

The Cloud Forests of Quillosara: A Local Government Initiative to Establish a Compensation Mechanism for Environmental Services in Ecuador

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It is paradoxical that South America, while having the tropical rainforest with the world's highest precipitation (>2000 mm/year), is also the continent with the fastest changes in climatic behavior. As a result of deforestation and practices which are usually associated with technological development, the continent has undergone a dramatic fall in the availability of water. An example of this destruction and its effects on the ecological environment can be seen in the district of Celica, Ecuador.

Context

Celica is located in the province of Loja in the South of Ecuador (figure 1). It lies at the foot of the Eastern Mountain Chain of the Andes, between 400 and 2600 meters above sea level with an annual mean temperature of 15.3°C, a mean precipitation of 1178 mm/year and a population of 13,338.

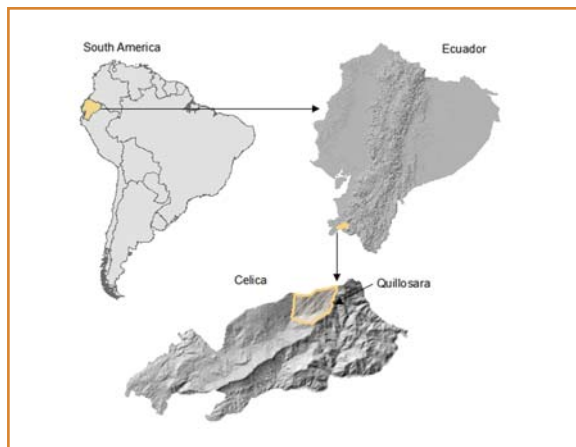


Figure 1 Locating Celica

The district's main economic activity is based on agriculture and livestock (bovine cattle and grains). Due to the existence of grazing pastures within the forests, many owners use intense silvopasture systems to feed their bovine livestock. These constitute a form of land management that combines forestry with the rearing of domestic animals. Sustainable use of silvopasture systems can result in the improvement of the quality of forests. However, in Celica the system prioritises livestock over the forests.

The permanent grazing of the animals prevents natural regeneration, the accumulation of organic matter, and alters the porosity of the grounds. The livestock also affects the cycle of indigenous species and in some cases displaces them, whilst large-scale deforestation for agriculture has impacted

upon the native rainforests (cloud forests). The immediate result has been a reduction in the amount of organic material and species with effects on soil compacting, which gave way to diminished capacity of the Quillosara micro-basin to retain rain water.

From initial total coverage of water services provided by the micro-basin, water availability in the city of Celica suffered a slow reduction in a time lapse of ten years to just two hours of water a day during the months of extreme shortage (July to November) in 2005. If this situation is not resolved and the current trend continues, families will be forced to migrate.

Protection programme

In May 2005 the municipality of Celica created a Protection Programme for the Quantity and Quality of Water. Designed to form a link between users and the people responsible for the protection of water (owners of the micro-basin, authorities and inhabitants), the programme grew out of a cooperation agreement signed between municipal authorities and the Ecuadorian Corporation for the Development of Natural Resources (CEDERENA). CEDERENA offered its support as a technical consultant to the municipality of Celica, and provided the initial funding (US \$3000).

Celica's initiative aimed to recover water-generating ecosystems through a phase by phase development process including 1) analysis of the environmental, social and economic problems of the micro-basin; 2) negotiations; 3) information, environmental education and capacity-building for authorities and citizens; 4) creation of a management committee, and 5) establishment of environmental policies.

The initial analysis was necessary to determine the state of the micro-basins and potential impact on social relations. Statistical data was collected from the inhabitants, and information recovered about water availability along with scientific studies on the soils of the micro-basin. As a result of this process, it was determined that micro-basin lands (610 hectares) are exploited by 43 families. About 233 hectares (38.2%) of the micro-basin are forests, and more than half of the forests have some grazing pasture within them. The water demand by Celica inhabitants is not met, with a daily consumption per inhabitant of less than 93 litres (the WHO recommends a minimum consumption of 100).

In order to achieve an adequate negotiation process with the property owners, it was necessary to implement training initiatives and environmental education. The following stages were executed simultaneously.

- The Committee for Environmental Services and water protection policies were established.
- The cost of the protection and recovery of forest vegetation was calculated in the micro-basin; considering the opportunity cost of owners and the annual water demand, a final cost of US\$0.09/m³ for environmental service compensation for 320 hectares was added to the water rate paid by the community, with the remaining 290 hectares for purchase with financing from external sources. The final figure of 320 hectares was the result of the calculation of an appropriate increment in the water costs for the population, taking into account the low fee for water services and the need for this added rate to be accepted amongst the population.
- The local fund for environmental services was created,



View from the top of the watershed, grassland and native forest. Photo: Robert Yaguache.

which receives the incoming payment of the protection fee included in the water bill and other external financing. This money is destined for the leasing and purchasing of land, compensation payments, building of infrastructure, research and environmental education.

- An administrative committee was established, consisting of two representatives of land owners, two from Celica's urban population, and two from the municipality. This committee is a negotiation entity responsible for making decisions and must approve any use given to the funds. Its main functions are execution of project planning, information sharing, support in negotiations and establishment of compensation agreements.

Whilst previous schemes failed because of vying commercial interests, the committee of representatives was a mobilising force. Environmental training and education geared toward landowners was also a critical intervention, given that there was a general lack of knowledge about the effects of their economic activities on the water resource.

During the meetings, a mutual point of interest was reached: both parties were interested in the protection of the water in the district. With that common ground, it was possible to start negotiations which outlined various options for watershed protection and sustainable development. These were:

- **Voluntary conservation:** the landowners could themselves decide, and, without any economic compensation, work toward the conservation of their own lands, reducing the intensity of its use.
- **The establishment of production alternatives as a means of compensation:** the landowners could make

changes in the focus of their crop production, geared towards taking advantage of other forestry products not including wood, especially planting and producing alternative indigenous crops.

- **Direct economic compensation for conservation:** the landowners would receive compensation (PES) for not exploiting their lands and allowing for a natural regeneration process. Using information on the opportunity cost of the landowners per hectare, an average annual payment of US \$52 per hectare was determined.
- **Purchase of land:** this alternative would be opened to landowners who decided to sell their land. The municipality would be in charge of management and reforestation of the sold land.

Results

In conclusion, we present some of the most important aspects of the Celica experience:

- By 2008, 28 hectares (almost 5% of the total area of the micro-basin) had been protected by compensation schemes for environmental services, and 100 hectares were purchased by the municipality.
- 20 of the 43 landowners in the micro-basin have implemented agro-forestry systems in their lands using native species as production alternatives.
- Four protection agreements were signed with landowners with 100 hectares purchased for US \$55,000, obtained with the financial support of Nature and Culture Corporation International (a local NGO that works on biodiversity conservation mechanisms). This area was given to the municipality to be managed over a 10 year



Panoramic vista of Celica. Photo: Robert Yaguache.

period, and has resulted in a vast improvement in the regeneration process of plant species. According to a hydrological study, if natural regeneration occurs over nine years, the ground will store 101 m³/ha more water than the grazing areas; if it reaches 30 years, it will store 216 m³/ha more.

This process demonstrates several important differences to many other PES mechanisms that are particularly worthy of attention:

- The landowners have clear representation.
- It is a local initiative started with the intervention of local participants and several organisations dedicated to natural resource management and mitigation of the effects of severe climatic alterations in rural communities.
- This ensured the development of the PES mechanism, since it was adopted as a mandatory regulation to be upheld by future administrations.

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