

IASP
8th Conference of Bloomington
May 30 - June 5, 2000

Panels WAT5 and WAT6

**"Water rights and the institutional dynamics of irrigated systems:
between State, market and community action"**

Water disputes in the Ecuadorian context up to the third millennium:
no State, no market, no common property

The transition of Santa Rosa (Tungurahua province)

Thierry Ruf
IRD
(Institut de recherche pour le développement)
BP 5045, 34032 Montpellier Cedex 01
Tel 33-4-67 63 69 72
E-mail : thierry.ruf@mpl.ird.fr

Summary

In the Ecuadorian part of the Andes, irrigation is used on some 400,000 hectares of which 320,000 depend on private or community-based water management. State schemes, thus, only serve 80,000 hectares. In the 1970s-1980s, the State started taking over water administration by nationalizing all the water resources and granting concessions to the communities. In the beginning, the *Instituto ecuatoriano de los recursos hidraulicos* did useful work by modernizing the water rights system, but because of inter-community conflicts, local concessions were split up and community organizations became divisive.

After thirty years of «hydraulic bureaucracy», the last few governments have been trying to apply a new, liberal policy. During the last five years, the World Bank has been introducing a new legal framework, much like the Chilean model for water privatization. Resistance has come from many quarters. The politico-economic crisis during the last ten years has not facilitated the introduction and adoption of the new water law. The problem of water is now the focus of farmer organizations and the civil society, as well as professional circle, of course.

Since 1988 we have been studying a very complex slope of the Andes in the Santa Rosa region. This paper describes the problems facing the local society because it lacks the background needed for water management and conflict resolution. The communities of the region are divided, their State authority is weak, and they are unfamiliar with the new legal provisions needed for water management. Our example comes from the fight over water from an old canal between 1990 and 1995 period when the State decided to allocate all the water to the communities residing along the canal. Today, the water dispute has taken a new, curious turn: the people are faced with no State, no market and no common links.

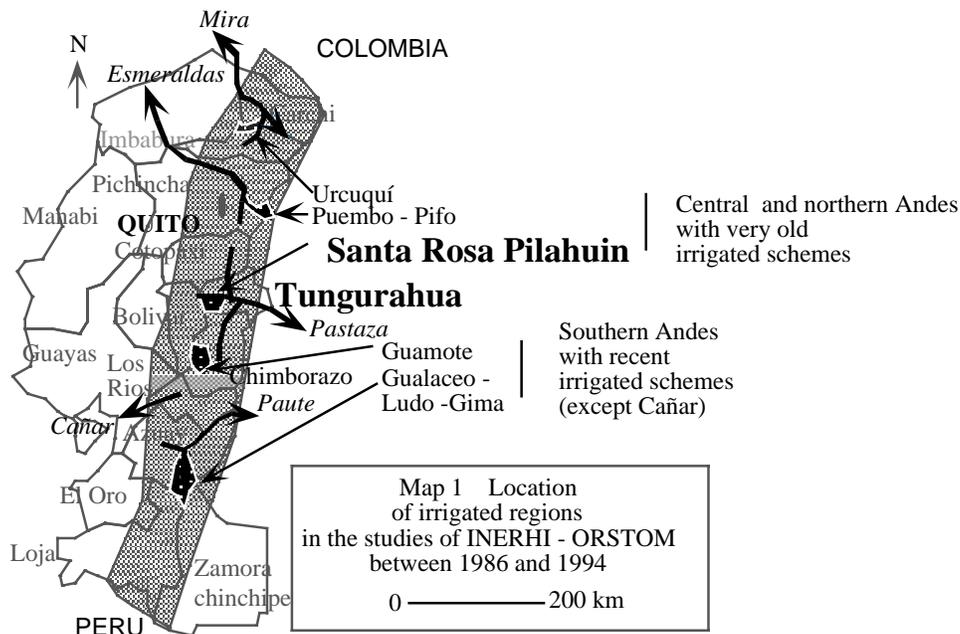
No State, no community, no private sector! Even if this triple negation only concerned water and irrigation, the question would be whether such an unpredictable situation could really exist, if we ask Wittfogel (1957) from the side of the oriental despotism, Orstrom (1992) for self-governing irrigation systems or Feder and Lemoigne (1994) for the development of water markets. The Republic of Ecuador seems to stand out as an example at the heart of contradictions facing our planet's overall economic development and the world water vision that was discussed in The Hague in March 2000 (World Water Council, 2000) or the principles of participatory irrigation management of the world bank (EDI, 1996).

