate, due to the early stage of the tourism operation. As for Chalalán, it is necessary to look at these effects at different spatial scales, distinguishing impacts in the immediate vicinity of the lodge from those on the reserve as a whole.

### **Asunción de Quiquibey village and lodge area**

On Asunción's own initiative, a land-use zoning has been established with assistance from PRAIA. There are now areas designated for tourism, where hunting and forest clearing are

prohibited. Initially, some of these protection areas were not always respected locally, but interviewees reported that such violations are decreasing as community members recognised their importance. Community members have decommissioned outside hunters who have entered the tourist area (L. Chavarro personal communication). According to one local guide, this zoning has resulted in more animals (N. Cuata personal communication). The zoning and protection thus represent a concrete conservation gain as a result of tourism.

According to participants, the main source of income and subsistence continues to be agriculture, and it is unlikely that this will change in the near future. Less forest clearing per family is taking place due to diversion of labour. When the lodge was being built, for example, participants report that they farmed less. One guide said that before he was selling rice, now he just produces for own consumption. He farms 50% less land now, because the work as a guide takes too much of his time (N. Cuata personal communication). However, at the same time tourism has reduced emigration and attracted return migration, so there are more families cultivating. This counteracts the effect of labour diversion per family unit. The net effect on total forest clearing is thus indeterminate, and probably quite small.<sup>24</sup>

### **Pilón Lajas Reserve**

General comments suggest a positive relationship between park authorities (SERNAP) and the TCO that is growing as the latter takes more interest in ecotourism and conservation in general (C. Caimani personal communication; L. Chavarro personal communication). The importance of the wildlife and forest for tourism is generally recognised by local people, and could thus potentially shift the incentive away from timber and land sales, and lead to tighter internal land-use restrictions. The degree of this shift is still unknown, but we believe it is in the direction of more conservation. Furthermore, given that most community members worked directly with loggers before, there appears to be progress in this direction. A pro-park alliance may prove useful in the long term as outside pressures from loggers and settlers mount.

The current conservation goodwill of the TCO and of other communities is, *inter alia*, built on expectations about future economic gains from tourism. The problem is that, even among the participating communities, all except for Asunción have received either only marginal or zero benefits to date (see below). If this is not changed in the future, the potential positive conservation incentive from tourism will not materialise beyond the narrow level of Asunción village. In other words, what will be protected in a PES manner will have little or no effect on the wider biodiversity benefits of the reserve.

Our rough estimate is that all likely trends in threat changes as a result of the lodge are either positive or neutral, but probably quite small so far (Table 18).

[Table 18 near here](#)

### ***Economic Effects***

To visit Mapajo, tourists pay US\$65 per person per day, which includes transport, food, accommodation and guide service. The price may drop to US\$55 in the low season or for larger groups. The required minimum stay is three days, and the average stay is four days.

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<sup>24</sup> One interviewee said that cultivated area was 'about the same', another said that it had 'expanded slightly'.



There are four two-person cabins currently functioning with a shared bathroom, and one two-person cabin with a private bathroom; the maximum capacity is for 10 people.

Since the lodge's inception, it has made no net profits to distribute to shareholders, though this is one of the future expectations of the project, including from the other communities that participate. In the first year (2000), there were four groups that visited Mapajo, generating US\$2500 in revenue and US\$800 of gross profit (Schulze 2001). However, the profits apparently dissipated into some of the high fixed costs of the operation. In 2003, some 347 tourists visited the lodge, and it broke even for the first time (L. Chavarro personal communication). If we assume that the average PAX (per person per day) price for tourists is US\$60,<sup>25</sup> we can thus estimate gross revenues for 2003—some 347 tourists paying for an average stay of four days, multiplied by US\$60 per PAX, yields a total of US\$83 280.

The yearly gross revenue of US\$83 280 represents quite a sizeable cash flow; in other words, it takes an extremely elevated cost structure to run this revenue down to zero net profits. The enterprise apparently has not been run very efficiently from a business point of view. One aspect relates to unfortunate decisions, e.g. regarding the administrative office in Rurrenabaque. Other reasons are 'deliberate' inefficiencies and over-payment in order to please community interests. As to the latter, the daily wage is set at 50 Bs (US\$6.40) for all labour, double the minimum wage rate in Bolivia of 25 Bs (US\$3.20). For the former, an illustrative example is that the community enterprise insists on using only boatmen living the community, in order to maximise local employment. However, since tourists need to be brought in from and delivered back to Rurrenabaque, this implies two extra two-hour boat trips compared to hiring a boatmen from Rurrenabaque. Four hours of extra boat rides for each trip trigger significant extra costs in terms of fuel, maintenance and depreciation, which reduce the net profits.

It is thus hardly surprising that the economic benefits of the Mapajo Ecolodge are currently incurred through employment in lodge activities, which range from construction maintenance to guiding, cooking and cleaning. Participants in cultural activities during a tourist visit, such as basket weaving and carving, earn 15 Bs (US\$1.92) per exposition, which can last between one and three hours. Community members also sell their agricultural goods to the lodge and their artisan goods directly to the tourists.<sup>26</sup>

According to the lodge's manager, 90% of adults from Asunción de Quiquibey are involved in the lodge activities on a rotating schedule (C. Caimani personal communication). Asunción is clearly the centre of tourism activities. Of the six communities participating in the operation, four are involved at some level in the lodge, while the other two are only marginally associated. Much of the planned involvement of the others is yet to be realised. For example, some members of the other communities have proposed including their communities on tourist routes as a way of capturing some revenues. However, other members of those communities oppose the idea and prefer to keep tourists at a distance (L. Chavarro personal communication). The distribution of employment and wages is shown in Table 19.

[Table 19 near here](#)

The income earned through these various activities has enabled community members to spend more money on outside goods that previously were unobtainable. These include medicines,

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<sup>25</sup> Midpoint of the US\$65–55 range of the PAX price described above.

<sup>26</sup> Due to time constraints, we were not able to calculate the income generated by these sales.

manufactured goods and processed foods. Since no profits have been accumulated, basically all the gains have been going into private pockets, a situation which is markedly different from the benefit distribution in Chalalán.

### *Social Effects*

The introduction of tourism has brought a range of social side-benefits. Training courses in guiding, cooking and administration have been provided. Most of the participants are primarily farmers; now their skill set has been diversified. Pre-existing community organisation has been strengthened, as the demand for leadership grew with the project (Schulze 2001). A report by PRAIA emphasizes the increase in women's participation and empowerment, as they assume leadership roles and responsibilities for tourism activities (Schulze 2001). Finally, the lodge has also helped to solidify cultural pride, especially among the youth. The youth are migrating less to the larger towns for work. In addition, five families who moved to away have returned to live in Quiquibey (Schulze 2001).

Community members hope for many more tangible social benefits from tourism in the future, such as improvements in education, health and potable water service (C. Caimani personal communication). Currently, there is a small school and health post, but not even Quiquibey, the most accessible community, has potable water. There are various ideas for ways in which these improvements should be designed, but revenues from the lodge are still insufficient to implement them.

Disagreements over management of the lodge have created some (actual and potential) conflicts, both within and between communities. Within the council, some members have competed for leadership positions to manage the Mapajo project, necessitating a redefinition of community roles (Schulze 2001). It is mostly the relation between Asunción and the other villages that yields potential for conflict, in particular around the distribution between wage benefits (that broadly favour Asunción) and net profits (which should be shared with other communities). Another complicating factor is the diverging attitudes towards outsiders between the Mosestén and the Tsimane. While the Mosestén acknowledge the municipal and national government as authority figures, most Tsimane communities do not. This discrepancy could make future coordination with the municipal governments difficult. It remains to be seen as the lodge progresses how such changes in relationships and power dynamics will affect the current social structures of the TCO.

### *Discussion*

To what extent can we talk about a genuine PES system in Mapajo? Our standard evaluation table (Table 20) can give us some clues. Tourists pay a relatively high price with the expectation of experiencing the beauty of high-quality rainforest. This is one of the reasons why the tour can be sold at a higher price than those tours that just visit the surroundings of Rurrenabaque. However, compared to the Chalalán case, wildlife viewing has not the same priority—there are other attractions that also count, in particular the ethno-cultural experiment. The PES is thus more embedded into other value components of the entire package. Some donors to the project have clearly been motivated by the alleged wider biodiversity benefits, but the average donor orientation is probably also less environmental and correspondingly more developmental and pro-indigenous than in the Chalalán case. On the recipient side, it seems that until now only the main village (Asunción) has been 'selling' the service. It is clear to that community that the tourism operation vitally depends on

conservation success in the visitation areas, but the link to the broader biodiversity conservation goals of the entire reserve is at present not realised.

**Table 20 near here**

How good ‘value for money’ is the Mapajo project from biodiversity-conservation and livelihood-improvements points of view? Despite of not yet producing net profits, the progress made so far is significant. For comparison, the Chalalán Ecolodge had a donation of US\$1.4 million for a single community with strong pre-existing commercial ties to the outside world. Mapajo has built a functioning lodge on one-sixth of the budget—and within a TCO with several disparate communities that have very little external commercial interaction.

Nevertheless, in order for this ecotourism venture to become a stand-alone business that is able to produce sustained livelihood and conservation benefits without recurrent donor financial injections, the lodge must achieve economic viability. Current gross annual revenues in Mapajo are around US\$83 000—for Chalalán we found that running costs were about 60% of gross revenues, and there are no obvious justifications why that percentage should be higher in Mapajo. In fact, even the very generous salary payments make up less than 10% of gross revenues. Forty per cent of US\$83 000 still leaves about US\$33 000 at stake. Where does the rest of the money go? This is the question we ask ourselves, but apparently the same question is increasingly being asked by the surrounding community partners, who would like to see some tangible financial returns.

There are several possible steps that Mapajo could take to reach profitability. Changes include improvements in administration and institutional organisation, enhanced marketing and significant reductions in operating costs. Vested internal community interests and obvious inefficiencies should not be allowed to trigger skyrocketing cost levels that nullify returns. First, a trustworthy and independent administrator should be trained as soon as possible. Book-keeping must be certified as efficient and transparent in order to build a foundation of trust among all participants. To increase revenues, the project could expand its marketing reach and connections with the outside tour agencies and even operators—in case it is judged desirable to scale up the operation.

Alliances with Chalalán are being explored. If ‘turf’ conflicts can be overcome, a tour package combining the two lodges could be beneficial for both enterprises. A nearby nascent lodge is perhaps the most direct competitor to Mapajo, and a proactive strategy for dealing with its emergence should be developed. Mapajo should clearly distinguish itself on the market in order to compete. Its current ‘cultural’ angle could be an effective means to that end.

Another challenge for Mapajo will be to determine how the distant communities should be integrated into the tourism structure. Some groups have demanded benefits while at the same time choosing not to participate in the council or to receive tourists. Because the current structure is shaky and the revenues still not realised, it may be wise for the lodge to limit participation initially, and cast the net wider as it progresses. On the other hand, the wider strategic conservation incentive for the Pilón Lajas Reserve that biodiversity donors are promoting can only work if the benefits from tourism become more widespread, thus increasing the number of conservation allies.

#### 4.4. La Chonta

##### *Background*

The La Chonta ecotourism initiative began in 1998 in the wake of the expansion of Amboró National Park, which put under permanent protection several thousand hectares of forest and led to a logging bust. It also created an integrated-management buffer zone to the park, which is where many communities are located. The 13-household community of La Chonta was zoned into the northern buffer zone, and not surprisingly its inhabitants were opposed to the new land-use restrictions. According to the law, communities within the buffer zone can carry out traditional activities, but are prohibited from logging or clearing new land for commercial purposes. Having lost intermittent employment from logging and the ability to expand its farmland into the park, La Chonta conceived of the idea of creating a community-run ecolodge at the park's border. Tourism operators from the nearby town of Buena Vista had been taking tourists into the park periodically, but did not use local guides. The communities hoped to capture some of the income from tourism by constructing a lodge and offering a guiding service.

In 1998, the community received a US\$5000 grant from CARE (Cooperative for Assistance and Relief Everywhere) to construct huts that currently house up to 18 visitors. The operation has received consistent funding, marketing and technical support for the past six years from The Association for the Conservation of Biodiversity through Integrated Management, an NGO associated with the American Museum of Natural History. This support helped consolidate community organisation and train interested community members in guiding, cooking and administration. It has also helped connect La Chonta to tour operators in Santa Cruz and publicise directly to tourists (S. Davis personal communication).

La Chonta was just one of three communities in Amboró's northern buffer zone to receive such support. Two others, Mataracu and Macunyacú, are also in the process of consolidating community hostels. However, La Chonta has proved to have the most solid organisation, probably because it is smaller and more unified than the other two communities (S. Davis personal communication). Unlike in the Madidi area, the communities near Amboró are comprised of recent immigrants from the highlands. Most have arrived since the 1980s in search of land to farm. As a result, the communities generally lack cultural cohesiveness and broad familial ties—except perhaps for smaller and more homogenous communities, such as La Chonta.

The annual monetary consumption per household in La Chonta lies in the approximate range of US\$360–560 (Village group meeting, 4 March 2004). Farmers grow rice, bananas and cassava, primarily for subsistence, and sell surpluses for cash. A few farmers own cattle, which provide an extra source of income and security. Commerce with the outside world is constrained by unpaved roads and by the fact that the Amboró River can become impassable for three to four months of the year.

Numbers of visitors have decreased in the past three years, as the park started to restrict tourist numbers. Community members report that tour operators brought in 1600 visitors to La Chonta in 1996, prior to the establishment of the community enterprise. These high numbers, and in particular certain groups of young 'misbehaving' tourists, resulted in adverse

impacts for plant and animal life in the area and hence the restrictions were put into place.<sup>27</sup> Operators must now be granted permission to enter the park and register all visitors. In 2003, the number of visitors to La Chonta decreased to 400, divided equally between Bolivians and foreigners (D. Agustine personal communication).

Land tenure in the area is established, but people in La Chonta do not have formal land titles. The border of the park seems to have been negotiated, but recently park management has questioned the interpretation of the community. It claims that the tourist cabin constructions are located inside the park, and thus should be removed. Obviously, this puts into danger significant investments on behalf of the community. When we visited to La Chonta in March 2004, no resolution had been reached. Clearly, such disputes not only challenge the viability of the La Chonta tourism operation, but also the park's tenuous gains in local park allies.

### *Environmental Effects*

The conservation effect of the La Chonta tourism operation is likely to be significant for the local protection of Amboró National Park against external threats. The park's porous borders and the lack of workforce to patrol the area make it relatively easy for loggers and hunters to enter illegally through the roads near La Chonta. Even colonist land invasions and forest conversion for alternative uses occur frequently. The scenario is thus one of high and variable threats against the integrity of the park, and the associated wider objectives of biodiversity protection.

How does this goal of biodiversity conservation relate to the provision of the more narrowly defined service of scenic beauty? There is little attractive forest outside the park borders, so La Chonta relies on the park's scenic beauty to attract tourism, not on the village area itself. Community members have a direct incentive to aid in the park's protection, and there is evidence that the incentive is working. Their extra efforts at protecting wildlife and keeping out intruders are probably more significant than in the two Madidi cases (above), as land invasions into the park are a more frequent and massive threat near La Chonta. Independent sources confirm that community members regularly decommission both illegal loggers and hunters from the park (S. Davis personal communication).

Are there any perceivable changes in La Chonta's own natural-resource management practices as a result of the rise of tourism? With regards to hunting, community members have cut back as they realise wildlife is a main attraction for tourists (S. Davis personal communication). However, local hunting inside the park still occurs occasionally; there is no internal village system of sanctions, and only 'soft' persuasion is used. Nevertheless, as a result of both internal and external hunting restrictions, community members claim that wildlife populations have increased over the last years (Village group meeting, La Chonta, 4 March 2004). Local labour diversion effects from tourism remain limited. While community members reported that they had less time to farm during the hostel construction, the current time commitment is neither regular nor sizeable enough to make much difference—farming continues at its normal rate. Guiding is an activity for only four men, 10 days out of the year. Thus, the effect of tourism on La Chonta community land (outside of the park) is extremely limited.

