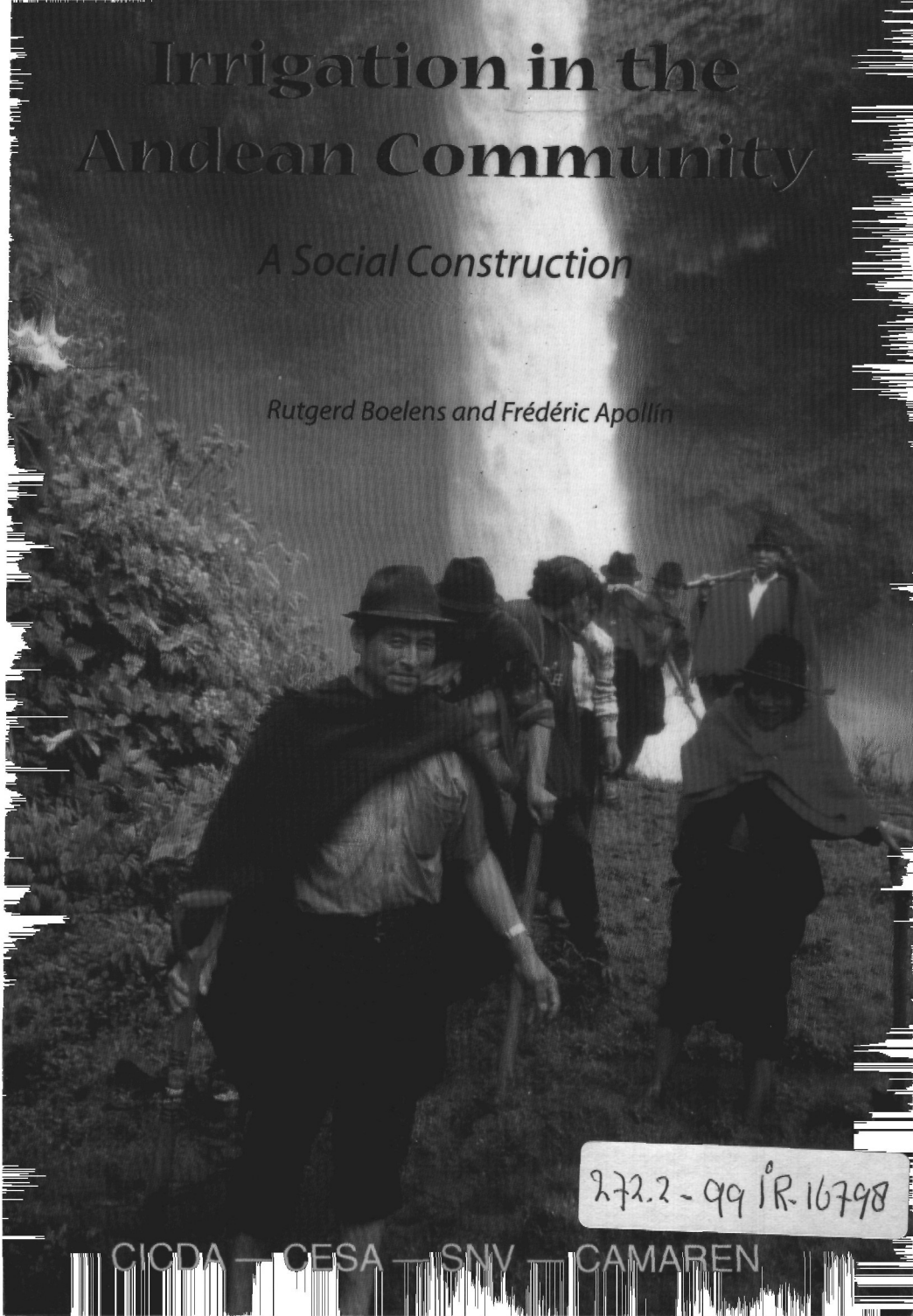


Irrigation in the Andean Community

A Social Construction

Rutgerd Boelens and Frédéric Apollín



272.2 - 99 IR.16798

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(Urcuqui and San Blas)
- Production of English version: IWMI
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Booklet: Irrigation in the Andean Community: A Social Construction

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- Editing and Design: Gloria Dávila, Edmundo Narváez
- First edition: Quito, October 1996
- English translation: Samuel Dubois
- Publisher of English version: IWMI

Funded by: NEDA, PEIRAV, SNV, CICDA, CAMAREN, CESA, and IWMI

English translation of *El riego en la comunidad andina: Una construcción social*.
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These materials have been prepared under the supervision of CAMAREN, with the purpose of fostering the sharing of experiences, reinforcing inter-institutional coordination and providing conceptual and methodological inputs for the development of irrigation projects in Andean communities.

Accordingly, the booklet may be used and disseminated freely, provided the original sources are cited. As for the video, in order to maintain proper quality, please order copies from CESA (Spanish version) or IWMI (English and French versions).

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FOREWORD TO THE ENGLISH VERSION

The video and booklet “Irrigation in the Andean Community: A Social Construction” provides colorful and substantive insights into successful participatory processes for gender-balanced community-based rural development. The kit documents detailed steps involved in the inclusive planning of a technical irrigation project, and highlights how initial investments in infrastructure determine water rights for both women and men.

IWMI is constantly looking for best practices in water management that are socially inclusive and enhance food and livelihood security. We therefore felt that this training kit is relevant to a larger audience than the Spanish-speaking inhabitants of Latin America, as it was initially intended by the authors.

In order to facilitate worldwide access to this training kit, IWMI's Gender, Poverty, and Water Project sought permission from the composers of the Spanish version to produce English and French versions of the video and the booklet. We thank them for their approval and collaboration. Whereas the video focuses on gender-balanced participatory design process in Licto, Ecuador, the booklet, including the facilitator's guide, describes both this case and the case of Urcuquí.