1. State, Private Sector, and Communities in Ecuador

In the Ecuadorian Andes, traditional hydro-agricultural irrigation infrastructure is used on 80% of the irrigated lands, *i.e.* 320,000 out of 400,000 ha. The center and north of the Sierra has more infrastructure than any other part of the country; earth canals were built there between the 16th c. and the middle of the 20th c. (see map no. 1). These ancient irrigation canals are still operational and are run by farmer communities or large landowners. Their economic importance is often underestimated by the other sectors of the country's economy (Ruf and Nuñez, 1991 & Le Goulven and Ruf, 1992). In the center of the country, which has the biggest basin in the Andes (the Rio Pastaza basin), the economically-important Tungurahua province is a vital agricultural produce supply center for the whole country. It relies heavily on how water is managed by the dozens of mestizo and Indian irrigators' associations.

a) The State's late (1972-1994) commitment to agricultural hydraulics and its destructuring effects

Ecuador was a latecomer to State-run hydraulic centralism. Between 1935 and 1965, the



Caja Nacional de Riego was the country's leading organization in irrigation promotion and constructed new irrigation systems using modern hydraulics, *viz.* inlets, cemented canals,

distribution equipment. In 1967, the military government replaced it with the *Instituto ecuatoriano de los recursos hidraulicos* (INERHI) whose activities were governed by the 1972 water nationalization law. The economic planners and the military authorities opposed the concentration of private water and canal ownership that only benefited a privileged few. Since the beginning of the Spanish colonization, the ordinary courts had settled irrigation conflicts. INERHI was tasked with straightening out the situation by imposing a concessionary system that required renewal every ten years. The water administration was to function like an arbitration body for water-related disputes, since users' complaints were to be filed with INERHI and not with the ordinary courts any more. The disputes were to be treated first by the regional agencies but could be referred up to the central administration at Quito. The process had to be handled by lawyers. Furthermore, the water administration was run by jurists who based their decisions on the technical reports made by civil engineers. (Ruf 1994).

the race for concessions (1975-1985)

The first concessions were actually established in 1975. Well-informed people everywhere had their ancient rights confirmed by registering them as concessions with INERHI. The main criterion for attributing rights was long-standing *de facto* recognition of someone's water rights based on written records of his use of the canal. On the basis of an INERHI scale, engineers proposed a flow-rate entitlement which usually corresponded to previous proprietary rights. In a certain way, the first technical study and the concession itself constituted an updated source of information that was useful for the stakeholders, but applying the law took far more time than expected.

Most of the *haciendas* very quickly legalized their preceding situation and received a new document ascertaining their control over the best irrigated lands. Things were not as easy for the farmers. Their canals used to be managed by associations, water juntas with different forms of ownership: there were the so-called community networks that, on the whole, belonged to the junta which managed the canal and distributed water to all the established families of the community. There were the so-called "bought water" networks in which each family bought or, more often, inherited water rights according to various modes of organization (shared flows, hours of irrigation, fixed or variables time schedules, etc.). The concession system was made even more complex by the strife among certain communities that depended on the same canal but disagreed about canal management or something else.

Splintering of user organizations and renewal of concessions (1985-1994)

The first decisions concerning concessions in some cases were unclear because decisions, after centralization occurred, were taken not only outside the villages but even outside the region. To avoid the problems encountered with the first concessions and to facilitate the decadal renewal procedures for the concessions, INERHI simplified its administrative approach. Further, the resources it had available for going out into the field and helping the irrigators' associations shrank. Actually it started by granting water rights to a canal piecemeal and then, at a later stage, worked out a general, inclusive concession. Because of this situation, certain groups submitted their request for a concession direct to the head of INERHI. There was no universally recognized local hydraulic authority any longer (Ruf, 1997). The central canal juntas lost much of their authority in various domains, *viz.*:

- distribution rules (control over water distribution system among communities);
- respect for water schedules (control over per plot irrigation time);
- maintenance of infrastructure (agreed-upon organization of regular or exceptional collective work after landslides);
- financial issues (regular and exceptional cash flow management).

Certain communities claimed to be independent. The impact of non-governmental organizations or certain public institutions with favored customers was not negligible. In some cases, certain individuals who were not satisfied with their share of water went direct to INERHI to get their own concession.

In case of non-respect for the established water rights and rules, the water junta did not have the any real authority to punish the guilty party. In former times, an official report was drawn up on the basis of a statement by a water guard and the junta imposed a fine that, if not paid, led to cancellation of irrigation rights. Money from fines was often turned over to public welfare establishments such as schools. Subsequent to the 1972 water law, and up to 1994, the report - if drawn up at all - was to be filed with the INERHI regional agency; this often entailed lengthy travel. And then the agency would mete out a symbolic fine...for its own benefit! The accused could appeal, of course, and take the president of the junta to court if his water supply was cut off. This led to more and more functional problems: longer watering rounds, incomplete irrigation (service interrupted during scheduled irrigation time) and material problems in organizing the maintenance of the infrastructure (Ruf and Gilot, 1995).

