

Case Study of Watershed Valuation in the Condor Bioreserve, Ecuador

Final Report

Based on a September 2004 site visit

Prepared for The Nature Conservancy by
Marcia B. Brown
Foundations of Success

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Acronyms

BMP	best management practice
BRC	Bioreserva del Cóndor (Condor Bioreserve)
CESA	Centro Ecuatoriano de Servicios Agrícolas (Ecuadorian Center for Agricultural Services)
CNP	Cotopaxi National Park
COSUDE	Swiss Agency for Development and Cooperation
EEQ	Empresa Eléctrica de Quito
EMAAP-Q	Empresa Municipal de Agua y Alcantarillado de Quito
FONAG	Fondo Ambiental para la Protección de las Cuencas y Agua (Environmental Fund for the Protection of Watersheds and Water)
FOS	Foundations of Success
REA	Reserva Ecológica Antisana
RECA Y	Reserva Ecológica Cayambe-Coca
TNC	The Nature Conservancy
USAID	United States Agency for International Development

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1 Introduction

1.1 Purpose of case study

For the last few years, The Nature Conservancy (TNC) has supported watershed valuation projects in several countries in Latin America as a strategy for achieving biodiversity conservation. Through the International Water Policy Program, TNC has provided technical assistance to the following countries and sites:

- Mexico: Chiapas (including the El Triunfo and La Encrucijada Biosphere Reserves)
- Mexico: Quintana Roo
- Guatemala: Sierra de las Minas Biosphere Reserve
- Honduras: Yojoa Lake Multi-use Area
- Bolivia: Sama Mountain Range Biological Reserve
- Ecuador: Condor Bioserve

Watershed valuation projects are designed to link water users to watershed conservation. They seek to get water users to contribute to conservation either financially (through user fees or increased public financing of conservation activities) or by taking actions directly to reduce threats to water resources. Thus, watershed valuation projects involve close collaboration between conservation organizations and government agencies, water companies, citizens groups and other key stakeholder groups.

TNC asked Foundations of Success (FOS) to develop a series of case studies that document the experiences and knowledge that TNC and its partner organizations have gained about watershed valuation projects in these six sites. This document represents one of the six case studies. In addition to the case studies, we have written a cross-site lessons learned document to analyze the use and effectiveness of watershed valuation as a conservation strategy, based on the experiences of all of the sites. The purpose of developing these documents is to facilitate learning among these and other sites that are currently implementing watershed valuation projects or are interested in undertaking these activities.

1.2 Watershed valuation project theory

Many montane protected areas provide abundant, clean water that is valuable for human consumption, irrigation, hydro-electric production, industrial production, ecological processes and other uses. The basic intention of watershed valuation projects is to help local actors recognize the importance of these natural areas and take action to protect them, in order to ensure the integrity of this critical environmental service. Local people may not value the conservation of biological diversity, but they value water. Therefore, the theory is that if they can be motivated to take action to protect their water resources, this action will contribute to biodiversity conservation. It is worth noting that TNC's approach to *watershed valuation* goes far beyond *economic valuation*.

While this basic theory sounds relatively simple, in reality watershed valuation projects are quite complex. Before visiting these watershed valuation projects, we decided to develop a results chain to help clarify TNC's assumptions about how watershed valuation actions should lead to

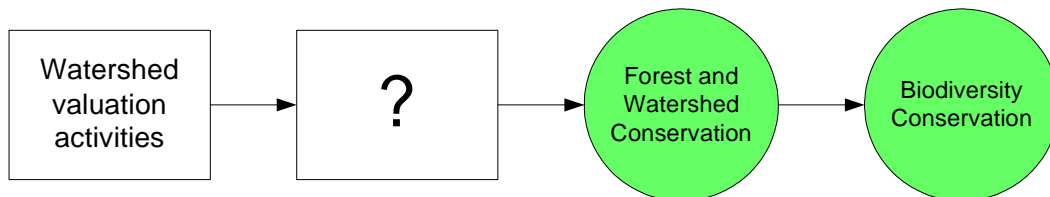
biodiversity conservation – in other words, to define in more detail the project theory and provide a framework for examining each step along the way from intervention to desired impact.

In order for any conservation project to be successful, the implementing organization must develop the project based on sound project theory, and they must execute the project well. Projects can fail to achieve their objectives due to poor theory, poor implementation, or both.

Usually, project theory remains hidden in the minds of the people who design and implement the project. Often, if a group of people is working together to implement a project, they each have different assumptions about how their actions will contribute to achieving their intended impact. Results chains graphically map a series of “if-then” statements that define how a project team believes that a specific conservation action will contribute to achieving a conservation impact. They are a tool used to make the project theory explicit so that it is clear to everyone involved and they can test and refine their assumptions over time.

FOS worked with TNC’s Senior Advisor for International Water Policy to develop the results chain shown in Figure 1. She provided technical assistance to most of these projects for several years. Therefore, her project theory has influenced the approach taken in most (though not all) of the sites. We explain the results chain here, and we use it as a framework for all of the case studies and the cross-site lessons learned document. Within this framework, we describe the actions taken in the sites and analyze the extent to which these projects are achieving their intended objectives.

When we began building the results chain, it looked like this:



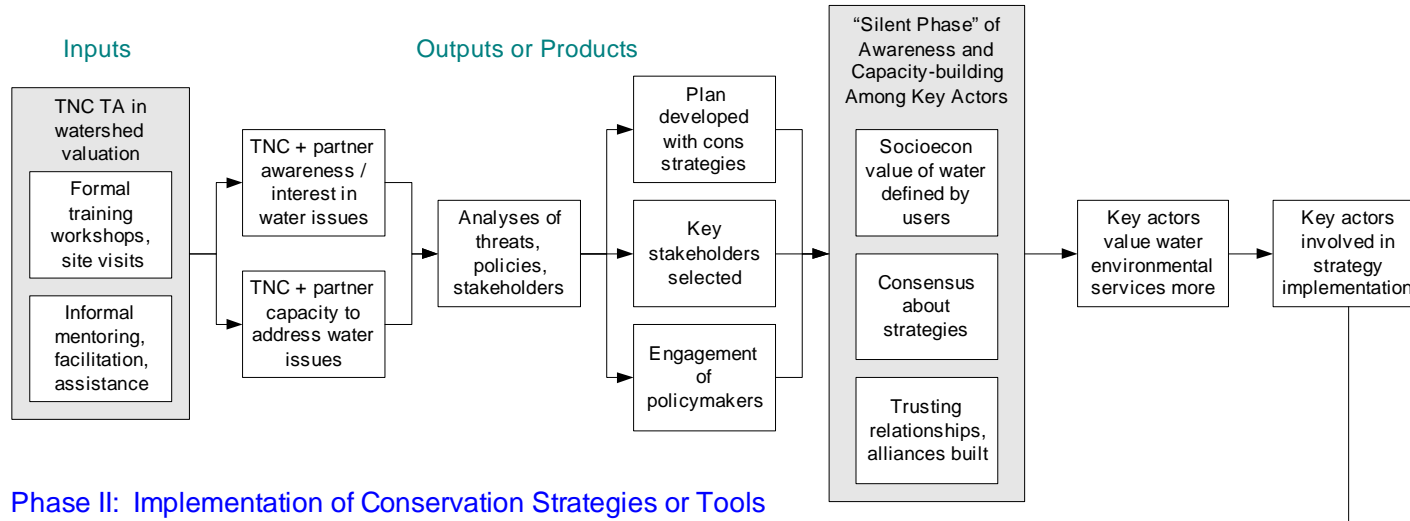
This initial chain says that TNC and its partners are conducting watershed valuation activities to achieve two long-term impacts. The first is an increase in forest and watershed conservation in the specific sites, which TNC believes will contribute to an increase in biodiversity conservation. The difficult part of building the chain is defining the intermediate results needed for the activities to achieve their desired impact.

The complete chain (see Figure 1) includes two project phases. Phase I focuses on initial capacity development, planning and alliance-building. Phase II involves the implementation of specific conservation strategies or tools. TNC’s Senior Advisor for International Water Policy believes that Phase I is a necessary prerequisite to Phase II.