IWMI gratefully acknowledges the contribution of the Swedish International Development Agency (Sida) for supporting the translation and distribution.

Doug Merrey
Deputy Director General, IWMI

FOREWORD

"Water is like the earth's blood," a farmer said. Without water, the land would no longer be a fertile, life-giving goddess. Irrigation water is much more than H₂O running through a cement-lined canal or an earthen ditch.

A vertical approach to extension work and many years of rural development reduce irrigation to an issue of civil engineering and construction, where the key players are contractors, engineers and brickmasons; once the building is over, the work is finished.

The outcome of this way of pursuing development is spread before our eyes; rootless irrigation systems, designed and set up by outsiders.

This poses the need for us to seek and recognize other ways of approaching irrigation, and to build development processes that will be different from conventional ways.

At the same time, our country is feeling the desire to share experiences among the various rural development agencies.

Accordingly, CESA, PEIRAV, SNV and CAMAREN would like to share our proposals for the design, implementation and management of Andean community irrigation systems that have been successfully applied in several areas of the Andes. For this reason, we are providing this video and booklet, entitled "Irrigation in the Andean Community." This is a training kit, with a facilitator's guide for reflection on and analysis of the theoretical and methodological foundations.

These materials are basically geared toward technicians responsible for advising and cooperating with Andean society in irrigation system design, implementation, distribution and usage.

In order to encourage reflection, two experiences from the Ecuadorian Andes are presented: Licto, which is receiving CESA support, and is in the construction phase of a new irrigation system, and Urcuquí, supported by CICDA, where a long-standing system is operating.

Many features of both cases may prove to be replicable within other Andean settings.

Irrigation can become a factor of social conflict, but it is also a fundamental mainstay of rural participation and social mobilization. Therefore, irrigation

systems cannot and must not be designed or built separately from organizational actions. In fact, farmer involvement is fundamental for all phases of the system, to achieve greater consensus and co-ordination among the various stakeholders and thereby forestall potential societal strife.

Furthermore, the “basic triangle” of irrigation system management must consider three elements: project infrastructure, norms and rights, and farmer organization. And it must be borne in mind that women’s participation in the management, decision-making and benefit-distribution processes is crucial for proper design and usage of irrigation systems.

Evidently, these materials emphasize the social approach to the overall issue of irrigation as a whole. For this reason, certain elements of irrigation systems (e.g., irrigation and changes in agricultural production and productivity, or ways of influencing rural society’s linkages with society at large) are not discussed here.

Finally, these materials and experiences are being disseminated in an unusual way for our setting; through inter-institutional co-operation, the keystone for sharing expertise and overcoming past mistakes. Thanks to this concerted effort –bringing together rural lore, international advisory assistance and the input of local technical experts— it has been possible to produce the video and booklet entitled “Irrigation in the Andean Community: A Social Construction.”

Quito, October 1996

Antonio Gaybor
CAMAREN Coordinator

Andean Irrigation: A Social Construction

In the Andes, water plays a fundamental role in the different spheres of human coexistence. In Andean irrigation systems, water performs a vital social and cultural function, and is intertwined with the symbolic lives of Andean households, as expressed in the many rites and festivals surrounding irrigation. This socio-cultural role is directly linked to the productive role of water in irrigation systems.

Indeed, for most of the agricultural area of the Andes, irrigation water is an indispensable production factor, both to **assure** production in unpredictable environments and with village economies under difficult conditions, and to **enhance and intensify** production, by crop diversification or second planting-harvest cycles.

The social, cultural and productive functions of water explain why rural communities throughout the Andean zone, from Chile to Colombia, built irrigation systems for centuries and keep on building them to use the readily available water from rivers, springs and lakes for their farming.

Given the vital importance of water and its ever greater scarcity, irrigation has always been an element of power and conflict. Throughout history, different social groups have attempted to control and make sure of their access to water resources. Water is power, and this leads to struggles; the folk who manage to dominate access to water also heighten their position of power and their standard of living.

Nevertheless, although water has traditionally been a factor leading to conflict, it can also become an element bonding a group together. Access to and utilization of water require agreements and collective efforts, since the complexity of irrigation systems means that isolated individuals cannot manage or sustain them unaided. In Andean areas, the rugged terrain forces entire communities to work collectively to gain access to water, build the infrastructure and administer irrigation systems.

There are currently two types of irrigation systems in the Andes:

- **Recently created irrigation systems**, involving communities that obtained their water concessions through agrarian reform processes (in some cases, after intense struggles) or through more recent processes of building irrigation systems such as in the case of the Guarguallá-Licto Irrigation System located in the Province of Chimborazo.
- **Traditional or long-standing irrigation systems**, which are the result of lengthy struggles in which the communities, through the years, have managed to defend and maintain their access to water. This entails consolidated traditional rights, organizational forms and societal norms (despite certain weaknesses) that make it possible to manage and control the systems. This is the case of the Urcuquí and San Blas Irrigation System, located in the Province of Imbabura.

Both in old systems and in those newly constructed or are currently under construction, the irrigation system is not just an economic or physical project, with a given social organization; it is a **social construction**, in which human groups, often with differing interests, come together to build the infrastructure, building up and defining, at the same time, the norms for using the irrigation water, according to the situation of the zone and the people's specific ways of thinking.

Indeed, prior to and during irrigation system construction, and throughout its use, irrigators collectively define:

- Norms for access to water and creation or conservation of rights
- Infrastructure and types of water catchment, conduction and distribution works, according to the rights that have been agreed to
- Obligations and rules that all must observe in order to conserve their access to water
- The type of organization that will be able to enforce these norms.