The State's inadequate response to social demand

Tension concerning water resources grew but did not prompt the State to reinforce centralism or its authority over the water supply. The response of INERHI was to build a new, modern canal at an exorbitant price, with unconsumed water resources often located far from the irrigated zones. To bring water to the deficit zones meant boring tunnels, building aqueducts, installing siphons. The national debt from investments in hydraulic installation for agriculture made up 10% of the national public debt, although a mere 60,000 ha has been equipped (or simply incorporated in a State project). Another possibility would have been to make an analysis of earlier network management, since improvements could have been made to the infrastructure and the organization of the users which, in some cases, are several centuries old. The financial cost of State irrigation projects has been criticized by the international financial institutions and, as in the rest of the world, all the governments since 1990 have adopted a policy of disengagement and have been transferring management responsibilities to the users (Morant Zacarés, 1993 - CNRH, 1995). As matter of fact, the

whole policy of irrigation in Ecuador still is defined and oriented for the state schemes, forgetting at purpose that the main use of irrigated land depend on traditional canals with their specifics normes and rules.

b) the clashing requirements of the water market: the collapse of the State apparatus in the 1990s and the dissolution of INERHI in 1994

The reasons that led Ecuador to the brink of bankruptcy cannot be analyzed here. Suffice it to say that the International Monetary Fund and the World Bank have been applying structural adjustment plans for the last ten years in order to decrease the country's level of indebtedness. Since the beginning, these plans have sought to free entrepreneurs of administrative constraints, and in particular in the water sector, apply the resources privatization laws as the Pinochet regime did in Chile since, at least in that field, they were considered to be an example worth following. The international funding agencies made the dissolution of INERHI and the introduction of a new law on water a prerequisite. INERHI was indeed dissolved in 1994, but the next steps did not take place as planned in the technical assistance program since there was strong political, economic and professional resistance. The initial proposals were reviewed with special attention to the balance between the public and the private sectors, but without any genuine interest in the situation facing the users' associations (Cisneros, 1995, Boelens and Doornbos, 1996)

An inter-institutional irrigation forum (FIR) was created as a sort of a way out of the dead end in which the State institutions had landed. The main non-governmental organizations, the farmer and Indian organizations, university academics and research scientists participated in the forum which met regularly under the auspices of the national council for water resources (CNRH) and was composed of a few former senior staff from INERHI. During the years 1985-1995, NGOs have managed a lot of projects to help farmers communities in irrigation organisation, searching for Equity or applying new methodologies to analyze peasants irrigation networks (Apollin and Eberhart, 1998 - Boelens and Davila, 1998 - Boelens and Appolin, 1999) But, in the FIR, the discussion commissions got bogged down for various reasons. Actually opposition to the privatization of water came mainly from the unions and political circles. The Indians were lukewarm when they protested against the end of the agricultural reform in 1995 but grew increasingly sharp in their opposition to the Chile-inspired draft law. As part of their manifest efforts to recover the rights stolen from them through five centuries of Spanish colonization, they started preparing a draft water law which established common rights to water and provided an outline for community regulations on water. Unfortunately, the debates were stopped short by the failure of the Ecuadorian politico-economic system.

Ecuador has recently been affected by the following events:

- in March 1999, the whole country was blocked, which led to cancellation of the measures which the IMF had imposed on the Ecuadorian government;
- in January 2000 the Indians' march on Quito led to the downfall of Pres. Mahuad and the short-lived Indian-military rebels government.

The Ecuadorian government no longer has the resources needed for action, nor the authority and probably no clear political orientation. The new government is following the former government's monetary policy that replaced the national currency by the U.S. dollar.

The last decade bore the stamp of State failure in both economic and water policies, and of growing economic problems for the Indian and mestizo agriculture. On the other hand, in the

outskirts of Quito the large *hacienda* owners invested in the production of cut flowers for export. Certain owners politically supported liberalization and for some time already have been counting in dollars but, for several reasons, did not readily back the privatization of the water sector. Some felt that since water provided through State channels was extremely inexpensive it was not in their interest to take over the charges. For others, who used an old *acequia* (irrigation canal) that had «belonged» to the *haciendas* for generations, privatization would probably have meant having to defend what they felt was their own if per chance some other owner was interested in buying the concession from the State. This would have meant that they either lost access to the canal or would have to pay a high price for the water source they were used to tapping. Still others felt that since the development of their business depended on their capacity to attract farm hands from the neighboring areas, they did not want to get into a conflict about water which could lead to a conflict about labor. At the end of the day, the private agricultural sector was reticent.

