



Bolivia- Los Negros

Compensation for Hydrological Environmental Services in Los Negros Cloud Forest

SUMMARY

NGO-led initiative, underway since 2002. Protection of a buffer zone around Amboró National park (community of Santa Rosa), through in-kind payments (beehives) to landowners, subsidized by donor funds. Once water quantity benefits of the scheme become apparent, it is expected that the downstream community of Los Negros will start to trust the upstream community, and will be motivated to contribute to the scheme. . This initiative aims at the combined provision of watershed and biodiversity services.

MATURITY OF THE INITIATIVE

Ongoing since 2002. 120 beehives have been distributed and over 1,100 ha of forest placed under protection (out of a total watershed area of 25,000ha)

DRIVER

Fundacion Natura Bolivia organises and promotes the initiative. Downstream land values (1 hectare with water = \$7000, without water \$500, for similar location and soil characteristics) and agricultural production (the main activity) are highly dependent on the availability of water, especially in the dry season (1ha of farmland can provide a net return of up to US\$100/ha per annum without irrigation and US\$400/ha per annum with irrigation (Vargas 2004). Over the past 10 years water levels have fallen in both rainy and dry seasons (Vargas 2004) and in the early 1990s this even led to Los Negros residents blocking the roads to Santa Rosa and demanding that no more colonists enter the area to deforest the headwaters. The downstream community was accusing the upstream community (be they inhabitants of Santa Rosa or landless farmers migrating to the area) of diverting more water for irrigation and increasing cloud forest clearance for agricultural expansion.

STAKEHOLDERS

Supply

Private landowners in the town of Santa Rosa de Lima (upstream) - adjacent to the Amboró National Park. So far 1100 ha of forest are protected (2004 -1st year:- 6 farmers = 500ha, with an average of 10ha each, but ranging from 3 to 390ha; 2005: 7 more farmers = additional 600ha). The main objective of NATURA is to protect 2500ha of forest under the compensation system, and 500ha as community water conservation reserves (one 60ha area is already nearly established in Sivingal). Farmers choose which parts of the land to set aside and contracts are renewable annually.

Demand

International NGO: International funding is currently the only source of payments. Water users in the town of Los Negros in the Municipality of Pampagrande (downstream), especially horticulture producers, depend on water for irrigation of their crops and this is reflected in land prices. However, they are not currently paying for the watershed services. For domestic use, water is extracted directly from the river in Los Negros and at various other downstream villages. Irrigation systems draw off their water through eight canals in or just upriver of Los Negros. The idea behind this scheme subsidised by NATURA is to raise landowners' levels of trust, both upstream and downstream, hence leading to more active participation in the future.

By mid 2006, the Municipality of Pampagrande and downstream water users were expected to be contributing 60% of the cost of annual payments (including all transaction costs); for the period 2005/6 the target was 30%. In 2004, the municipality had already contributed \$US 2,000. It should be noted that most of the farmers in Los Negros view increased water supplies as their most important service need. According to NATURA (2004) farmers perceive that water supplies have fallen by over 50% in the last two years as a consequence of deforestation upstream. If this is so, a 50% reduction in two years suggests either serious climate change effects, or water being diverted to other uses. The inhabitants of Los Negros believe the cause of falling water levels lies upstream: the people of Santa Rosa were "diverting too much water for irrigation and clearing the forests that were vital to river protection". (Robertson and Wunder, 2005)



Intermediary

Local NGO (NATURA): The NGO is planning to expand to other environmental services and to other watersheds in Sivingal (where NATURA has already implemented a community water conservation reserve), Palmasola and Agua Clarita. It hopes to benefit 2,600 inhabitants of the Florida provinces, one of the poorest departments in Santa Cruz.

Facilitators

Funds are donated by the US Fish and Wildlife Service to establish a PES system to protect both bird habitat and the watershed functions.

MARKET DESIGN

Service

Enhancement of water quantity and reduced sedimentation through conservation of cloud forests. The main threats to forests include slash and burn agriculture, permanent agriculture and cattle grazing.