Such established, socially accepted norms in rural society make it possible to collectively manage water resources. Thus, rights and obligations become the basic foundations for Andean irrigation systems.

Irrigation Projects: Acknowledging Flaws and Shortcomings

Within irrigation interventions in the Andean highlands, as elsewhere in the world, many advisory institutions and rural organizations face serious problems in terms of the technical, financial and socio-organizational sustainability of their systems.

In most recently built systems, irrigation management fails to meet expectations. Numerous experiences feature such problems as feeble irrigators' organizations, inadequate operational management, high costs to repair and maintain the system and poor upkeep, limited increase in agricultural productivity, vague rights and obligations, chaotic and conflict-ridden distribution of water, worsened gender issues, greater environmental deterioration, and so on.

Similarly, projects that attempt to improve irrigation in long-standing systems have all the above problems and other difficulties, including, among others: infrastructure poorly matched to system needs and/or to the norms and rules already established by irrigators regarding water distribution; definition of new rules for distribution that are radically opposed to historically constituted usage and undermine the farmers' concepts of equity or justice; conflicts with existing water boards that were not considered or involved effectively in the project.

Despite the various analyses and studies conducted, which have detected and reported the above problems, little headway has been made in terms of practical solutions. Although the discourse of "farmer participation" has permeated almost all institutions, especially NGOs, universities and rural organizations (but also, increasingly, governmental and financial agencies), there are as yet very few projects that have actually undertaken processes geared to achieving a system that the farmers can manage in the future.

It is very common for irrigation projects to markedly separate the basic components such as:

1. Planning, design and construction or reconstruction of the irrigation infrastructure
2. User capacity-building and organization (during system "implementation" or rebuilding)

Institutional technicians and staff perform the first task, sometimes with *local manpower* (for example, through community work parties). Then, institutions may, at best, attempt to organize users into irrigator associations to manage the system according to the institution's technical and organizational designs.

For the second task (training, formation and/or strengthening of irrigator organizations and system implementation), many institutions try to apply participatory methodology. However, this widespread irrigation intervention methodology entails serious constraints and misconceptions, most of which result in the problems mentioned earlier:

- Planning, design and construction are done mechanically, by applying "technical recipes." Designs seldom suit the technical, ecological, historical or socio-organizational reality of the beneficiary zone. They are applied non-creatively and ignore such issues as the existing organizational structure, gender problems, community uses and customs, the background of existing facilities, their social significance, and others.
- Technical designs are never neutral. All projects have socio-organizational implications. They embody the technical irrigation design, as well as the benefit distribution system (water and other benefits), and the system for sharing the irrigation system's responsibilities. Participatory capacity building and support for organizational growth, when undertaken after the facilities have already been designed, look like an attempt to fit users and their existing relationships into a pre-established technical framework.
- One of the fundamental principles in Andean irrigation is the **creation of rights** through system construction and upkeep. For users, participation in the work is an investment (labor, intellectual input, dues paid, meetings attended, and so on) that creates users' water rights and their voice in collective decisions on water benefits. Excluding

genuine user participation from infrastructure creation aborts this orderly process of creating and conserving rights and sustainable organization.

- In older systems, rights were created over time, during the system's construction, implementation and management. Current rights (and even the network layout) reflect water management usage and customs, power relationships among irrigator groups, and organizational agreements among different societal groupings. Interventions that overlook these historically constituted norms, which are the reason for and heart of collective action in Andean smallholder irrigation management, can break down the capacity for local management, without providing any sustainable substitutes.

Most irrigation projects undertaken in the Andean region fail to take these principles into account. This is often because the engineer's position—as an “irrigation specialist”—is defended, but also sometimes because there are no methods available for putting participatory processes into practice during the design and organization building stages.

3.

Moving Toward an Integrated Vision of Irrigation Systems: Interaction Between Technical Experts and Farmers

The experiences from Licto and Urcuqui present two different irrigation systems. The former is a new system and the latter an old one. They have developed different strategies for user ownership and management, strengthening shared responsibility and promoting “farmer-to-farmer” capacity building processes.

These projects have addressed the challenge of avoiding separation within project implementation among the physical facilities, the organization, the social norms and the training processes.

As we describe these experiences, we are by no means offering recipes, but only highlighting some ideas and guidelines for efforts to begin or improve irrigation systems through interactive processes involving technical and rural people, and from farmer to farmer.

These two experiences implicitly view the creation/consolidation of the physical system, the normative system of rights and obligations, and the organizational system as three intimately interrelated processes.

Consequently:

- To create or upgrade the facility, there must be adequate **organization**, which must be created or, if already existing, reinforced. During this construction process, the system’s stakeholders must agree to create or adapt their **rights and obligations**.
- During system operation, **organization** is fundamental for enforcement of **norms** and to administer the system (including distribution of water according to rights).
- System maintenance entitles irrigators to **maintain their rights**, if performed under the organization’s aegis.

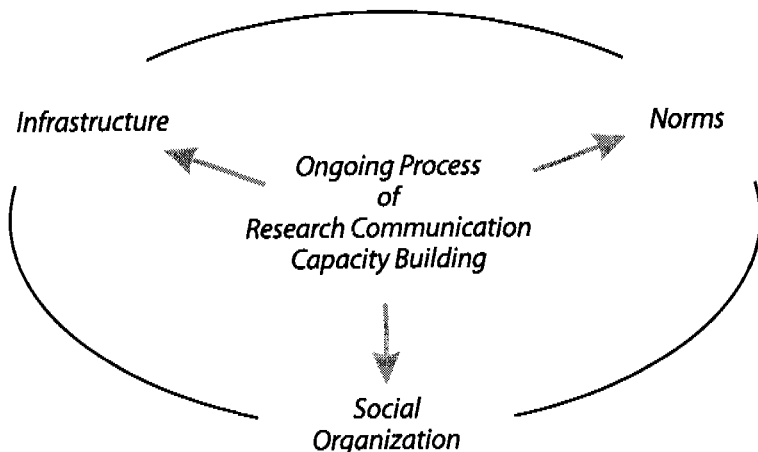
During project implementation, it is necessary to carry out suitable participatory **capacity building and communication** processes, in order to inter-relate and link these three basic components (Figure 1).