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<sup>27</sup> It was not fully clear from our interviews how the restrictions are being handled—who is granted access and who is not? Our impression was that the restrictions possibly affect groups of Bolivian tourists, not foreigners.

Finally, we should not forget that tourism in some cases can have a *direct* negative environmental effect. As mentioned, many visitors and unregulated operations led to a predatory type of tourism in the early stages. But since these problems seem to have been resolved some time ago, and are not being mentioned for the period of community-based tourism (after 1998), we do not include this as a factor in Table 21, which summarises the environmental effects.

[Table 21 near here](#)

The positive environmental trends could increase as the lodge becomes more successful. As with the Madidi cases, the incentive to protect both the park and the community land may depend to a significant extent on the perceived magnitude of the net benefits of tourism. At the same time, the aforementioned tensions with the park over land use threaten to decrease tourism in the area and thus threaten the pro-park sentiments and actions of the community.

### *Economic Effects*

To stay at the hostel, foreign tourists pay roughly US\$16 per night, which includes accommodation, food and, optionally, horse riding. The price for Bolivian visitors is flexible depending on the group; we base our calculations on US\$5 per night as an average. All tourists must be accompanied on the trail by a guide. Four community members are trained as guides. According to their work plan, they work on a rotational basis, though participants report that sometimes the rotation is not followed due to the demands of farm work. They charge US\$15 per day, the standard price for the area. Tour operators who bring tourists to La Chonta often choose not to employ the local guides because of the extra costs involved. Neither the PAX price nor the guide rates are fixed so any calculation has a high margin of error.

Nevertheless, the information obtained allows us to make a rough calculation of gross revenues and guide wages in 2003 (Table 22). First, of the 200 foreign tourists, 100 pay on average US\$16 (for one night) and the other 100 pay US\$32. Similarly, half the Bolivians (100 tourists) pay US\$5 (one night), the others pay US\$10 (two nights). These add up to US\$4800 and US\$1500, respectively. Among the 200 foreign visitors, we assume half chose to employ local guides and, of those, half employ a guide for two days, the other half for one day. This yields US\$562.50 in annual guide revenues.<sup>28</sup> Summing up the three components yields total gross annual revenues of US\$6862.50.

How are these revenues distributed? The four guides make US\$141 per year (see above). Each guide would have worked between nine and ten days in the six tourist months. The hostel also employs four women as cooks who also work on a rotating schedule, making about 25 Bs (US\$3.20) per day. Assuming there are guests at the hostel 75% of the time during tourist season and the rotation is even, each cook works for 34 days per year.<sup>29</sup> This total wage amounts to US\$108.80 for the six months of the tourist season. The hostel has also generated an internal cash market for agricultural goods. This arrangement saves the farmers the high transport costs of taking their goods from the community over the poor roads to Buena Vista, and is another channel to distribute tourism income internally within the village.

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<sup>28</sup> 400 visitors divide into 200 foreigners and 200 Bolivians; 200 visitors with 4 people per group = 50 groups; 25 groups opt for a guide = (US\$15 per day) × (1.5 days) = US\$562.50 for guiding for four guides. Per guide this yields US\$562.50/4 = US\$141 (rounded up).

<sup>29</sup> 180 days (0.75) ÷ (4 cooks) × (US\$3.20 per day) = US\$108.

In spite of wage, food, maintenance and other operating costs, the 2003 gross revenues of US\$6863 still seems to provide a fairly solid financial base. This figure indicates that the operation is probably able to channel back significant resources to consolidate the ‘public sector’ village economy—a feature that is quite distinct from the Mapajo case (see section 4.3).

[Table 22 near here](#)

### *Social Effects*

Similar to the other ecotourism cases, the La Chonta has resulted in enhanced community organisation and structure (S. Davis personal communication). One possible long-term effect of the hostel is the stemming of emigration to Santa Cruz. As a result, the community can maintain its cohesion.

The tourism project has provided various training workshops, raising the skill levels of community members in administration, guiding and cooking. This has created benefits that may extend beyond tourism management. At the same time, though many training courses have incorporated the whole community, it appears that one community member is coordinating the hostel and has assumed a dominant leadership role. A strong single leader could catalyse project advancement, but in the long term it may also limit leadership capacity to run the hostel.

Not surprisingly, there are many local hopes for more tangible social benefits. These include improved health facilities and a local school. Unlike in Chalalán and in Mapajo, the tourism operation is not led by a separate company, but the profits from the operation go directly into the collective community coffers. Consequently, since the community-based enterprise was conceived, the community savings have been consolidated. For instance, some funds have been made available for health emergencies for community members (Village group meeting, La Chonta, 4 March 2004).

### *Discussion*

The inspection of La Chonta from a PES model perspective does not yield results that are radically different from the other ecotourism cases (Table 23). Natural beauty is the clearly defined ecological service—more clearly than in the case of Mapajo, since there are no ethno-cultural attractions that are ‘blurring’ the picture. There is no doubt that this payment is conditional, in the sense that most tourists (probably the foreigners in particular) would stay away if the environmental quality of the destination declined. The ‘service-selling’ local community cashes in the benefits through a wage premium for employees (guides, in particular), but mostly through operation profits that bolster community funding. On the other hand, the more common type of natural attractions at the La Chonta site (and the high degree of competition from other companies) mean that the size of the PES market premium is much lower than in the two Madidi-based operations.

[Table 23 near here](#)

Biodiversity donors have invested in this operation with a view to broader conservation goals: they are ‘purchasing’ protection in a more implicit and non-contingent manner. Until now, however, this investment seems to have been successful, in the sense that the tourism

operation has created a conservation ally at a strategic entrance point to Amboró National Park.

What is the outlook for future conservation linkages? As with the Madidi cases, the incentive to protect both the park and the community land may depend on the magnitude of the net benefits of tourism. At the same time, the aforementioned tensions with the park over land use threaten to decrease tourism in the area and may thus jeopardise the pro-park sentiments and actions of the community.

It is also clear that even with higher future incomes from ecotourism, the activity will always remain a supplementary activity in La Chonta, whereas it is the main income source in the Madidi cases. This naturally reduces both the PES type of effect (direct conservation incentives) and indirect ICDP type of impacts such as labour diversion. The size of income, as determined by the type of operation and the attractiveness and uniqueness of the natural asset, thus has an important influence on how ecotourism changes local resource uses.

Because of its proximity to Buena Vista and the park, La Chonta probably has the potential to enjoy increased numbers of tourists willing to pay for the services that La Chonta offers. If tourism grows in a manner that is consistent with new park guidelines, including limited camping within the park and caps on overall visitor numbers, more tourists could help La Chonta succeed, and thus increase the positive environmental effects of its existence. Certainly, in light of their environmental effects, there is an upper limit to the ideal number of tourists, which should be strictly monitored, but it appears that the number of tourists currently visiting La Chonta does not reach this limit.

La Chonta appears to have the basic infrastructure and organisation to handle more arrivals and thus earn more income. In addition, because La Chonta is such a small community, divisions among members are few. This relative tranquillity stands in stark contrast to the two other community-run ecotourism ventures in the area.

At the same time, La Chonta must still take many steps to achieve a successful tourism enterprise. First, it must create an acceptable system of coordination with tour operators and agencies. Going it alone will be extremely difficult without direct connections to the market or transport services. Second, it must improve its services in order to remain competitive. Alternatively, it may be that the best option to capture more tourists is to lower prices in the hopes that increased volume of visitors will maintain profitability.

## **4.5. La Yunga**

### ***Background***

The 35-household community of La Yunga lies in the southern buffer zone of Amboró National Park, roughly 150 km from the major city of Santa Cruz. Similar to the community of La Chonta, described in the previous section, La Yunga was also affected by land-use restrictions from the expansion of Amboró National Park. Since 2001, La Yunga has been undertaking an ecotourism initiative with FAN.<sup>30</sup> It is part of a larger FAN project over the last decade, developing alternatives to natural-resource exploitation in communities of the

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<sup>30</sup> FAN is the Santa Cruz based NGO that also implements the Noel Kempff project (section 2.2) and the preliminary watershed PES project (Box, section 3.3).



southern Amboró buffer zone that are almost all opposed to the park extension. FAN hopes that this first ecotourism project in the area could be replicated in neighbouring communities (FAN 2001).

The village lies at about 2000 m.a.s.l. and holds land rights to roughly 3200 ha, 480 ha of which are cultivated cropland (FAN 2001). This ecological region is known as the 'Yungas', or Andean cloud forest. A little less than half of the villagers have lived in the area for over two generations; the others are recent immigrants from other regions, principally from Cochabamba (FAN 2001). Population size has fluctuated dramatically over the years—it peaked during the logging boom of the 1980s, but then plummeted (F. Riojas personal communication).

Farming is currently the main activity. Peaches are currently the most lucrative crop, followed by others such as potatoes, peas and peppers, most of which are sold in the city of Santa Cruz. Cattle ranching is important as both an investment and as a safety net for when cash is needed for emergencies. Some families own as many as 40 head of cattle, but most have less than 10. The more recent immigrants are poorer and often do not own land; most work occasionally as day labourers for landowners at 25 Bs (US\$3.20) per day. When they do have land, they are also the ones that deforest the most, in order to establish a viable farm size. Land is not formally titled, but tenure rights are locally recognised and even traded.

The area within and around the community of La Yunga is of particular interest to conservation organisations and tour operators because of its famous giant-fern forest remnants. Two species of tree ferns grow over 3 m in height and provide habitat for jaguars and spectacled bears, among other threatened species. The habitat is so unique that tourists gladly make the four-hour round trip from the main highway over a bumpy dirt road to visit the forest. The fern forest remnants within the community area cover 80 ha, the most visited part of which lies 3 km up a steep road from the village. Prior to the community ecotourism initiative, outside tour operators entered the fern forest without paying entrance fees. Foreign tourists would pay US\$20–40 per person for the tour, arriving in four-wheel drive vehicles from Santa Cruz or from nearby Samaipata.

Many people in La Yunga thus hoped that the FAN project would be a means of capturing more benefits from tourism locally. Increased revenue would occur both from an obligatory entrance fee being charged to all tourists and from local optional services being offered (guiding, food and accommodation). Project funding (US\$40 000 in the first project phase) has primarily come from the United Nations Development Programme (UNDP), while the village has provided labour as counterpart. So far, a 5 km trail network, an eight-bed hostel for tourists and other infrastructure have been built, supplemented by local training in tourist services and financial management. The local Association for Responsible Tourism (ASYTUR, in its Spanish acronym) now has 12 members, all of whom have received tourism training (eight are official guides). Some women who are not members have been trained as cooks. Associates have joined on an interest basis, but have also paid a fee of 400 Bs each to create a capital base. They are the owners of the hut infrastructure, and most influential families in the village have joined.

### *Environmental Effects*

Due to the short lifetime of the initiative (established in 2001), it is hard to outline effects in general and environmental effects in particular. However, certain patterns are already visible

that may allow us to project some potential future effects. In doing so, it is best to distinguish three spatial levels of effects: the tourism destination proper (the 60 ha fern forest), the community area, and the Amboró National Park (Table 24).

**Table 24 near here**

For the main tourist attraction, the fern forest, there has clearly been a positive conservation effect. Some time ago, a company had been extracting ferns for flower pots, but this was stopped by the community due to the perception that they were risking losing an asset. Three private landowners voluntarily ceded the forest area to tourist area zoning. But this was not a big sacrifice: the trees have little commercial value, the soils are unsuitable for farming, transport access is difficult, and incursion of forest predators makes it problematic for livestock grazing. In other words, the opportunity cost of conserving the fern forest land was close to zero (F. Riojas personal communication).

This situation is fundamentally different for other forests within the designated community land. For decades, forests in the region have been high-graded by timber companies for two main tree species, cedar and *nogal* (a hardwood). New immigrants are arriving and clearing the remaining forests to stake claim to the land (FAN 2001). To a certain extent, pre-existing farms are also being enlarged at the expense of forest cover. Residents also graze their cattle in the forest and hunt jaguars which prey upon cattle. Thus, the main conservation threats on community lands are agricultural expansion, cattle grazing and hunting—and none of these seems to have diminished significantly (F. Riojas personal communication). Hunting may have decreased slightly, as community members realise that tourists come to see wildlife (F. Riojas personal communication). Jaguars remain a principle threat to cattle, the most important local investment, and it is unlikely hunting of them has diminished. One reason for the lack of change is that the tourism operation so far has created very little genuine ‘payment’, and thus has not really altered the local land- and resource-use dynamics.

Finally, there is probably some more indirect yet quite intentional ‘conservation goodwill’ effect vis-à-vis Amboró National Park and its extension. According to one community member, previously high animosity towards the park has decreased somewhat, and community members are now more aware of the importance of the park’s integrity for tourism in general. FAN is clearly identified as an environmental organisation with pro-conservation goals. It is now acknowledged that environmentalists do not only create land-use restrictions, but also actively try to improve local livelihoods. In this sense, the project has a ‘compensatory’ touch, which is not conditional and does not produce tangible short-term effects upon local land use, but the effect of which on long-term people–park relations should not be underestimated.

### ***Economic Effects***

The primary revenue generator in La Yunga is the obligatory entrance fees, which the community has decided to charge tourists to walk the fern forest trail. With project funds, it installed a gate to regulate the entrance of vehicles to the road that leads to the forest, 3 km uphill from the village. Foreign visitors pay US\$1.90 (15 Bs), Bolivian adults US\$1.20 (10 Bs) and Bolivian students and taxi drivers pay US\$0.60 (5 Bs).<sup>31</sup> Visitation in the tourism

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<sup>31</sup> In response to this new fee and the new regulations on trail use, some tour operators have threatened to stop bringing tourists to La Yunga. However, the question is how credible this threat is. The entrance fees represent only a minor incremental cost vis-à-vis the US\$20–40 total package price, at least for foreigners.

months of 2003 (May to November) was roughly 110 visitors/month and had been increasing over the previous few years (F. Riojas personal communication). Unfortunately, there are no records to show the long-term trends in visitation, because the community is only just beginning to keep records. In 2003, there were approximately 650 visitors in the six months of the tourism season; during the other six months of the year, the rains cause the road to become difficult to pass and tourism stops (F. Riojas personal communication). A rough estimate of entrance-fee revenues amounts to a total of US\$838.20 for the last six months of 2003, assuming entrance is divided equally among foreigners, Bolivian adults and Bolivian students (giving average fee of US\$1.27/visitor, grossing US\$139.70 per month).

Guiding is the second source of tourism income, though to date it has been small. Hiring a local guide used to be obligatory, but the rule has been relaxed due to protest from tour operators. Currently, about 10% of groups employ a guide. Guides operate on a rotational basis, though the system is still not formalised (F. Riojas personal communication). They charge 80 Bs or US\$10 per tour, independent of the number of tourists. We estimate (from the figures and estimates presented to us) that in 2003 the guide services earned an approximate total of 1320 Bs (US\$170) over 6 months for 8 guides, which averages only US\$3.50 per guide per month, i.e. corresponding to one day-labour wage.<sup>32</sup> Clearly, this amount is bound to be too small to cause any significant changes in the household economy or labour allocation. Thus, the two main tourism revenue sources sum up to just over US\$1000 for 2003.

A third potential revenue source is the new hut accommodation (including food), but the amount captured so far is still negligible. Between the inauguration in December 2003 and March 2004, only three groups had stayed in the hostel. The rate is 40 Bs (US\$5.12) per person per night, including breakfast and dinner. Because there are no private rooms, bathrooms, electricity or running water, the price is likely to remain in this range.