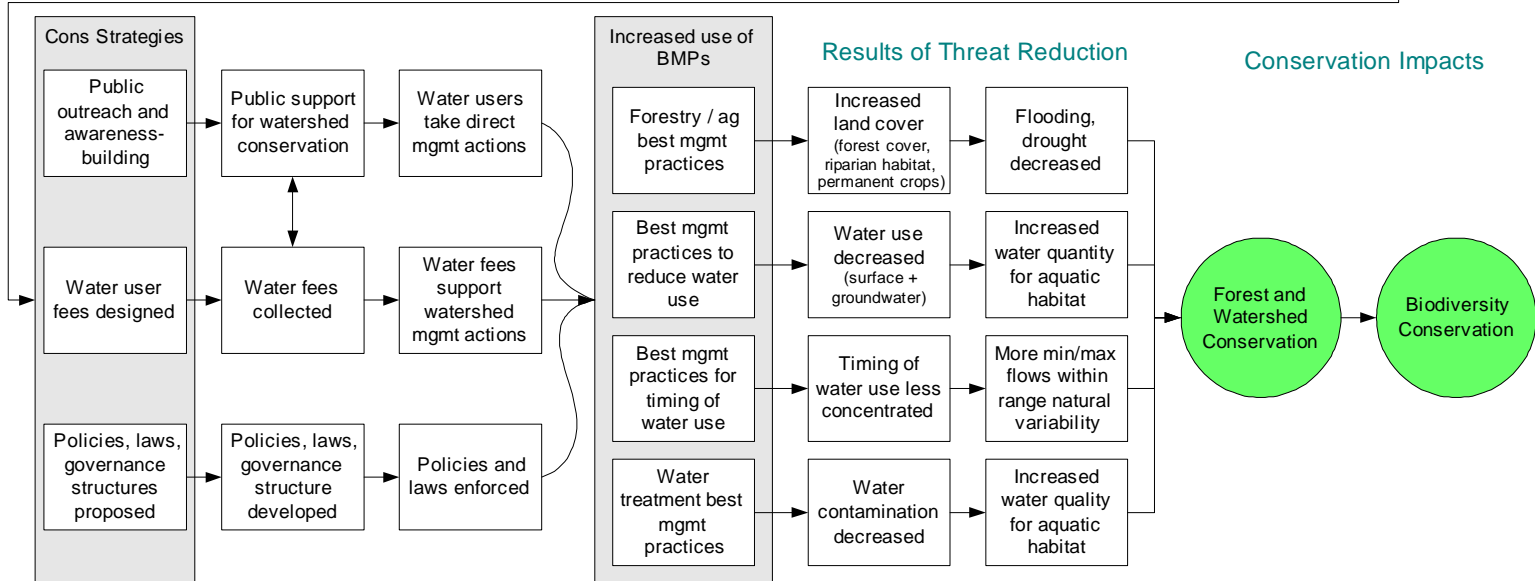
In Phase I, TNC provides technical assistance in watershed valuation, which contributes to building awareness and interest in water issues and capacity to address them. This interest and capacity enable partners to produce initial outputs or products such as analyses of threats,

Figure 1. Causal Chain Defining How TNC Watershed Valuation Projects Are Intended to Contribute to Biodiversity Conservation

Phase I: Initial Capacity Development, Planning and Alliance-building



Phase II: Implementation of Conservation Strategies or Tools



policies and stakeholders, which enable them to develop a watershed valuation action plan and select key stakeholders that need to be involved in implementing the plan. A “silent phase” of information-sharing, awareness and capacity-building among key actors is necessary to achieve consensus about what conservation strategies to undertake and to build trusting relationships among the key actors. TNC calls this the “silent phase” because it may appear to outsiders that little is going on during this phase, but the implementing organizations usually develop important alliances during this period that create the foundation for achieving results during Phase II. During this period, a water valuation process is usually conducted and the key actors may form a watershed group. All of the products of the silent phase contribute to increased recognition by these key actors of the value of watershed environmental services, which contributes to the involvement of these key actors in the implementation of conservation strategies in Phase II.

According to TNC’s program theory, Phase II focuses on the implementation of one or more of the following three conservation strategies: (1) public awareness campaigns, (2) water user fees, and (3) policy development and enforcement. For each of these strategies, a short chain explains expected results. Public outreach and awareness-building increase public support for watershed conservation, which will contribute to water users taking action to improve watershed conservation. The design of a water user fee will result in collection of water fees that are used to support watershed management actions. Engagement of policy-makers will result in the development of new laws, regulations or governance structures that are enforced.

If these conservation strategies are well executed, then they should result in increased adoption of best management practices (BMPs) related to forestry and agricultural activities, reduction of water use, the timing of water use, or water treatment. Which of these best management practices is relevant depends on the conditions in the specific site. For example, forestry and agricultural BMPs may be very important for montane areas, while water pollution reduction is vital to areas such as the Yucatan Peninsula that have complex groundwater systems that influence sensitive marine areas. Where they are relevant, forestry and agricultural best management practices can increase forest cover and other land cover, which will result in decreased flooding and drought. BMPs to reduce water use will reduce surface or groundwater use, which will increase the quantity of water available for aquatic habitat. BMPs related to the timing of water use will result in less concentration in the timing of water use (for example, by hydropower plants), which will increase the number of minimum and maximum river flows within the range of natural hydrologic variability. Water treatment practices will decrease water pollution, thus increasing water quality for aquatic habitat. According to TNC’s theory, all of this will contribute to increased forest and watershed conservation, which will increase forest and freshwater biodiversity conservation.

Although the results chain is presented as a linear sequence of actions and results, we must remember that this is program *theory* – in reality results are often not achieved in the order presented by the chain. For example, some sites have jumped directly to working on the development of water user fees, without an extensive capacity-building, planning and alliance-building phase. These differences help us to learn about the advantages and disadvantages of different approaches and their relative effectiveness under different conditions.

1.3 Case study structure

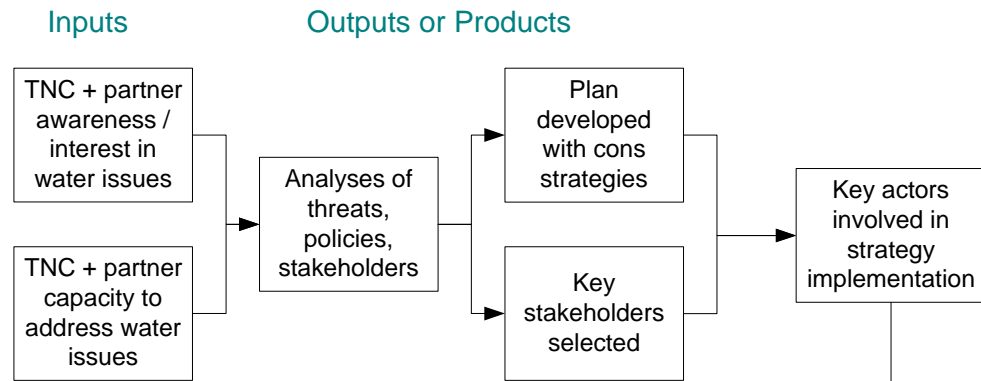
The structure of this document is based on the results chain. We begin by addressing the last two factors at the end (bottom right-hand side) of the chain. In the site description we describe the biodiversity that TNC and its partners are trying to conserve in the protected areas where they are conducting watershed valuation activities and in the project objectives and strategies we describe the project’s objectives related to watershed and biodiversity conservation.

We then move to the beginning of the results chain. In the project history and planning and alliance-building process sections, we describe all of the achievements made related to the Phase I portion of the results chain. In the implementation of conservation strategies section, we describe all relevant activities related to public outreach campaigns, water user fees and watershed management policies and, if appropriate, how these activities have contributed to increased use of best management practices. We then describe any monitoring that partner organizations are undertaking to measure the effectiveness of watershed valuation work. Finally, we describe the principal lessons learned and provide concluding remarks.

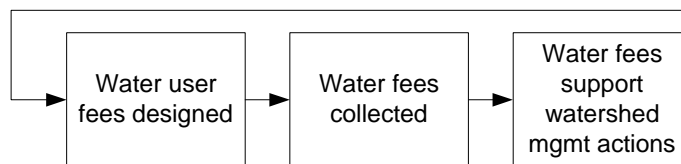
1.4 Overview of this site project

For this site, only part of the results chain shown in Figure 1 applies. TNC conducted research to characterize the watersheds, analyze threats and identify key stakeholders. During the planning and alliance-building phase, TNC chose to work with a select group of high-level decision-makers and concentrate primarily on the design and development of water user fees. The work to date has focused on the following parts of the results chain:

Phase I: Initial Capacity Development, Planning and Alliance-building



Phase II: Implementation of Conservation Strategies or Tools



2 Site Description

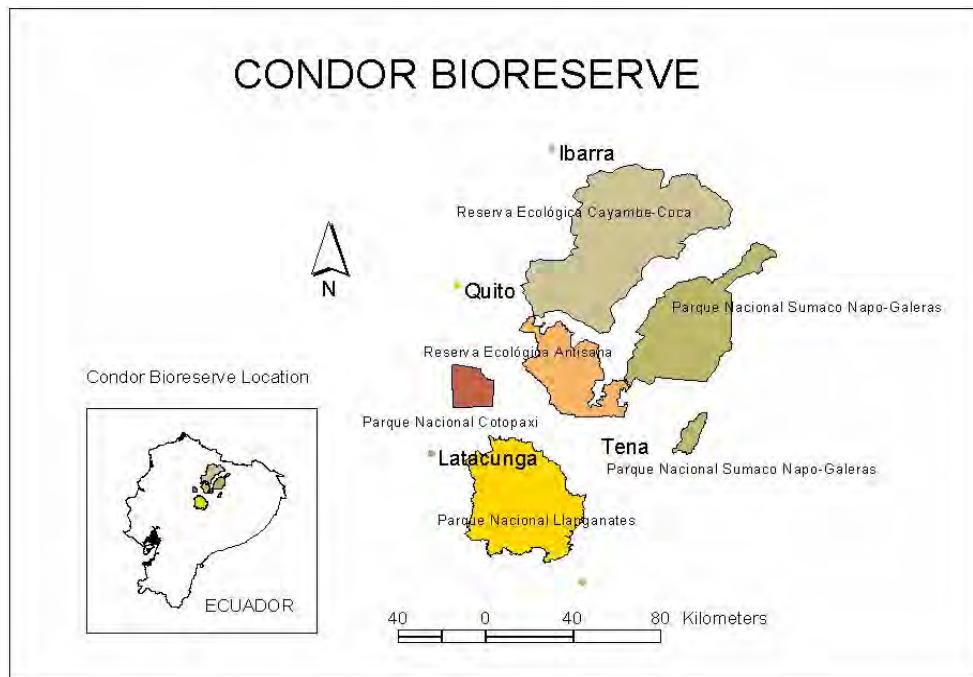
The Condor Bioreserve (CBR), shown in Figure 2, is not one but several protected areas and their areas of influence that together make up an ecologically functional site comprising more than one million hectares. TNC calls the CBR a “management concept” that includes:

- seven protected areas: Cayambe-Coca Ecological Reserve (RECAY), Antisana Ecological Reserve (REA), Sumaco-Napo Galeras National Park, Cotopaxi National Park (CNP), Llanganates National Park, Cofán-Bermejo Ecological Reserve, and Pascocha Wildlife Refuge.
- the areas of influence between these areas (Quijos and Consanga valleys, the buffer zone between Antisana and Cotopaxi, and the buffer zone between Antisana and Llanganates); and
- the northern area of Cayambe-Coca to the border with Colombia.