Further, the Ecuadorian canals actually went through a period of private management prior to 1972. Water rights existed and were recognized by the jurisprudence applied to local conflicts about water. Some people probably remember back to when their grandparents might have been large canal owners and private water distributors. All these earlier systems ended up in failure, and the canals were returned to the mestizo farmers and the Indian communities which set up users association. The private sector, thus, was largely uninterested in water, at least the water that it didn't need for direct consumption. As long as there was no personal shortage, private users had no interest in the water requirements of other users in the area.

c) No efficient State apparatus, no private sector interest...what happens to the community?

The rural world feels the brunt of globalization and the interminable economic crisis. The surge in agricultural exports in the plains along the Pacific attracted part of the population to the banana plantations and other tropical croplands. The rural exodus, however, affected mainly the rainfed crops in the Andean regions. In areas where the farmer communities had access to irrigation canals, the Andean populations were able to stay where they were and develop new production systems designed to feed the people in big cities like Quito, Guayaquil and Cuenca.

Macro-economic upsets triggered a series of material difficulties for the middle and poorest classes of society. The Ecuadorian response was to expand the range of activities undertaken by the family «networks». Some people continued to work in agriculture, preferably irrigated agriculture, while others entered the system of season migration that took them to very varied destinations. Local communities became increasingly dispersed in a economic sphere that became increasingly open.

Since the Andes are directly connected to the international market because of the expansion of its greenhouse flower exports, the production systems used by small farmers working within the zone of influence of this new agro-export economy are seriously affected by the labor shortage, especially in mestizo family farms and traditional *haciendas* (Gasselin 2000).

Outside the «flower basin» certain regions are becoming important food and tree crop producers, even regions with cold climates where a goodly part of the Indian communities live, regions which from the beginning served as a reservoir of labor for irrigated agriculture

in the temperate and hot areas. This means that the landscape and the rural economy in the cold zones are experiencing major change, and the collective forms of highland agricultural production are fast falling apart. The Indian families, thus, are adopting the organizational modes used by the mestizo farmers, *i.e.* family farms and collective systems for coordinating and managing irrigation water.

Actually, the management system for hundreds of *acequias* has led to a new equilibrium in the power play between mestizo farmer groups that were generally located downstream of the canal and the Indian communities that were upstream. Mestizo organizations disintegrated because of the INERHI splintering policy. Now they are trying to respond by referring back to the community ideal. As for the Indian communities, their economy is far more farmer- and family-oriented than communal or collective. Their geographic position on the mountain slopes is turning out to be of strategic importance for local relations with the mestizos but their inter- and intra-community strife is sometimes very bitter. There are no real communities anymore, in the social and historical sense of the word, but rather collective groups undergoing total transformation.

The Ecuador irrigation world in the year 2000 could be summarized in three statements: weak State apparatus, inter-community division, rather limited interest by the private sector. What type of deregulation lies on its path? What will be the bases for redesigning social relations in the water sector?

2) An example: Santa Rosa communities (Tungurahua Province)

a) A densely populated region seriously changed by human action

During the 20th c. the province of Tungurahua has experienced radical demographic and economic changes; its rural population density is currently over 500 inhab/km². After having built a large number of canals and tried private management, the *hacienda* and canal owners abandoned agriculture and sold everything *viz.* land in batches and water rights by segments, to the mestizos and the Indians. Irrigation from major canals (sometimes 50 km long, flowrates of 500 l/sec) was required for annual double cropping. Between 1900 and 1950, the farmers bought the canals (private canals were considered as shares of the «hydraulic» capital) and formed union associations (central junta) to manage each of them. Between 1970 and 1990, water concessions granted by INERHI were divided up on a per canal and sub-canal basis, which badly weakened the central junta. A canal was often tapped by over 1,000 users who had irrigation rights timed down to the half minute. The present risks involved in deregulating canal management, thus, will have immediate, visible repercussions throughout the region (Ruf and Nuñez, 1997).

