



Inter-municipal cooperation in watershed conservation through the establishment of a regional water fund – FORAGUA – in Southern Ecuador

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Short title: Inter-municipal cooperation in the Regional Water Fund of Southern Ecuador

Key Message: Water funds are user-funded mechanisms to finance the conservation and regeneration of water-catchment areas in order to ensure water quality and water retention capacity of mountainous ecosystems. These funds link water users to the ecosystems that provide the water they depend upon. In FORAGUA, smaller municipalities have jointly established a fund to overcome costs that would make the individual establishment of a fund too expensive.

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1. What was the problem?

In the Andean Region of Ecuador, mountain forests and Andean grasslands (páramos) provide key hydrological services. The most important hydrological services provided by these highland ecosystems are improved water quality through sediment retention (Brauman et al., 2007; Célleri and Feyen, 2009) and regulation of water flow (Bruijnzeel, 2004; Roa-Garcia et al., 2011). In addition to providing drinking water for people, these ecosystems provide habitat for an abundance of plant and animal species (José, 2001; Mutke and Barthlott, 2005).

The ability of these natural ecosystems to provide water services to people in up- and downstream areas of the watershed has been degraded by their conversion to agricultural land. This conversion has introduced all the problematic consequences of livestock grazing, periodic burning of pastures, and the use of pesticides, such as reduced water retention capacity and contaminated water due to sediment, manure and pesticide effluence. The growing population and the subsequent increasing demand for water adds to the problems of water provision. This is worsened by the drought part of the year, from which the Southern Andean region suffers. Recognizing the importance of protecting mountain ecosystems for their multiple ecosystem services, resource managers are pursuing innovative mechanisms to finance the conservation of these ecosystems, including the establishment of water funds which link upstream ecosystem service providers with downstream users.

2. Which ecosystem services were examined and how?

The Regional Water Fund (Fondo Regional del Agua – FORAGUA), has as its main objective the conservation of intact and restoration of degraded ecosystems through reforestation and natural regeneration in areas important for hydrological services in watersheds in Southern Ecuador (Figure 1). This is based on the assumed relationship between forests and hydrological service provision, not on actual measurements.