The CBR is located in the northern part of Ecuador and includes parts of three ecoregions and an exceptional amount of biodiversity. It includes large portions (more than 300,000 hectares) of both Northern Andean Paramo and Eastern Cordillera Real Montane forests and a smaller area (20,000 ha.) of Napo Moist Forests. The CBR includes a variety of habitats that extend from paramo and montane forests to tropical rainforests and also include hundreds of lagoons and wetlands. Conservation of this area will guarantee the conservation of the headwaters and biodiversity of the Napo and Aguarico watersheds, two of the most important Amazon basin watersheds. Scientists have documented more than 760 species of birds, 150 mammals and 110 amphibians in the bioreserve to date, but they consider these numbers to be conservative estimates, since several areas remain unexplored.

Figure 2. Location of Condor Bioreserve

Source: TNC (2001)



The high plateaus of the Condor Bioreserve include the headwaters of more than 20 rivers in 6 large watersheds that provide water for many water uses, including urban and rural drinking water, irrigation, electricity generation, recreational activities such as fishing and hot springs, and other activities such as aquaculture and navigation (Echavarria, 2001). Of all these activities, the ones that use the most water at specific sites and generate the greatest economic value are urban drinking water and electricity generation.

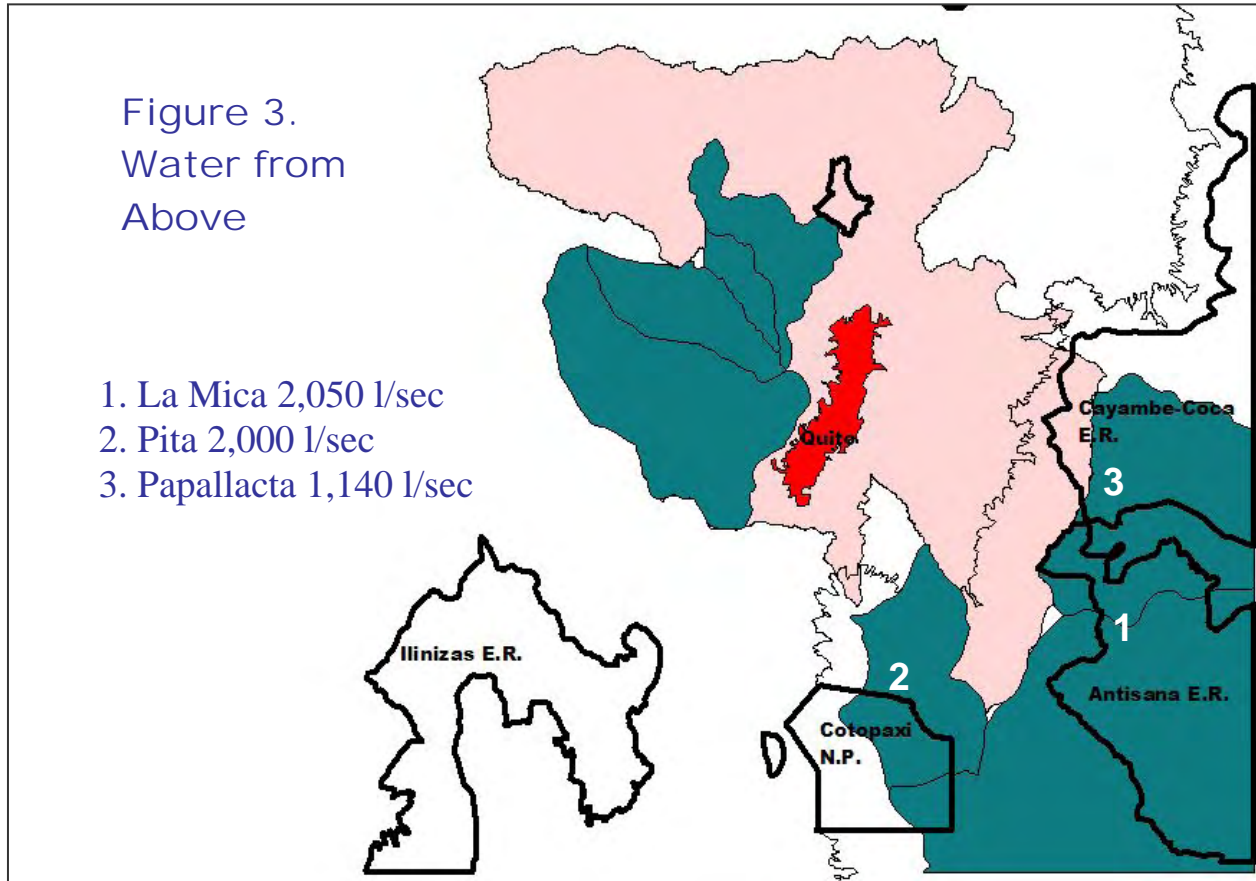
Condor is the source of water for more than 1.8 million people who live in the city of Quito, the capital of Ecuador. The Quito Municipal Water and Sewage Agency (EMAAP-Q) currently manages 7 water projects and has another large project planned. Table 1 lists these projects and describes how much water they produce, where they are located, and whether or not they receive water from the CBR. The table demonstrates that three of EMAAP-Q's current water projects, or approximately 5,190 l/s of the city's drinking water, come from the Condor Bioreserve. These projects, shown in Figure 3, include the Mica – Quito Sur Project that diverts water from a river on the Pacific slope of the Antisana Ecological Reserve, the Pita-Puengasi project that draws water from the Pita watershed in the Cotopaxi National Park, and the Papallacta Project that pumps water over the Continental Divide from the Tuminguina and Blanco Chico rivers in the Cayambe-Coca Ecological Reserve that flow into the Amazon Basin. The table also shows two major water projects planned for the future.

Project Name	Water Production (l/s)¹	River (and Watershed) Where Project is Located	Located in These CBR Protected Areas
Mica – Quito Sur	2050 l/s	Antisana and other rivers (Napo watershed)	Antisana Ecological Reserve
Pita-Puengasi	2000 l/s	Pita River	Cotopaxi National Park
Papallacta	1140 l/s	Tuminguina and Blanco Chico Rivers	Cayambe-Coca Ecological Reserve
<i>Total Current Water Production</i>	<i>5190 l/s</i>		
Tambo-Tamboacu (under construction)	1560 l/s	Tambo y Tamboacu rivers	Cotopaxi National Park
Ríos Orientales (planned)	16.5 m ³ /s (estimated production)	28 rivers Quijos watersheds)	Antisana and Cayambe-Coca Ecological Reserves and Cotopaxi National Park

Water from rivers in the CBR is also used to generate hydroelectric energy. Quito's Electric Company (EEQ) has the Los Chillos hydroelectric plant on the San Pedro River that receives water from the Pita and San Pedro Watersheds (whose headwaters are located in the Cotopaxi

¹ Carrera, L. 2004.

National Park and the Ilinizas Ecological Reserve, respectively) and generates 1760 kilowatts. EEQ also manages the Pasochoa plant in the Antisana Reserve that generates 4500 kw.



Despite their hydrologic value, current land use practices are degrading the watersheds that provide drinking water and generate hydroelectric power for Quito residents. The main threats to these watersheds include advance of the agricultural frontier, inappropriate agricultural practices, and poorly planned infrastructure projects. Rural residents convert paramo and montane forests to cattle and sheep pastures and fields used for subsistence and commercial agriculture. They use poor agricultural practices, such as overgrazing and burning of the paramo, that seriously degrade the high plateaus. The water and electric companies, municipalities and private companies have only taken environmental criteria partially into account when planning and constructing roads, dams, water distribution systems, oil and gas pipes, and other infrastructure projects. As a result, all of these actors are contributing to soil erosion and compaction and there is evidence of reductions in dry season flow and water quality, which may be caused by these factors.

While watershed degradation is occurring on a large scale, evidence of the effects of these land use practices is limited to specific sites. For example, the Quito Electric Company has been monitoring streamflow in the San Pedro River for 40 years and their data show a decrease in dry season flow. EMAAP-Q has been affected by reductions in water quality due to sheep grazing in the Antisana Ecological Reserve. A few years ago, a break in an oil pipe also contaminated

the Papallacta reservoir, forcing EMAAP-Q to construct another dam 10 km upstream and preventing the use of the water of the Papallacta reservoir for at least 10 years due to hydrocarbon contamination in the sediments. There is growing recognition of the part of the public of the pollution problem facing these rivers, which in turn affect water use for productive activities.

