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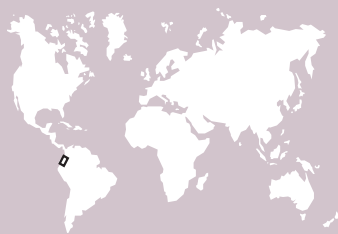
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Although Ecuador is a very small country in terms of area, its regions are heterogeneous. The province of Tungurahua, located in the highlands, is primarily an agricultural area with a hydrological deficit, even though the Ambato River, the major source of water, traverses 40% of its territory. In 1972, the Ecuadorian government nationalized all waterways and transferred the responsibility for their management to a state organization, the Ecuadorian Institute for Hydrological Resources (INHERI), whose main function had been the construction of new irrigation systems at a very high cost, with limited success and impact. INHERI also played a role in resource planning and

assignment of water concessions for all traditional irrigation systems, which account for 80% of the area under irrigation in Ecuador. These systems frequently consist of very old irrigation channels built in the past centuries. In 1994, this organization was eliminated and replaced by the National Council for Hydrological Resources. In the province of Tungurahua, the regional Corporation for the Development of the Center Highlands was established to regulate and strengthen hydrological resources in the watersheds located in 3 provinces: Tungurahua, Cotopaxi, and Pastaza. Presently, however, this institution is too weak to carry out all the responsibilities entrusted to it.

The environment

Irrigation is quite important for agriculture and agricultural intensification in the Andes. Currently, agriculture on family farms provides the country with cereals, tubers, fruit, vegetables, and dairy products. The Ambato River watershed, the main water source for Tungurahua Province (of which it constitutes 40%, with 75% of the overall population), is vital for rural and urban activities. Agriculture is the main source of income for the indigenous and *mestizo* peasant communities. The watershed has been categorized into 3 altitudinal zones (Figure 1). For 400 years, the Tungurahua peasants have used an indigenous irrigation channel built in the 17th century. After centuries of possession by landowners, this channel was returned to the peasants in 1945 after a period of dispute. Since then it has been managed by a Board of Users.

Currently, the watershed has a very high hydrological deficit because the flow

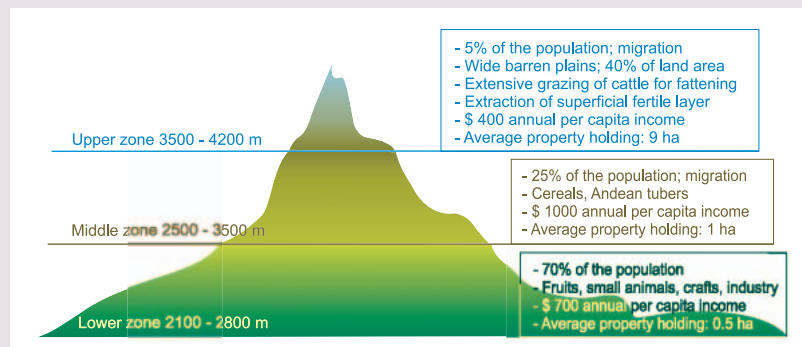
granted as a concession for watershed irrigation (10.2 m³) barely satisfies 45% of the requirements. Within the area of the watershed, water flow rises to 10.8 m³, of which 10.2 m³ is used for irrigation and 0.61 m³ for potable water, 90% of which is consumed in Ambato Canton, where only 60% of the people in the watershed live. Given the type of soils and the land use for which irrigation water has been allotted, 45% of the land can be efficiently irrigated, amounting to a potential irrigated area of 56,000 hectares.

The conflict: Origins and factors

Water quality is deteriorating, and water is becoming less available. This has direct impacts, such as lower levels of agricultural productivity as well as social inequity, due to low incomes for the families that depend on such production. The broader effects include unsustainable use of natural resources and progressive deterioration of the quality of life. Increasing demand for water and decreasing flows during the dry season have been a source of conflict and led to expensive lawsuits among users' organizations.

In fact, a multitude of historical, political, demographic, economic, infrastructural, social, cultural, and not least of all human-induced and natural environmental factors all increase the pressure on water resources and make it worse. Thus, for example, the area has to deal with erosion, loss of fertility, pollution, overgraz-

FIGURE 1 Altitudinal classification of the Ambato River watershed, showing altitudinal zones, population, main products, and average income per capita for each of the 3 zones.



ing, cropping of marginal lands, indiscriminate use of agrochemicals, wasting of water, inequitable water rights and distribution, poor management, leaky pipelines, lack of capital, “caciquism,” vindictive social processes, lack of policies and enforcement, the State’s sectarian vision, and so on.