Commodity

Conservation and protection of existing ecosystems through forest conservation contracts - prevention of deforestation in cloud forest.

Payment mechanism

Intermediary-based transaction (NGO). Los Negros farmers give one artificial beehive per year to each Santa Rosa landowner who agrees to set aside 10 hectares of primary forest for conservation. The strength of the link with downstream users is weak in practice. The system is voluntary.

Terms of payment

To providers: *In-kind:* Fundacion Natura Bolivia (FNB) has drawn up an agreement between the downstream and upstream farmers for the protection of upstream forests. The current agreement is valued at US\$3 per hectare payable in beehives (the actual incentive is one beehive and training in apiculture per 10 ha of cloud forest protected). So far, 120 bee boxes have been distributed as well as training on how to use them. One of the perceived benefits of these arrangements is a stronger claim on land (see social benefits below). On this basis, some farmers have asked that future payments be made in the form of barbed wire and assistance in delimiting their properties instead of beehives.

According to Roberston and Wunder, (2005), support for an in-kind payment instead of cash came from the community environmental committees and from some farmers themselves, with the view that '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' While others would have preferred a more flexible in-kind or even cash payments, as the beehives also require personal investment in order to harvest the "payment". Interestingly, "Some local recipients predicted they would sell the next hives to those in the village specializing in bees, thus creating a 'secondary market' to exchange beehives for cash within the village".

From users: One-off payments - so far the majority of the funding comes as one-off grants from international donors. The Municipality of Pampagrande has contributed with US\$2000 in 2004 and negotiations for the 2005 municipal contribution are already underway.

Funds involved

Payments are currently being subsidised by *donor funds:* Natura's funding partners for the initiative are Conservation International (legal issues), the Conservation, Food and Health Organization and Yale University (economic study and analyses), and the US government's Fish and Wildlife Service, the Garfield Foundation and the *Grupo Nacional de Trabajo Participativo* (a Bolivian NGO funded by the DFID). In the near future, downstream users (the community of Los Negros) are expected to finance the project if this initial stage can sufficiently illustrate the benefits of the system in terms of avoided losses in agricultural production.



ANALYSIS OF COSTS AND BENEFITS

Economic

Transaction costs: include costs of negotiations, and monitoring. These costs, alongside training, are about 10 times higher than the cost of the visible payment (the beehive, about US\$35).

Opportunity costs for the participant farmers: The level of compensation is below the average return to agricultural land in the area. It is therefore likely that the participating farmers are choosing areas that they are not planning to convert anyway. *Present livelihood options:* Main activities in the Santa Rosa area include slash-and-burn agriculture, cattle and agriculture. Bees are expected to provide additional sources of livelihood for the families. At the same time, the land use restrictions in the areas under PES could reduce opportunities for farm labourers. *Communities involved:* Upstream community of Santa Rosa with 481 inhabitants (only 13 so far receive payments), and downstream inhabitants in Los Negros (2970). In 2004, the average annual income for a farmer in Santa Rosa was approximately US\$1,024. Los Negros was more prosperous with an average annual income of US\$1,459.20 per household (Vargas 2004).

Financial benefits for the participant providers: (note: local wage rate is about US\$64 per month) according to Natura's estimate based on local market prices for honey, each farmer could make an income of \$100 dollars per bee box, per year (about 40 kilograms/box/year) (Vargas 2005). However, according to Robertson and Wunder (2005), since most of the honey is consumed domestically as a subsistence product, the actual value of the benefit is probably lower than this estimate based on market price. After deducting start-up costs borne by Natura (training) and labour input from the participant, the actual PES payment would mean that "skilful and lucky beekeepers could make a PES return of US\$12.66/ha, but the less fortunate ones would have negative returns, i.e. returns for 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 (...) those recipients that do not happen to be skilful beekeepers may in extreme cases be losing money because they could potentially allocate their labour to more remunerative activities."