The land area studied by ORSTOM between 1988 and 1991 belongs to irrigators' communities on the slopes of the Carihuairazo volcano located between Santa Rosa and Pilahuin (map no. 2) (Ruf, Bonhommeau, Proaño 1990). The lands are watered by three important, old canals - the *acequia* Toallo built in 1698, the *acequia* Chiquicahua built in 1849 and the *acequia* Cazimiro Pazmiño built in 1885 - and many other smaller, local *acequias* (Nuñez and Vega, 1992). Since 1995 this area has received assistance from an IEDECA¹ and CICDA² support project for farmer communities, funded by the European Union and called the *Conservacion de los recursos naturales y riego campesino en la*

¹ Instituto de ecología y desarrollo de la comunidades andinas

² Centre international de coopération pour le développement agricole, France

cuenca alta des rio Ambato. CORICAM was designed to promote slope water management based on negotiations among all the stakeholders. It also includes technical/economic assistance for canal renovation (Zaharia, 1995 - Marchand, 1996 - Hadjaj, 1998).

b) The struggle of the Santa Rosa communities for canal water ownership

The Santa Rosa-Pilahuin slopes are also traversed by the Chimborazo canal which, until 1994 only crossed them to carry water to the much lower Huachi zone. In 1994 the source of supply for the Huachi zone was changed when the Huachi-Pelileo canal, INERHI's last major construction, was put into service.³ Actually, the Huachi mestizo farmers lost their water rights to the Chimborazo canal as a result of a movement by the highland Indians to recover rights to the canal which was built in 1885 and flowed through the middle of their lands without depositing any water. Because of this situation the Ecuadorian government decided to take away the Huachi farmers' rights to the Chimborazo canal and allocate the canal waters to Juan Benigno, Vela, and Pilahuin, three highland communities in the Santa Rosa area. This allocation of new waters was one of INERHI's last legal acts. The Huachi farmers' organizations would have preferred the State to keep out of the matter. They had already observed that the canal water didn't get to their fields because of the increasing water demand upstream; in former times they could have negotiated rights to buy the water.

In 1994, the name of the Chimborazo canal was changed to the Cunucyacu-Chimborazo canal to show that the Indian communities, at least symbolically, had taken over local water management.

c) A study on the inflow of new waters into the Santa Rosa zone

The study method

In 1999, The CORICAM project asked the French research and teaching group of Social water management⁴ of Montpellier (France) to evaluate the effects of these new waters on part of the system, *viz.* along the oldest, historical irrigation line, the Toallo-Comunidades branch. The reference area (see map no. 3) is the inter-river region between two mountain small rivers, the Patalo *quebrada* to the west and the Terremoto *quebrada* to the east. The oldest canal in the zone, the Toallo canal, is located to the south and the Rio Ambato canyon to the north. The area within these bounds amounts to about 3,000 ha. and has a population of over 3,000 families whose system of access to water is extremely difficult to describe. There are several Indian communities and mestizo farmer groups in the five zones on the slope, and each has a special combination of water rights to the canal.

The main water flow paths in the five zones have been plotted (trajectories, GPS⁵ recordings, GIS⁶ created) and both the farmers and the group leaders have been interviewed. This detailed exercise served to explain the distribution configuration for water from the four canals and how the various communities incorporated the water recently brought in from the

³ In 1975 an FAO-IBRD study on restructuring the Santa Rosa and Pilahuin canals recommended abandoning the traditional canals and building three large conduits (FAO, BIRD 1975). But the Huachi-Pelileo system, which has the longest tunnel dug in Ecuador, is the only one INERHI made.

⁴ This study of two weeks in the field was made by 8 students of the Cnarc (Centre national d'études agronomiques des régions chaudes), with the help of IRD (Institut de recherche pour le développement) and the staff of Coricam project (see reference Benzaza and all, 1999).

⁵ Global Position System

⁶ Geographic Information System

Cunucyacu *acequia* into their old water distribution system (Cnearn, 1999).

Very fine griding

An irrigated area gradually took shape. The Toallo *acequia*, the first and highest in the zone, was built in 1698 upon the instigation of the priest of Santa Rosa. In the 18th c. it was used to irrigate the desert lands in the lower part of Santa Rosa and as a public service to provide water to the city of Ambato. By the end of the 20th c. the Toallo *acequia* was serving the highest parts of Santa Rosa (Angahuana), except for El Quinche, an area near the town of Santa Rosa which was sort of a vestige of the first system.

Since by the middle of the 19th c. the Toalla *acequia* provided far too little water to irrigate what was mainly the dry lands of Santa Rosa, another canal, the Chiquichua *acequia*, was built. Two-thirds of the canal are managed by the «parish» junta using a community system, the other third is sold to *terceristas* to generate the funds needed to pay for canal maintenance and the water guards. In principle, all the farmer groups and Indian communities that participated in building the canal are entitled to the water they need for the «block» where they live while the *terceristas* pay for the water rights as private users. Even now, the distribution mode is different for the blocks receiving water from the 2/3rds community consignment and from the 1/3rd «bought water» consignment. We will come back to this difference when examining the next phase of network implementation.