What are the current incipient tourism revenues being used for? The hostel has recently begun to employ a local caretaker who began in 2004 and earns 200 Bs (US\$25.60) per month. Guides have made a modest income supplement. The rest has been reinvested in the tourism infrastructure. It is hoped that in the future the entrance fees and prospective profits from the hostel will be distributed through dividends to tourism associates and a 'community tax' for social spending will be levied (see below).

### *Social Effects*

Under the current system, the community organisation will receive a 28% 'tax' from the net profits generated by the tourism enterprise (F. Riojas personal communication). As in La Chonta, these funds will be used for expenses in health and education for the community or a fund for health emergencies, or both. It may also be used as a counterpart to bring potable water, electricity or both to the community. Since no net profits have been made so far, there have not been any 'tax' payments either.

The project has provided training to the community members in accounting, tourist services and guiding, some of which could provide benefits that reach beyond tourism proper. The

<sup>32</sup> 110 visitors/month are reported for the last 6 months of 2003. Assuming one group has on average 4 people, this means there are 27.5 groups per month. If 10% of these use guides, that is 2.75 groups per month employing a guide. This yields a monthly total of  $2.75 \times 80 = 220$  Bs over 6 months. Since there are eight guides, this means  $220/8$  guides = 27.5 BS per guide per month, US\$3.52.

tourism business could potentially increase community cohesion, but could also lead to conflict over fund allocation—it is still too early to tell.

### ***Discussion***

La Yunga represents an incipient initiative, and the effects so far are still limited. The structure of the operation could well become similar to that at La Chonta: easily accessible destination, cheap prices, simple accommodation. Also like La Chonta, the project is supported by a conservation NGO interested in easing the pressures on Amboró and building community support for the park. The differences are, first, that in La Yunga the main area of attraction is a private visitation area outside of the national park and, second, that payments are made, at least in terms of the entrance fees, but profits are still being accumulated rather than being paid continuously to the community members.

Table 25 shows how well La Yunga measures up to our strict PES criteria.

**Table 25 near here**

What are the prospects for a thriving tourism business in La Yunga? Among potential tourist areas in the southern Amboró region, La Yunga has the advantage of having a unique natural site (the fern forest), a donated lodge and easy accessibility (at least during the dry season). Alongside La Chonta, La Yunga is the community with the least conflict in its region. In order to maximise these benefits, it must substantially increase its market appeal. New trails or tour route ‘packaging’ would make staying overnight more appealing. Extending the tourist attractions to other sites, e.g. integrating some of the cloud forest area into a larger trail system with greater hiking options, could help to ‘justify’ overnight stays, enhancing tourism incomes. Such an expansion of trails could also increase the conservation area to which La Yunga is tied economically and thus increase the incentive to conserve more areas. If community members of La Yunga have a stake in conservation of the nearby forests and the integrity of the park, similar to the situation at La Chonta, they may begin to search for mechanisms to decrease forest clearing and to discourage further land colonisation.

As in the case of Mapajo, negotiations between the environmental-service providers and the environmental-service intermediaries (the tourism operators) would be appropriate and could be beneficial for both sides. While tour operators have spontaneously opposed entrance fees, the monetary value of them is minor vis-à-vis the full tour price, and the fern forest site is unique. However, more flexibility in entrance fees, guide prices and improvements in tourist services could all be ‘win-win’ areas where both tour operators and the community stand to gain from closer cooperation.

## **4.6. The Eduardo Alvaroa Reserve**

### ***Background***

The Eduardo Alvaroa Reserve (REA, in its Spanish acronym) covers the south-western tip of Bolivia in the department of Potosí. It registered 45 000 visitors in 2003. It lies between 4000 and 6200 m.a.s.l. in a highland desert that receives only 10 cm of rainwater every year, making it the driest region of Bolivia. The REA is Bolivia’s most visited protected area, and visitation rates are increasing at roughly 15% per year. Unlike the other cases in this study,

the 'natural beauty' asset that REA's tourism business builds on does not involve forests. However, the REA case is interesting because its large tourism-related benefit transfers to local communities are unique to Bolivia. In its roughly 700 000 ha of territory, the REA offers attractions such as expansive desert landscapes and two coloured lakes (Laguna Colorada and Laguna Verde), which are home to three species of flamingo. The Uyuni salt flats are located just outside its borders, in between the gateway city of Uyuni and the REA's northern border.

The REA was established in 1973, principally for protection of the flamingo and vicuña (an endangered camelid), but it was not managed until 1994, when the government won funding from the Global Environment Facility (GEF) for protected area strengthening. The main threats to the reserve region included mining, rampant exploitation of flamingo eggs, hunting of vicuña, overgrazing and over-harvesting of native vegetation, including small trees and plants used as combustible material (Ribera 1995). While some of these threats have been reduced by the reserve establishment, others persist (Drumm 2004).

Under Bolivian law, ecological reserve status is not as restrictive as that of a national park; local communities are permitted to continue their traditional activities as long as they do not pose a significant threat to ecological integrity. Two communities, Quetena Chico and Quetena Grande, lie within the reserve. They are villages of 520 and 180 inhabitants, respectively. Quetena Chico was founded in the 1920s and Quetena Grande shortly thereafter (Blanco 2002). Inhabitants are of Quechua descent but speak exclusively Spanish. Some originate from the highland region of Chile, which lies just 50 km to the west of Quetena Chico.

Traditionally, the most important monetary income-generating activity in both communities has been camelid farming. Farmers sell the wool and meat from llamas, and some weavings, to intermediaries from Uyuni, the largest town in the region, roughly 200 km away. Some farmers own up to 400 head of llama and earn between 400 and 500 Bs (about US\$51–64) from the meat of one animal (Á. Báez personal communication). Supplementary off-farm economic activities include small-scale mining of borax and sulphur, among other minerals, and employment from larger mining companies operating in the area who mine copper, borax and sulphur (among others). Basic public services, such as health care and schooling, were not available until the 1990s. Electricity and potable water systems are still not installed.

Before the establishment of the REA, the sale of flamingo eggs provided significant cash (community group meeting, Quetena Chico, 24 April 2004). Many families depended on the flamingo eggs for income and would sell them at the Chilean border. A second REA-induced restriction was on hunting of fox, a principal predator of llamas. Community members report that since the restrictions have been in place, llama kills have increased (T. Esquivel personal communication). Thus, local livelihoods have been negatively affected by the reserve's land-use restrictions. When the administration of the reserve began in 1995, the communities thus opposed it, anticipating severe restrictions, including on ranching and fuelwood collection. However, prohibitions have in fact been limited to flamingo-egg collecting and fox hunting, thus being less severe than expected by many local people (T. Esquivel personal communication).

In 1999, TNC declared the REA a 'Park in Peril', mainly because of persistent threats to its ecological integrity. This categorisation brought additional financial and human resources to the reserve. TNC also promoted the establishment of an entrance fee system, which would create additional resources for park management. Since 1999, each visitor to the REA has

paid an entrance fee of 30 Bs (initially the equivalent of US\$5, now only US\$3.84 due to a depreciating exchange rate). The system of entrance fees (SISCO, in its Spanish acronym) makes explicit provision for a benefit-sharing system that facilitates payments to local communities. The REA SISCO is the first entrance fee system to exist in Bolivia. A second has begun in Madidi, but no percentage goes to the Madidi community.

REA-related payments and benefit transfers to the local communities occur through three channels: donor-financed ICDP projects, social infrastructure projects (financed through SISCO), and community members' own local hostel operations. In the following, we will briefly describe the three mechanisms. Subsequently, we will separate the effects of these mechanisms whenever possible.

First, TNC has financed various ICDP projects in the two communities. For instance, one project attempted to achieve genetic improvements of the llamas so that farmers could intensify production and decrease grazing pressures inside the REA. Other ICDPs are attempting to simultaneously achieve environmental and livelihood goals. However, they are not contingent upon environmental protection.

A second channel is the SISCO tourism benefit-sharing system. An agreement between SERNAP and the two communities stipulates that 25% of the after-tax fee revenues will be allotted to social spending projects, divided equally between the two communities. Since 2000, the two community Management Committees have prioritised community works projects, which SERNAP has later planned and implemented. The SISCO-financed projects thus have the aim of building public works for the community, and do not have explicit environmental objectives. An implicit environmental aim is to increase goodwill for the REA among the communities, showing that tourism, and thus the protected natural attractions that tourists visit, create tangible local benefits. Some participants have viewed these payments as a compensation for incurred losses from the REA resource-use restrictions. However, given the other benefit channels, such losses have likely already been outweighed. The SISCO system, in other words, is extra icing on the 'compensation' cake.

Finally, a third channel of benefit transmission is the rapidly growing community-based private tourism. These hostels are also generating a steadily increasing income stream. Members of Quetena Chico are constructing a basic and somewhat haphazard hostel complex in an area near the Laguna Colorada, known as Gualajara. At the time of the site visit, it was 75% finished and will comprise about 20 private hostels (M. Verna *et al.* personal communication). Unlike all the other hostels mentioned in this study, these were constructed without any outside support.

### ***Environmental Effects***

According to a recent analysis, the most prevalent acute threats to the ecological integrity of the REA include tourist incursion and off-road transit in sensitive habitats, and llama ranching (overgrazing) by REA inhabitants. Mining and a possible geothermal plant remain threats (Drumm 2004). Hunting and flamingo-egg collection by REA inhabitants and occasional intruders have decreased from their previously high levels, but still remain a threat. The question to be discussed in this section is thus to what extent the different benefit transfers to the communities have helped to prevent, alleviate or, in the worst case, reinforced these threats.

### **ICDP projects**

For the conservation-financed ICDP projects we do not have a lot of information. While some of the effects may only be long term, in the short term many of them do not have significant results to show so far. For instance, the aforementioned genetic improvements of llama livestock raising has not had much success, because of lack of coordination, insufficient funding and reluctance in the local adoption of new breeding techniques (Á. Báez personal communication).

### **SISCO projects**

As the second channel, the SISCO system has financed a series of public -investment projects (see Economic Impacts below). These could in principle have both a direct incentive effect and an indirect ‘conservation ally’ effect on the environment. As mentioned, the SISCO payment system was not *designed* to be conditional upon environmental performance or to provide other direct incentives. Thus, it should not be judged on its failure to create such conditionality. As for the incentive effect, the more tourists that come, the more money will be available for community investments. This may create an incentive for the local community to take care of the attractions that tourists come to see, such as flamingos. Indeed, since 2000, the flamingo populations have increased dramatically, due in part to a cessation of egg collection (Á. Báez personal communication).

At the same time, the SISCO system may have had an unintended incentive effect: since the SISCO community payments are determined as a percentage of all entrance fees paid, they grow proportionally with the number of tourists. This relationship means that, at least in terms of maximising short-term gains, the communities have an incentive to oppose regulations that restrict tourist access. This incentive certainly seems to have been a factor at play. For example, the original REA management plan, written by biologists with an eye to maximising habitat protection, called for more restrictions on tourist use (and on llama ranching) in certain sensitive areas. The plan was vehemently opposed by the community members. In another case, the communities have opposed the declaration of the Laguna Colorada as a National Sanctuary, which would also restrict access.

The SISCO was probably *designed* first and foremost to achieve the ‘conservation ally effect’. The payments would allegedly widen the network of REA supporters to include local community members that are not profiting directly from ecotourism. Though a more indirect and long-term effect, we saw from the previous case studies (Amboró, Madidi) that this effect could potentially be important. In both the Madidi and Pilon Lajas cases (sections 4.2 and 4.3), the communities demonstrated their allegiance to the park by opposing the proposed dam, outside loggers and colonists. It is unclear whether communities in the REA have united to oppose the outside threats to the park to any significant degree.

Indeed, in the case of the REA, several aspects of the project and uncertainties call this effect into question. First, resentment still exists between the reserve and the communities, which continues despite the SISCO projects. Some recent actions, though not directly related to the SISCO, suggest that the communities are still not prioritising the REA’s integrity. For instance, in protest of the aforementioned plan to restrict tourist access and ranching, a group of community members entered the Laguna Colorado and collected flamingo eggs. The REA plan was subsequently changed to allow for more ranching in sensitive areas (Á. Báez personal communication). Whether or not the incursion alone fomented this regulation change is not clear, but it is likely to have pushed the reserve in that direction.

These people–park conflicts over specific management issues do not necessarily imply that the communities do not support the reserve *per se*. However, whether or not the SISCO has actually *increased* their allegiance to the park is debatable. Large benefit transfers like the SISCO investments can well be understood by the communities as an indication that there is more money available where it came from. A negotiation tactic like the flamingo-egg collection action reveals how communities may well have perceived the REA authorities' willingness to go a long way in accommodating community preferences, be it in terms of financial transfers or management adjustments, in order to avoid conflict. Well-known REA environmental concerns—the flamingos being the most emblematic one—can thus be taken hostage to achieve certain strategic goals.

### **Community-based private tourism**

The third channel, the incomes from new community-based hostels, probably has mixed effects. On the surface, it would seem that local hostel owners would have more of a stake in maintaining the ecological integrity of the REA if they receive proper tourism profits. As mentioned, from SISCO they receive just 28% of the entrance fees. In the case of flamingo protection, such an incentive effect may generally be occurring. For the private lodge owners, the incentive from private enterprise to protect the flamingos and other scenic beauty is probably stronger than the incentive from the SISCO.

Yet, the other side of the coin is that a closer link between tourism revenues and community income can backfire if it is tourism itself—its scale and management—that is a main environmental concern. For example, park management has clashed with the hostel owners of Guallajara over the location of the complex, claiming it may be too close to the sensitive Laguna Colorada (Á. Báez personal communication). As mentioned above, several community members say that they staunchly opposed the management plan and have opposed the declaration of the lagoon as a sanctuary, because it would restrict tourism (T. Esquivel personal communication).

There are two possible interpretations about the rationale for this clash of interests. First, it could be that myopic community hostel owners are in search of short-term gains from tourism. This motivation is why they would be depleting the proper resource base for this tourism—whether consciously or not—by defying regulations on construction in and visitation to sensitive areas, as devised by the more foresighted REA management. A second interpretation is that the two groups would simply be seeking to maximise two environmental services that are in synergy, but whose exact environmental-service and time horizons do not fully overlap: hostel owners care for the nature beauty and its marketing in the short and medium terms; REA management cares for the wider, multifaceted biodiversity conservation and has a long-term vision. Biodiversity concerns will almost always trigger a much more cautionary management approach than one that exclusively seeks to maximise (even long-term) tourism revenues. The deeper underlying conflict may be over how the REA should weigh these two objectives against each other in overall REA management.

Community-based tourism has not only an incentive effect, but also an income effect. Hypothetically, it is possible that hostel owners would reinvest their tourism profits in ways that diversify their livelihoods into activities with higher 'value-added', which could reduce reliance on natural-resource extraction and thus mitigate pressures on the REA (the goal of the ICDPs). Unfortunately, this does not seem to be happening. On the contrary, a substantial portion of the increased revenues from tourism seems to be reinvested into environmentally unfriendly ranching. There are currently 10 000–12 000 llamas in the entire REA, and this



number seems to be growing as a result of tourism profits diverted into livestock. Llama ranching, in the short term, does not negatively impact tourism (J. Alcoba personal communication).

### **Aggregate environmental effects**

Table 26 summarizes the likely changes in environmental threats due to SISCO payments and community-based tourism—we are concentrating here on these two mechanisms.<sup>33</sup> Our approach is to look at the partial effect of each of the two payments separately.<sup>34</sup> In terms of environmental threats, we focus on the biodiversity conservation effect, since we knew too little about the (short- and long-term) dynamics of specific ‘natural beauty’ factors—and to what extent they are being appreciated by the tourists.<sup>35</sup> Also, we excluded effects on mining and other minor threats, as they are probably close to zero.