As the quantity and quality of water available for human consumption, generation of electricity and other uses is decreasing, demand for water and conflicts between water users are increasing. EMAAP-Q estimates that the population of the Quito metropolitan area will nearly double by 2025, growing from 1.85 to 3.61 million inhabitants and causing maximum daily water demand to rise from 7.67 m³ to 13.33 m³. To meet this demand the company is planning the *Ríos Orientales* Project that will draw drinking water from 28 rivers in the Amazon basin.

A recent analysis of the status of water resource management in the Quito valley (Hoya de Quito) emphasized the urgency of addressing the current mismanagement of water resources. The author stated that “It is essential to immediately design and promote harmonious development of water uses in accordance with the high level of urban growth and demand for water for potable water supply, generation of hydroelectricity and irrigation and to solve current problems of water scarcity, competing uses and pollution.” (Carrera, L. 2004)

3 Project Objectives and Strategies

The Nature Conservancy’s Ecuador office, local partner Fundación Antisana and the United States Agency for International Development (USAID) have worked together for several years with the goal of establishing a water-based finance mechanism as a long-term source of financing for the conservation of the Condor Bioreserve, particularly the Antisana and Cayambe-Coca Ecological Reserves. These two protected areas are the primary source of drinking water for the city of Quito.

Water users do not recognize the social benefits of good water quality and quantity provided by these protected areas. Therefore, the principal objective of the project is to establish an institutional mechanism that encourages water users to recognize the value of these environmental services. With support from USAID, TNC, Fundación Antisana, and others formed the Water Conservation Fund (FONAG) to collect a user fee from those who benefit from the water from the reserves. Their intention was to establish the user fee based on sound economic valuation of the resource. (Echavarria, Nov 2001)

4 Project History

4.1 Interest in Water Issues

Although the protection of Quito’s water supply was one of the justifications for creation of the Antisana Ecological Reserve, construction of water supply infrastructure became a threat to the reserve in the early 90’s, as EMAAP-Q built roads and distribution channels and expanded a natural lagoon through ecologically sensitive paramo for the Mica-Quito Sur water project. A conservation policy staff person from TNC’s headquarters in Virginia, the director of Fundación

Antisana, and TNC's Ecuador Country Program Director spoke about possible ways to address this threat and to get the water company to support the management of the reserve. Their conversations planted the idea of developing a mechanism for payment for watershed environmental services.

In 1997, TNC's Ecuador Director hired an independent consultant to prepare a document explaining the benefits of a water-based finance mechanism, or water fund, and envisioning how it could operate. The consultant had both academic training and professional experience working on water resources management, specifically with water users' associations in Colombia. She wrote *Water: Together We Can Care for It!* – a brief and graphically attractive document – to promote the idea of establishing a water fund. TNC printed the document in 1998 in both English and Spanish.

TNC used the document to begin negotiating with key actors to create a water-based finance mechanism. They approached Patricio Rivaneira, the manager of the water company. He was an advocate of conservation and at the time was a member of Fundación Antisana's Board of Trustees. He supported the idea of creating FONAG and he convinced the Mayor of Quito, Jamil Mahuad, of its importance. A member of the City Council, Roque Sevilla, also a conservationist (who is now a member of the Board of Trustees of World Wildlife Fund) also backed the idea. In April 1998, TNC and the Municipality of Quito signed an agreement to collaborate on the design and development of the Water Conservation Fund (Fondo para la Conservación del Agua – FONAG).

TNC hired the same independent consultant mentioned above to facilitate the process of designing the institutional and financial structure of the water fund. She formed an ad-hoc committee, composed of representatives from Fundación Antisana, TNC, EMAAP-Q and the Mayor's office to oversee implementation of the fund. She drafted a workplan and facilitated regular meetings of the committee to discuss ideas and assign responsibility for specific activities. Each organization carried out activities within their area of expertise and reported back to the group (Echavarria 2001).

TNC's independent consultant helped the committee to define the following criteria for selecting a water-based finance mechanism:

- Ecologically sustainable - promoting long-term watershed conservation
- Legally feasible - based on the local regulatory environment
- Politically viable - likely to be accepted politically
- Multidisciplinary - allow the participation of public and private organizations
- Efficient - should not create more organizations, and no bureaucracy
- Participatory - ensure and promote multi-stakeholder participation, in particular at the community level

She used these criteria to analyze examples of water-based finance mechanisms used in Brazil, Costa Rica, Colombia and other places. She examined both mandatory mechanisms such as taxes or user fees, as well as voluntary ones, such as incentives. At the time, TNC also hired her to provide technical assistance to TNC partner organizations in other South American sites that were beginning to develop water-based finance mechanisms for protected areas.

4.2 Capacity to Address Water Issues

To facilitate a watershed valuation process, TNC and its partner organizations must have some level of capacity to address water issues. Skills in education and outreach, facilitation of inter-institutional collaborative processes, hydrologic research, conservation finance and economic valuation can all be helpful. Roberto Troya believes that the most important skills needed specifically to facilitate the creation of a water fund include:

- Technical capacity in water resources management,
- Knowledge and experience in conservation policy,
- Knowledge of politics, negotiation skills and the ability to develop strategic alliances, and
- Patience and the ability to continue investing in long-term processes.

Together, TNC's Ecuador Country Program Director and the independent consultant have these skills. The consultant has technical capacity in water resources, knowledge and experience in conservation policy and negotiation skills. The Director has strong political skills and experience in negotiation and alliance-building. Both of them have invested part of their time every month, consistently over the past 7 years, to the development of FONAG. When they started, in the late 1990's, TNC's Conservation Finance and Policy program put them in contact with similar projects in the United States, such as New York City's program to conserve and manage the watersheds in the Catskills mountains and the Delaware River that provide about 2 billion gallons of drinking water each day for the city's 9 million inhabitants. TNC gave them access to conservation finance and policy tools and support in negotiation. TNC also helped them to increase the profile of FONAG by documenting their progress and sharing it with other practitioners within TNC's international network. The Condor Bioreserve also entered TNC's Freshwater Initiative as a potential site for replication of the work being developed in several action sites selected in the U.S.

5 Planning and Alliance-building Process

5.1 Project Design and Selection of Key Stakeholders

Water from the Condor Bioreserve is used for many purposes, including irrigation, drinking water, electricity generation, aquaculture and others. Early in the process of developing a water fund, TNC and Fundación Antisana chose to focus on those water users with the greatest economic and political weight. Their approach was top-down, focusing on selling the idea to a select group of leading decision-makers. They chose not to involve a broad array of stakeholders because they did not want to generate unrealistic expectations.

Because the water projects located in the Cayambe-Coca and Antisana reserves provided at the time 5 m³/sec of water that supplied 80% of Quito's residential water, EMAAP-Q was at the top of the list of key actors. Both the water and electric company are city organizations that respond to the Mayor's office, so they presented the idea of a water fund directly to the Mayor, while also lobbying the general managers of EMAAP-Q and EEQ. Because both general managers make decisions with their governing boards, they also provided information to these powerful

individuals (Echavarría 2001). As mentioned earlier, TNC and its partners used a short, attractive document to promote the idea of a water fund. The document presented the problem of water scarcity and watershed degradation, proposed a solution (the water fund), explained what steps needed to be taken to implement this solution, and the benefits of doing this. TNC prepared a video and Powerpoint presentation, based on the document.

When negotiating with leaders in other sectors, it is important for conservation professionals to understand the perspective and interests of these actors. EMAAP-Q's focus is on providing water to urban residents. Urban growth in Quito over the last three decades has created demand for water and the growing supply of untreated wastewater has affected the water quality of local rivers, which prompted water specialists to look beyond the Pacific slope watersheds and existing groundwater resources. This has placed great pressure on the company to expand their service and exploit rivers in the Amazon Basin, with little attention given to the environmental impact of this expansion and in particular of water diversion projects from one watershed to another. The company is composed primarily of engineers and their #1 priority is the design and construction of large water infrastructure projects. They measure their success based on the number of kilometers of drinking water distribution and sewage disposal systems.

Officially, EMAAP-Q reports a loss of 38.5% of its municipal water supply due to unreported sales, illegal connections and leaks in the system. In reality, losses are probably much higher. Rather than addressing this problem, the company proposes to build infrastructure to exploit rivers on the Atlantic slope of the Condor Bioreserve and pump the water across the continental divide, at vast economic and environmental expense.

Although the company is adversely affected by reductions in water quantity and quality due to agricultural activities, EMAAP-Q has limited capacity or little interest in integrated watershed management. Despite passage of the Environmental Management Law and the Water Treatment Law in Ecuador in the 1990s, the water company's Watershed Management Department has few staff or resources. Its importance to the institution is reflected by its location several levels down on their organizational chart – in the Environmental Division of Infrastructure Management.

