

Using Water Funds to Finance Watershed Conservation in the Andes and Costa Rica

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Introduction

Water resources management is a global priority. Throughout the world, there is recognition that water quality and flow are being affected by land use changes. Institutionally, water management faces multiple governing institutions and stakeholders with differing points of view and a generalised lack of controls (Milano et al., 2007; CAF and TNC, 2009; McAlpine and Wotton, 2009). Despite numerous efforts to protect watersheds or establish drinking water projects, few programs address the link with protected areas, which were often created to protect water sources (Echavarría, 2002; Nel et al., 2009). As a result, the level of investment in the conservation of water sources is miniscule, considering the need to guarantee the regeneration capacity of the resource. To address this situation TNC is promoting water funds as a key strategy to protect land and water.

Water funds establish multi-stakeholder institutional mechanisms for sustainable financing of watershed conservation that simultaneously support biodiversity protection and ensure water supplies. The expected results are both environmental and social, through the creation of an institutional framework for decision-making that will commit water users to protect the natural land cover and improve the living conditions of rural populations living in the watersheds that supply drinking water to cities.

The mechanism aims to bring together water users to pay for conservation efforts on a voluntary basis; it also optimises public-private partnerships by involving the private sector from the earliest stages of design-making through to implementation. The funds are managed by a financial institution and can only be spent on uses and activities stipulated in the trust fund contract. By using an independent financial vehicle transparency is increased and multiple stakeholders with a shared interest in common water sources can be brought together. For most countries, ecosystem services principles and policies are being developed in a holistic framework considering both biodiversity and social equity and distributional justice.

In 2007, CAF and TNC organised a regional workshop on Conservation of Environmental Services. Environmental authorities, municipalities, regional governments, ecosystem services specialists and NGO representatives from Bolivia, Colombia, Chile, Ecuador, Perú and Venezuela provided summaries and exchanged learning experience from some 40 initiatives, only a few of which have been consolidated (CAF and TNC, 2009). There are numerous opportunities to expand on these and to fund new projects.

1- Water Conservation Fund, “Fondo de Protección del Agua” (FONAG), Ecuador

For over 10 years, TNC has been working with local partners to establish a water-based finance mechanism as a long-term source of financing for the conservation of natural ecosystems in montane areas, including several public protected areas. Quito, Ecuador’s capital city of more than 1.5 million inhabitants derives more than 80% of its water from flows originating in several national protected areas: Cayambe-Coca and Antisana Ecological reserves, and

Cotopaxi National Park. Set up in 2000 with a seed capital of \$21,000 dollars, it is now a trust fund with a capitalization of over \$6 million that is investing in watershed programs and projects around the Quito water sources.

The Water Conservation Fund (Fondo para la Conservación del Agua – FONAG) has been a key instrument in helping to ensure that the growing population of Quito has a long term quality provision of water services. This mechanism has allowed for a direct link between the consumer and the Protected Areas to compensate for the ecosystem service that they provide: water. FONAG is an endowment fund that receives money from government, private companies and NGOs, an independent financial manager invest funds and returns investments to fund activities for watershed protection (Echavarria 2002). Only the financial returns from the endowment is spent, the money flowing to the endowment remains untouched in order to ensure sustainability of financial resources. The contract signed for the creation of FONAG establishes the activities in which the resources can be used, as well as the institutional arrangement and the decision-making process.

Though the Conservancy invested a mere \$2,000 when the project began in 2000, annual contributions from Quito's water and electric companies, as well as voluntary contributions from other private organisations such as a Brewery Company (Cervecería Nacional), water bottling company (Tesalia Springs Co.), Swiss Cooperation and TNC, had achieved by December 2008 an endowment of US \$ 5.4 million, which now releases nearly \$800,000 each year in disbursements for conservation projects in the watersheds that supply the city (Table 1).

FONAG received the first financial resources in 2000. During the first years of FONAG the fund was capitalizing and a strategic planning process went underway with the Boards of Directors where five watersheds were identified as a priority for intervention. In 2002, the first request for proposals was publicly announced and the first project was implemented by a local NGO in 2003 with US\$ 40,000. During this time FONAG received criticism because an important amount of money was going to the fund, but the investment in watershed conservation was still small. In 2004, FONAG was able to hire a person with recognized experience on watershed management to act as Technical Secretariat of the fund, this contributed to raise FONAG profile. The hiring of the new Technical Secretary with experience and expertise in watershed management has been essential to strengthening FONAG's institutional capacity (Brown 2005). Since 2004, FONAG has been successfully investing in watershed conservation, and interest has arisen in different areas in Ecuador and in Latin America to replicate this experience.