The actors

The main organizations concerned with water in the watershed are parish boards, water assemblies, water users’ organizations, the Tungurahua indigenous movement, and the Corporation for the Development of the Center Highlands (CORSICEN). The Forestry District of Tungurahua, The National Council of Hydric Resources, the Municipal Potable Water Company of Tungurahua, the municipalities, and the Provincial Council of Tungurahua are also involved. Ten years ago, the water concession was legally handed over to CORSICEN, but disagreements among stakeholders have prevented this legal arrangement from being put into effect. It is the aim of the newly formed Provincial Executive Commission—consisting of members of social organizations, non-governmental organizations, governmental organizations, and the Provincial Council—to examine ways to best handle the conflicts to reach agreements that will benefit all people involved. After a decade of conflict, the actors are beginning to understand that if they do not come to an agreement they will all lose in the end.

Initiatives to prevent and mitigate conflict

Several institutions are currently working for the Proyecto Manejo de la Cuenca Hidrográfica del Río Ambato project (PROMACH). Through an interinstitutional strategy of consensus, these institutions are seeking sustainable ways of dealing with the watershed’s renewable natural resources. They support the Provincial Executive Commission, whose main duty is to facilitate solutions to the existing problems.



FIGURE 2 Meeting of the water users’ associations that share canal in the Mocha Quero and Pelileo cantons. The participants are attempting to reach consensus about water management. (Photo courtesy of the PROMACH Project, GTZ)

BOX 1

Steps taken	Objectives
1. Preliminary conversations between parties	<ul style="list-style-type: none"> • Search for an approach to initiate and promote dialogue between the parties involved in the conflict
2. Periodic meetings	<ul style="list-style-type: none"> • Participatory identification of (cultural) conflicts between communities; assessment of exclusion of actors; identification of leading actors; building trust
3. Analysis and study	<ul style="list-style-type: none"> • Diagnosis of conflict situations from social, legal, technical-environmental, and economic points of view • Identification of possible alternatives for action
4. Visits to other projects	<ul style="list-style-type: none"> • Leading actors in conflict observe the achievements of other projects in areas where similar conflicts were resolved • Confidence building and search for initiatives to resolve conflict
5. Workshops to raise awareness	<ul style="list-style-type: none"> • Better understanding of problems and possible solutions by all involved
6. Planning of possible conflict-resolution strategies	<ul style="list-style-type: none"> • Actors identify and develop mechanisms to resolve conflicts, focusing on possible mediation or mere facilitation
7. Periodic meetings to convey information	<ul style="list-style-type: none"> • Actors are kept informed so they have adequate understanding of progress

FIGURE 3 Chibuleo Páramo resource users walking in the highlands to identify the topographical features of the area to make a determination about equitable distribution and joint management of resources. (Photo courtesy of the PROMACH Project, GTZ)



Dealing with conflict

Collective reflection about management of water in the irrigation system—an issue that was ignored for fear of loss of rights and which involves sensitive ethnic matters—has now taken place through an integrated and participatory methodology involving all stakeholders (Figure 2). The Provincial Executive Commission is promoting alternative solutions through proposals, negotiations, and agreements with the community itself. Among the fundamental objectives is the need to demonstrate the importance of irrigation at the local and national levels. This involves national economic development, rehabilitation of the irrigation systems, improvement of the quality of life, and better distribution of water resources. These aims enhance the role of the irrigation process beyond the limits of civil engineering to include social measures.

The steps taken to deal with conflicts in the cantons of Mocha Quero and Pelileo are summarized in Box 1 as an example of this approach for dealing with conflict.

Conclusions

The water resource has functioned as a link that generates alliances. Actors are now more aware that water is a resource that can and should link all communities, indigenous or *mestiza*. Consequently, irrigation has become a focal point that motivates users to undertake integrated management of the watershed's resources, leading to increased income for peasant producers, thanks to better provision of irrigation water. Existing problems have generated conflicts that require new policies to transfer possession, use and maintenance to water users' organizations. This will be accompanied by appropriate training programs on resource management in the different zones of the watershed, and hence by further development for the families settled there. The main water channels must be rehabilitated. Communication and negotiations must take place among the different sectors and actors to enhance water distribution and foster suitable conservation in the Ambato River watershed.

Continual work on the problems hampering integrated watershed management led to the decision to establish an organizational structure to build consensus. Hence, the South Western Front of Tungurahua Province for the Defense and Protection of the Environment and Natural Resources in the Mocha, Tisaleo, Cevallos, and Quero cantons was created. The aim of this new organization is to improve the Mocha–Tisaleo–Cevallos irrigation system. Training exercises that foster understanding of conflict(s) and ideas about possible solutions enable actors to improve their well-being and show that it is possible to transform conflict situations to bring about a sustainable setting with a focus on joint integral management (Figure 3). The overall aim is to find solutions that promote equitable distribution of the limited water resource, achieve greater equity for the indigenous and *mestiza* populations, and foster sustainable conservation of the Ambato River watershed.

FURTHER READING

Consortio Camaren. 2000. *Fichas de capitalización de experiencias. Volumen 1. Agua y riego.* Quito: Consortio Camaren.

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