The Quito Electric Company (EEQ) has been providing electricity generated by hydropower for the past 40 years. The government has given the company concessions to exploit hydropower in specific locations and the company does not pay anything for the right to use the water. EEQ participates in FONAG for three reasons. First, the Mayor asked them to participate. Second, as mentioned earlier, their data show that streamflow has decreased in the San Pedro River over the past 40 years and the company attributes this to poor watershed management. They are interested in working with other institutions to maintain existing streamflow levels, through reforestation and other watershed management activities. Third, EEQ's regulating entity asked all power generators in the country to present environmental management plans for all operations. Therefore, EEQ has sought FONAG's assistance in addressing the issue of minimum base flow. In some locations, EEQ diverts all of the water in the river, leaving stretches of the riverbed completely dry for kilometers at a time. For example, one town's wastewater is deposited into a dry riverbed, causing environmental consequences and threatening human health. Although national regulations require that the company leave enough base flow (*caudal ecológico*) to support ecological processes, the regulations are not enforced. The National

Electrification Advisory Council (CONELEC) has nevertheless passed a resolution requiring that EEQ address base flow needs in the watershed management plans. Therefore, one of EEQ's primary interests is to analyze what level of minimum stream flow is needed in the San Pedro River. Conservation organizations have presented proposals to FONAG to conduct this research.

The beer company is the only member of FONAG from the private sector. The company joined FONAG as part of their environmental management strategy. They have received ISO 9000 certification and they would like to achieve ISO 14000 certification. Like many industrial operations in Quito, they depend on groundwater for their water needs. Their participation in this kind of scheme is voluntary and it sets an excellent precedent for FONAG to involve other industrial water users.

Recently, the Swiss Agency for Development and Cooperation (COSUDE) has become a member of FONAG. This is the first international, bilateral aid agency to join the fund and it represents a very different type of member, because they are not a local water user. The Swiss see their involvement as a long-term commitment which will translate into concrete on-the-ground improvements in watershed management.

In summary, the members of the FONAG Board currently include one representative from each of the following institutions: EMAAP-Q, EEQ, the Andina Beer Company, TNC and COSUDE. TNC was able to involve EMAAP-Q and EEQ in FONAG by taking advantage of conservation-oriented leadership and pressure from the Mayor's office. Because this approach depends on the support of a few leaders, it has required a high level of involvement of TNC staff and cultivation and lobbying of new decision-makers when government leaders change.

Key Dates for the Condor Bioreserve Watershed Valuation Project

- 1997 *Water: Together We Can Care for It!* developed
- 1998 TNC and Quito Municipality officially launched the Water Conservation Fund (FONAG) initiative, agreeing to collaborate on the design and development of the water fund.
- 1999 TNC facilitated an ad-hoc committee to design and develop the water fund.
- 2000 Development of FONAG bylaws that defined its financial structure (as a trust fund) and governance structure. EMAAP-Q and TNC signed the contract that created the trust fund and defined EMAAP-Q's annual contribution of 1% of drinking water profits.
- 2001 EEQ signed the FONAG trust fund contract, committing to an annual contribution of 0.5% of profits.
- 2002 FONAG developed a process for presentation and review of proposals and approved its first proposal.
- 2003 Quito Mayor pressured FONAG to finance more projects.
- 2004 FONAG hired a new Technical Secretary with strong capacity in watershed management. FONAG Board approved new policies, procedures and criteria for project selection. TNC and FONAG conducted a general technical analysis of the river basins and water demand in Quito's area of influence (*Hoja de Quito*).

5.2 Economic Valuation and Hydrologic Research

When developing FONAG, TNC and its partners did not consider valuation research a high priority. They believed that getting key actors to make long-term financial commitments to the

water fund depended more on lobbying than on the results of economic research. Because of this, they made only a small investment in economic valuation research.

In the late 1990s, during the start-up phase of FONAG, Fundación Antisana conducted a simple economic valuation study in the Cayambe-Coca Ecological Reserve. They estimated the cost of maintaining park guards to effectively patrol the upper parts of the Papallacta, Chalpi Grande and Oyacachi watersheds and they divided this cost by the amount of water extracted from the area for urban water supply. The study concluded that the area could be effectively protected by charging a user fee of US\$0.04 per household in Quito. Several years later, the German development agency GTZ conducted similar research in the Antisana Reserve that estimated two costs: (1) the cost of patrolling the upper Antisana watershed and (2) the opportunity cost to landowners for not being able to graze their cattle and sheep in the protected area. They proposed a US\$0.07 monthly user fee for each of the households that receive water from the La Mica – Quito Sur project to cover both of these costs (Echavarria 2001).

While these studies provide a preliminary estimate of the level of a user fee that could be considered, FONAG is focusing on developing the political support necessary to charge a user fee. Efforts are also underway to formalize the water company's current support for FONAG through a city ordinance.

Although it is not clear whether consumers would be willing to pay \$0.04 or \$0.07 per month to ensure conservation of their source of drinking water, there is a perception that people are concerned about the state of their water sources. It is also not clear that these amounts would be sufficient to ensure watershed conservation, since they include only patrols and, in the Antisana Reserve, payments to landowners to compensate them for not grazing their livestock. The studies do not take into account other current or future threats to water quality and the regulation of streamflow.

FONAG and TNC have also supported hydrologic research and research on aquatic biodiversity that has provided baseline information about certain watersheds, especially the Pita and San Pedro Rivers. With support from FONAG and the Corporación Vida para Quito, an Ecuadorian student studying in Barcelona, Spain conducted hydrologic research on the Pita and San Pedro Rivers, two of the three rivers that flow through Quito. TNC conducted a hydrologic characterization of the watersheds based on the Forest Service method. TNC's Freshwater Initiative (now called Sustainable Rivers) also provided technical assistance in the study of aquatic biodiversity, wetland mapping, and ecological classification of rivers. They also funded the design of a meteorologic and hydrologic monitoring network with the minimum number of necessary data collection stations to provide scientifically sound data. FONAG has received support from the Spanish government to study ecological baseflows in the Pita and San Pedro rivers, as a first study which could continue into more comprehensive technical research.

6 Implementation of Conservation Strategies

6.1 Water User Fees

6.1.1 Design of water user fees

In 2000, a new Ecuadorian finance law allowed companies that handle public funds to put money into a trust fund designated for a specific purpose. The Ad-hoc Committee created to facilitate the creation of FONAG decided that this mechanism would meet their criteria (described earlier). They developed the bylaws and defined FONAG's financial and governance structure. The Environmental Management Unit of EMAAP-Q worked with TNC's consultant to choose a socially responsible financial institution, Enlace Fondos, to manage the trust fund. In January 2000 EMAAP-Q signed the contract creating FONAG as a trust fund. Once FONAG was created, the Board of Directors chose a Technical Secretary.

The creation of FONAG was delayed by political circumstances. When Jamil Mahuad left the Mayor's office to become President, Roque Sevilla became Mayor of Quito and he appointed a new EMAAP-Q manager. TNC had to build alliances with these new officials. FONAG was signed under the leadership of Sevilla. Because the FONAG contract allowed the addition of other members at a later date, in 2001 Roque Sevilla convinced EEQ to join the trust fund. In 2003, the FONAG Secretary also convinced the beer company, Cervecería Andina, to join. The FONAG contract defined that the funds could be used for activities in the following areas:

- Legalization of land tenure and land acquisition,
- A system of patrols to control illegal activities such as fires, fishing and hunting,
- Hydrologic protection measures such as installing fencing around springs and erosion control,
- Promotion of sustainable agricultural production systems, and
- Monitoring and evaluation of project results.

Under the contract, EMAAP-Q agreed to contribute \$50,000 in seed capital and 1% of drinking water profits (initially approximately \$15,000 per month) to the trust fund for watershed management. According to TNC's consultant, they reached the decision to commit 1% of their profits by considering that a commonly accepted standard investment for good environmental management is 5% of a company's sales and FONAG represents only about one fifth of the company's environmental management responsibilities. EEQ considered 1% of their sales too much money to commit to FONAG, especially because their use of water is non-consumptive. They agreed to commit 0.5% of their profits, or about \$45,000 a year, to FONAG.

As shown in Table 2, FONAG had received a total of \$1,718,000 in contributions by the end of December 2004, 88% of which have been provided by EMAAP-Q. FONAG's total capital at the end of 2004 was \$2,112,000. FONAG uses only the interest generated from the trust fund to finance watershed management projects. In 2004, FONAG committed \$140,492 to projects.

TNC provided a symbolic contribution to FONAG but they are not a major contributor because they are not a water-using industry. Their contribution to FONAG appears to be quite small in Table 2, but in fact TNC has provided substantial technical assistance to FONAG for the past 7

years. Although TNC has not kept a detailed record of these in-kind contributions, they estimate that they have spent approximately \$40,000 per year on technical assistance, financed through USAID and in-kind TNC contributions, all designed to strengthen the institutional capacity of FONAG. In addition to the technical assistance provided each year, in 2004 TNC decided to begin providing project support as a counterpart to FONAG in the Antisana and Oyacachi watersheds, critical to the Condor Bioreserve Project.

Table 2. Contributions to FONAG Through December 2004

Contributors	2000	2001	2002	2003	2004	Total Through Dec 04
EMAAP-Q	\$160,000	\$240,000	\$360,000	\$360,000	\$400,000	\$1,520,000
EEQ		\$45,000	\$45,000	\$45,000	\$50,000	\$185,000
TNC	\$1,000					\$1,000
Cervecería Andina				\$6,000	\$6,000	\$12,000
						\$1,718,000

The FONAG Board is interested in increasing the operating budget of FONAG, either by increasing membership, developing strategic alliances that generate matching funds, or fundraising. Of these three options, matching funds have the greatest potential to increase the money available for watershed management projects over the short term. Beginning in 2004, TNC has provided matching funds to co-financed projects with FONAG, increasing the fund's operating budget by 18%.