By 2008, FONAG has invested almost US 2.3 M in watershed conservation with financial resources coming from the returns of the endowment (FONAG, 2008). In addition to the resources coming from the financial returns of the endowment, FONAG has been very successful in leveraging funding for their programs and projects. For each dollar FONAG puts in a project, they are able to get 3 more dollars as matching funds. By 2008, FONAG has leverage US\$ 7.5 M (FONAG, 2008). This is a total of US\$ 9.8 M invested in watershed conservation most of which has been directed to five priority watersheds providing water to Quito (San Pedro, Pita, Oyacachi, Papallacta, and Antisana).

FONAG has determined to invest 80% of its annual financial returns in programs, meaning permanent activities for long-term and 20% in short term projects. The programs and projects were developed as part of FONAG strategic planning process lead by the Technical Secretariat with agreement and approval of the Board. The programs currently underway are: control and monitoring of protected areas, restoration of natural vegetation, environmental education, and outreach; training in watershed management, productive projects with local communities and a hydrological monitoring program (FONAG, 2008)

Table 1: Breakdown of FONAG endowment fund sources in US\$ (FONAG, 2008).

Quito Water Company (EMAAP-Q)	4.886.000
Quito Electric Company (EEQ)	360.000
The Nature Conservancy (TNC)	81.000
National Brewery (Cerveceria Nacional)	36.000
Swiss Cooperation Agency (COSUDE)	30.000
Tesalia Springs Co. (Private water bottling company)	7.000
TOTAL	5.400.000

The Conservancy is starting to replicate this successful model in other parts of the Andes, to help cities finance the protection of their water supplies for the long-term. The water funds that are being created will protect mountain ecosystems in Colombia and Ecuador, and hopefully we will be able to replicate in other places around Latin America and eventually the world. Two important examples of the success in replication are the Bogota Water Fund in Colombia and the Paute water fund in Ecuador.

In April 2008, TNC, Empresa de Acueducto y Alcantarillado de Bogotá (EAAB), Sab Miller Bavaria brewery, the National Protected Area Agency and Patrimonio Natural Foundation (a National Trust Fund created to improve Protected Areas finance) agreed to create a conservation trust fund to protect the watersheds of the Bogotá water supply system. The fund was created in 2009, and is starting its operation. The fund is expected to generate \$60 million over the next 10 years for projects such as helping local cattle ranchers operate more sustainably and strengthening protection in Chingaza and Sumapaz natural parks, where the main water supply watersheds for Bogota are located. The project will positively impact more than 550.000 acres by conservation activities in Natural Parks and their buffer zones.

In the southern Andes of Ecuador, TNC has been working with water users in the creation and operation of a water fund in the Paute watershed. In joint collaboration with Cuenca Water Company (ETAPA), other water users were brought to the table including the largest hydropower company in the country CELEC (former Hidropaute), ElecAustro a local hydropower company, EMAPAL (Azogues water company), Fundacion Cordillera Tropical (a local conservation NGO) and the University of Cuenca. The Paute water fund (FONAPA) was created in September 2008. The fund will finance conservation of the Paute watershed, which supplies water to more than 500,000 Cuenca residents and other cities and towns in this watershed. It is home to the strategically important Paute Hydroelectric Dam, which currently generates around 32% of Ecuador's electricity. Paute is also home for extraordinary biodiversity, and the Sangay National Park as well as other public and private conservation areas which will benefit from this initiative. The water fund has achieved almost US\$ 600,000 in capital, and the technical secretariat is fully operative. First investment in conservation activities started in October 2009.

The Nature Conservancy has learned from the difficulties and success of FONAG and is now using this experience gained in replication in other areas:

- Water funds are a successful model for long-term financing for watershed conservation
- Water funds are an effective way to implement integrated watershed management where several water users can unite in a common vision
- Water funds constitute a transparent and accountable mechanism attractive to a diverse array of donors
- Water funds can play an important role in development where local communities can benefit with investment on sustainable livelihoods

- Water funds can promote a new vision of water among the different users of water including citizens of large cities
- Water funds can be very effective in developing climate change adaptation strategies, due to their long term vision and financing, and their investment in natural and social capital

Some issues that we have learned from FONAG, and are in the process of implementation:

