

Compensation for Hydrological Services in Bolivia: the Comarapa Municipal Water Fund



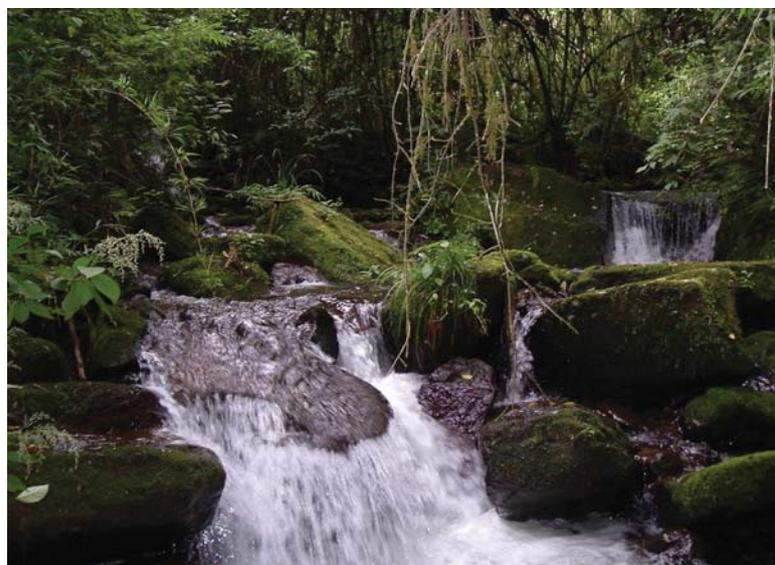
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Abstract

Bolivia's Comarapa watershed faces constant pressure from soil erosion, increased sedimentation, contamination, and loss of fertility and biodiversity. In February 2008 local authorities approved the creation of a Water Fund, with the objective of sustaining and reviving the environmental services of the watershed through conservation of native forest and restoration of degraded ecosystems. The Caballero Public Services Cooperative Ltd., a pre-existing entity with legitimacy and administrative capacity, administers the Fund. Resources are derived from the annual contribution of the Municipal Government, a local NGO and from contributions of members of the water cooperative. In its first two years, the fund collected US \$22,400 from domestic water users, which compensated 10 families for putting 628 hectares of cloud forest under permanent conservation. The size and type of each compensation package was negotiated with each farmer.

Introduction

Bolivia is a country divided. Two cultures, two world-views and two economic models split the country almost exactly in half. The desert-like high plains and mountains are home to the Aymara and Quechua-speaking indigenous groups who govern their scarce water – a gift from the earth goddess Pachamama – using traditional models of community participation. In the mercantile humid tropical lowlands, the concept of paying to protect environmental services is less alien (Asquith and Vargas 2007). Between these two extremes lie the inter-Andean valleys ranging from 500-3000 metres above sea level. Water is scarce in the valleys, but abundant in the mountains above. It is in these areas where incentive-based watershed management is perhaps most feasible.



Watershed of Ambaro National Park. Photo: Maria Teresa Vargas.

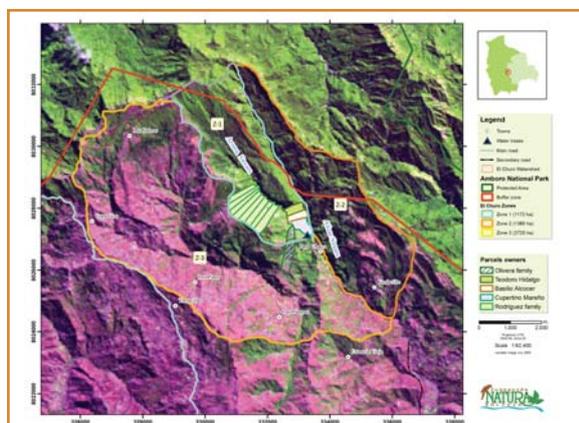


Figure 1: Upstream Comarapa Map.

Case study: the Comarapa Watershed

The Comarapa River watershed covers an area of 54,300 hectares in the municipalities of Comarapa and Saipina in the Santa Cruz Department. The Comarapa River is a tributary of the Río Grande, which eventually flows into the Amazon. The watershed is fed by the cloud forests of Amboró National Park and much of the watershed is in the Park's buffer zone. In 2003, a public investment of US \$26 million was used to build the La Cañada dam. The water from the dam is used primarily in the lower part of the watershed irrigating around 2400 hectares and thereby supporting more than 400 downstream families. The Comarapa River flows and feeds the dam throughout the year.