FONAG has also begun to collaborate with the Corporación Vida para Quito, an initiative of the Quito Municipality. In Ecuador, all taxpayers can decide to dedicate 25% of their income tax to a specific cause of a public entity. Under this program, the Quito Municipality formed this corporation to address pressing environmental and social needs. Quito could receive approximately \$100 million through this program over the next 5 years. Currently, the corporation is focusing on the restoration of the three rivers that flow through the city. Because FONAG's priority areas include two of these rivers, the San Pedro and Pita rivers, the objectives of the two organizations overlap and they have both supported small hydrologic research and reforestation projects. Although the city has many needs, including the need to invest a substantial amount in sewage treatment, this municipal corporation has the potential to be a huge partner for FONAG.

Increasing FONAG membership will require a substantial investment of time to cultivate potential members. OIKOS, a communications firm, funded by USAID, is designing a communications strategy for FONAG to increase awareness among key groups about Quito's water problems and how FONAG contributes to addressing these problems. OIKOS also plans to cultivate potential new members. They have chosen to target potential contributors in the following sectors: flower growers, the beverage industry, the food industry, hotels, textile manufacturers, and other municipalities.

Fundraising for FONAG is complicated by the fact that FONAG is a trust fund and not a non-profit organization. Under Ecuadorian law, only non-profit organizations with legal status

(*personería jurídica*) can receive donations and grants. Banks, not non-profit organizations, manage trust funds. Therefore, FONAG would need to create a non-profit organization before being able to fundraise.

6.1.2 Use of funds to support watershed management projects

Between 1997 and 2000, TNC and its partner organizations focused on designing and establishing FONAG. Although the first funds were contributed in 2000, it was necessary to capitalize the fund and for FONAG to undergo a lengthy strategic planning process in 2001 to define their investment priorities, before supporting any projects. Because FONAG members represent different sectors with very distinct interests, this process took several months. TNC's consultant did work behind the scenes documenting the thematic interests and geographic priorities of each FONAG member institution and structuring the priority-setting process. The FONAG members defined 5 priority geographic areas or micro-watersheds: (1) the San Pedro – Pita, (2) Papallacta, (3) Chalpi, (4) Oyacachi, and (5) Antisana. Several members wanted FONAG's initial investments to be visible to city water users, so the priority areas included the San Pedro and Pita rivers, which are close to the city. TNC's consultant worked with representatives of the member organizations to analyze each watershed's current condition and needs.

Beginning in 2002, FONAG faced increasing pressure – especially from the Municipality and USAID – to begin showing results. An important political transition occurred this year, when the Mayor of Quito changed for the third time in FONAG's short history. Once again, TNC and its partners provided information to the Mayor, the EMAAP-Q Manager and other high-level decision-makers and worked to build their support for FONAG. Over time, the Mayor came to recognize the value of FONAG and support it, but he insisted that it begin to show results on the ground.

During 2002, the consultant and the Technical Secretariat of FONAG designed a process for presentation and review of proposals. FONAG distributed a public Request for Proposals focusing on an environmental evaluation and action plan for the San Pedro and Pita rivers and received its first project proposals (5 qualified). A review committee evaluated them anonymously (without knowledge of the proponent organizations) and selected the strongest proposal. FONAG gave Fundación Natura \$40,000 to analyze current land use, problems and conflicts over water resources, and quantify potential solutions in the San Pedro and Pita watersheds. Fundación Natura's findings helped FONAG define specific needs to which it could respond over the next few years.

As FONAG began supporting projects, TNC recognized the need for a Technical Secretary with training and experience in watershed management. At the time, the FONAG Secretary had training in economic and financial analysis. His skills had been valuable during the design and creation of FONAG, but they did not match current needs. An external evaluation of FONAG recommended that FONAG develop a job description for this position. It suggested that the Technical Secretary have skills in the management of a non-profit organization, including: management of the Board and personnel; the design, management and monitoring and evaluation of a small grants program; experience in fundraising and co-financing at the national and international levels; and good speaking and writing skills in English and Spanish.

Based on the recommendations of the external evaluation, TNC presented an action plan to the FONAG Board in January 2003. The action plan recommended specific points to strengthen the Board and the Technical Secretariat, to create Financial and Technical Advisory Boards, to develop a strategic plan to guide investments, to refine the list of priority watersheds based on an analysis of the threats facing each basin, to determine the cost of conservation of each basin (under minimum, intermediate and optimal management scenarios), to increase FONAG's capital and operational funds and to implement a communications strategy about FONAG. Initially, FONAG Board members rejected this action plan, because they felt the results of the evaluation did not warrant changing the profile of the Technical Secretary, as suggested in the plan. At the time, the Board was not prepared to consider drastic changes in the structure and functioning of the Fund, despite the fact that the Fund's progress had been slow until that point.

Pressure mounted in 2003 for FONAG to do more. The Mayor of Quito publicly criticized FONAG for accumulating money and not spending it. At the same time, USAID and TNC, through their Parks in Peril Program in the Condor Bioreserve, offered to co-finance FONAG projects. Eventually, the Board accepted the need to change the profile of the Technical Secretary and to hire a person to meet this profile. A formal search process was developed and FONAG was fortunate to find a very capable person who had several years of experience working for the water company in Cuenca, Ecuador on watershed management. Pablo Lloret began working as the FONAG Technical Secretary in May 2004.

The new Technical Secretary has been working to formalize FONAG's grant-making process. With TNC's technical support, he proposed policies, procedures and criteria for the project selection process, which the FONAG Board approved in August 2004. All proposals must contribute to the fulfillment of FONAG's annual plan, which is developed each year within the framework of the strategic plan. FONAG has distinctive policies and procedures for small, medium and large projects. For small projects (under \$20,000), the Technical Secretary has the discretion to commit funds at any time. Proposals for medium and large projects must be submitted in October for project implementation the following year. The Technical Advisory Committee or an Evaluation Committee selects the strongest medium-sized projects (\$20,000-\$50,000) and the Technical Advisory Committee and two additional people select the large projects (over \$50,000).

In September 2004, TNC and FONAG completed a general technical analysis of the river basins and water demand in Quito's area of influence (*Hoya de Quito*). This study represents the largest effort to date to consolidate information about these watersheds and provide a strong technical basis for management. FONAG is conducting a series of workshops to share the findings with key actors and create a common understanding of the critical situation of these watersheds and facilitate collaboration on watershed management.

6.1.3 Challenges

FONAG has faced several challenges at different points during the development of the fund. We discuss the major challenges here.

6.1.3.1 Creating a culture of integrated watershed management

The ultimate goal of FONAG is the conservation and management of the watersheds that provide water to Quito, not just the creation of a water fund. This requires, however, a fundamental cultural change in key agencies such as EMAAP-Q, EEQ and the Municipality of Quito. The city of Cuenca provides an example of what TNC and its partners would like to achieve in Quito. In Cuenca the water and electricity company (ETAPA) has environmental education programs and uses conservation easements and other incentives to improve the land management practices of private landowners. ETAPA does not have a water fund, but it directly invests a large amount of its resources into integrated watershed management. ETAPA and the Ministry of the Environment co-manage the protected area that provides water to the city.

According to several people involved in the development of FONAG, one of the biggest challenges in this project is to create a culture of integrated watershed management (IWM) and improve the environmental practices of the principal water-using agencies and industries in Quito. Decision-makers in these agencies recognize that there is growing demand for drinking water and other water uses. Their investment in FONAG demonstrates that they also recognize the need to address threats such as overgrazing and deforestation. They have not, however, recognized the need for integrated watershed management – i.e., for integrated planning and management of all activities that affect water resources within each watershed. Gradually, they have come to recognize how the actions of their agencies contribute to watershed degradation. For example, EEQ drains the San Pedro river completely and leaves the river bed dry for several kilometers. Although EMAAP-Q contributes to FONAG, the construction of its water infrastructure continues to represent one of the biggest threats to biodiversity conservation and a major threat to watersheds in the Condor Bioserve. Although the company wants to apply environmental best practices in its planning and construction, EMAAP-Q and the Municipality of Quito promote large infrastructure projects such as *Ríos Orientales* as the only way to meet the city's growing demand for water. Demand management practices are overlooked even though significant water savings could be achieved by fixing leaks, controlling illegal connections and charging unpaid connections in the city's water system.

Creating such a cultural change requires pressure from inside or outside of these agencies. By bringing together key decision-makers representing the municipal water and electric companies and a conservation organization, FONAG is working to build a common agenda for improved watershed management and trying to increase pressure for change from within the agencies. This process takes time, due in part to the general lack of communication between the municipal water and conservation sectors. Fortunately, the winds are changing and FONAG is playing an important role in modifying the situation.