### **Table 26 near here**

What is noticeable as a general impression, especially compared to other cases in this study, is that the incentive effects are substantially mixed. The relationship between tourism-derived payments and environmental protection are less clear than in other ecotourism cases, primarily because tourism itself is a primary threat to the biodiversity of the REA. A second general observation is that community-based private tourism seems to have a considerably stronger effect on conservation—whether in a positive or negative direction—than the SISCO transfers, despite the latter being superior in terms of economic value.

### ***Economic Effects***

#### **SISCO transfers**

Due to the high per-capita revenue generated through the SISCO system, the economic value of the corresponding community transfers has been substantial. Since the initiation of the SISCO in 2000, the revenue generated for the two villages has totalled about US\$143 000 (J. Alcoba personal communication). The agreement with the REA administration and the Ministry of Tourism stipulates that all SISCO transfers must be in-kind (community projects and investments), and cannot be distributed as direct cash payments. The following have been the main spending categories in the two villages.

#### ***Quetena Chico***

- Housing for school teachers
- Soccer field
- A two-room health centre
- Co-funding with the government for the electricity supply
- Diesel for tractor and road maintenance

<sup>33</sup> We have omitted the ICDP effects, since there was too little information available.

<sup>34</sup> Our conservation effect columns thus express the change vis-à-vis the hypothetical situation where this particular mechanism was not in place—while all other mechanisms are operating.

<sup>35</sup> It would take a tourist survey to find out what specific hedonic values tourists treasure in the REA. The next step would then be to determine what long-term management can assure these values. As mentioned, we would expect there to be mostly synergies between the two services, e.g. in terms of the three flamingo species, but there would likely also be trade-offs; for instance tourists might appreciate seeing many llamas grazing, while this is counterproductive for the conservation of endemic biodiversity of the REA.

### *Quetena Grande*

- Soccer field
- Health centre
- Satellite dish
- Radio

As a major new investment in infrastructure, an electricity grid and a piped water system were planned for both communities for 2005. In addition, the communities have also already expressed interest in a number of other future investments.<sup>36</sup> Due to the 'no cash rule', direct cash-transfer effects of the SISCO system have been restricted to paid local employment in the community projects. One road-improvement project in Quetena Chico generated substantial employment over several months. Incomes were 25 Bs (US\$3.20) per day, and each employee worked for at least 10 days. The total income per person was thus 250 Bs (US\$32). Assuming 70% of the adult males in the community (there are 104) worked for 10 days, total earned income in the community was about 17 500 Bs, or about US\$2240. So far, no other SISCO project has generated such large-scale employment, though the forthcoming instalment of electricity and water systems is likely to create even more extensive wage employment.

Before community members began building at Guallajara, some SISCO funds were invested in a communal lodge in the town of Quetena Chico. However, the operation of the lodge had not begun at the time of writing (April 2004), because of internal community conflicts over management. According to associates of Quetena Chico, the communal lodge has not yet begun to function, because the benefits for each member were too indirect and disbursed, especially in comparison to other private enterprise possibilities. Interviewees stated that building and operating individual hostels was more straightforward and more lucrative (M. Verna *et al.* personal communication).

### **Community-based private tourism**

The private local lodges in the REA are generating a steadily increasing income stream and growing rapidly in number and size—the construction has not yet been completed. Associates who do not own a hostel provide other services to the visitors, such as food and sanitation. On average 80 tourists per day currently arrive, and there are currently only about eight hostels open (soon to be at least double this amount). One hostel owner reported that he currently charges 15 Bs to each of the approximately 10 tourists he receives per night. At this rate, he is grossing 150 Bs per night and 4500 Bs, or US\$576, per month. Such a high-revenue stream per individual is likely to decrease by about 50% in the short term as other community members open new hostels, assuming the numbers of visitors continue to grow at their current rate of 15% per year. One community member speculated that each owner could gross up to 2000 Bs or US\$256 per month in revenue when Guallajara is in full swing in late 2004, a substantial amount compared to other income-generating activities in the region. If the number of tourists arriving each day continues to grow at 15% per year and other factors such as price of lodging stay the same, the total gross revenue for the Guallajara complex would be approximately US\$64, 500 in 2005<sup>37</sup>. Currently, only two community members of Quetena

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<sup>36</sup> This includes an antenna for cellular telephone and internet access, a fund for student grants, training courses for local guides and business training for private hostel owners (Drumm 2004).

<sup>37</sup> If current average daily visitation rises 15% from 80 to 92 visitors, total revenue for the lodge complex in 2004 would be  $92 * 15 \text{ Bs (or US\$1.92, the cost of lodging per night)} * 365 \text{ days} = 503,700 \text{ Bs, or US \$64 494.24, rounded to US\$64 500.}$  The authors did not have the exact 2004 visitation and revenue data at the time of

Grande operate private hostels, and their revenues are not known. No cost estimates were collected to estimate net profits, yet community members report that the income generated from tourism clearly outweighs the losses incurred by REA's establishment: 'tourism is much better than collecting flamingo eggs' (community group interview, Quetena Chico, 24 April 2004).

An additional benefit from community-based tourism is the diversification and risk reduction it provides in a region where few other productive activities are feasible. Llama ranching, while providing the main source of income from the sale of meat and wool, is affected by price fluctuations and by the weather. In 2001, for example, a frost killed off many llamas, significantly decreasing rancher income (Á. Báez personal communication).

### **ICDP project**

From the ICDP project, which has been more active in Quetena Grande than in Quetena Chico, there are likely to be secondary income effects from various other projects such as weaving, painted art and dried llama meat. However, the income effects are not documented and were not investigated in this study.

### ***Social Effects***

Since many of the SISCO investments have been in social sectors (education, health), they are likely to yield significant social returns at least in the medium term. Another social benefit for both communities has been the consolidation of the land tenure of their respective territories. Conflicts among communities in the region are numerous and sometimes violent. With resources from the REA and TNC, the communities have been able to formalise their legal status and protect their borders from invasions. Quetena Chico is currently also supporting a 300 000 ha expansion of the REA into more of its purported territory, expecting that more effective border protection will come as a result. Finally, the ICDPs have involved environmental education and awareness-raising, incorporating community members as park guards and central stakeholders in the tourism management planning process.

A corollary to this stability of territory is the benefit of family and community cohesion. As a result of the income generated by private tourism enterprises and the increase in basic services for the community, there is less migration to the cities (community members, Quetena Chico, 24 April 2004).

On the downside, divisions within and between the two communities have risen partially as a result of the SISCO and the other proposed community development projects. In addition, between the two villages there is tension over the allotment of SISCO revenues. Quetena Chico maintains that because it has many more inhabitants (520) than Quetena Grande (180), it should receive a larger slice of the pie (M. Verna *et al.* personal communication). Not surprisingly, Quetena Grande vehemently opposes such a redistribution (Á. Báez personal communication). It is unclear how deep-seated this tension between the communities is, but nevertheless it has created friction where none existed before.

One major problem identified by the REA management and by TNC is the dependency relationship that has sprung from the SISCO. The communities are increasingly accustomed

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publication of this report, and it should be kept in mind that estimates of visitors and lodging rates are very approximate.

to ‘asking for things’ and are hesitant to contribute counterpart resources in the community projects (J. Alcoba personal communication). Though they express general satisfaction over the projects, they still express some hostility towards REA management and demand more benefits (Drumm 2004). This could lead to a decreased sense of community ownership of the project and poor management and maintenance. More generally, a paternalistic relationship can create future problems. Finally, concern has also been voiced over the disequilibrium that SISCO projects in Quetena Chico and Quetena Grande have created vis-à-vis other villages in the region (J. Alcoba personal communication).

### **Discussion**

For our evaluation of the payment initiatives in the REA, we will divide the analysis into the SISCO payments and the community-based tourism components,<sup>38</sup> both of which are payment structures with one buyer group (tourists) paying another (the communities) (Table 27). Both payments are directly correlated with the number of tourists, either through entrance fees (SISCO) or through other local tourist spending (private local hostels). The hostels generate cash revenue for the owners; the SISCO transfers provide non-cash benefits. There is some evidence that the hostels are driving changes in local behaviour more than the SISCO, probably because the local economy is extremely cash-poor and thus very sensitive to the large and rapid influx of cash. In either case, there is not as direct a link to the environmental service of natural beauty as in the other tourism cases in this study, both because the service is less well defined and because payments are not contingent upon its continuous provision.

#### **Table 27 near here**

One reason for this complexity is that tourism itself is much more of a threat to the biodiversity of the REA and the long-term conservation of natural beauty. Therefore an incentive linked to higher tourist numbers and more unrestricted tourist access may have a negative effect to biodiversity protection. Secondly, the REA-mediated SISCO payments that are meant to increase local environmental goodwill probably have a weak incentive effect, since they are perceived as unconditional transfers.

From the above assessment of the economic and social effects of the SISCO, it is evident that the livelihood effects of tourism-derived SISCO payments have been overwhelmingly positive for both communities. Indeed, so significant are the benefits of being part of the REA that many of the bordering communities want to be included in the expansion area so that they will also receive a portion of the SISCO (Á. Báez personal communication). The economic and social effects of the private local tourism and the ICDP are also positive (on balance), with the former likely to produce a higher overall effect. Despite these benefits, the potential for conflicts within and between communities over the distribution of benefits from all project components should not be overlooked.

Is the current structure of SISCO payments effective from the viewpoint of ‘buying’ environmental protection—beyond the narrow viewpoint of tourists’ appreciation of natural beauty? As mentioned, the incentive effects of SISCO payments are weaker than for the community-based tourism, the park ally effect from compensations is dubious, and the net result for biodiversity of the opposing effects of encouraging protection of landscape beauty that tourists pay to see with encouraging more destructive tourist access is unclear.

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<sup>38</sup> Again, we do not have sufficient data to include the ICDP component in the analysis.

On a separate level, a continuous flow of projects may permanently raise expectations for more projects. The increase in active support of the REA should not be taken for granted, especially if local inhabitants continue with environmentally destructive activities. This is a feature shared with another generous compensatory yet unconditional payment analysed in this study, the Noel Kempff project. There is a risk that this type of arrangement can, in the long term, create more problems for protected area management than it would foster conservation allies.

A root problem in the REA case is that the two villages would like to make more cash income (rather than in-kind projects) from tourism. The rules underlying the current SISCO payments preclude them from that, which may contribute further to their push to own and operate their own hostels. If they had a greater direct income stake in tourism, they might become more interested in the long-term livelihood potential of REA-based tourism than the diffuse SISCO transfers. To the extent that the two communities perceive the REA as 'the flamingo that lays the golden eggs', they will also take a more direct interest in its conservation. Obviously, an underlying premise in this recommendation is that local traditional land and resource uses (llama ranching, flamingo-egg collection, etc.) do actually constitute a (current or potential) threat to REA's integrity. However, if that is *not* the case, then the SISCO, or indeed any other type of local tourism payment, does not really have a conservation rationale.

The question then remains of how to deal with predatory tourism as a rising threat to the future tourism resource base itself as well as to independent wider biodiversity conservation goals. It is obvious that incentives that are positively correlated with visitor numbers (entrance fees, lodging rental, food catering, etc.) can have a counter-productive effect. So, on the one hand, the REA management would want the communities to have an income stake in tourism, while, on the other hand, it would not want them to have a dominant stake in predatory tourism. How can this basic incentive dilemma be addressed?

It is evident that the REA to some extent will have to rely on traditional command-and-control tools to resolve this impasse. Many of the crucial environmental safeguards will relate to spatial and qualitative parameters that are not easily linked to PES or to economic incentives in general. However, one of the tools at the disposal of the REA management is the SISCO system. Some changes have already been proposed for the percentage allocations and there may be room to put forward conditional clauses. First, it would clearly seem advisable to unlink SISCO community payments from the number of visitors. This would eliminate a potentially perverse incentive to increase tourist access beyond the limits of sustainability.

Secondly, one should consider making (part of) the SISCO payments conditional upon local environmental performance, i.e. to take one further step towards a genuine PES system. A contingent PES payment has not been established, primarily because the reserve status *legally requires* the inhabitants to abide by a set of conservation rules. Implementing a PES structure might make such restrictions appear optional when legally they are not (J. Alcoba personal communication). However, command-and-control alone can make it hard to bridge the gap between *de jure* rules and *de facto* implementation. REA management could for each year outline environmental management goals that the two villages are expected to contribute to, with parameters that can be monitored. At the end of the year, or for some indicators with shorter frequency, REA would pay an 'environmental premium' depending on the (variable degrees of) performance, in terms of compliance with the environmental goals.

There can be little doubt that changing the SISCO transfer system from a basic right to a mechanical subsidy linked to visitor numbers to a (partially) performance-based system would initially lead to an outcry from the communities: it is like replacing an unconditional gift with a conditional reward. The viability of implementing this change without excessive disruptions would depend on REA's negotiation skills and on 'packaging'—including in the reforms a change towards partial cash payments might be something in which the communities have a positive interest, and which makes a reform more palatable. Success would also hinge upon how objective the 'performance indicators' are designed, and how transparent the monitoring system would be. In deciding whether to follow this recommendation or not, the risk of short-term conflicts must be considered. On the other hand, it might turn out to be even more risky to project into the future an incentive system that does not give adequate signals to local land and resource users.

## CHAPTER 5: CASE STUDIES – BIODIVERSITY PROTECTION

### 5.1. Introduction

At the global level, biodiversity is probably the most highly valued among the services from (natural) forests in the Southern Hemisphere; yet paradoxically it is probably the one among them where least money has been invested in direct, contingent conservation systems. Biodiversity funding in general has recently seen a drastic decline from traditional sources like bilateral and multilateral ‘green’ aid. Data from the World Bank’s Program on Forests (PROFOR) show that bilateral forest-sector funding declined from slightly more than US\$1 billion in 1990–92 to US\$600–900 million in the late 1990s; for multilateral agencies the simultaneous decline was more dramatic, from about US\$1 billion to about US\$400 million. Support for protected areas, the main traditional channel of biodiversity funding, may have declined from a range of US\$700–770 million in the early 1990s to as little as US\$350–420 million in the early 2000s (Molnar *et al.* 2004).

This decline can be attributed both to a certain disappointment with the results of biodiversity-oriented development assistance, and to a shift in donors’ general priorities towards issues such as poverty alleviation and good governance. Private-sector funding for biodiversity has increased markedly, but from a very small base, thus being clearly insufficient to offset the decline in bilateral and multilateral assistance. Private foundations may spend up to US\$150 million annually, while other private-sector sources contribute in the range of US\$20–30 million yearly (Molnar *et al.* 2004). Much of the increased private-sector funding for biodiversity has been channelled through the three largest conservation organisations, WWF, TNC and Conservation International (Chapin 2004). However, this structural shift in the composition of conservation funding may eventually be more favourable towards a contingent, business-type approach to conservation, which PES is a key representative for, since this more result-focused method may generally appeal more to private-sector funders.

Why are people in the North investing in biodiversity? Biodiversity use values are one motivation. For instance, pharmaceutical companies have paid for the value of bioprospecting the biodiversity contained in certain spatially defined areas, though the payments have been low and the number of initiatives very limited. In spatial terms, biodiversity conservation tends to be positively correlated to the provision of other services, a factor that was certainly confirmed for our Bolivian sample. Hence, to the extent that biodiversity-rich areas correlate positively with, for instance, landscape-beauty values, people might donate money for biodiversity conservation so they could still (consider to) go and visit these areas, and thus derive a use value.

Nevertheless, the more intrinsic non-use values seem generally to be more important as Northern conservation motives. This includes both ‘option values’—future use values that are not yet providing any benefit at present. For instance, forest conservation preserves plants and genetic material that has no current human use, but such useful utilisation may be discovered in the future. There are also ‘existence values’ that are unrelated to any (present or future) use of biodiversity. The global wildlife enthusiast may out of altruism be willing to pay simply for the knowledge that a certain species survives, although he or she would never see it or derive any other utilitarian value from this knowledge. Donations to large international conservation organisations are one way of manifesting this willingness to pay for existence values.