Costs for the participant users: An initial Willingness to Pay survey revealed that 70% of downstream farmers were willing to pay 'something' and on average roughly 2% of household income, or a total of US\$12,487-\$19,728. However no payments had as yet been made (in 2005). Anderson (2005) suggests that the discrepancy arises either through dishonest responses, or from an inefficient collection system.

Higher compensation might be obtained if downstream farmers were to pay into the system, but this has not yet happened. (However differences in the price of land with and without irrigation indicate the importance of water services: one hectare of non-irrigated land is worth about \$500 while a similar hectare with a reliable water supply could be worth more than \$6,000).

Environmental

Effectiveness of the PES in delivering the ecosystem service: No hydrological study has been done to date, but deforestation of the upstream cloud forest is perceived to contribute to lower water levels of the river, especially in dry season. NATURA is currently commissioning hydrological base studies. It is unclear if the effect of the scheme is likely to be significant, as current hydrological studies in cloud forests elsewhere (i.e. Monteverde, Costa Rica) have demonstrated that additional water input from fog deposition is smaller than initially thought (see Bruinjzeel 2005 for details). However, cloud forests are highly endangered and their protection provides significant benefits for biodiversity, landscape beauty (with potential for tourism activities) and improved water quality.

- i) In this area, about 1.5ha of forest (either primary or secondary, depending on the availability) is cleared annually by each family; (Vargas 2004) therefore, *preventing forest conversion* is one of the key environmental benefits expected from this PES. However, since farmers could choose which lands to set aside, and given the level of the compensation being offered (approximately 2–10% of the opportunity costs for setting aside agricultural land), it is likely that the areas enrolled in the PES were those with less potential for agriculture (areas on steep slopes) and therefore at less risk of being cleared (*lack of additionality*).



- ii) It is also possible that, enrolling forest land in the PES y leads farmers to change the location of production to forest land areas elsewhere on the property (on-farm leakage) or on open access forest land higher up (leakage).
- iii) *Indirect environmental benefits:* Diverting labour and time to bee keeping reduces the chances of farmers converting forest elsewhere; strengthening of perceived property rights avoids invasion from squatters, who would be more likely to actually convert the land.

Social

Property rights: Currently there are no clear property rights (especially regarding specific property borders) and possession is usually demonstrated by clearing (see Legislation Issues below). Although enrolment in the PES does not legalise property rights, the fact that the land is part of the scheme strengthens the idea that the land is being 'used' even if not in a visible way (i.e. not cleared and farmed) and is owned by someone, which may help defend the land against squatters. In fact, participants have suggested changing the PES payment from beehives to barbed wire and other assistance in delimiting their forestland, so that they can better enforce their tenure rights. In this way, the PES actually becomes a very good incentive to participate in the scheme as it clarifies the ownership of the land.

Social infrastructure. The project provides a very useful example of experimentation and learning by doing. It has been successful in bringing together farmers in the upstream area to address problems that were previously acknowledged but not acted upon. Also, it has brought upstream and downstream farmers into dialogue, where "only resentment and bitterness existed" (Robertson and Wunder, 2005). NATURA has helped set up the "*Comite de Medio Ambiente*" (Environmental Committee) formed by upstream/downstream communities to deal with water pollution, changes in water flows and sedimentation.

LEGISLATION ISSUES

Opening up the dialogue at a national level. The project takes place at a time of increasing interest in PES-type initiatives in Bolivia (Vargas, personal communication). The lack of legal property rights upstream is part of the problem. There are no valid property ownership deeds for the primary forest, giving the impression that it is "up for grabs" (Anderson, 2005). Perceptions of land ownership vary from "gentleman's agreement" to open land access. In some areas the only way to demonstrate possession is by clearing and converting land. According to Anderson (2005), participating in the PES may be giving farmers the impression that it officially legalizes their ownership of the land (Natura's land-conservation contracts explicitly identify boundaries and owners) and confusing people with 'papers that look official but are not, and may be causing an atmosphere of panic'.