Pushing for this cultural change from outside would require a different (but probably complementary) approach. A multilateral lending agency could press for or even require policy changes. For example, the International Development Bank (IDB), which finances many of EMAAP-Q's water projects, has strong institutional policies on integrated watershed management (IWM) and it could require that the water company adopt IWM. Unfortunately, however, these policies are not applied in Ecuador and IDB does not integrate its water and environmental activities in this country. TNC's consultant believes that TNC could achieve a higher level of conservation impact in Ecuador and other countries by identifying channels

within IDB and other multilateral organizations for integrating watershed conservation into water infrastructure projects. TNC Conservation Finance and Policy staff tried to make this link in the late 1990s and she feels that there is a need to revisit their efforts.

High-level international events can also influence culture change. In 2004 the Andean multilateral bank, the Corporación Andina de Fomento (CAF), the Municipality of Quito, TNC and EMAAP-Q highlighted FONAG in an international forum called “Water: Source of Life, Development and Peace.” The event produced the Quito Declaration – a mandate for investing in watershed conservation. This event focused on trying to shift the agenda of EMAAP-Q from just providing water to managing the resource better over the long term through IWM. TNC is working to make the Quito Declaration a reality and not just a piece of paper.

6.1.3.2 Building a Sense of Shared Ownership

FONAG was created to facilitate collaboration between the city’s principal water users and conservation organizations to improve watershed management. According to the contract, all FONAG members have the same level of participation in decision-making, irrespective of their financial contribution to the water fund. Nevertheless, EMAAP-Q representatives say that almost all of FONAG’s funds are from EMAAP-Q and imply that this gives EMAAP-Q ownership over the fund. Frequently, they refer to FONAG as “an appendix of EMAAP-Q” or “an initiative of the Municipality of Quito and EMAAP-Q to conserve the watersheds that provide water to the city.” Other people share this perception of FONAG. For example, a representative of EEQ called FONAG “a trust fund for potable water supply.”

This perception may have hindered recruitment of new members. Capitalizing the fund at the necessary level will require the investment of other companies. These companies will only join if they perceive FONAG as a multi-sectoral initiative in which all members have equal weight in decision-making, no matter what their financial contribution to the fund. With the membership of the Swiss cooperation and the continued and strengthened support of the Andean Beer Company and other industrial users, there is the expectation that new members will be integrated in the short term.

6.1.3.3 Building the Capacity of FONAG

The institutions that compose FONAG have little experience and technical capacity in watershed management. By providing advice and technical information to guide decision-making, TNC has tried to gradually build the capacity of FONAG to make decisions and support programs that improve the condition of the watersheds that provide water to the city. While TNC could have accomplished more by doing certain things directly (such as cultivating new members), they felt that it was more important to build the capacity of FONAG to do things themselves. Building this capacity was a slow process and it took a particularly long time for FONAG to begin supporting projects in the field. Many people agree that hiring a new Technical Secretary with experience and expertise in watershed management has been essential to strengthening FONAG’s institutional capacity. Now that FONAG has skilled personnel, it is likely that TNC will only continue providing technical assistance to the fund for about one more year.

6.1.3.4 Need to Institutionalize FONAG

FONAG was created by an 80-year contract signed initially between TNC and EMAAP-Q and later by EEQ and the Andean Beer Company, and recently the Swiss Agency for Development and Cooperation. Because EEQ and EMAAP-Q are municipal companies, on three different occasions over the past eight years changes in city leadership have required TNC to invest in lobbying the new mayor, so that he will continue honoring this contract. TNC and the FONAG Technical Secretary say that it is essential to institutionalize FONAG through a municipal ordinance. This process is currently underway and it is expected to bear fruit this year since the political climate is conducive to a quick approval of the ordinance.

6.1.3.5 Meeting High Expectations with a Relatively Small Operating Budget

Initially, FONAG was designed to be a major source of funding for the Condor Bioreserve. Promotion of the fund within Ecuador and internationally raised high expectations of what this innovative source of funding could accomplish. Currently, there is an imbalance between the large expectations of FONAG and the small level of financial resources available for watershed management projects. Because FONAG is a trust fund, it can only spend the interest generated from the fund. At the end of 2004, FONAG had received \$2,112,000 in capital and it had \$140,492 for projects. Because of this, to date FONAG has only been able to finance small projects, around \$50,000 per project, covering a wide range of topics such as reforestation, removal of illegal dumps, building a small river park, best management practices to reduce soil erosion and sustainable production activities for local communities.

To address this challenge, outside consultants recommended in 2002 that the Board modify the trust fund's legal requirements (*escritura*) to allow the use of not only interest payments but also 50% of annual contributions for watershed management projects. They projected that this would dramatically increase the amount of funding available for projects in the short term. For example, it would have made \$221,825 available for projects in 2002, as opposed to just \$30,650, as shown in Table 3. It would slow the capitalization of the fund – for example, FONAG's projected capital in 2008 would be \$2.4 million, as opposed to \$3.8 million. This change, however, would have increased the fund's impact at a time when it was also trying to gain credibility and attract new members.

FONAG has chosen not to spend half of its annual contributions on watershed management projects, as the consultants recommended, because they feel that modifying the trust fund's *escritura* could “open Pandora's box,” leading to undesirable changes in the legal agreement between all members. Instead, as discussed earlier, FONAG is seeking co-financing. In 2004, TNC began providing matching funds from the USAID Condor Bioreserve project. In addition, the Technical Secretary has negotiated matching funds from a variety of organizations, such as Corporación Vida para Quito, Swiss cooperation and the Spanish government.

Table 3. Projected Financial Impact of Using 50% of Annual Capital Contributions to FONAG

Source: Oleas and Kloss (2002)

	Actual Contributions			Projected Contributions					
	2000	2001	2002	2003	2004	2005	2006	2007	2008
EMAAP Annual Contribution	160,000	240,000	360,000	360,000	400,000	450,000	450,000	450,000	500,000
EEQ Annual Contribution		45,000	45,000	45,000	50,000	50,000	50,000	50,000	60,000
Contributions from new members (a conservative estimate)				1,000	2,000	3,000	4,000	5,000	6,000
Interest generated from the previous year (5%)		8,000	22,650	42,900	63,200	85,800	110,950	136,150	161,400
Scenario 1: End of year capital assuming capitalization of all contributions	160,000	453,000	858,000	1,264,000	1,716,000	2,219,000	2,723,000	3,228,000	3,794,000
Scenario 2: End of year capital assuming capitalization of 50% of contributions	160,000	453,000	666,825	891,275	1,148,875	1,443,275	1,750,000	2,071,325	2,435,025
Withdrawals for investment in projects:									
Scenario 1: Interest generated	No projects		30,650	42,900	63,200	85,800	110,950	136,150	161,400
Scenario 2: 50% of contributions and interest generated	No projects		221,825	224,450	257,600	294,400	307,475	320,575	363,700
			(included interest 2000-02)						

6.1.4 Enabling Factors

6.1.4.1 Long-term Commitment to the Process

With financial support from USAID, TNC has consistently provided technical advice and guidance to FONAG for over eight years. Developing a water-based finance mechanism such as FONAG takes several years. As TNC’s consultant says, “You have to have a motor that keeps things going.” TNC’s Country Program Director and watershed valuation consultant were that motor. Since the creation of FONAG, Quito has seen three new mayors and three new directors of EMAAP-Q. TNC has invested a significant amount of time into cultivating new political leaders and helping FONAG weather these political changes, as well as times of financial crisis. TNC has also invested significantly in building the institutional capacity of FONAG.

6.1.4.2 A Clear Proposal

One factor that facilitated the creation of FONAG was the development of a clear, user-friendly proposal that presented complex concepts such as environmental services in straightforward and accessible language. The production of *Water: Together We Can Care For It!* and an accompanying video and Powerpoint presentation facilitated communication with key decision-makers. Depending on the audience, TNC and its partners could present the ideas in simple terms or share the full complexity of the problem and proposed solution.

6.1.4.3 Vision of High-level Decision-makers

Without the vision of a few key decision-makers, it never would have been possible to create FONAG. Because of interest in conservation and openness to new ideas, Patricio Rivaneira (the manager of the water company in 1997-98), Jamil Mahuad (Mayor of Quito) and Roque Sevilla (a member of the City Council and then Mayor of Quito) made it possible for TNC and the

Municipality of Quito to formally launch this initiative in 1998 and then sign the trust fund contract with EMAAP-Q in 2000 in which the water company committed 1% of drinking water sales to the fund. At the same time, the generosity of Paco Moncayo (Mayor of Quito in 2000-present) and Juan Neira (the manager of the water company in 2000-present) insured that the effort could be effectively implemented.

6.2 Public Outreach Campaigns

6.2.1 Public Outreach Activities

Because FONAG was created by a small group of visionary, high-level decision-makers, most people in Quito don't know about it. TNC intentionally chose to keep a low profile while developing the fund, so that other institutions would not try to steal the funds dedicated to FONAG. They felt it would be better to invest in building public awareness once the fund was built and was financing some projects.

People in the conservation community and water sector know about FONAG, because the water fund gets some visibility in water-related events such as the National Meeting of the Water Forum held every year, which usually attracts about 800 people representing 300 organizations. Internationally, TNC has insured that FONAG is well publicized within the conservation community. Residents of the rural communities where FONAG has implemented projects may also have some knowledge of the fund. Beyond these specific groups, however, few people know about FONAG because the water fund has not yet invested in public outreach activities.