Whether of their own free will or by force - we were unable to determine the exact period of history or the nature of the take-over - the Indian groups upstream of the Chiquichua canal in the Angahuana sector secured water from the Toallo branch. At present, the water is distributed according to the community method, *i.e.* without setting individual rights within the closely timed water use schedule. Water is distributed starting upstream. Each user receives access to the water when his upstream neighbor closes his bunds and lets the water flow into the canal again. He can keep it flowing onto his fields as long as he pleases. Since there are hundreds of users, water rounds take a lot of time, and a farmer's turn to irrigation waters may only occur once every two months.

The Casimiro Pazmiño canal was built at the end of the 19th c. to provide additional water to the lower part of the Santa Rosa zone. In the beginning it was a private canal, but at the next stage it was managed by an association in which each user was recognized as having bought his water rights (*aguas compradas*). The position of the blocks in the lower part of Santa Rosa is very varied and depends on whether the oldtimers participated in financing the capital or not. Although these waters are called «bought waters» they have usually not been obtained through a commercial transaction on the water market. Actually, the right is linked to the plot, and water is distributed at given times and intervals as part of a strictly established overall watering time schedule.

The detailed study of the former water trajectories demonstrated that the 3,000 ha zone was not composed of five irrigation zones that reflected special access to the three old canals but rather some hundred water blocks with very specific water access rights, usually stipulating a given branch of a canal, a specific day or only a few hours a week. Each block is composed of about 30 ha and includes between 50 and 100 families which do not necessarily live in the same hamlet or the same distance from the Santa Rosa parish. This means that the communities have become geographically dispersed and also divided by the water rights inside the irrigation network.

Water reaches the blocks under increasingly precarious conditions, especially since all the families are set on producing tree and food crops (apple plantations and temperate zone vegetables in the lower areas and blackberries, tubers and onions in the higher areas of Santa Rosa).

Since 1994 the local inhabitants have had two possibilities:

- they can count on the entry into force of a new water privatization law that has been under discussion since 1994 but which has been hotly contested by the Santa Rosa Indians since 1999 (we experiment that during the national strike of march 1999 which oblige the president to abolish some economic reforms) ;
- after the State granted additional water rights to the Cunucyacu-Chimborazo canal in 1994, certain groups have been trying to operationalize this new resource which is delivered by the Santa Rosa *ovalo* (the distributor of water from the main canal).

What about a water market?

Users sometimes settle their water problems among themselves in their small water blocks and develop a sort of local market governed by rules that are more flexible than those in the normative system of the canal users association. But transactions are limited to more or less neighborly people and plots. This is because the network of distribution channels has been designed for high flowrates during rather well established time sequences. It is not unusual to see the waters of the three old *acequias* flow in parallel branches.

If farmers from one block have water rights to a canal on a given day and other farmers have water rights to another canal on another day they could have an agreement and decide to use the same branch. But if they don't get along, they have to develop different secondary branches to bring the water from each of the canals. However complicated it may be to bring in the water, getting waters that have been transferred from one block to another to the assigned destination will always be difficult because of the numerous diversions on the water line, be they accidental or on purpose.

This explains why, in the densely populated areas, the proposal to privatize the water sector does not seem to interest users or private operators. The effects of the provision of new waters from the Cunucyacu-Chimborazo canal to the Santa Rosa zone should be considered bearing in mind these technical and organizational problems.

New waters and the local context/national political context

The Cunucyacu canal delivers water to all the farmer groups that supported the struggle to recover water rights. Along its 50-km trajectory, these groups have decided on 11 ensembles that are entitled to a certain proportion of the waters from the canal. The penultimate ensemble is the Santa Rosa zone which, in 1994, was allocated a mere 15 l/sec⁷. This meager amount has to be shared by the 13 Indian and mestizo groups of Santa Rosa that actively participated in efforts to win the water rights and helped pay the lawyers' fees. In theory, there are two branches that, in turn, bring in the water for a period of two weeks. Each group has a set watering time once every two weeks according to a negotiated schedule. In

⁷ The Santa Rosa farmers committee had asked for twice that much but the 10 other committees opposed the allocation of a water concession to Santa Rosa because the zone was already receiving irrigation waters from other canals. Finally the committees reached an agreement, and INERHI finalized an allocation of 14.5 l/sec.

principle, each *cuadra* (0.7 ha) is to receive 15 l/sec for one hour. Furthermore, in principle the total water rights for the two fortnightly periods apply to an area of 500 ha located throughout the 3,000 ha area of the Santa Rosa zone.