- Use the best science available to have a good understanding of the ecosystem service (e.g. flow regulation, sedimentation control) in the watershed. This will allow the identification of key areas for conservation of the service, and will show which are the possible benefits of establishing a water fund in terms of the ecosystem services.
- Establish clear objectives and goals regarding the ecosystem service that the water fund aims to maintain or improve. Activities implemented should be linked with these objectives.
- The water fund should start investing funding as soon as possible to start gaining credibility from the general public.
- A good financial plan is essential, and should balance funding going to the endowment with money being spent in conservation activities
- The water fund must establish a clear system of measuring impact of their activities on the objectives of the fund (e.g. flow regulation, sedimentation control, biodiversity conservation). This should be implemented in a framework of adaptive management
- The role of the technical secretariat or manager of the fund is key and resources should be spent in ensuring a high profile person in this position

2- Water fund proposal for Lima, Peru

2.1- Context

Water availability in Peru, comes from 3 large basins: Pacific, Atlantic and Lake Titicaca. 60% of the entire population of Peru is concentrated on the Pacific coast, where most productive activities (agriculture) are also located. This situation would not be a problem if water availability was sufficient for both the population and productive activities.

The availability of surface water in the Pacific slope region is the equivalent of 16 mm precipitation, contrasting with an average of close to 2,700 mm on the Atlantic slope and 130 mm in the Titicaca Lake basin. Furthermore, only 1.8% of total water runoff available in Peru heads towards the Pacific (offshore)¹(Figure X). Despite these figures, the Peruvian coast sustains most of the agricultural activity of the country (Ordoñez & Vera, 2002). The problem is even more critical because agriculture accounts for 80% of all water used, yet poor agricultural practices lead to a loss of 40% of water used by agriculture.

The capital of Peru, Lima, is located in the central part of the Pacific coast. With a population of over 8 million people (30% of the Peruvian population), it is the second largest city in the world located in a desert (the first is Cairo, Egypt).

Environmental management of the desert ecosystem and efficient water management for different applications are major challenges, considering the population size, annual growth rates exceeding 2%, poverty, inefficient use practices and rapidly declining water from melting glaciers (Vuille et al., 2008).

¹ Peru has 3 big geographical regions: the coast, the mountains and the tropics. While in the tropics the rainfall precipitation is about 3,000 to 4,000 mm, in the coast it is about 40 mm.

One way to tackle this problem is by developing favourable environmental conditions that will ensure water quantity and quality through efficient use by the main water users. To do this, the Nature Conservancy (TNC) is seeking to establish a **water fund** modelled on the successful experiences of the Ecuadorian water fund, FONAG (see below). The water fund is designed to work as a **trust fund**, with private and public contributions. This legal figure has the advantage of becoming a sustainable financial mechanism, transparent, flexible and long term.

2.2- Watershed conservation and related projects

The water fund will be used to develop a series of investments in the basin regarding afforestation and reforestation, reduction of sediment fences for protection, environmental education and communication, studies of ecological flows, erosion control, water infrastructure, agroforestry, ecotourism, effluent management, among others. Furthermore, these projects will serve to organise or strengthen governance processes in populations from watershed areas to efficiently manage the resource.

- Water fund benefits. Improved quality, distribution and quantity of water are major expected benefits. Afforestation and reforestation can lead to reduction of sediments, can lower water treatment costs, ensure greater volumes of water and lead to a more favourable tariff structure.
- Landscape restoration. Appropriate management means that landscapes associated with catchment basins increase in value and provide recreation and education areas, generating income for local populations.
- Fundraising. The water fund can provide matching funds to leverage greater resources in the public or private sector.
- Governance and institutions. Given their dual private / public figure, water funds are also an opportunity for democratic discussion between the stakeholders to contribute ideas and develop new projects for the conservation of watersheds.

2.3- Organization

A group of civil society organisations, led by GEA Group and The Nature Conservancy, are developing the water fund for Lima which will allocate resources for the conservation of the Chillón, Rimac and Lurín rivers, main suppliers of freshwater to Lima.

The fund will be established with private or government contributions and administered by an institution of the civil society with experience in fund management. The major contributors will be private companies that use water for their operations: energy companies, beverage companies, mining, among others, and the national water company.

The Fund will have a board with members of the private and public institutions that will oversee the conservation projects. These projects will be in character tender, and may access institutions of civil society. Currently, GEA and TNC are designing studies to estimate the intervention of the Fund; these studies will define investment priorities and conservation strategies, as well as technical and financial needs.

2.4- Location

Combined, the three basins play a vital role in providing several benefits for Lima (figure 2). The watersheds supply the inhabitants of the city with drinking water, power generation, agriculture, recreational areas and tourist destinations, cultural and sporting events.



Figure X. Watershed map of Peru. The numbers represent the classification of each basin, 52 watersheds drain into the Pacific, 1 drains to the Atlantic through the Amazon River basin and 1 into the Lake Titicaca basin. The red circle indicates Lima city. Source: Ministerio de Energía y Minas, Perú.