Most people in Quito don't know where their water comes from, nor do they understand how agricultural activities and infrastructure projects are degrading the watersheds that provide water for the city, or the importance of conserving the Antisana and Cayambe-Coca Ecological Reserves to ensure future water supply. Thus, they cannot understand the value of a water fund such as FONAG and they cannot provide political support for it. The lack of political support for FONAG leaves the fund vulnerable when political leaders change.

To address this problem, the USAID Mission in Ecuador has given a 2-year grant to OIKOS, an Ecuadorian NGO that works in environmental education and communications, to develop a communications strategy for FONAG, as part of a communications strategy for the Condor Bioserve. OIKOS will analyze current awareness and attitudes about FONAG and design a communications strategy oriented towards increasing public awareness about FONAG and increasing contributions to the fund from the private sector and other municipalities.

6.2.2 Challenges and Enabling Factors

Unfortunately, the Municipality and private companies have not recognized the public relations value of FONAG. The Mayor of Quito could use FONAG to show how he is working to protect the city's water supply. Instead, he promotes the *Ríos Orientales* project. None of the members of FONAG – EMMAP-Q, EEQ or the Andean Beer Company – have produced publicity materials to show the public the important work they are doing. They do not recognize how their involvement in FONAG could improve their public image. FONAG is working to change this

and use the results of the projects they funded in 2004 (watershed management projects in the San Pedro and Pita watersheds) to raise the public's awareness of FONAG and the companies that contribute to it.

6.3 Best Management Practices

6.3.1 Forestry and agricultural best management practices

Because FONAG just began financing projects in 2003, it is too early to evaluate the impact of these projects in terms of improving watershed management. To give a sense of FONAG's geographic and thematic priorities, we provide here a brief description of some of the projects funded to date:

- To contribute to the recuperation of the lower parts of the San Pedro and Pita watersheds, FONAG supported a study of hydrologic resources, forestry planning, reforestation and river cleaning.
- FONAG has supported the clean-up of clandestine solid waste dumps and the recuperation of the river banks in the San Pedro and Pita basins.
- The Páramo Foundation conducted an environmental education and restoration project in the Pita watershed.
- In collaboration with Vida para Quito, FONAG is supporting reforestation in critical zones.
- The Ecuadorian Center for Agricultural Services (CESA) has worked with cattle ranchers in the Cayambe-Coca Ecological Reserve, in the Papallacta and Oyacachi watersheds, to improve cattle ranching practices, reduce conflicts between cattle and the Andean bear, and reduce the environmental impact of cattle ranching on the watersheds.
- FONAG pays the salary and expenses of one of the 34 park guards in Cayambe-Coca.

7 Monitoring Watershed Valuation Work

Measuring success, particularly in relation to water flows and quality is FONAG's aim. However, the process has been difficult since the information available is limited in scope, of variable quality and is not obtained at regular time intervals. Therefore, TNC tried in 2000 to promote a proposal for a network of monitoring stations, but unfortunately it was not possible to mobilize the institutions that needed to be involved. Now, with the results of the monitoring done with the University of Barcelona, questions have arisen that will generate further work in this area. The new Technical Secretary is aware of the importance of this area of work and is working to get the necessary funding and institutional commitment to create a network of stations.

8 Lessons Learned

8.1 Conserving watersheds only achieves part of what is necessary to conserve biodiversity

The early literature about FONAG envisioned the fund as a finance mechanism for the Antisana Ecological Reserve (120,000) and the Cayambe-Coca Ecological Reserve (400,000 hectares), or even potentially the entire Condor Bioreserve, which includes more than one million hectares. The watersheds of interest to EMAAP-Q and EEQ, however, include a smaller area – portions of the San Pedro-Pita, Papallacta, Chalpi, Oyacachi and Antisana basins. The headwaters of these watersheds encompass the higher altitude parts of Condor. It is logical to believe that FONAG will continue to fund projects only in the areas of geographic interest to its members. While these areas are important, some people say that these are not the areas of greatest biodiversity value within Condor. Thus, conserving the watersheds that provide water for Quito will only achieve a small part of what is necessary to conserve the biodiversity of Condor. While this may seem obvious – a water fund cannot be the sole source of funding for such a large area – we mention this lesson so that other sites will be realistic when projecting the geographic area that could potentially benefit from a water-based finance mechanism. Water users are likely to want their money spent only on the watersheds that supply their water and not entire reserves or ecologically functional sites.

8.2 Long-term commitment to the process is vital

It is essential to have a person with the right skills facilitating the process of developing the water fund. This includes both technical skills in integrated watershed management and also an ability to work with the major players (in this case, primarily the water company) and get things done. Roberto Troya advises organizations not to undertake the development of a water-based finance mechanism unless they can dedicate the necessary resources to facilitate the process over several years and they have the commitment of key actors.

8.3 Account for in-kind contributions to the process

TNC has contributed approximately \$20,000 per year in technical assistance to FONAG over the past eight years. Since they are not a water-using industry, TNC chose to only give a symbolic contribution of \$1,000 to the FONAG trust fund. Because of this, some people in EMAAP-Q believe that TNC has not contributed much to FONAG. One of the people most closely involved in the process suggested that TNC should have been more explicit about the role they felt was appropriate for them to play – as a facilitator and technical advisor, rather than a financial contributor. They also should have accounted for the money they spent on technical assistance as in-kind contributions to the fund.

8.4 Endowment funds have some limitations

If a water fund is established as an endowment fund that local agencies capitalize gradually over time, then the interest available for supporting projects is quite limited during the first few years – which is a time when the fund needs to demonstrate its effectiveness to potential donors or investors. A combination trust fund / sinking fund can provide the long-term benefits of an endowment fund, combined with a larger budget for projects in the early years. Another alternative is to co-finance projects with other organizations, as FONAG is doing with TNC now.

8.5 Invest in visible projects at the beginning

Because it is important to gain recognition and credibility in the early years, the first few projects funded by FONAG should have been visible projects that the Mayor, EMAAP-Q and EEQ could have used for publicity. For example, FONAG would have benefited from newspaper articles showing the Mayor inaugurating a reforestation project, showing the Quito public his commitment to the protection and management of their water resources. Instead, FONAG supported feasibility studies and did not try to produce publicity about the fund. A small investment in communications could have increased public support for FONAG as it began financing projects.

8.6 It is important to have a solid plan

Because FONAG members represent sectors with very distinct interests, it has been very important to develop a solid work plan, as a way to avoid having the agenda of any one member institution unduly influence decisions. Since 2001, TNC has worked to develop such plans through strategic planning and an outside consultancy to review draft plans. During 2004, TNC facilitated the development of a 10-year investment plan defining what kinds of projects FONAG plans to support. TNC also conducted a technical study of the water resources of the Quito basin, to strengthen the scientific information available to inform decision-making by the Municipality, conservation organizations and other actors.

9 Concluding Remarks

TNC, the Municipality of Quito, EMAAP-Q, EEQ and the Andean Beer Company have achieved impressive results in the design and development of a water fund financed solely by local Ecuadorian institutions. As of the end of 2004, FONAG had \$2,112,000 in capital, which provided a budget of \$301,000 for projects in 2005. The design of the fund allows the capital and funds available for projects to increase each year and by 2011 it is projected to have over \$5.5 million in capital and generate over \$250,000 for projects each year. FONAG has also negotiated co-financing with other institutions and is working to attract more matching funds as well as donations. This will provide a strong and solid base of sustainable financing for these watersheds over the long term.

It is important to remember, however, that the ultimate goal of FONAG is the improved management of the watersheds that provide water to Quito and conservation of the biodiversity in these watersheds. A conservation finance mechanism contributes to this goal but is not sufficient to achieve it. This goal will not be achieved unless EMAAP-Q, EEQ and other institutions adopt a culture of integrated watershed management. As discussed earlier, construction of large infrastructure by the Municipality, EMAAP-Q and others represents one of the biggest threats to biodiversity conservation and a major threat to the watersheds of the Condor Bioreserve, because these institutions do not apply environmental best management practices in their planning and construction. The Municipality and EMAAP-Q promote projects such as *Ríos Orientales* as the only way to meet the city's growing demand for water and they do not plan or construct these infrastructure projects in a way that would minimize their environmental damage. As currently planned, the *Ríos Orientales* project will provide 17 m³/sec to Quito by diverting water from 28 rivers in the Amazon basin, constructing 67 kilometers of

tubing and 42 kilometers of tunnels, three reservoirs, two treatment plants and four hydroelectric plants. The ecological impact of this project on Condor would likely include widespread habitat destruction and fragmentation, alteration of hydrologic processes and water pollution.

To conserve the Condor Bioreserve, TNC is developing a strategy for building support for integrated watershed management in key institutions such as EMAAP-Q and the Municipality. In the long run, this would reduce the threats facing the Condor Bioreserve that FONAG is designed to address, but it is not enough. A multi-faceted strategy is necessary, which includes the FONAG but is not solely dependent on it. Conservation work in such a large area needs to work with different strategies, including a water-based financial institution, but also private lands conservation, collaboration with indigenous communities, and others.

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List of People Interviewed

1. Marta Echavarría, Independent Consultant, Ecodecisión
2. Roberto Troya, TNC Ecuador Country Program Director
3. Pablo Lloret, FONAG Technical Secretary
4. Efraín Andrade, Quito Municipal Water and Sewage Company (EMAAP-Q)
5. Raul Cubillos, Quito Electric Company (EEQ)
6. Doug Mason, USAID
7. Marco Encalada, OIKOS