Applying these agreements made by recipients of the new waters is not easy. First of all, the water has to transit through existing canals, starting with branches of the Toallo *acequia*, then through the Chiquicahua or the Casimiro Pazmiño canal. But the management groups of the old canals are not the same as the groups entitled to the new waters; in each of the old blocks, some people are recognized as the «heirs» while others (a goodly number of farmers) are excluded either because they did not participate in the struggle for the water rights or because they have access to some other source of irrigation water. This water rights distribution system is largely theoretical because the new water is tapped upstream, often without proper authorization. This was the rather hazy picture that existed when the junta of the Santa Rosa *ovalo* asked that, with help from the NGOs, a new distribution network be built using pressure-driven plastic conduits to supply water to each of the small blocks inhabited by water rights holders. The network was built with the assistance of Swiss Aid but there were no pre-studies or prerequisites. Water lines were laid throughout the Santa Rosa zone, but they have not been connected to the canal because of opposition from the current water users.

When the State is powerless, the markets uninvolved and the communal base falling apart, the way becomes open to a transition in which the players lose their bearings, there is no authority to settle conflict nor any «democratic water entitlements» and competition between NGOs in the field can become absurd!

Conclusion: the risk of growing contradictions, from the local to the global level

The Andes, because of its great concentration of irrigation systems, is a region where it is interesting to study the process for developing and implementing management rules for common resources. State withdrawal, the liberal policies of the Andean countries, and the emergence of new rural partners to manage and optimize water resources provide a stage for theoretical and practical consideration using the comparative approaches adopted by the irrigators communities (Ruf, 2000). Local economies are increasingly joining the world markets. How are these communities going to adapt to institutional changes and the strong influence of the market economy? The Andean societies are multi-ethnic, and the stakes connected to the land tenure system and the changing water access conditions are waking up dormant conflicts. How are the mestizo and Indian peasant societies going to get a handle on the various irrigation systems if the transition period continues over time? The Santa Rosa example shows that local societies are capable of great adaptation when faced with internal and external contradictions. It is quite striking that collective dysfunctioning caused by the State or community disintegration has not led to large-scale privatization of irrigation; this is probably because it would be inefficient in such a densely populated area. Further, one might expect the mestizo and Indian producers to develop a totally individualistic line of reasoning, but they have been seriously restrained by the absence of readily accessible underground waters. Yet, here and there the richer farmers are building individual reservoirs to cope with the irregularity of water supplied from collective sources. It is probably at this level of reservoirs and regulation between them that a collective solution is still the most efficient. What should be the social compromise at beginning of the third millenium ? Maybe a state should act with some elements of authority, the communities should find a new kind of legitimacy, the private sector should be more open to small farmers organisations.

Two maps will be presented in the panel. They can't be included here because of the space they take in Mb.

Map 2 irrigated systems of Santa Rosa Pilahuin

Map 3 details on irrigated network inside the Santa Rosa slope.

Bibliography

- APOLLIN F., EBERHART C., 1998. Riego andino. Metodología de análisis y diagnóstico de sistemas de riego campesino. Camaren, CESA, CICDA, Ruralter, Quito, 104p.
- BENZAZA T., CABARET D., CADET S., CHABAUD F.X., DHIVER V., GOUT C., NGYEN S., YEN L., 1999. Rapports du stage de gestion sociale de l'eau à Santa Rosa, Equateur. CNEARC, IRD, Montpellier.
- BOELENS R., APOLLIN F., 1999. Irrigation in the andean community, a social construction. CICDA, CESA, SNV, Camaren, IWMI, Colombo, 44p.
- BOELENS R., DAVILA G. (Ed.), 1998. Searching for Equity, conceptions of justice and equity in peasant irrigation. Van Gorcum, Assen. 472p.
- BOELENS R., DOORNBOS B., 1996. Derecho consuetudinario campesino e intervención en el riego. Visiones divergentes sobre agua y derecho en los Andes. SNV CESA, Quito, Riobamba, 99p.
- CISNEROS I., 1995. *Riego campesino y modernización*, IEDECA-CICDA, Quito, 55p
- CNEARC
- EDI, 1996. *Participatory irrigation management*. Worldbank, Washington, 56p
- FAO, BIRD, 1975. *Ecuador, Tungurahua irrigation and rural development project*, Rome, Report núm. 22/75 Ecu 10, vol II, 10 an.
- FEDER G., LE MOIGNE G., 1994. *Une gestion équilibrée des ressources en eau*. Finances & développement, Juin 1994, 24-27
- GASSELIN P., 2000. *Le temps des roses, la floriculture et les dynamiques agraires de la région agropolitaine de Quito (Equateur)*. Thèse Doctorat, INAPG – IRD, Paris
- HADJAJ, H., 1998. *Gestion de l'eau au sein du périmètre irrigué du canal de la Toallo dans les Andes équatoriennes. Etude sur le périmètre de la Toallo Alobamba : communautés de Alobamba, Huachi, Montalvo Alto*. CNEARC – CICDA – IEDECA. Montpellier, mémoire Ingénieur en Agronomie tropicale, 86p.
- LE GOULVEN P., RUF T., 1992. - *L'eau et sa gestion dans la planification de l'irrigation traditionnelle dans les Andes équatoriennes*. - Usage agricole de l'eau., ORSTOM, coll. Colloques & Sémin., Montpellier, pp 203-224
- MARCHAND L., 1996. *Estudio de la organización del riego y del uso del agua en la zona del proyecto CORICAM (caso de El Quinche y de Chibuleo San Francisco)*, IEDECA-CICDA, Quito, 77p.
- MORANT ZACARES, B., 1993. Investigación y desarrollo agrícola en el riego estatal. Proyecto de asistencia técnica del subsector riego. IDEA, Quito, 21p..an.
- NUÑEZ, P., VEGA J., 1992. *Análisis histórico de la problemática del riego en la provincia de Tungurahua*, Pontificia Universidad Católica del Ecuador, Tesis de Licenciatura, Quito, 136p.