Figure 2: Snowy landscape in the upper Rimac watershed. The Rimac river is the principal water provider for Lima. Its headwaters are in the Andes at 16,400 feet above sea level. Photo © Walter H. Wust.

The Rimac River valley comprises the most fertile and productive land. However, these flat, arid areas have been occupied by factories, homes, and mines that have transformed the natural environment. The Chillon River basin is located northwest of Lima, and harbours the main economic activity of agricultural production. Arid lands are highly productive, but the messy process of urbanisation continues in the basin, threatening Chillon Valley farmland. Southeast of Lima is the Lurin River, known as the last green valley of the city. Around 16% of the valley has been occupied by urban expansion and is valued by local people.

4- Restoring watersheds while creating sustainable livelihoods in the buffer zones of La Amistad International Park, Costa Rica

Context

80% of the water that supplies the 50,000 people living in the Costa Rican canton of Buenos Aires comes from the highlands of La Amistad International Park. Currently these watersheds are threatened by pineapple farms and a soon-to-be-launched hydroelectric project. This Project will be the biggest hydroelectric dam built in Central America, and will be constructed by the Costa Rican Institute of Electricity (ICE). ICE has studied this watershed for more than 40 years, because the Terraba Watershed is the basin with the highest hydro electrical potential in the country. ICE is very interested and they are committed to have an active role in promoting actions for a good management and restoration of the Watershed. It is the co founder of a recent institutional alliance called PROTERRABA- which will be directly involved in watershed management. Thus the project is not only about water supply but also watershed management that will mitigate any potential threats. The Nature Conservancy and its partners seek to develop a Watershed Management Plan that includes participation from civil society groups and key public and private sector stakeholders who have demonstrated their interest in restoring the natural resources on which so many communities depend.

Location and Threats

The project will take place in three districts—Volcán, Brunca and Potrero Grande—where two watersheds, Volcan and Singri, provide water for human consumption and for important economic activities. These micro-watersheds are part of the Térraba River watershed, one of the 12 fresh water priority eco regions selected in a TNC Mesoamerican Region study (TNC, 2009). These two watersheds show high levels of deterioration, especially at middle and high altitudes, where cattle and pig farming and intensive pineapple monoculture caused severe deforestation and pollution (figure 3). In addition to past deforestation, renewed deforestation in the two watersheds has allowed pineapple farms to expand all the way to the water, even though our national law says watersheds need to have 15 meters of forested land on each side. This region is somewhat of an exception, because the old farms of cattle and coffee that caused deforestation until the 80s are still owned by a small number of landowners that live away from the farm and don't depend on these activities. Despite being economically unproductive at present, the lack of local commitment and presence in the community has meant no changes in farm practices. The opportunity of working with PES in this rural region can help the regenerations of these areas. With regards to pineapple in the Brunca Region, they used to be cattle land, but they are increasing their area, getting very close to indigenous territories and protected areas such as La Amistad (currently 1km away from the Amistad International Park), and have recently affected 2000 hectares of forest in the Singri watershed. In Costa Rica there are now 40,000 hectares of pineapple (ASEPROLA.org) and growing, since demand is growing (SEDER, 2005; McConnell Smith, 2008)

TNC's Amistad-Bocas del Toro Program identified important ecosystem and wildlife conservation targets, such as jaguars, tapirs, paramos, natural savannahs and three mountains: Cerro Ena; Cerro Cabécar; and Cerro Kamuk (Costa Rica's second largest mountain, 3485 m). The area's range of elevations provides conditions for a rich ecology to flourish. For example, the Volcán watershed, despite covering a relatively small area, holds five of the 12 life zones found in Costa Rica.



Figure 3: La Amistad park, seen from a pineapple monoculture with intensive irrigation and agrochemical use. Costa Rica. Photo Héctor Panigua.

Both watersheds serve as important migration corridors, but the expansion of pineapple monoculture is threatening connectivity, which compromises the health of populations of native plants and animals. At the same time, the largest hydroelectric dam project in Central America led by the Costa Rica Institute of Electricity (ICE) is in its final planning stages. Pineapple production and hydroelectricity depend on these watersheds but their contributions for the water they use under the National Water Tariff law is very low and they go to a National Fund that lacks the institutional controls to reinvest in the area that was damaged. The activities TNC is supporting, by creating financial mechanisms, will go directly to watershed compensation in the local area. Communities are concerned about the threats posed to these watersheds — increased flooding and a diminishing water supply, as well as pollution from agrochemicals. Worried local leaders have sought support from various organisations to solve these crucial issues by involving key stakeholders.