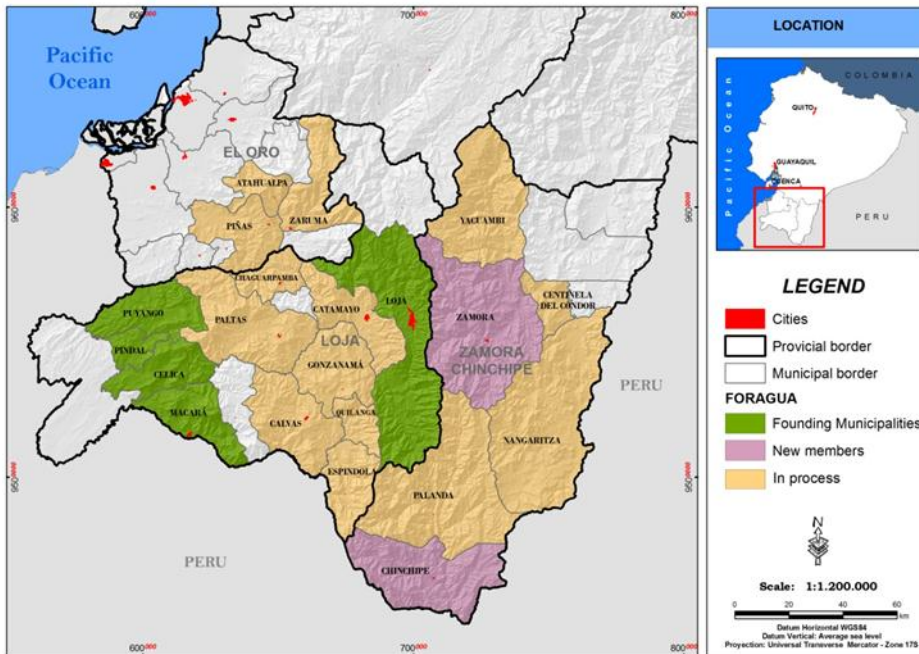


Figure 1: Municipalities of FORAGUA

FORAGUA was established in 2009 with the participation of five municipalities (Celica, Pindal, Loja, Macara and Puyango) and an NGO (Nature and Culture International–NCI). Two municipalities joined the fund in 2011 (Chinchipe and Zamora) and work began to integrate two more (Piñas and Zaruma). In addition, 12 municipalities (Atahualpa, Centinela del Condor, Chaguarpamba Calvas, Catamayo, Espíndola, Gonzanamá, Nangartiza, Palanda, Paltas, Quilanga and Yacuambi), and a provincial government (Loja) have expressed interest in participating (figure 1). The total endowment for the establishment of the fund was US\$ 532,000 distributed among property and cash resources. Currently the capital fund is worth US\$ 700,000. This includes the value of the properties that are incorporated as endowments.

By mandate, the municipalities that constitute the fund should devote the resources exclusively to water conservation. The trust-fund was established for a period of 80 years, which allows for undertaking long-term conservation programs. Future additional benefits of the fund include increased biodiversity and carbon absorption, as forest is allowed to re-grow in the areas purchased by the municipalities, either through natural regeneration or reforestation. Biodiversity conservation is especially important in this region, as the Southern Andean region of Ecuador is a hot spot for biodiversity (Keese et al., 2007).

Watersheds in the region go from a height of 400 m.a.s.l. in the municipalities of Pindal and Macará, up to 3900 m.a.s.l. in the municipality of Loja. Key hydrological

services targeted include water regulation and nutrient and sediment retention. FORAGUA has purchased land of hydrological interest from individual landholders in key watersheds.

In the Municipality of Loja most of the landholders that sold their land were living in the city and the land in the watersheds was not their main source of income. This made the effect of selling land on their livelihoods minimal. As watersheds where people are actively using the land gets incorporated, there is a growing need for alternative strategies for watershed conservation, so as not to displace the people involuntarily from their land.

The aim is to conserve remaining ecosystems and regenerate forests, which serve to protect and enhance hydrological services as well as to promote biodiversity conservation (see also Goldman et al., 2010).

The importance of the hydrological services was measured primarily by the number of beneficiaries served by a particular watershed. Those watersheds that provide water to the largest number of users were targeted first. Also, the use of maps has been key. Especially aerial photographs and satellite images have allowed to identify the current land uses, and to have a much clearer idea of the state of the water catchments. Information such as soil types, slope, fertility, temperature and precipitation were also collected to determine if the current land use was the best within the range of potential uses of that land, where forest was assumed the best use. With all this information it was possible to determine which areas within the watershed are being over-exploited and which should be priority areas to be bought by FORAGUA.

How does the mechanism work?

The mechanism is based largely on the willingness of citizens to pay an additional amount on their water bill, known as the “environmental charge” for the conservation and restoration of water catchment areas. To do so, a survey examined the willingness to pay an additional charge for the protection of watersheds (Zapata et al., 2009). The total costs to implement protection and restoration measures as well as the costs of purchasing land were going to be high. In order not to increase the costs too much for individual households, especially those with limited resources, it was decided to make a classification of users using the same categories as were already used by the municipalities, i.e. residential, commercial and industrial, and official users. Finally the fee was set trying to average it with already existing ones (garbage collection, street lighting, etc.). The charge was formalized through the issuance of a municipal ordinance and is the responsibility of the Decentralized Autonomous Municipal Governments. Ordinances have been put in place in Loja, Macará, Puyango, Celica, Pindal and Chinchipe (Figure 1). The ordinances specify the size of the environmental charge. The fee ranges from the residential tariff of US\$ 0.03/m³ for a consumption of 0 to 50 m³/month to US\$ 0.07/m³ for 101 m³/month or more, a commercial tariff of US\$ 0.07/m³ and an official tariff of US\$ 0.05/m³. In addition to the funds obtained through the environmental fee, other sources of funding such as economic resources which are allocated by the municipality in its budget or funds obtained on the basis of voluntary donation of the income tax can also be destined to the fund.