The town of Comarapa has 4000 residents, most of whom are farmers or provide services to the farming sector. The principal productive activity in the watershed is agriculture, specifically fruits and flowers, generally with irrigation. There are marked differences in relation to the types of crops grown, irrigation systems used and the extension of the lands cultivated between the upper, middle and lower watersheds. The second most favoured productive activity in the watershed is cattle ranching, with approximately 15,000 animals in the Comarapa municipality. Cattle ranching is small to medium in scale, with low investment/input levels and an extensive system of production for both meat and milk products.

The Comarapa River and its tributaries are critical for water provision, both for domestic use and for the productive sectors of the area (see Le Tellier et al 2009). Within the upper watershed, eight sub-watersheds cover a total area of 15,037 hectares. The Churo Negro sub-watershed, which has an area of 1976 hectares, has the highest levels of precipitation and the greatest area of forest cover. Consequently this river provides the greatest contribution to the Comarapa River.

Much of the upper Comarapa watershed faces constant pressure through the expansion of land under production and from soil misuse, leading to soil erosion, increased sediment load and contamination, loss of fertility and biodiversity, all of which contribute to greater poverty in the rural populations. In the middle watershed around the La Cañada dam, cattle is grazed intensively in areas that are inadequate for cattle due to the characteristics of the soil. Severe overgrazing worsens this situation, causing high levels of

sediment production. Within a year of the inauguration of La Cañada dam, sediment-laden floodwater had filled the reservoir, diminishing its useful life by almost 30%.

The solution: direct incentives for poor farmers

Given this situation, the local authorities determined that improved management of the Comarapa watershed required two components: 1) protection of the remaining forests in the upper part of the watershed in order to maintain potable water quantity for the town of Comarapa, and 2) diminishing the sediment load in the middle watershed in order to maintain water quality for irrigation downstream of La Cañada dam.

There was already demonstrated interest from downstream water users to protect the upper watershed. The mean monthly household willingness to pay (WTP) for an upper watershed restoration programme to improve drinking water was US \$1.95 among 211 urban households, while the mean annual WTP among 188 rural farmer-irrigators to improve irrigation water was \$17 per hectare. Aggregated to the entire population of households and farmer-irrigators, total WTP was \$77,400 per year (Shultz and Soliz 2007). Given this prior interest, a logical first step was to create a local, credible and transparent institutional framework, consisting of the Water Cooperative, Comarapa Municipal Government and a non-government organisation, Fundación Natura Bolivia.

The objective of this tripartite alliance was to conserve the environmental services of the watershed through conservation of native forest and restoration of degraded ecosystems. The way to reach this goal was to establish a compensation system that could meet or exceed the opportunity cost of landowners who would be asked to adopt watershed-friendly land use practices. In order to be sustainable the scheme needed to involve the farmers of the upper, middle and lower watershed in commitments for mutual cooperation, considering that they have complementary interests. The scheme's designers assumed that fair compensation would gradually build support for upstream families to help provide environmental services, while downstream users, benefitting from the results of improved land use practices, would be more inclined to invest their own resources to expand the scheme. In theory, the vicious cycle of deforestation, erosion and low productivity could be transformed into a virtuous cycle of conservation, restoration and enhanced incomes.



Signing the Cooperative agreement. Photo: Roxana Valdez Zamorano.

Latin America

In February 2008 local authorities approved the creation of a “Compensation for Hydrological Environmental Services” Water Fund scheme as a tool to help protect the most important water sources for the municipalities. The Caballero Public Services Cooperative Ltd., a pre-existing entity with local legitimacy and administrative capacity, administers the Fund. Resources are derived from the annual contribution of the Comarapa Municipal Government, Fundación Natura Bolivia and from the contributions of the members of the Comarapa water cooperative. The contribution from the water cooperative members was obtained through an arduous process of participative discussions, which sought to introduce the concept that the preservation of the sources of water supply is not a cost, but rather an investment with a high return in terms of social benefit. This contribution consists in charging members a percentage of their monthly fee for the provision of water, which in the majority of cases amounts to approximately US \$0.35.