From this standpoint, each irrigation intervention (whether in old or new systems) must implement a process of capacity building and communication that will tie the infrastructure-building process together with the creation or improvement of the organization and normative system. It is also necessary to conduct research beforehand and continually, in order to understand the farmers views, the history of the irrigation system and/or the organization, usage and customs, etc.

Therefore, training is not just the organization of extension events. Rather, the idea is to implement a process of communication, discussion and negotiation in order to transfer technical and organizational responsibilities to the users, creating the necessary capacity so they can handle their irrigation system self-reliantly.

The ultimate aim is for the farmers to feel that the irrigation system as their own, so male and female irrigators can build and upgrade their system on the basis of both technical specifications and their own criteria. This will enable them to handle the system on their own.

Figure 1. Relationships among creation of the "project," the "organization," and the "norms."



The Case of LICTO

4.1 HISTORY AND CONTEXT

Licto is a parish located in Chimborazo Province, in central Ecuador. The population is mainly indigenous (Quichua speaking). Hillsides are heavily eroded and water is in short supply during the dry season.

Licto farmers are smallholders with little, scattered plots totaling no more than a hectare per household. Since their farming activities cannot support them, the rate of migration from this zone is very high. Most men migrate to cities to make extra money, leaving the women in charge of housework, agricultural chores and community responsibilities, including responsibilities of the irrigation project.

The **Guarguallá-Licto Irrigation System** is being built in this zone, to improve people's living conditions and to increase and assure agricultural production. The irrigation system will have a flow rate of 1,200 liters per second and will benefit 1,700 hectares.

The Licto project was initially designed by the central government. During the planning and implementation of that phase, system users were not involved. There was a very sharp distinction between project design and construction on the one hand, and the organizational and capacity building process for irrigators on the other.

At present, the project has been redesigned to transform the initially vertical system into a farmer-driven one, built and managed by its users. This effort has been shared by the following institutions: the Ecuadorian Agricultural Service Central (CESA), the Swiss Development and Cooperation Agency (COSUDE), the Central Highlands Regional Corporation (CORSICEN), the Netherlands Development Co-operation Service (SNV), and the Corporation of Farmers' Organizations of Licto (CODOCAL).

For project implementation, users from 18 indigenous communities and rural sectors have formed a single irrigators' organization; the Guarguallá-Licto Irrigation Board, which represents 1,400 beneficiary families.

The project's purpose is to get the irrigation system built so that the beneficiaries operate it as their own. The farmers (men and women) will take part, along with the supporting institutions, in planning, designing, consolidating and implementing the different activities related to construction, irrigator organization, and irrigation rights and obligations (see Figure 2).

4.2 PARTICIPATORY INFRASTRUCTURE CREATION

Previously, an irrigation system was designed and built by technicians and engineers with no farmer involvement. The farmers were considered only as beneficiaries and laborers. The idea was that, once the facilities were built, the extension workers would train and organize the farmers so that they could learn to manage the system and understand their duties and obligations.

The current project has changed this notion of seeing farmers as simply "receivers" who know nothing about irrigation, since farmers have been creating and organizing their own systems for centuries. The project now sees it as fundamental to incorporate farmers' knowledge and capacities along with proposals of advisory institutions, in order to achieve local management.

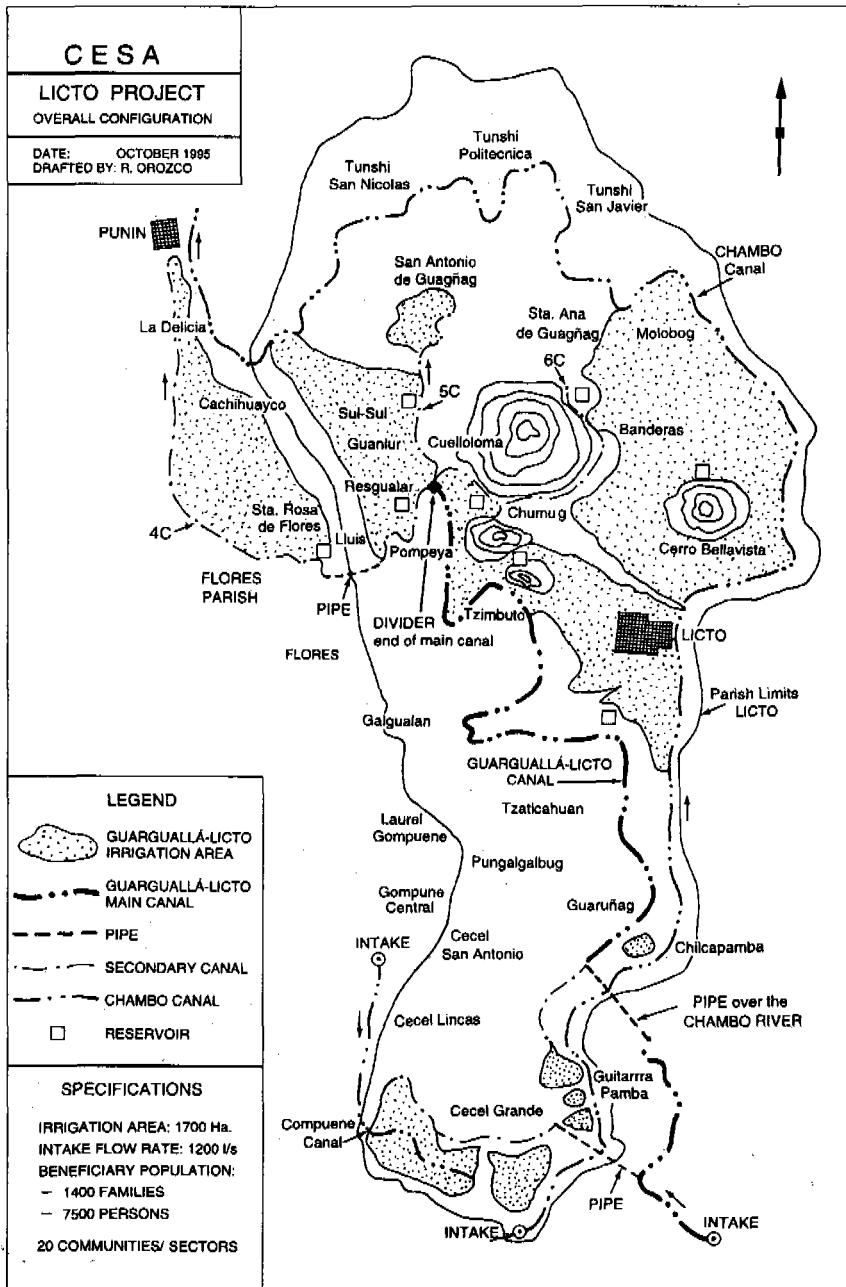
Capacity Building and Communication to Facilitate Participation