The ordinance also establishes the authority to declare municipal reserves designed to protect biodiversity and water sources. The declaration of land as a municipal

reserve limits the use that can be made of the natural resources in the affected properties. Although the main focus is currently on purchasing land in the watersheds from individual landowners, private persons can maintain their land within the areas of hydrological importance, but with restrictions. In the case of private land, the owner or owners may retain ownership, while respecting the limitations established by the municipal ordinance and its regulations.

The ordinance only created the environmental charge and how to manage the collection of the money. The fund was created by deed, wherein the constituents established the mandates governing FORAGUA. One of the advantages of the fund is that it can ensure "fair use" of the financial resources collected.

FORAGUA is an endowment fund, where it is not the interest generated by the fund, but a portion of the fund itself that is used to finance conservation activities in the watershed (Laurans et al., 2012). The investment of the financial resources provided by the fund can only be done by implementing an individual investment plan for each municipality that is approved by the municipal council of the fund on a yearly basis. Of the total of funds raised with the environmental charge, 90% of the revenues are reinvested in the municipalities proportionally to the amount each municipality collected, and 10% is used for the functioning of the technical secretariat of the fund. Because the fund's financial resources are public, they are administered by the National Finance Corporation (Corporación Financiera Nacional – CFN). There exists a directive which empowers the CFN to invest the endowments in the stock market. The interests generated will complement the activities of the Secretariat. The annual amount for investment of the fund is US\$ 400,000.

The mechanism is designed so that all municipalities provide their resources to the management of the fund's activities. Each municipality alone could not achieve this because in the case of small municipalities, the resources would not be sufficient to manage a technical secretariat or to implement broad conservation activities. Solidarity and collaboration are key to the proper functioning of the fund. Municipalities who generate more income support those who generate less.

3. Did the examination of ecosystem services generate impacts on decision-making or policies and, if so, how?

The Regional Water Fund now has a team consisting of three professionals, a furnished office equipped with computers, and a vehicle. Additionally, in March 2012, NCI established a support agreement through which four engineers are now working full time for the secretariat, assisting in management activities, technical reinforcement, and fundraising.

Following the enactment of the municipal ordinances, six municipalities collected about US\$ 500,000 through environmental water charges. This money is being invested in watershed conservation programs. More than 33,000 ha of municipal reserves have been created to protect and restore ecosystems that provide water to over 250,000 people.

In addition to increasing protected areas by investing in "green infrastructure" such as forests, water utilities can save money by not having to invest in "gray infrastructure," such as water filtration systems. Over the past two years, the municipality of Loja

saved US\$ 200,000 in chemicals for water treatment, due to the removal of livestock in the watershed following FORAGUA funded purchases of land.

As well as purchasing land of high hydrological value and declaring it municipal reserves, FORAGUA and the municipalities have initiated other projects in the watersheds, such as reforestation in the El Carmen watershed of Loja or the promotion of coffee agro-forestry instead of intensive maize production in Pindal.



Figure 2: El Carmen Watershed, Photo: L. Raes



Figure 3: Reforestation in Pindal, Photo: J. Romero

4. Lessons learned

When small municipalities join together in a water fund, they can create economies of scale that make the working of the fund possible. In the case of FORAGUA this is currently not fully achieved. A portion of the budget needed for the functioning of the secretariat is provided through donors, mainly USAID and NCI. As more municipalities join the fund (Figure 1), the need for external donors to finance the secretariat's operations decreases. Collaboration also facilitates the transfer of knowledge and good management practices; it makes solidarity between smaller and bigger municipalities possible; and, it strengthens the possibility of applying for national and international financial aid.

Currently the main focus of the fund has been the purchase of land of hydrological importance. The purchase of land can have an effect on the rural development of the region. More emphasis will go towards implementing production systems in the watersheds that improve hydrological services compared to current systems. This is for example already the case in Pindal where agroforestry systems are being implemented.

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