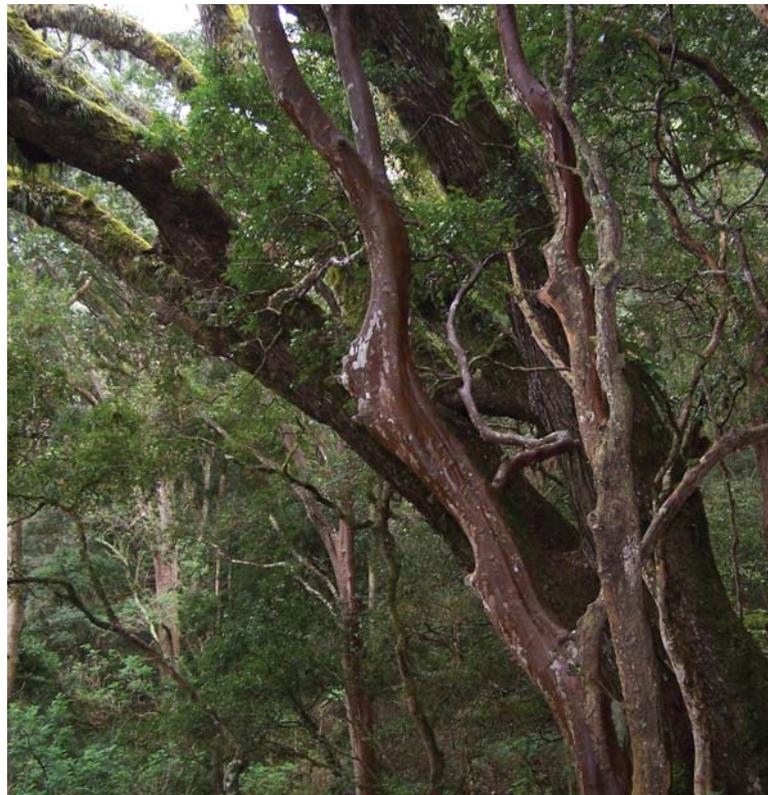
Evolution of the water fund

In its first two years, the fund collected US \$22,400 from domestic water users, which compensated ten families for putting 628 hectares of cloud forest under permanent conservation. The size and type of each compensation package was negotiated with each farmer. An indicator of the success of the scheme is the quantity of farmers willing to participate. Approximately 148 families have offered environmental services (provision of water and reduction of sediment). Most of these families have not yet received compensation due to a lack of funds, but the idea is to ultimately conserve 80% of the upper watershed forests.

Recognising the success of the conservation activities and the transparency of fund management, in early 2009 the Comarapa Irrigators Association (downstream irrigators who benefit from the La Cañada dam) joined the effort. The irrigators contribute \$1.40 per hectare/year. In total there are 460 irrigators and the area under irrigation occupies 2400 hectares, so this component of the Water Fund is projected to raise an annual amount of \$3425. Other producers' associations of the area (such as the Comarapa Cattle Ranchers Association) have demonstrated their interest in supporting the conservation efforts in the middle and upper watershed. Project partners are currently defining the kind of contribution the cattle ranchers might make.

Through this initiative Comarapa stands out as a “green” municipality and a model in the region for schemes related to conservation and environmental responsibility. The leadership has catalysed additional support for the integrated management of the watershed, the expansion of the sewer system, faster establishment of water connections and improvements to the administration of the cooperative. One proof of this is that the national government recently approved a project worth \$370,000 for the sustainable management of the Comarapa watershed; part of these resources will be used to strengthen the scheme.

There is still much work to be done to consolidate the Comarapa Water Fund, but experiences elsewhere in Bolivia (Asquith et al 2008) and around the world (Asquith and Wunder 2008) show that incentive-based watershed management, be it a Water Fund or payments for environmental services, can simultaneously enhance natural resource management and improve local livelihoods.



Comarapa cloud forest. Photo: Nigel Asquith.

References

- Asquith NM, Vargas Ríos MT, Wunder S. 2008. Bundling environmental services: Decentralized in-kind payments for bird habitat and watershed protection in Los Negros. *Ecological Economics* 65: 675-684.
- Asquith NM, Vargas MT. 2007. Fair Deals for Watershed Services in Bolivia. *Natural Resource Issues Series Number 7*, IIED, London
- Asquith NM, Wunder S, editors. 2008. *Payments for Watershed Services: the Bellagio Conversations*. Fundación Natura Bolivia, Santa Cruz de la Sierra, Bolivia.
- Le Tellier V, Carrasco A, Asquith NM. 2009. Attempts to Determine the Effects of Forest Cover on Stream Flow by Direct Hydrological Measurements in Los Negros, Bolivia. *Journal of Forest Ecology and Management*. 258: 1881-1888.
- Shultz S, Soliz B. 2007. Stakeholder Willingness to Pay for Watershed Restoration in Rural Bolivia. *Journal of the American Water Resources Association* 43: 947-956

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