Biodiversity obviously matters not only to the North, but also to developing countries themselves. In higher middle-income countries, there is often a growing urban conservation constituency appreciating existence values. As has been demonstrated in recent opinion surveys in Brazil, for example, there is a growing pride about the national endowment of pristine habitats and endemic wildlife. Bolivia is probably at an economic development stage where this constituency remains limited. At the local level, people often treasure the use values of biodiversity—in particular those elements of it that are useful for food, medicines, construction material, and so forth—and including the ‘option value’ of having certain products available as safety nets in the case of natural disasters and other emergencies. However, local people may also value the proper service side of forests, for instance through cultural and spiritual traditions that depend on the ‘existence’ of certain species.

What types of biodiversity-enhancing action can one achieve through PES? On the one hand, one could talk about ‘use-restricting’ PES systems that reward providers for *conservation* (including natural regeneration), putting caps on resource extraction and land development, or fully setting aside areas, e.g. as protected habitat. Here, landowners are paid for their conservation-opportunity costs, plus possibly for active protection efforts against external threats (Hardner and Rice 2002). In contrast, in ‘asset-building’ systems PES are made for the environmental-service *restoration* of an area, e.g. for bringing trees (back) into a treeless, degraded landscape. Conservation-opportunity and protection costs aside, PES may here also compensate direct costs of environmental-service establishment, often within agricultural systems (e.g. Pagiola *et al.* 2004). In the Bolivian case of a forest-rich country, one would expect the *use-restricting* type of initiatives to dominate over the *asset-building* ones paying for active restoration.

How does one actually pay for biodiversity—what is the vehicle for the direct payments? The most common type is *area-based systems*, where contracts stipulate land- or resource-use caps for a pre-agreed number of land units. Examples are conservation concessions (see 5.6 below), easements, protected catchments, and forest-carbon plantations. The second type is *product-based systems*, where consumers pay a ‘green premium’ on top of the current market price for a production scheme that is certified to be environmentally friendly, especially vis-à-vis biodiversity. This could be for a product that is meticulously linked to the use or non-use values of pristine habitat (e.g. extractive jungle rubber, Brazil nuts), for agro-ecological production modes preserving relatively high environmental-service levels (e.g. shade-grown coffee, organic farming) or for environmental-service conflictive production types that minimise their negative environmental effects (e.g. certified timber, proposed certification of soy and cattle producers in Brazil). In this brief section, we will describe both area- and product-based initiatives, but in Bolivia both of these remain at an infant stage.

## **5.2. The Beni Biological Station Debt-for-Nature Swap**

One of the first PES initiatives implemented in Bolivia was the world’s first debt-for-nature swap. In 1987, the Government of Bolivia and Conservation International signed an agreement in which Conservation International acquired US\$650 000 of Bolivian external debt at a discounted price of US\$100 000. In return, the then Bolivian Government provided the Beni Biological Station (EBB, in its Spanish acronym) with maximum legal protection along with US\$250 000 in local currency to a trust fund for management activities. At the time, the exchange was extremely controversial. Many Bolivians resented the conditionality



of the debt cancellation and the implied preference it placed on conservation rather than poverty alleviation (C. Miranda personal communication). Despite the initial resistance, numerous debt-for-nature swaps have occurred in Bolivia since the EBB. In recent years, they have petered off because the debt has become more expensive (C. Miranda personal communication).

### **5.3. Robin Clark and His Neighbour**

We found only one case of an attempted direct, continuous and contingent payment for biodiversity. Robin Clark, an ornithologist and conservationist who lives just outside the small town of Buena Vista, 20 km north of Amboró National Park, offered his neighbour US\$30 per month to conserve his remaining 50 ha of forest instead of cutting it down to plant rice. A former director of Amboró and the owner of a small lodge that caters to groups of bird-watchers and entomologists, Clark has both a personal and economic interest in conserving forest near his property. Agricultural expansion is causing rampant deforestation in the area and a consequent loss of bird populations. According to Clark, 450 species of birds have been spotted on this 50 ha property, making the area a high priority for conservation.

In 2003, Clark's neighbour accepted his offer. However, when the owner's adult sons learned of the contract, they persuaded their father to back out. According to Clark, they suspected the 'gringo' would later expropriate the property (R. Clark personal communication). This fear echoes that expressed by the property owners in Santa Rosa, who hesitate to enter into a PES contract with Fundación Natura Bolivia for the same reason (section 3.2). Indeed, these two examples underscore the importance of secure property rights and trust between participants in a PES system. In order for direct payment contracts to succeed, confidence must be established and maintained.

### **5.4. El Ceibo**

While no payment for biodiversity protection has occurred there, El Ceibo reveals both the untapped potential and the barriers to the establishment of such a market. Founded in 1977, the El Ceibo Cooperative is one of Bolivia's oldest and most successful farmer cooperatives. It has grown from 300 original members to 700–800 members today. Since 1979, El Ceibo growers have produced certified, organic cocoa in the semi-tropical Alto Beni region, 400 km north of the capital city of La Paz. The cacao beans are processed into cocoa powder and chocolate at El Ceibo's factory in El Alto, just outside of La Paz. One-quarter of the chocolate is for domestic consumption, and the rest is exported to the USA and European markets. The growers receive several benefits from organic production, which include a small price premium on the bean and a guaranteed buyer, in addition to training and technical assistance. According to the staff of El Ceibo, the latter is perhaps the most significant contribution for farmers; they can sell their beans to other buyers, but no other institution provides needed technical assistance (B. Apasa personal communication).

The organic certification requires that farmers eschew the use of any artificial pesticide on or near the cacao, construct physical barriers between their farms and pesticide-using farms and implement some degree of soil conservation measures. In 1998, El Ceibo also became 'Fair Trade' certified, which requires that it pay its growers a guaranteed minimum price, regardless of what the larger cocoa market dictates. Organic certification does not require

more trees planted per hectare, but over the past few years, El Ceibo has been experimenting with multi-species agroforestry in order to diversify the number of tree species within each plot. According to one field technician, such multilayered systems may help control pests (F. Cancari personal communication).

El Ceibo has received outside support from various international aid agencies, such as the Inter-American Foundation and the Swiss Agency for Development and Cooperation (SDC). Most of the foreign aid support has come in the form of technical assistance to increase cacao yields and quality. Donors have also helped with processing facilities and marketing (F. Cancari personal communication).

Members of El Ceibo have expressed interest in an additional 'biodiversity friendly' certification (B. Apasa personal communication). It is quite possible that the introduced tree stratification is having a positive effect on wildlife. A possible PES system for biodiversity thus exists, in which consumers would pay a premium for El Ceibo's extra trees. Members of El Ceibo have yet to familiarise themselves with the standards and seriously consider the additional certification. They pointed to several obstacles: first, the market is still new and unpredictable. Indeed, a market analysis would be difficult as the first pioneer products are still defining themselves on the market place. Second, the process would entail not only addition upfront costs (applications, new standardisation), but also increased fixed costs (research, monitoring, more certification) (B. Apasa personal communication). The premium may not yet be high enough or predicible enough to warrant the initial upfront costs of such certification.

Certainly, if credit were available or a donor were to foot the upfront costs, El Ceibo would be more inclined to jump into the biodiversity-friendly market. Pagiola and Ruthenberg (2002) point out that direct credit and even guarantees of credit-worthiness of farmers played a large role in biodiversity-friendly coffee establishment. With its long business history and favourable track record, El Ceibo appears to be a solid candidate for credit support. As with all of the other PES initiatives, it appears that some outside funding support is needed to get the system rolling. For now, biodiversity-friendly chocolate in Bolivia remains untapped potential.

### **5.5. Biocomercio Initiative**

With support from the United Nations Conference on Trade and Development (UNCTAD), the Bolivian Government has recently launched the Biocomercio Initiative. Three businesses that produce natural products that are environmentally, socially and economically 'sustainable' will initially receive support from the fund. The support will be in the form of training in marketing and business management, in addition to environmental and social standards. When the research for this paper was conducted (February–March 2004), the businesses had still to be chosen. Contenders included native grains, wild cocoa and herbal medicine products. Many of the products are already developed and are hoping to gain market exposure and higher premiums from the Biotrade logo. How the project and the market will evolve is still unknown. It is evident from the current standards, however, that strict biodiversity standards have not been developed. Ultimately, the 'bio' name rather than certification may be the products' marketing tool.

Along these lines, bird-friendly coffee is another option being explored in Bolivia. In an attempt to capture some of the growing market for bird-friendly, shade-grown coffee, one Bolivian brand markets itself on the internet as ‘meeting Smithsonian standards for bird-friendly coffee’. However, upon further investigation, it was learned that the claim was not backed by actual certification. No Bolivian company has yet been certified as compliant with Smithsonian standards (Robert Rice personal communication).

## 5.6. Conservation Concessions

Under a conservation concession agreement, national authorities or local resource users agree to protect spatially well-defined ecosystems in exchange for a stream of structured compensations from conservationists or other environmental-service users (Rice 2003). Recently, this type of agreement has also come to be known under other labels, such as ‘conservation incentive agreements’ or ‘incentive-based conservation agreements’. In its simplest form, this type of agreement mimics a timber concession, in which a logging company pays the government for the right to extract timber. Rather than log the concession area, the conservation investors pay the government for the right to preserve the forest intact, for instance, in order not to log it and to prevent third parties from degrading it. The negotiated agreement typically includes the amount and form of payment, the duration, the caps on land and resource use, and guidelines for monitoring and enforcing protection of the concession area (Rice 2003). An example is an agreement reached in Guyana in 2003 between Conservation International and the government (Richard Rice personal communication).

Under Bolivian law, there are several barriers to establishing conservation concessions. A 1997 Supreme Decree (no. 24773) outlines a regime for ‘concession of national land for conservation and biodiversity protection, research and ecotourism’, and gives the Agrarian Superintendent the authority to classify certain lands as conservation concession. However, it limits this classification to protected areas and land classified as inappropriate for forestry, agriculture or ranching. Thus, while the idea of a conservation concession is present, the legal framework does not help enable it to compete with other land uses.

Furthermore, it is not clear if the land reform law of 1997 (no. 1715) considers forest protection or conservation a legitimate ‘social economic function’. Rejecting such an interpretation, landless peasants have invaded lands, even private forest reserves with titles, arguing that the land should be ‘for (s)he who cultivates it’. The Bolivian Government has not clarified this discrepancy.

The Forestry Law (no. 1700) provides a legal space for two main conservation mechanisms that could potentially make room for conservation concessions: (1) Private Reserves of Natural Patrimony, of less than 5000 ha, protected for at least 10 years; and (2) Forest Protection Reserves within a forest concession, occupying up to a maximum of 30% of the concession (Camacho and Moscoso 2004). However, the law does not clearly define the multiple values of ecosystem services as a parameter for concessions; in other words, the concession would still probably have to be primarily for timber extraction (R. Guzman personal communication). The forestry law grants some tax benefits to people who put land under protection, but these benefits have not been clearly defined and are changing with a new revision of the forestry tax. A big constraint in using these mechanisms within the

forestry law is that a formal land title is required under this law (M.T. Vargas personal communication).

Despite these legal barriers, at least one effort to establish conservation concessions is underway. In the department of Pando, the northernmost province of Bolivia, the Jose Manuel Pando Foundation, the Chicago Field Museum and Conservation International have been working jointly to establish a reserve comprised of a mosaic of conservation areas. Pando is Bolivia's most forested department, and 95% of its forests are intact (Conservation International–Bolivia *et al.* 2004). The area of interest to the investors spans about 250 000 ha. Within one of the concessions, which spans 150 000 ha, Conservation International had targeted a 35 000 ha region that forms a triangle with two major rivers, the Tahuamanu and the Muyumanu. It is home to 14 species of primates representing all the New World subfamilies and is thus of high conservation priority.

Many different actors already hold or are attempting to gain some form of land and land use rights in this area, including the central government, municipal governments, timber concessionaires, Brazil-nut harvesters and private farmers. The 35 000 ha of land targeted for the conservation concession is currently part of three disputed timber concessions, which were originally granted to the San Martín Sawmill Ltd (Aserradero San Martín SRL). However, the land reform law of 1996 has led to a recategorisation of land use, and much of this land has been granted to private and communal landowners in addition to municipal governments, though most of the actual borders are still being determined (Richard Rice personal communication). It is likely that two of the concessions will be distributed to smallholder farmers, as well as some substantial portion of the larger concession known as San Martín. It is still unclear how much land will remain under timber concessions. Currently, the aforementioned conservation interest groups are supporting the land-titling process in order to clarify land tenure, a necessary step for establishing conservation agreements.

According to Conservation International, establishing these conservation agreements could take a variety of forms. The first agreement would likely occur with the San Martín timber concessionaire, which has expressed interest in entering into a contractual arrangement in which Conservation International would pay San Martín not to log the concession. Ultimately, the goal of Conservation International would be to pay the concessionaire to retire the concession permanently. In addition, Brazil-nut harvesters are in the process of seeking use rights within the San Martín concession. If they win these rights, their use of the area would be much more conservation-friendly than logging. Furthermore, because the economic benefits of Brazil-nut harvesting are tangible and widely accepted, the land use would still, unlike strict conservation, be considered as serving a 'socio-economic function'. There is thus scope for an alliance between conservation interests and Brazil-nut extractors.

The current and potential future challenges that the project faces, in addition to the unclear laws outlined above, include the slow process of land titling and conflicting objectives with farmers who want to cultivate the land—and have opposed protected areas in Pando in the past. If these barriers are overcome and the San Martín concession holder or Brazil-nut harvesters agree to such arrangements, the environmental benefit of protecting this area could be enormous. However, even if the establishment of conservation concessions was successful, third parties could still threaten it. Some degree of national legal recognition could help stem such pressures. The tumultuous economic and political climate has clearly created an unfavourable climate for the establishment of such agreements.

A final and key question is how much the conservation concessions will cost. Because no titles have been granted and the legal status remains volatile, this critical question has not yet been confronted, though it would likely become a central debated point during negotiations. Without a doubt, experimentation is warranted and lessons learned will be a valuable contribution to the conservation concession debate.

## CHAPTER 6: OVERALL CONCLUSIONS AND DISCUSSION

### 6.1. Characterisation of Case Studies

This study set out with the objectives of providing an overview of various PES initiatives in Bolivia, assessing their most salient and critical environmental and livelihood effects, identifying the obstacles to and promoting factors for PES establishment, and if possible making specific suggestions for their future implementation. For each case study, we have presented effects, obstacles and promoting factors, and have suggested prospects for future sustainability. In this chapter, we present a summary of these findings.

Perhaps the main overall result is that the ‘pure’ PES scheme, with the five criteria we used to define PES in the Introduction (well-defined service, at least one buyer, at least one seller, contingent transaction) does not really exist in Bolivia to date. This may come as a surprise to some readers, thinking for instance of the Noel Kempff project as a pilot community carbon project in the tropics. Indeed, carbon buyers ‘paid’ different ‘selling’ actors for a well-defined service. But on the seller side, the project used a one-off buy-out compensation method vis-à-vis the commercial actors (landowners, concession holders), i.e. it did not buy ‘service provision’ over time, but expropriated the land or use rights. With regard to the communities, it is more of a compensatory ICDP project, without any conditionality involved. This example shows the benefit of using an explicit definition with tangible criteria to decide what is a PES and what is not, and thus avoid the growing confusion around the PES concept.