- ORSTROM E., 1992. *Crafting institutions for self-governing irrigation systems*. ICS press, Institute for Contemporary studies, San Francisco, 111p. Traduction en français par Lavigne-Delville Ph., 1997. Pour des systèmes irrigués autogérés et durables : façonner les institutions. Inter-réseaux, 35p.
- RUF T., 1994. *Dynamiques de l'utilisation de l'eau dans l'agriculture andine: la gestion ancienne et actuelle des ressources hydriques à Urcuquí (nord de l'Equateur)*. - Colloque Recherche pour une agriculture tropicale viable à long terme, 19 octobre 1994, Paris, Comptes rendus de l'Académie d'agriculture de France, Vol.80 - n°8 - 1994, pp 87-104
- RUF T., 1997. *Réussites et vicissitudes de l'agriculture paysanne irriguée dans les Andes équatoriennes*. In : Haubert M. (ed.) : Les paysans, l'Etat et le marché; sociétés paysannes et développement. Paris Presses de la Sorbonne 253-266
- RUF T., (à paraître). *Du passage d'une gestion par l'offre en eau à une gestion par la demande sociale, ordre et désordre dans les questions d'irrigation et de conflits d'usage de l'eau*. Territoires en mutation. Numéro spécial sur les approches sociales de l'irrigation issu du colloque SFER – CEMAGREF – IRD (ex ORSTOM) : la gestion collective de l'eau en France et dans le monde. Montpellier, nov. 1998.
- RUF T., BONHOMMEAU X., PROAÑO M., 1990. *Mapa de los sistemas de riego de la zona de Santa Rosa y Pilahuín / 1:25.0000*, Quito, INERHI-ORSTOM.
- RUF T., GILOT L., 1995. - *History of the irrigation, the constitution of water rights and the role of the State and peasants' communities in Ecuadorean Andes*.- 5th Common property conference, Reinventing the commons, 24-28/5/1995, , Bodo (Norvège), IASCP, 17 p.
- RUF T., NUÑEZ, P., 1991. *Enfoque histórico del riego tradicional en los Andes ecuatoriano (seguido del inventario de los juicios sobre riego en el Fondo Tierras del Archivo Nacional de Quito)*, Memoria, núm. 2, Quito, Instituto de Historia y Antropología Andina (MARKA), 1991, pp. 185-281.
- RUF T., NUÑEZ, P., 1997. *La lucha por el agua en la provincia de Tungurahua (Ecuador): Compartir los recursos, un reto de tres siglos, un desafío para el siglo XXI en la zona de Santa Rosa – Pilahuín*. 49° Congreso Internacional de Americanistas. Simposio: Las aguas que fluyen, las aguas que gotean, las luchas por el control de un recurso vital, Quito, 7-11 de julio 1997.
- WITTFOGEL K., 1957. *Oriental despotism, a comparative study of total power*. Yale Univ. press. Ed. française utilisée: Le despotisme oriental, Editions de Minuit, 1977, 651p.
- World water council, 2000. *World water vision, comission report, a water secure world, vision for water, life and the environment*. 83p.
- ZAHARIA H., 1995. *Diagnóstico socioeconómico del sistema agrario bajo riego de las parroquias de Huachi, Santa Rosa, Juan Benigno Vela, Pilahuín y del cantón Tisaleo. Proyecto Río Ambato, riego campesino y conservación de los recursos naturales en la cuenca alta del río Ambato*. IEDECA, CICDA, Quito, 31p.