MONITORING

Although a monitoring system is under development, at the time of writing there had been no violations documented or sanctions applied (e.g. beehives to be returned to Natura). According to Robertson and Wunder 2005, NATURA considers that fully enforcing that rule would have very high political costs, and therefore choose to simply not prolong the contract with the respective participant. In the authors' opinion, this "softened management practice may be a realistic approach in this potentially conflictive setting". However, it may create a situation where "any forest owner, even those firmly planning 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." (Robertson and Wunder 2005).

MAIN CONSTRAINS

- i) *Perception of the term 'payment'* which is associated with privatisation and expropriation. NATURA changed the term "payment" to "improved management of hydrological resources", but it seems that this has resulted in further confusion, underscoring the importance of secure property rights and trust between participants;
- ii) *lack of understanding of the PES' objectives:* having it confused with a first step towards general land use regulation, a potential means to expand the already contentious Amboró park boundary or to begin charging for water (and there is a deep-rooted aversion to paying for



- irrigation water which is currently free; also organisational capacity among the irrigator groups is weak and unwilling);
- iii) *lack of trust in the usefulness of the PES*: scepticism about the forest –water connection;
 - iv) *lack of engagement from the users*, in the first round of payments (2003), potentially due to a “wait-and-see attitude because they suspected Natura would be able to find PES seed money from elsewhere — which actually occurred”;
 - v) *lack of users’ trust in the compliance of providers*: 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 handed over the money;
 - vi) *property rights issues, raised by the PES*: landless *campesinos* upstream consider handing over payments to those who are already better off to be unfair. Obviously these farmers have an interest in keeping land for open access and efforts to reduce open access are bound to create conflict, since, as Robertson and Wunder (2005) note, “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”.

MAIN POLICY LESSONS

The aim of the initiative is to build up the necessary organisations and institutions for a well-functioning payments for environmental services scheme. “The creation and effective enforcement of community reserves will help prove to downstream water users that upstream forest protection is possible, that with appropriate funding Santa Rosa and Sivingal it can guarantee the water supplies to Los Negros, and that any investments that Los Negros makes in water protection would be secure”. “Using short-term donor funds, the farmers are thus demonstrating to downstream users—the potential long-term supporters—that upstream watershed protection is feasible and trustworthy—as long as appropriate incentives are provided.” Vargas, M. T. (2005). However:

- i) All costs relating to the initiative are being borne by the intermediary using international donor funding. Sustainability will be an issue when the payments for land use are no longer subsidised by donor funds, if users are not yet contributing to the scheme.
- ii) The aforementioned lack of commitment from downstream farmers might be a result of a discrepancy in objectives. They are more interested in increasing water quantity (rather than just quality) and they realize that additional irrigation upstream might be the problem rather than deforestation. This perception is backed by hydrological studies elsewhere that show that the additional contribution of cloud forests through fog deposition is small. On the other hand, NATURA is pursuing a more holistic conservation of the many values of cloud forests. However, in this case, trying to justify the efforts in terms of water quantity will not suffice.
- iii) In this way, the project could benefit from: **a)** A hydrological study that clarifies the potential watershed benefits and how much they are worth in order to convince downstream farmers to pay up (if the benefits are indeed significant). This is already under development, with the support of CIFOR. **b)** Targeting key areas and making payments proportional to their relative importance will increase the efficacy of the payment. **c)** Anderson (2005) suggests that cash might be the best compensation for forgone income to protect their land **d)** As noted by Robertson and Wunder (2005) it is important to try to “effectively sanction non-compliance without losing too much hard-won local goodwill”, otherwise the scheme may lose its effectiveness. OTHER INFORMATION

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LINKS

Natura Bolivia website. <http://www.naturabolivia.org/index1.htm>;
<http://www.naturabolivia.org/proyecto.htm>

On Rapid Hydrological Analysis: <http://www.naturabolivia.org/Informacion/Proy4.pdf>