The project has developed ongoing processes for communicating and discussing the project with future users, involving them actively in decision making. They should take part not only in building canals but also in planning, technical design and system organization.

During the first training experiences, it was evident that common capacity building methods did not work well, for a number of reasons:

- The population (mostly women, and most of them illiterate) had no interest in the leaflets and brochures prepared by the project.
- There was low public involvement in courses provided in the training centers, and these "courses" were limited to "one-way" talks by technicians.
- They did not understand the topographic maps or documents prepared in technical jargon by irrigation specialists.

Figure 2. Map of the Licto Project.



This made it necessary to design other training strategies that would be more accessible to the public and enable women to take greater part in discussions.

Observation trips and exchanges with different irrigators' organizations from other systems have proved to be the best way to discuss and visualize (potential) problems, possibilities and challenges of the irrigation system, and they have enabled future irrigators to more clearly understand their own system.

At the same time, **training materials and methods** were designed to specially target the Licto zone population, to facilitate deeper reflection with irrigators on the system's contents, organization and administration.

A crucial step was to prepare a **general model**, which has become a key teaching aid because it:

- Made it possible to explain and visualize what the proposed irrigation system consisted of.
- Enabled irrigation promoters and community leaders to explain and discuss the system "farmer to farmer:" in their own language, which made it easier for women to take part, since they find it easier to express themselves in their mother tongue.



The model made it easier to discuss and define the overall system with male and female users.

- Is portable and could be taken around to all communities. Many had never seen the entire system, including its intake, especially the more distant communities, because they had no way to get there (especially, the women).
- Enabled users to formulate opinions about the system as a whole, in their own communities and with their own people. On the basis of community discussions, ideas arose to change certain important aspects of the technical proposal.

Later, when it was time to decide how to build the tertiary units or irrigation modules, there were problems again in capacity building, since these were very technical, abstract topics. So the project built other **portable models to different scales** showing ideas about the tertiary canals, irrigation module design, night reservoir function, etc. These models made it possible to discuss various proposals about how to materialize the distribution networks.

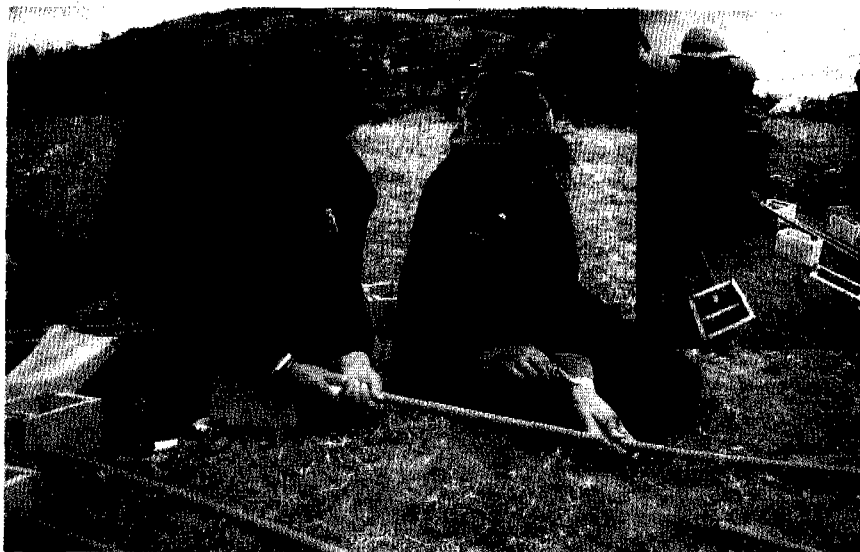
Once the farmers themselves had begun building the distribution network, another communication problem arose; although the local workers were doing high-quality masonry work, many "work-party" volunteers (inexperienced in irrigation projects) did not understand how the piping, distribution tanks, etc. would operate. To facilitate their understanding, a working model was built, with the assistance of the irrigation promoters and rural leaders.

This model, made to a scale of 1:10, is a complete miniature distribution network. The farmers called it the "**living model**," because when it was ready they could run water through it. This enabled them to better understand the proposal and its implications.