Developing conservation and compensation

The University of York and other academic institutions recently supported studies, mainly in Volcán, that involved watershed analysis and workshops to identify priority areas and tree species to plant for reforestation. Working with the Ministry of Agriculture and Livestock, TNC and partners have identified areas in the watersheds for installing biodigestors and carrying out a market study to certify 150 acres in organic agriculture. The expected benefits are to demonstrate good agricultural practices and stimulate a reconversion to lower impact activities, compatible with conservation, and create new alternatives of incomes that reduce hunting, illegal logging and intensive use of the natural resources in the buffer zone of La Amistad International Park. This 150 acres are from 12 families that now have increase their familiar incomes in a 70% through the commercialisation of only one product: organic banana and they would explore possibilities of exportation and saling others products as oranges, lemon, coffee, etc .

Communities have received initial support from the private sector, such as the pineapple grower and export giant PINDECO (Pineapple Development Corporation, more than 35,000 acres planted in Costa Rica), for activities that include forest fire control and reforestation. These companies have also expressed interest in supporting financial mechanisms to maintain and restore the watersheds. It is hoped that eventually PINDECO and other big consumers of water compensate the use of the natural resources of the watershed that they demand with a financial mechanism. Until now they have provided small donations for reforestation and some funds to train the communal fire brigades to improve control of forest fires.

Despite progress, there still is no comprehensive plan in place for the management and funding of these projects. Prioritising conservation activities in the area and involving key stakeholders such as local communities, universities, NGOs and private businesses in the management of these, could bring companies like PINDECO and government institutions as ICE, to invest in corporate responsibility efforts related to conservation.

This project will create a five-year Watershed Management Support Plan. A new water resources law is being debated in the Costa Rican legislative assembly. The new law proposes setting up local commissions for water administration and watershed management, as well as fostering the creation of water funds that must be coordinated by the local commissions. This project pretends to create and strengthen local commissions for this kind of role.

TNC is working with local groups to develop the baseline studies and train experts to formulate management plans and design two financial mechanisms: one for water consumers such as PINDECO and the ICE; and the other one to stimulate the carbon sequestration market. This initiative is going to be coordinated with the National University. The expert advice from additional TNC experiences in South America with successful mechanisms or funds is also going to be used to help this experience in Costa Rica.

The Watershed Management Support Plan will advance already identified strategic activities, such as installing biodigestors, reforestation, organic agriculture, promotion of payment for environmental services (PES), by holding workshops for local community members, carrying out studies, and working together with government institutions and the private sector. The development of the Watershed Management Support Plan includes the participation of numerous sectors and payment for environmental services is at the core of its success. In the short term the experience is going to execute a plan for increasing the farms receiving PSA from the FONAFIFO fund to start to impact in a positive way the watersheds, but in a medium and long term we expect to have a water fund and a Plan for carbon sequestration involving the private sector.

The proposal hopes to make use of the existing Costa Rican Fondo Nacional de Fideicomiso Forestal (FONAFIFO) created from a fuel tax. FONAFIFO pays landowners close to \$64/ha of demonstrably conserved or restored forest. The fund is a world first, although it could still be improved in a more stratified approach to payments and in bureaucratic efficiency. There are 3 incentives given by FONAFIFO that we would use in this project: 1) \$64 per hectare, per year for Forest Conservation. 2) Conservation of Water sources pays \$80 per hectare, per year, and 3) Reforestation pays \$1.30 per tree (www.fonafifo.com, 2009). An organised group can provide the channel to inform, promote, and provide the necessary bureaucratic support to these conservation schemes, increasing their probability of success. This is the intention of this ongoing project.

Discussion

Water resources are a key environmental service. Water funds are a mechanism to link conservation of watersheds and biodiversity with water utilisation and conservation. Although there are many other environmental services, water, and water funds, can act as proxies or

catalysts to protect many others including biodiversity, carbon storage, soils, biogeochemical cycles, pollination, waste cycling, etc. Such protection goes a lot further than the economical benefits (Luck et al., 2009). The establishment of compensation mechanisms sets in motion public awareness and capacity building which benefits both social and environmental systems.

The Conservancy has been successful in the replication of the Water Conservation Funds model in other parts of Latin America (CAF and TNC, 2009). In Colombia, we are working to create water funds in Bogota (Werman, 2009), East Cauca Valley, Cali, Sierra Nevada and Medellin. In Ecuador, several water funds are already working with TNC support, this includes Paute, Zamora, Espindola and Tungurahua.

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