Table 28 shows at a glance the answers to our five-criterion test done at the end of each of the nine case studies; actually all cases were voluntary agreements, so we only show the evaluation for the other four criteria. We included in this analysis only those cases where field activities with some environmental implication had already progressed. The table also shows other summary variables that we will return to later. While in none of the cases were all five criteria met simultaneously, in most cases various criteria were fully or partially met at the same time. This trend clearly demonstrates an interest in the use of economic incentives and in the broader generic family of what one could call ‘PES-like initiatives’. Many of the initiatives could eventually become actual PES, if the actors involved judge it desirable to transform them. In general, nothing *per se* mandates that a pure PES is better in achieving desirable outcomes than a *PES-like* blend with traditional tools of conservation and development. Yet, given the horizons of project funding in some cases, such initiatives almost have to become a PES in order to continue, i.e. when payments are being made using external donor money substituting for proper user payments—unless the users can be convinced to pay at some point, the initiative will likely cease when donor funding stops.

**Table 28 near here**

Among the unmet criteria, there is particular hesitance in Bolivia vis-à-vis the concept of contingency: with three ‘no’ and two ‘in part’ determinations, conditionality is leading the list of lacking criteria. This indicates how the contingency principle conflicts fundamentally with the altruistic–paternalistic tradition underlying decades of development assistance and rural interventions. The second most difficult criterion to meet is ‘minimum one buyer’—identifying the lack of willingness to pay for the service as another key obstacle. In turn, for all but one case there were sellers (i.e. potential PES recipients). These last two observations underscore a feature that has been noted in other studies, namely that PES is extremely

dependent on initiatives from the demand side, rather than a lack of potential providers willing to sell environmental services.

The most common initiatives in Bolivia are for landscape beauty/tourism, which play some role in two-thirds of the cases (six out of nine). Indeed, as noted previously, there are numerous other ecotourism initiatives in Bolivia which we did not explore. In spite of the sensitivity of international tourism to political turmoil, the ecotourism market is growing, and the costs of setting up simple tourist infrastructure are quite low. Since all the initiatives are near protected areas that tourists already frequent, local people in all the case studies had already observed tour operators making money from bringing tourist to 'their land'. In most cases, communities had gathered previous experience from work as wage labourers (e.g. as guides) in these externally driven operations. In most cases, the idea to set up a tourism operation sprang from them and was funded by conservation organisations.

In all five tourism cases, upfront investments or running subsidies to finance recurrent costs were provided by donors with a prime interest in biodiversity, although there was a variable degree to which these donor investments were instrumental in the start-up and operational success of the lodge. At one extreme, in Chalalán the immense investments and international consultancies were essential; in La Chonta, at the other extreme, the initiative received far less external support. In all cases, the landscape-beauty product was fairly explicit, while the biodiversity implications were implicit, thus justifying that the services are only 'in part' well-defined. There are certainly ample synergies between the biodiversity and landscape-beauty services, though we also found occasional trade-offs, e.g. when visitation to biologically sensitive areas puts biodiversity at risk, without really endangering the basis for tourism itself.

Many analysts of environmental-service payment systems would not count our ecotourism cases as PES systems at all (e.g. Kiss 2004). They would argue that, to be true PES cases, there should be *direct* payments to local people *exclusively* for an environmental service, for instance as when tourism operators in Zancudo (Cuyabeno, Ecuador) paid the local community in-kind benefits in order to stop hunting in a tourist-visitation zone (Wunder 2000), i.e. payment directly for a service or a changed land-use practice, and for nothing else. Our cases where landscape beauty is *embedded* into a tourism operation with the tourist also paying for food, transport and lodging would thus not qualify. These observers would either see our examples as variants of ICDPs, or as an 'enterprise strategy for community-based conservation' (Salafsky *et al.* 2001).

In fact, we think the classification is ultimately a matter of interpretation. If one sees the cases as *area-based systems*, the critics would clearly be right that no conservation area is being defined and protected in a contingent way. However, one can also see the cases as *product-based systems*—the conventional tour product is being sold with a premium for preserving natural beauty, and possibly other desirable eco-label features such as low environmental impacts and social sensitivity. This vision would look at the community-based tourism cases as an eco-product, not as an area-confined land-use agreement. For some of our cases, like the strongly nature-oriented Chalalán, that conceptual approach seems to hold; for others, like the REA, the payment mode and the behavioural reaction to it raise more doubts about the existence of an 'eco-premium' that is contingent on 'good' land-use and environmental protection.

Watershed PES systems are the second most common PES type in the projects that we visited, with three initiatives involving that service. There is a growing scarcity of water,

especially in drier areas, driving the interest in landscape-level integrated natural-resource management as an alternative to alleviate that scarcity from the supply side. At the same time, we begin to get a more realistic vision of the role of forests in the protection of water quality and (sometimes) quantity. Although water demand is the main underlying point of leverage, we note that, except for the ICO–La Aguada experience, initiatives are in fact not demand-driven, but rather initiated by conservation organisations attempting to gain support for protected areas or conservation in general. In terms of PES, these initiatives range from Los Negros–Natura, arguably the experience in Bolivia that comes closest to a genuine PES trial, to the Sama–PROMETA case, as a non-PES traditional watershed management project where PES-type economic incentives have been considered but not applied so far.

The two other services, carbon storage/sequestration and ‘pure’ biodiversity protection, are in a more infant stage in Bolivia. All but one of the carbon initiatives are in the pipeline, largely as a result of the uncertain market for carbon, the current exclusion of avoided deforestation from the Kyoto CDM, and some political resistance to carbon farming. There are still no stand-alone biodiversity PES systems in place. Uncertain markets in the case of biodiversity premiums for products and uncertain legal land-tenure systems for conservation concessions are some of the key obstacles. At the same time, biodiversity is factored into seven of the nine initiatives as a ‘bundled’ environmental service, often in a subtle, implicit way. Importantly, all the initiatives but one (ICO) are linked directly to conservation organisations with a primary interest in biodiversity protection, and are physically located within or in the vicinity of a protected area.

In terms of the financial state of the initiatives, ‘financial influx’ (Table 28, column 8) distinguishes three main scenarios (Low, Medium, High) of how much money has been spent, be it from donors or from service buyers, in relation to local population size. There are huge differences between, at the extremes, the luxury Chalalán Ecolodge and ICO’s small-scale project in La Aguada. We do not pretend to quantify this influx in discrete terms, but the three-tier category gives a rough indication. Another question is how many projects currently are fully financially independent—that is, no donor other than the buyer of the main environmental service is ‘subsidising’ the initiative. This currently seems to hold for three initiatives: Noel Kempff (the energy companies are footing the bill), REA (the SISCO and private tourism are paid for by tourists) and Chalalán (now purely based on tourism incomes). However, in all of these cases, the current financial independence was only achieved following significant upfront investments from conservation organisations (TNC, Conservation International) and multilateral banks (Inter-American Development Bank). Two watershed-protection initiatives are fully dependent on external funding—Natura and PROMETA—though for both the foreign donor was/is a ‘buyer’ of biodiversity. This underlines that conservation and development donors are likely to play an important role in the development of PES initiatives, at least in their initial phases. When service users simply are not willing to pay ‘out of the blue’, donors could step in and finance a pilot phase, buying time and demonstration effects necessary for intermediaries to mobilise the potential buyers.

## **6.2. Effects of the Initiatives**

In Table 28, we were only looking at initiatives with ongoing field action, but even among those, most are very young (see ‘age of initiative’ column), implying that their environmental and livelihood effects are incipient. As pointed out in several of the case studies, PES or PES-like systems need time to evolve, with trust-building and fundraising as main hurdles in the



process. The short-term effects we have found in this rapid assessment are thus not necessarily certain indications of where the initiatives are heading in the medium and long term. Thus, our observations about preliminary effects do not imply finite judgements about the achievements of the initiatives, or lack thereof.

With these caveats in mind, the two last columns in Table 28 give us a summary of the case-study analyses of environmental and livelihood effects in this report. Looking at the outcomes of the environmental and livelihood sections, we gave each case a simple three-stage score of ‘weak’, ‘medium’ or ‘strong’, i.e. rating the effects vis-à-vis the combinations of environmental threats or the livelihood situation at hand. While this is obviously a simplified procedure which can involve some arbitrariness, we thought it was the most adequate for a quick overview exercise, given the internal complexity of cases and the different variables across cases.

Four cases showed strong environmental-protection effects, two with medium and three with weak ones. It also proved important in various cases to look at the environmental effect in a differentiated way. This would involve different types of activities constituting threats (e.g. clearing vs. hunting), different potentially threatening actors (e.g. landholders vs. landless), and different scales of analysis (e.g. contract area vs. village level).

We are referring here to *net* effects; there were also some partial effects that put increased pressure on the environment. Typically, this would include higher local food production necessitated by higher population than would have been the case without certain initiatives, especially those with large financial injections like Chalalán, REA or Noel Kempff that made it much more attractive to stay in or come (back) to the community targeted by the initiative. Ecotourism and landscape-beauty consumption itself could also lead to enhanced threats when scaled up significantly without the necessary restrictions, as shown in the REA case.

On aggregate, however, the effects on the environment were positive but variable in significance. These positive effects were often the direct result of land-use caps stipulated in or underlying the PES contracts (to the extent that these were truly conditional). But in some cases they were also in part the result of changed socioeconomic dynamics among PES recipients, e.g. because of changed labour allocation or consumption structures.

Almost all of the environmental effects analysed in the nine initiatives were ‘activity-restricting systems’ (as defined in section 5.1). People were being encouraged to preserve or conserve resources such as natural forests through caps on current or planned land use, or at least to let the resource recover naturally (as in the ICO water schemes). In many cases, people were being paid not to use a certain natural area at all, which in some cases necessarily affected some previous users negatively. There were many fewer examples of environmental ‘asset-building systems’, e.g. those with active reforestation efforts. Some reforestation with natural species occurs in the Sama watershed (Tarija) and the reintroduction of trees into cocoa agroforestry systems (Biocomercio Initiative); otherwise one was referred to only under carbon projects ‘in the pipeline’.

Obviously, this clear emphasis on ‘activity-restricting systems’ reflects that Bolivia is a forest-rich country where currently a richness of environmental services can be provided by existing (but threatened) ecosystems, which in most cases is easier, cheaper and more rational than rebuilding those that have already been degraded. However, this also provides a challenge for PES implementation, since rural employment and income-generation levels are

often linked to activities degrading the provision of environmental services, the restriction of which raises significant political resistance.

Are there any hints as to what background variables could have influenced environmental outcomes? The sample is too small (n=9) to do a meaningful statistical analysis of correlation. From simple comparison, no systematic pattern is visible as to certain PES modalities (the four criteria) singularly affecting the environmental effects. There is also no sign that larger amounts of money being locally disbursed by donors or service buyers (column 8) would in and of itself make environmentally positive outcomes more likely: REA, La Aguada and Mapajo seem to be prove this hypothesis wrong. However, as we can see, there is some support to the intuitive hypothesis that initiatives which have been working for longer time tend to have more environmental effect.

For the livelihood effects (which include for purposes of simplification both economic and social effects), we noted three cases with strong (positive) effects, two with medium effects and four with weak effects (Table 28). The initiatives were thus apparently slightly less 'effective' in achieving livelihood effects than in promoting environmental protection. This is hardly surprising, since the main goals of all but one project (ICO) were environmental. Also, we generally did not find negative economic effects (in net terms) among PES recipients or environmental-service sellers—participants were generally made better off in income and asset terms than had they not participated. We did not find cases of environmental-service sellers being 'trapped' in PES agreements reducing their welfare.

Looking beyond economics at the social-impact side of livelihoods, in some cases there were negative social side-effects, typically affecting the entire community rather than exclusively 'sellers' alone. While new initiatives have improved human capital, investment in community projects and community organisation, they have also in some cases changed internal power structures and caused new rifts among actors. Much of the general literature of PES flags equity issues as a concern for future PES implementation, especially in cases where environmental-service providers experience large gains relative to other stakeholders who do not have an environmental service to 'sell' or relative to the environmental-service buyers who are forced to pay for environmental-service protection (Landell-Mills and Porras 2002; Rosa *et al.* 2003).

Do the data (Table 28) indicate any possible causalities regarding what boosts positive livelihood effects? Again, the fulfilment of individual PES criteria does not seem to have a systematic influence on performance; it could be that combinations of PES criteria have an impact, but more sophisticated techniques would be needed to test for that.<sup>39</sup> As with the environmental effects, there seems to be a positive correlation with the number of years of operation: the longer the initiative has been running, the more significant are the effects—once again, an intuitive result. Where 'more influx money' (column 8) apparently had no clear effect on the environment, it does increase livelihood effects: six out of nine score pairs have the values we would expect ('High-Strong', 'Medium-Medium', 'Low-Weak') for that relationship to hold.

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<sup>39</sup> For example, Boolean algebra analysis is a statistical technique designed to detect multivariate patterns of this type, even in small samples like ours.

### 6.3. Recommendations and Perspectives

Before providing some specific recommendations, it seems worthwhile to step back and survey the results of our review in the light of the specific obstacles and opportunities presented by the Bolivian context.

The many obstacles to establishment of PES systems in Bolivia include general scepticism and in some cases aversion to applying any type of market-related mechanisms to natural-resource management (especially for carbon and watersheds), lack of secure land rights for the vast majority of people, and unclear policies surrounding environmental services. In addition, as with many other regions, a general uncertainty about the future markets and the biophysical linkages remain major challenges, as does the potentially high transaction costs of establishing PES systems with small landholders and communities.

Nevertheless, there are still many aspects of the Bolivian social, economic and political context that could promote the growth and success of PES systems. Some groundwork has already been laid by innovative pilot projects, and there appears to be substantial interest in experimenting with new mechanisms to improve watershed management, increase tourist numbers and explore markets for biodiversity-friendly products. With extensive forest ecosystems still intact, there are many places where such new initiatives could take root. Though the political climate is heated, Bolivia has also been an environmental policy innovator in Latin America and could carry this innovation to the realm of environmental services.

Some suggestions may resonate more than others for specific projects, but can be grounds for reflection for any initiative. For nascent PES initiatives, we have recommended a focus on key factors that could be periodically revisited in order to improve the environmental and livelihood outcomes. These include a thorough understanding of land–environmental service linkage, trust and willingness among actors, and a solid demand for the environmental service that compares favourably with the transaction and opportunity costs associated with providing the environmental service. If such elements do not exist, they must be built and fortified before any PES initiative can begin to move forward and achieve successful agreements among actors.

For initiatives that are already in motion, there are additional key efforts that can be undertaken to improve outcomes on the ground. To improve environmental impacts, clearer, agreed-upon contingent payments may help, as well as more rigorous systems that monitor compliance with the agreement. To improve economic impacts, in many cases we suggest enhanced management and promotion of the environmental service, and in some cases—where there are several entities involved in the PES—more efforts could be made to share part of the actual ‘payment’ with environmental-service providers. To improve social impacts, we suggest emphasis on culturally appropriate, open negotiations among trusting participants, and frequent local discussions about environmental services and other relevant PES initiatives underway. For all types of impacts, an understanding and clarification of land rights, at both legal and cultural levels, could create more durable environmental, economic and social benefits for environmental-service buyers and providers.

PES initiatives are forging new paths in the forests and plains of Bolivia. Their tracks are relatively few and fresh, but their initial steps towards the dual goals of environmental conservation and livelihood improvement suggest an approach with the potential to achieve

new levels of success. Future PES exploration and endeavours will reveal their ability to reach both goals in the long term.

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**[Text box 1]**

**Santa Cruz–Amboro**

Similar to the efforts of PROMETA in Tarija, FAN is experimenting with a comparable approach. With support from TNC, it is undertaking preliminary research on the hydrology of the Pirai River, which originates in Amboró National Park and supplies the city of Santa Cruz with much its water. Many proponents of Amboró have pointed to this important environmental service that the park provides, an argument that has been stressed especially since the park expansion brought it under the public spotlight. Due to rapid population growth, Santa Cruz is becoming more constrained by water availability. Following its mission to find sustainable mechanisms to finance conservation, FAN is thus attempting to understand the water situation in Santa Cruz and the linkages between the environmental service and land use in the Pirai watershed and in Amboró. It is possible, though not at all certain, that a PES system could eventually emerge from such research. Obviously, the lessons learned from PROMETA and the current challenges it faces in Tarija will be important for FAN's work.