Demonstrations about how the distribution network would operate were given in each community. For this purpose, irrigation promoters chose a representative piece of land, either flat or sloping, big enough for the scale model (about 30 m x 30 m) so the entire community could get involved. First, the users made their design with the working model. Then they put together the elements of the irrigation system, open ditches, piping, distribution tanks, etc. Finally, they ran water through their "living model," showing what was right and what was wrong in their design, construction flaws, and management problems such as water pilferage, erosion and other difficulties that need analysis.

That was how the users got actively involved and the communities reflected on eventual distribution problems.

This experience in Licto has made distribution network design and construction a training and communication process in which users discuss, in



The working model made it possible to see the irrigation system's elements and how they would work.

practical terms, the problems and solutions, building the infrastructure interactively.

Training methods were suited to a female majority for whom it would have been difficult to move further from home, many of them speaking only Quichua, and with little or no basic education or literacy. Although these were restraints, these factors did not prevent the participatory system design process from happening.

This training and discussion process went on alongside the project's design and implementation. The canals are built by teams of masons of the communities, who work for the farmers' organization earning a stipend.

The volunteer workers of the communities are not paid, since they are working in their own communities and holdings for their own benefit, participating in "modular work parties" and "community work parties." These efforts are overseen and recorded at the community level.

For the main canal, communities work collectively, community by community. These are called "general work parties." Irrigation promoters coordinate them, with advisory support from the CESA technicians. They are supervised and records maintained by the Irrigation Board, with assistance from community leaders and irrigation promoters.

Clearly, designing and building a system calls for adequate organization to establish user rights and obligations. Again, it is important to remember that each Andean community is the basic unit for organization and survival. Through the Licto irrigation system, the community was reinforced and inter-community collaboration was bolstered. Community structure became the system's design foundation for the technical design and for the irrigation organization.

Participatory Creation of Organization and Rights

In Licto's new system, formation and strengthening of the Irrigators' Organization is a crucial aspect, both to build and administer the system adequately and to discuss and define each irrigator family's rights and obligations.

For this purpose, along with the construction process, users have been consolidating an Irrigators' Organization that will help in the construction process and ensure proper system operation in the future.

The Organization being formed comprises various management levels, namely:

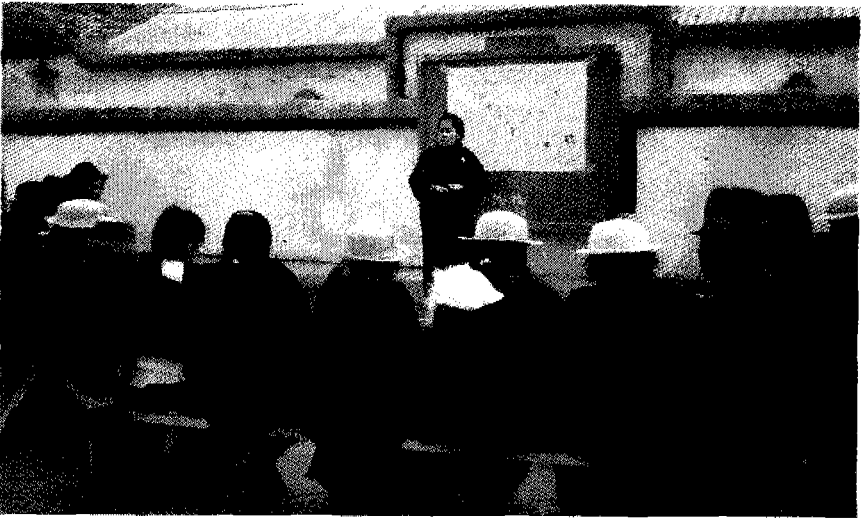
1. The family level, comprising the Organization's membership
2. The community level, comprising the community, its local leadership body and the Community Irrigation Committee
3. The inter-community level, represented by the Irrigation Board
4. The General Assembly of Members, which is the Organization's top authority

Family Level

At the first basic level, irrigator families are trained by working with them, and involving both women and men. One of the most essential elements is training of women as irrigators and leaders because the male emigration rate from Licto is so high, making most future irrigators women.

To promote active participation by women in irrigation management, so they will not just be implementing decisions made by others, the project has placed special emphasis on training female promoters, female leaders and women with technical skills (brickmasons).

Accordingly, a **Program for Literacy and Irrigation Training** is under way, targeting women. In Literacy Centers, they analyze women's issues and dis-



Promoter giving a literacy class in a community.

cuss concrete aspects of the Irrigation Project, such as system operation, regulations, irrigation rights, women's status, etc.

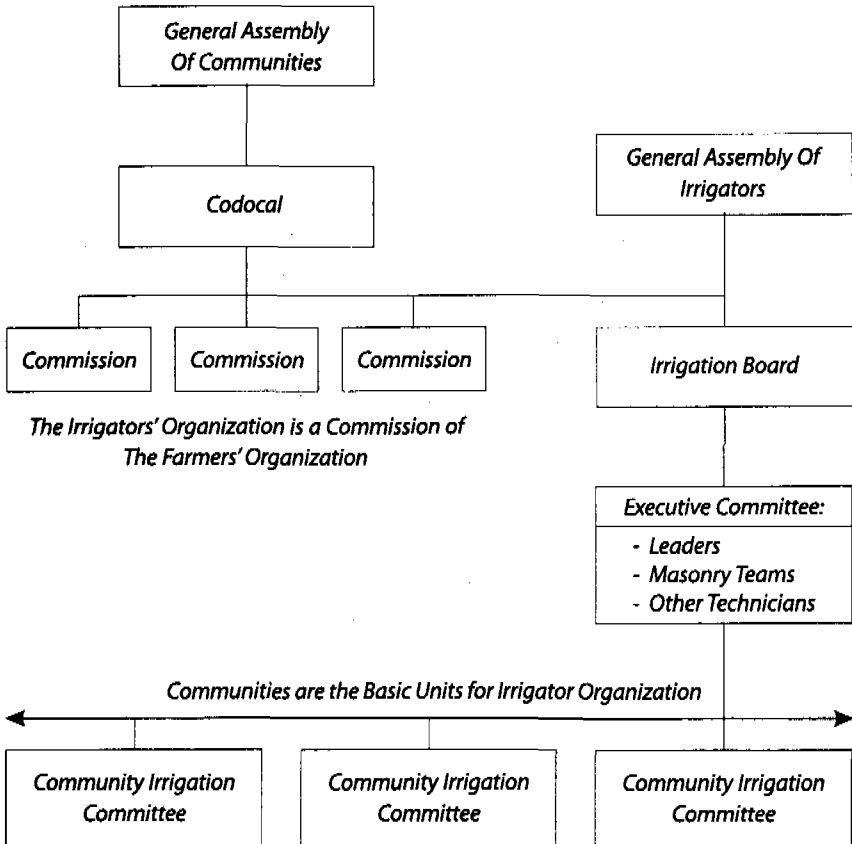
Community Level

At the second level (communities), **Community Irrigation Committees** are being formed to work within Community Councils or in coordination with them. These committees discuss irrigation-system progress and problems with the community, and community representatives are elected to convey each community's proposals and concerns to the inter-community Irrigators' Organization.

Inter-Community Level

At the inter-community level, the **Irrigation Board** plays a fundamental role. All communities elect their representatives to the Inter-Community Board, which is responsible for coordinating all activities for organization, training and building. It is also responsible for preparing irrigation policies and regulations. The Board is the main commission of the CODOCAL (farmers' umbrella organization).

Irrigation Organizational Chart



General Assembly

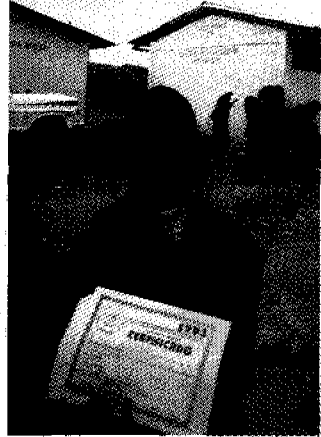
The **General Assembly of Irrigators** brings together all member families and communities in the irrigation system. The Assembly meets twice a year. Members receive information and discuss, approve or change irrigation policies prepared by the Board and evaluate activities conducted by advisory institutions.

The Organization also has a group of Irrigation Coordination Promoters, who work with the Leaders, promoting the organizational and communicational

process among the various levels. These inter-community promoters work with families, with community promoters and leaders, and with the Board.

The fact that the Promoters are women has a positive impact on the Organization's internal communications, since they are skilled in communicating with everyone concerned, and also understand women's specific issues.

This experience has highlighted the value of women's role showing that women are just as capable of coordinating irrigation activities as men are. Women can handle not only organizational issues but also technical problems, such as irrigation patterns, shift scheduling and timing, and canal protection mechanisms.



A farmer who has fulfilled her obligations with the certificate she received.

Throughout this process, a top priority aspect is to **record and administer farmers' contributions**, both cash dues and fines paid, and attendance at assemblies and work parties. Promoters and Leaders record the inputs of each community and each family.

This is a very important aspect, because a basic criterion for earning water rights in Licto is participation "with one's hands and one's head" and not just by paying fees. These records respect and consolidate a fundamental principle of Andean irrigation, which is that **participation in Assemblies and work parties creates the entitlement to water rights**.

Criteria for obtaining rights are discussed at all levels, top-down and bottom-up. The General Assembly has the last word in deciding what rights and obligations are most equitable, according to users' opinions.

As for rights, the Licto project has achieved a major change by not getting only men listed on irrigation rosters but women as well. So, the two, father and mother of the family, hold water rights and are enabled to carry out direct duties in the Organization.

Proper administration of contributions provides security for irrigators. They know that they are not working, paying or meeting pointlessly, because these inputs ensure their future irrigation rights. Generally, the more strongly organized systems feature good record keeping about contributions, agreements, rights and obligations. These systems that do not have transparent, thorough, user-manageable administrative systems lend themselves to manipulation, disagreements and lack of collective collaboration.

To achieve transparency and encourage farmer participation, at the end of each year the Irrigation Board holds a very important event regarding farmers' contributions to award **Participation Certificates** to each family that has fulfilled the required levels of participation.

This certificate entitles each beneficiary household to water rights, when Licto gets its irrigation water. It is also a mechanism whereby men and women can see that their Organization is recognizing the contributions that each family has built up, and families can see clearly whether they are entitled to irrigation water or not.

This is how CODOCAL is building the Physical Facility, the Irrigators' Organization, and the System of Irrigation Rights and Obligations, all at once. Ongoing communication among the different stakeholders and organizational levels is the backbone coherently linking the activities related to the three basic system components.

The Riegus Project in Urcuquí and San Blas

5.1 Context and History of the Irrigation Canal

Built in 1582, over 400 years ago, the “Big Canal” or “Caciques Canal” is the backbone of the Urcuquí and San Blas irrigation system in Imbabura Province. It currently covers some 320 hectares, located at altitudes of 2,000 to 2,500 meters above sea level, benefiting 435 small farmers of mixed indigenous and Spanish ancestry.

As in the past, the towns of Urcuquí and San Blas are still surrounded by large farms and ranches (in the high altitude areas) and sugar cane plantations (in the lower, hotter Salinas Valley).

During the 17th and 18th centuries, these large landowners got control over all the water in the Urcuquí area, except the water rights belonging to the Caciques family who founded the canal and still owns these rights.