**[Text-box 2]**

**Chalalán Ecolodge's main forms of income generation and development finance in San José**

- Financing community land-titling process
- Income generation through direct temporary and permanent employment
- Distribution of dividends to tourism business associates
- Income from food and handcraft sale for tourist consumption
- Financing secondary high-school education
- Financing of new school-house construction
- Contribution to teachers' salaries
- Financing rotating fund for the provision of school materials
- Other social investments in the community.

**Source:** Pastor (2004); authors' field data.

**Table 1. Case-study projects according to environmental service types**

<b>Main environmental service (to be) paid for</b>	<b>Projects being implemented</b>	<b>Projects in the pipeline</b>
Carbon sequestration/storage	1	2
Watershed protection	2	2
Scenic beauty/tourism	5	0
Biodiversity	1	4
<b>Total</b>	<b>9</b>	<b>8</b>

**Table 2. Ecoregional distribution of main and secondary projects**

<b>Ecoregion</b>	<b>Main projects</b>	<b>Secondary projects†</b>
Dry mesothermic valleys ( <i>Valles secos mesotérmicos</i> )	3 (Natura, La Yunga, ICO)	1 (FAN Amboro)
Humid subtropical transition forest and lowlands ( <i>Bosque húmedo estacional subtropical de transición y tierras bajas</i> )	1 (La Chonta)	1 (Robin Clark)
Tropical Amazonia–Chiquitania transition forest ( <i>Bosque tropical transicional entre la Amazonía y la Chiquitania</i> )	1 (NKMCA <sup>‡</sup> )	
Subhumid semi-evergreen montane and submontane forest ( <i>Bosque subhúmedo –semi-semperverde de montaña y submontaña [Yungas Tucumano]</i> )	1 (Sama–Tarija)	
Highland desert and prairie ( <i>Región de tierras altas y praderas altoandinas</i> )	1 (REA)	1 Inquisivi
Palm savannahs of northern La Paz‡ ( <i>Sábana de palmeras del norte de La Paz</i> )		3 (El Ceibo, H Chapare, EBB)
Humid seasonal lowland tropical forest ( <i>Bosque húmedo estacional tropical de tierras bajas</i> )	2 (Chalalán and Mapajo)	1 (Conservation International–Pando)
<b>Total</b>	<b>9</b>	<b>8</b>

Con formato: Español  
(España - alfab. internacional)

† The Biocomercio initiative is spread over many sites and ecoregions.

‡ The name for this ecoregion may be misleading as it implies solely palm savannahs. In fact, while the presence of palm savannah is a distinctive feature of this ecoregion, there are many other ecosystems distinct from palms, including ones where PES initiatives are located.

**Table 3. Political region distribution of projects**

<b>Department</b>	<b>Main</b>	<b>Secondary</b>	<b>Total</b>
Santa Cruz	5	2	7
Beni	0	1	1
Tarija	1	0	1
La Paz	2	2	4
Cochabamba	0	1	1
Potosí	1	0	1
Pando	0	1	1
Dispersed	0	1	1
<b>Total</b>	9	8	17

**Table 4. Environmental threat changes as a result of the NKMCA**

Threats (in prioritised order)	Threat level before	Threat level after	Land area affected (ha)	Conservation effect†
Logging	High	Low	634 000 (size of the expansion)	++
Clearing by (bought out) landowners	High	Zero	Just 307	+++
Land clearing by local communities	High	Zero	224	+++
Hunting by local communities	High	Medium	?	+

† The number of symbols indicates the estimated scale of overall conservation effect.



**Table 5. Compensation payments to purchase private properties within Noel Kempff National Park expansion area**

<b>Property</b>	<b>Size (ha)</b>	<b>Compensation amount in 1996 (US\$)</b>	<b>Investments compensated (in addition to land)</b>
TacuaraI	145	44 500	House, fence, pasture, pond
El Milagro	22	15 300	House, fence, pasture, pond
Santa Fe	150	7 500	Pasture and secondary forest
<b>Total</b>	307	67 300	

Source: FAN (1997); R. Vaca (personal communication).

**Table 6. Implemented initiatives versus the PES concept: NKMCAP**

<b>PES criterion</b>	<i>Well-defined environmental service</i>	<i>Minimum one buyer</i>	<i>Minimum one seller</i>	<i>Conditional payments</i>
<b>Our evaluation</b>	<b>Yes:</b> Carbon storage (and biodiversity conservation)	<b>Yes:</b> Foreign carbon buyers paid	<b>Yes:</b> All main parties suffering (financial and opportunity) costs were paid: <i>(a) loggers and (b) landowners:</i> – one-time, cash <i>(c) communities:</i> – continuous, ICDP benefits	<b>No:</b> <i>(a) Loggers and (b) landowners:</i> – payments conditional on abandoning all rights—not only service provision <i>(c) communities:</i> – non-conditional

**Table 7. Environmental threat changes as a result of the PES system: Santa Rosa**

Threats	Threat level before	Threat level after†	Land area affected (ha)	Conservation effect
Land clearing by local landholders	High	High	562‡	Close to zero
Land clearing by landless colonists	Medium	Low	562	+
Forest degradation from cattle grazing	Medium	Medium	562	Zero

† Because of lack of monitoring, these threat levels are estimates, based on information gathered on potential additionality and leakage.

‡ The land area enrolled for 2003–2004 (increased to about 1000 ha for 2004–2005).

**Table 8. Perceived advantages and disadvantages of two PES payment modes in Santa Rosa (Santa Cruz, Bolivia): Cash and in-kind transfers compared**

Beehive pros / Cash cons	Cash pros / In-kind cons
<ul style="list-style-type: none"> <li>• Some recipients reject money</li> <li>• Cash would be spent rapidly and leave no long-term benefits</li> <li>• Receiving cash ‘smells’ more like giving up future property rights</li> <li>• Honey is a useful subsistence or sellable product</li> <li>• Beekeeping includes an incentive to protect forest as bee habitat</li> <li>• Demonstration effect (to neighbours) of bees and the sweet taste of honey gives PES implementers more goodwill than a corresponding cash transfer</li> </ul>	<ul style="list-style-type: none"> <li>• Some recipients little skilled and little interested in beekeeping, thus losing benefits</li> <li>• Beehives are inflexible assets to sell, compared to animals or equipment</li> <li>• Beehives are inflexible assets to subdivide, compared to cash</li> <li>• Extra training costs for implementing NGO</li> <li>• Extra costs for recipients to benefit—beekeeping demands labour inputs</li> </ul>

**Table 9. Implemented initiatives versus the PES concept: Santa Rosa – Los Negros watershed**

<b>PES criterion</b>	<i>Well-defined environmental service?</i>	<i>Minimum one buyer?</i>	<i>Minimum one seller?</i>	<i>Conditional payments?</i>
<b>Our evaluation</b>	<b>In part:</b> – Forest– watershed links not yet determined – biodiversity conservation effects are more obvious	<b>In part:</b> – Downstream (potential) beneficiaries do not yet pay – External biodiversity donors pay	<b>Yes:</b> Some Santa Rosa farmers have enrolled	<b>Yes:</b> Conditional, monitored contracts—though monitoring still in progress, and cases of non-compliance remain to be handled

**Table 10. Predicted hydrological changes in the Victoria watershed in two land-use scenarios (percentages)**

	<b>With protection†</b>	<b>Without protection‡</b>
Change of average annual water flow§	-10.3	15.2
Change of average dry-season water flow	7	-28
Change of average wet-season water flow	-11.6	18
Change in sediment run-off	-51	280

Source: PROMETA (2004).

† For the ‘with protection’ scenario, it is assumed that no degradation occurs and that some areas that are currently degraded would be allowed to recuperate. For some vegetation areas, reforestation is introduced.

‡ For the ‘without protection’ scenario, the model changes land-use types to likely future uses, based on topographic and soil characteristics, and population pressure. It classifies the land uses of the watersheds into 33 vegetation types and then, based on the three variables, predicts what degradation in vegetation cover could occur as a result of human intervention. The model assumes that all changes are to the most extreme land degradation possible within the range of potential land-use changes.

§ ‘Flow’ refers to the amount water passing through a waterway, measured in cubic metres per second.

**Table 11. Initiatives versus the PES concept: The Tarija–Sama watershed**

<b>PES criterion</b>	<i>Well-defined environmental service?</i>	<i>Minimum one buyer?</i>	<i>Minimum one seller?</i>	<i>Conditional payments?</i>
<b>Our evaluation</b>	<b>Yes:</b> Watershed protection for drinking water, irrigation and hydroelectric use well documented	<b>No:</b> The users are not paying; predominantly donor funds	<b>No:</b> No direct payments to service providers— some project benefits	<b>No:</b> Project benefits non-conditional

**Table 12. Environmental threat changes as a result of the PES system: La Aguada**

<b>Threats (in prioritised order)</b>	<b>Threat level before</b>	<b>Threat level after</b>	<b>Land area affected (ha)</b>	<b>Conservation effect†</b>
Cattle grazing (compacted soil and water contamination)	High	Zero	510	+++
Land clearing	Medium	Zero	33	++

† The number of symbols indicates the estimated scale of overall conservation effect.



**Table 13. Implemented initiatives versus the PES concept: La Aguada**

<b>PES criterion</b>	<i>Well-defined environmental service?</i>	<i>Minimum one buyer?</i>	<i>Minimum one seller?</i>	<i>Conditional payments?</i>
<b>Our evaluation</b>	<b>Yes:</b> Watershed protection (cleaner drinking water)	<b>In part:</b> The beneficiaries contributed in the case of La Aguada but the project paid in all other cases	<b>Yes:</b> But social and legal pressure factors influenced	<b>Not really:</b> Payments conditional on abandoning all rights, not only service provision

**Table 14. Environmental threat changes and conservation effect: Chalalán Ecologue**

Threats (in prioritised order)	Zone	Threat level before	Threat level after	Land area affected (ha)	Conservation effect <sup>†</sup>
Land clearing by squatting colonists	Park	High	Medium	?	+
	Village	Medium	Low	?	++
	Lodge	Medium	Low	400	++
Logging by external operators	Park	High	Medium	?	+
	Village	Medium	Low	?	+
	Lodge	Medium	Zero	400	++
Hunting	Park	High	Medium	?	+
	Village	High	Medium	?	+
	Lodge	High	Very low		+++
Clearing by local inhabitants	Village	Low	Medium	440	-

<sup>†</sup> The number of symbols indicates the estimated scale of overall conservation effect.

**Table 15. Chalalán Ecolodge visitor numbers and gross revenues (approximates)**

<b>Year</b>	<b>No. guests (per year)</b>	<b>Average price of package (US\$)†</b>	<b>Gross annual revenue (US\$)</b>
2000	700	341	238 700
2001	850	341	289 850
2002	1160	341	395 560
2003	950	341	323 950

Source: Field interviews.

† Assuming that 60% of guests stay for 3 nights; 40% for 2 nights (G. Mamani personal communication).

**Table 16. Estimated local employment and wages (US\$) at Chalalán Ecolodge (2003)**

Position	No. individuals	Wage/day	Days worked per individual		Amount earned per individual		Amount per individual	Total amount per position
			HS†	LS†	HS	LS		
Guide	8	8	70	20	560	160	720	5 760
Boat driver	3	4	180	100	720	400	1120	3 360
Maintenance staff	15	4	40	20	160	80	240	3 600
Cook	10	3	40	20	120	60	180	1 800
Cleaner	8	3	40	20	120	60	180	1 440
Administration	3	7	180	180	1260	1260	2520	7 560
<b>Estimated total annual wage income from tourism</b>								<b>23 520</b>

Source: Field data.

† High season (HS) is June–September, low season (LS) October–May.

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**Table 17. Implemented initiatives versus the PES concept: Chalalán tourism**

<b>PES criterion</b>	<i>Well-defined environmental service?</i>	<i>Minimum one buyer?</i>	<i>Minimum one seller?</i>	<i>Conditional payments?</i>
<b>Our evaluation</b>	<b>In part:</b> – <i>Nature beauty</i> (strongly embedded) – <i>Biodiversity</i> (past, implicit)	<b>Yes</b> – Tourists pay beauty premium – Donors paid for biodiversity protection (past)	<b>Yes:</b> Village receives profits, wages and other benefits	<b>Yes:</b> For nature beauty <b>No:</b> For biodiversity

**Table 18. Environmental threat changes and conservation effects as a result of the Mapajo lodge**

Threats (in prioritised order)	Zone	Threat level before	Threat level after	Land area affected (ha)	Conservation effect†
Land clearing by colonists	Village	Zero	Zero		0
	Pilón Lajas	High	Moderately high	?	?
Logging	Village	Low	Zero	500	+
	Pilón Lajas	High	Medium		+
Hunting	Village	High	Low	500	++
	Pilón Lajas	High	Medium?	?	+
Clearing by local inhabitants	Village	Low	Low	?	0
	Pilón Lajas	Low	Low	?	0

† The number of symbols indicates the estimated scale of the conservation effect overall.

**Table 19. Employment and estimated salaries (US\$) for the Mapajo Ecolodge in 2003**

Position	No. individuals	Wage/day	Days worked per individual		Amount earned per individual		Total amount per individual	Total amount per job
			HS†	LS†	HS	LS		
Guide	4	6.40	35	10	224.00	64.00	288.00	1152.00
Guide assistant	6	6.40	20	5	128.00	32.00	160.00	960.00
Maintenance	4	6.40	15	5	96.00	32.00	128.00	512.00
Cooking and cleaning staff	10	6.40	30	8	192.00	51.20	243.20	2432.00
Cultural activity participant	16	1.92	40	10	76.80	19.20	96.00	1536.00
<b>Estimated total annual wage income from tourism</b>								<b>6592.00</b>

† High season (HS) is June–September, low season (LS) October–May.

**Table 20. Implemented initiatives versus the PES concept: Mapajo tourism**

<b>PES criterion</b>	<i>Well-defined environmental service?</i>	<i>Minimum one buyer?</i>	<i>Minimum one seller?</i>	<i>Conditional payments?</i>
<b>Our evaluation</b>	<b>Somewhat:</b> – <i>Nature beauty</i> (but embedded) – <i>Biodiversity</i> (but implicit)	<b>Yes:</b> – Tourists pay beauty premium – Project donors pay for biodiversity conservation	<b>Yes:</b> Main village retrieves wage premium; other villages no benefits yet	<b>Yes:</b> For nature beauty <b>No:</b> For biodiversity



**Table 21. Environmental threat changes and conservation effects: La Chonta ecotourism operation**

<b>Threats (in prioritised order)</b>	<b>Zone</b>	<b>Threat level before</b>	<b>Threat level after</b>	<b>Land area affected (ha)</b>	<b>Conservation effect†</b>
Land clearing by colonists	Park	High	Medium	?	+
	Village	Low	Low	500	No effect
Hunting by locals and outsiders	Park	High	Medium	?	+
	Village	High	Low	?	++
Logging	Park	High	Medium	?	+

† The number of symbols indicates the estimated scale of overall conservation effect.

**Table 22. Estimated tourism employment and salaries (US\$) in La Chonta in 2003**

<b>Position</b>	<b>No. individuals</b>	<b>Wage/day</b>	<b>Days worked per individual</b>	<b>Income per individual for six month tourist season</b>	<b>Total income</b>
Guide	4	15.00	9.4	140.63	562.50
Cook	4	3.20	33.75	108.00	432.00
<b>Estimated total wage income from tourism</b>					<b>994.50</b>

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**Table 23. Implemented initiatives versus the PES concept: La Chonta tourism**

<b>PES criterion</b>	<i>Well-defined environmental service?</i>	<i>Minimum one buyer?</i>	<i>Minimum one seller?</i>	<i>Conditional payments?</i>
<b>Our evaluation</b>	<b>In part:</b> – Nature beauty – Biodiversity (implicit)	<b>In part:</b> – Tourists pay (small) landscape-beauty premium – Donors pay for biodiversity	<b>Yes:</b> Village gets profits; employees get premium	<b>Yes:</b> For nature beauty <b>No:</b> For biodiversity

**Table 24. Environmental threat changes: La Yunga ecotourism initiative**

<b>Threat</b>	<b>Region</b>	<b>Threat level before</b>	<b>Threat level after</b>	<b>Land area affected (ha)</b>	<b>Conservation effect†</b>
Clearing for agriculture	Core area	Medium	Zero	60	++
	Community	High	High	0	
	Park	High	Medium–High	?	+ (very small)
Hunting	Core area	High	Low	?	++
	Community	High	Medium	?	+
	Park	High	?	?	
Logging	Core area	Medium	0	60	++
	Community	Medium	Medium	?	0
	Park	Medium	Medium	?	0

† The number of symbols indicates the estimated scale of overall conservation effect.

**Table 25. Implemented initiatives versus the PES concept: La Yunga tourism**

<b>PES criterion</b>	<i>Well-defined environmental service?</i>	<i>Minimum one buyer?</i>	<i>Minimum one seller?</i>	<i>Conditional payments?</i>
<b>Our evaluation</b>	<b>In part:</b> – <i>Nature beauty</i>	<b>In part:</b> Tourists pay (small) beauty premium	<b>Yes:</b> Community receives (small) benefits	<b>Yes:</b> For natural landscape beauty (fern forest)

**Table 26. Environmental threat and conservation effects of tourism-related payments in Eduardo Alvaro Reserve†**

<b>Threat</b>	<b>Threat level (without payments)</b>	<b>Threat level with SISCO (without community-based tourism)</b>	<b>Conservation effect of SISCO</b>	<b>Threat level with community-based tourism (without SISCO)</b>	<b>Conservation effect of private tourism</b>
Tourism direct degradation of sensitive habitats	High	High	0	Very high	–
Flamingo-egg collection	Medium	Low	+	Low	+
Llama over-grazing	Medium	Medium	0	Higher	–
Hunting	Low	Low	0	Low	0

† The ‘land area affected’ column is excluded in this case because land areas affected are unknown, unlike other case studies.

**Table 27. Implemented initiatives versus the PES concept: Reserva Eduardo Alvaroa**

<b>PES criterion</b>	<i>Well-defined environmental service?</i>	<i>Minimum one buyer?</i>	<i>Minimum one seller?</i>	<i>Conditional payments?</i>
<b>Evaluation:</b>	<b>In part:</b>	<b>Yes:</b>	<b>Yes:</b>	<b>In part:</b>
(a) <i>Private local tourism</i>	(a) Natural beauty – partly	(a) and (b): Tourists pay – directly or through SISCO	(a) and (b): Communities receive	(a) For natural beauty – partly
(b) <i>SISCO transfers</i>	(b) Increased park-ally			(b) No, not conditional

**Table 28. Summary characteristics of case studies**

Case	Eco-service type†	Service clearly defined	Buyers	Sellers	Conditionality	Life-time (years)	Financial influx	Environmental effect	Livelihood effect
Noel Kempff	C, B, T	Yes	Yes	Yes	No	7	High	Strong	Strong
Los Negros	W, B	In part	In part	Yes	Yes	3	Low	Weak	Weak
Sama, Tarija	W	Yes	No	No	No	4	Medium	Medium	Weak
La Aguada	W	Yes	No	Yes	No	11	Low	Strong	Weak
Chalalán	T, B	In part	Yes	Yes	In part	6	High	Strong	Strong
Mapajo	T, B	In part	Yes	Yes	Yes	5	Medium	Weak	Medium
La Chonta	T, B	In part	In part	Yes	Yes	6	Low	Strong	Medium
La Yunga	T, B	In part	In part	Yes	Yes	1	Low	Medium	Weak
REA	T, B	In part	Yes	Yes	In part	3	High	Weak	Strong
Count 'yes'‡		3	4	8	4				
Count 'no'§		0	2	1	3				

† Eco-service types: C = Carbon storage; W = Watershed protection; B = Biodiversity protection; T = Tourism/Landscape beauty.

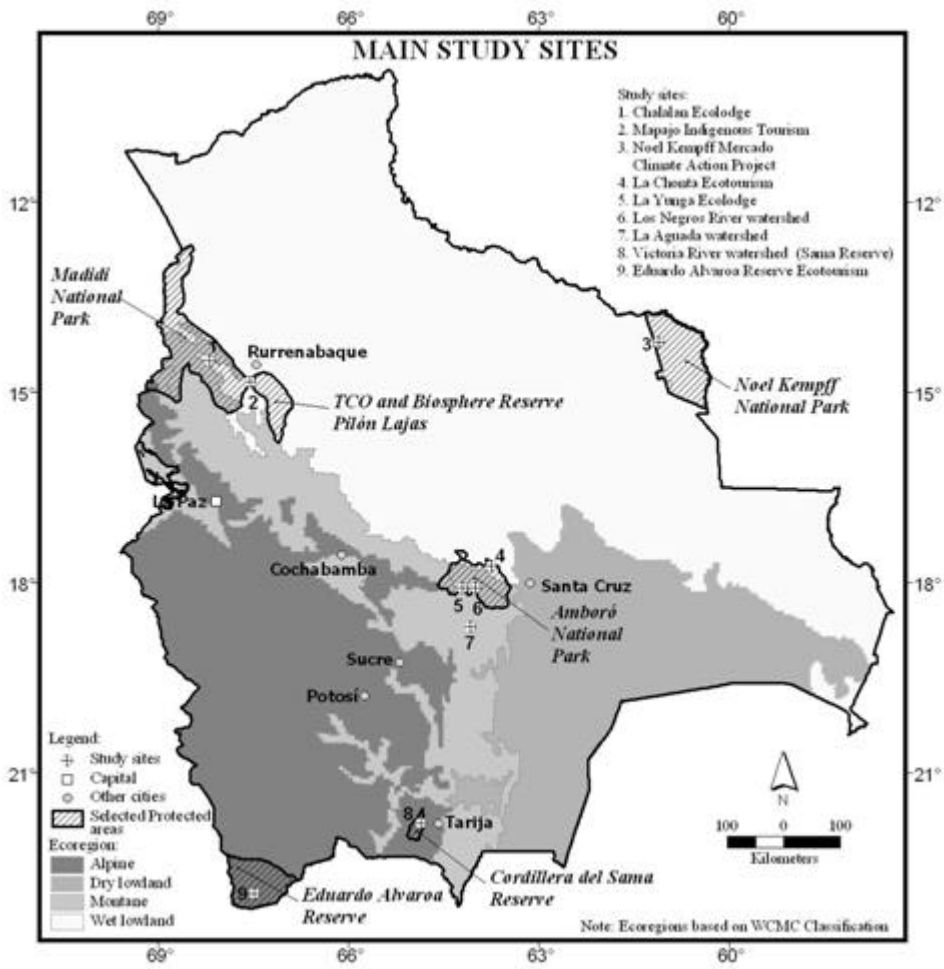
‡ Number of 'yes' determinations in column.

§ Number of 'no' determinations in column.



Figure 1. Map of main study sites<sup>40</sup>

Suggest you import <Bolivia.jpg> file direct into DTP program



Note: if possible (1) clean up label "La Paz", (2) remove note from image itself (it is footnoted)

<sup>40</sup> The Map uses an aggregate ecosystem classification based on the WCMC categories.

## ABBREVIATIONS AND ACRONYMS

ASYTUR	<i>Asociación para el Turismo Responsable, La Yunga</i> (Association for Responsible Tourism)
BOLFOR	<i>Proyecto de Manejo Forestal Sostenible (de Bolivia)</i> (Sustainable Forestry Management Project [of Bolivia])
Bs	Bolivian bolivianos
CADEFOR	<i>Centro Amazónico de Desarrollo Forestal</i> (Amazonian Centre for Forest Development)
CARE	Cooperative for Assistance and Relief Everywhere
CEDES	<i>Consejo Empresarial de Desarrollo Sostenible</i> (The Business Advisory Group for Sustainable Development)
CDM	Clean Development Mechanism (of the Kyoto Protocol)
CES	compensation for environmental services
CETEFOR	<i>Fundación Centro Técnico Forestal</i> (Forestry Technical Centre)
CGIAR	Consultative Group on International Agricultural Research
CIFOR	Center for International Forestry Research
cm	centimetre(s)
CO <sub>2</sub>	carbon dioxide
COBIMI	<i>Conservación de la Biodiversidad para un Manejo Integrado</i> (Biodiversity Conservation for Sustainable Management)
CONDESAN	<i>Consortio para el Desarrollo Sostenible de la Ecoregión Andina</i> (Peru)
COSAALT	<i>Cooperativa de Servicios de Agua y Alcantarillado de Tarija</i> (Water and Sewage Service Cooperative of Tarija)
DC	District of Columbia (USA)
Dr	Doctor (title)
EBB	<i>Estación Biológica del Beni</i> (Beni Biological Station)
ed.	editor
eds.	editors
e.g.	for example
etc.	etcetera, ‘and so on’
FACE	Forests Absorbing Carbon Emissions
FAN	<i>Fundación Amigos de la Naturaleza</i> (Friends of Nature Foundation)
FAO	Food and Agriculture Organization of the United Nations
Fig.	Figure
FSIV	Forest Science Institute of Vietnam
GEF	Global Environment Facility
GPS	Global Positioning System
ha	hectare(s)
ICDP	Integrated Conservation and Development Project
ICO	<i>Instituto de Capacitación del Oriente</i> (Eastern Training Institute)
i.e.	‘that is’
IIED	International Institute for Environment and Development
Inc.	Incorporated company
INRA	<i>Instituto Nacional de Reforma Agraria</i> (National Institute for Agrarian Reform)
IUCN	The World Conservation Union
kg	kilogram(s)
km	kilometre(s)

km <sup>2</sup>	square kilometre(s)
Ltd	Limited company
m	metre(s)
m <sup>3</sup>	cubic metre(s)
M.A.	Master of Arts (postgraduate degree)
MA	Massachusetts (US state)
m.a.s.l.	metres above sea level
mm	millimetre(s)
MST	<i>Movimiento sin Tierra</i> (Landless Peasant Movement)
NGO	non-governmental organisation
NKMCAP	Noel Kempff Mercado Climate Action Project
no.	number
NPV	net present value
p.	pages
PAX	per person per day
PES	payments for environmental services
PNUD	see UNDP
PRAIA	<i>Programa Regional de Apoyo a los Pueblos Indígenas de la Cuenca del Amazonas</i> (Regional Support Program for the Indigenous Villages of the Amazon Basin)
PRISMA	<i>Programa Salvadoreño de investigación sobre desarrollo y medioambiente</i> (El Salvador)
PRO-AGUA	<i>Asociación para la Protección de las Fuentes de Agua de la Ciudad de Tarija y las Comunidades Aledañas</i> (Association for the Protection of Water Sources of the City of Tarija and Surrounding Communities)
PROFAFOR	<i>Programa Face de Forestación</i> (Ecuador) (Face Foundation Forestation Program, Ecuador)
PROFOR	Program on Forests (World Bank)
PROMETA	<i>Protección del Medio Ambiente Tarija</i> (Environmental Protection of Tarija)
REA	<i>Reserva Eduardo Alvaroa</i> (Eduardo Alvaroa Reserve)
RPPN	<i>Reservas Privadas del Patrimonio Natural</i> (Private Reserves of National Heritage)
RUPES	Rewarding Upland Poor for Environmental Services
SDC	Swiss Agency for Development and Cooperation
SERNAP	<i>Servicio Nacional de Áreas Protegidas</i> (National Protected Area Service)
SISCO	<i>Sistema de Cobros por Ingreso a Áreas Protegidas</i> (system of national park entrance fees)
SLA	Sustainable Livelihoods Approach
SNAP	<i>Sistema Nacional de Áreas Protegidas</i> (National Protected Area System)
TCO	<i>Tierras Comunitarias de Origen</i> (Communal Territory of Original Inhabitants)
TNC	The Nature Conservancy
UNDP	United Nations Development Programme
UNCTAD	United Nations Conference on Trade and Development
US	United States (of America)
US\$	United States dollar
USA	United States of America
USAID	United States Agency for International Development
vs.	versus
WCMC	World Conservation Monitoring Centre

WTP  
WWF

willingness to pay  
the global conservation organization

## ANNEX: PEOPLE INTERVIEWED

### ***Aserradero San Martín (San Martín Sawmill)***

Juan Abuawad

### ***Biocomercio Initiative/Fundación Bolivia Exporta***

Heidi Muñoz

### ***Centro Amazónico de Desarrollo Forestal (CADEFOR, Amazonian Centre for Forest Development)***

Robert Manzilla

### ***Comité del Medioambiente (Environment Committee), Santa Rosa de Lima***

Serafín Carrasco

Jose Guillén

Demetrio Vargas

### ***Consejo Empresarial de Desarrollo Sostenible (CEDES-Bolivia, The Business Advisory Group for Sustainable Development)***

Ovidio Roca

### ***Conservación de la Biodiversidad para un Manejo Integrado (COBIMI, Biodiversity Conservation for Sustainable Management)***

Susan Davis

### ***Conservation International***

Richard Rice

### ***Conservation International, Bolivia***

Cándido Pastor

Eduardo Forno

### ***Eco-albergue Chalalán (Chalalán Ecolodge)***

Zenón Limaco

Guido Mamani

Nelson Navi

Neil Palomenque

### ***Eco-albergue La Chonta (La Chonta Ecolodge)***

Augustine Salazar and other community members

### ***El Ceibo***

Bernardo Apaza

Felipe Cancari

### ***Estación Biológica del Beni (EBB, Beni Biological Station)***

Carmen Miranda

***Fundación Amigos de la Naturaleza (FAN, Friends of Nature Foundation)***

Cecilia Ayala  
Karin Columba  
Saira Duke (also affiliated with *Museo de Historia Natural Noel Kempff Mercado*)  
Cole Genge  
Jörg Seifert-Granzin  
Richard Vaca

***Fundación Natura Bolivia***

Nigel Asquith  
Irwin Borda  
Paulina Pinto  
María Teresa Vargas

***Instituto de Capacitación del Oriente (ICO, Eastern Training Institute)***

Héctor Arce  
Edwin Rocha  
Robert Rueda  
Adalid Salazar

***Instituto de Conservación de Ecosistemas Acuáticos (Institute for the Conservation of Aquatic Ecosystems)***

Arturo Moscoso

***La Yunga, Asociación para el Turismo Responsable (ASYTUR, Association for Responsible Tourism)***

Fidel Riojas

***Mapajo Ecoturismo Indígena (Mapajo Indigenous Ecotourism)***

Clemente Caimani  
Nicholas Cuata

***Office of the Clean Development Mechanism, Bolivia***

David Cruz

***Programa Regional de Apoyo a los Pueblos Indígenas de la Cuenca del Amazonas (PRAIA, Regional Support Program for the Indigenous Villages of the Amazon Basin)***

Lizette Chavarro

***Protección del Medio Ambiente Tarija (PROMETA, Environmental Protection of Tarija)***

Ricardo Aguilar  
Alfonso Blanco

***Quetena Chico and Quetena Grande community members***

Tolivio Esquivel  
Humberto Verna  
Marcelino Verna

***Servicio Nacional de Áreas Protegidas (SERNAP, National Protected Area Service)***

Juan René Alcoba

Álvaro Báez

***Superintendencia Forestal (Forest Superintendency)***

Mercedes Barrancos

Rudy Guzmán

**The Nature Conservancy**

Marlon Flores

**The Nature Conservancy, Bolivia**

Monica Ostría

**Viceministry of Agriculture, Bolivia**

Alan Bojanic

**No affiliation**

Alejandro Aguilera

Robin Clark, Ornithologist