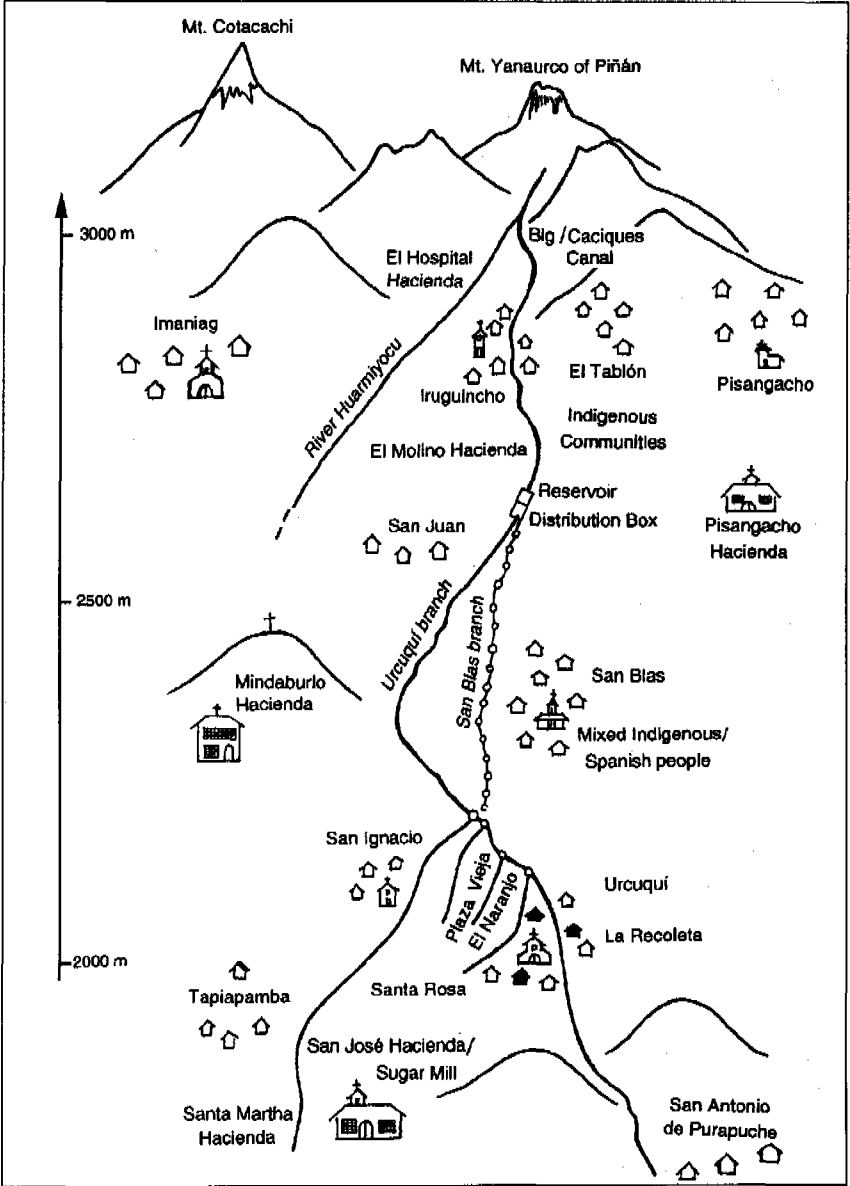
In 1945, after a historic struggle, the people of Urcuquí managed to recover their water rights with the expropriation of the San José hacienda, and land and water rights were registered on that new basis. This provided numerous rural families with access to irrigation water, which is so essential for their farming production.

Even today the Big/Caciques Canal is built of earth, is 19 kilometers long, and carries a discharge of 200 liters/second. From the intake, on the Huarmiyacu River at the foot of Mt. Yanaurco of Piñán, the canal takes water 7 km to a reservoir where the water is stored at night for daytime irrigation.

After the reservoir, there are two canals distributing the water to Urcuquí (two thirds of the total flow) and San Blas (the remaining one third). The distribution box, recently repaired by the Project, is therefore one of the key elements in the irrigation system.

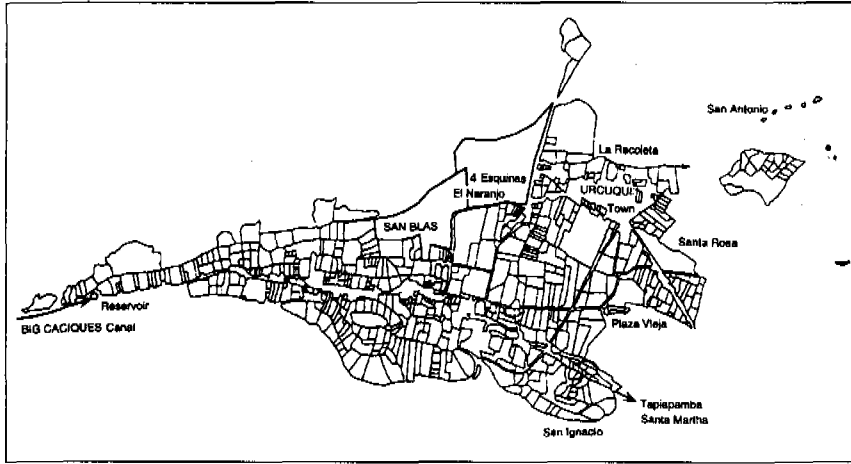
Each town has its own rules for water distribution, with its own Board, its own inspector and its own administrative and economic operations.

Figure 3. Area map of the irrigation system.



Note: The other place names are just the same. Please check, if your version is physically larger, that I have copied the microscopic fine print accurately!

Figure 3.1. BIG/CACIQUES Canal.



The Central Board of the Big/Caciques Canal, grouping the three Users' Boards of San Blas, Urcuquí and the Caciques, has operated for 50 years making it one of the oldest legal irrigation water administrative bodies in Ecuador.

Each town is currently facing specific problems in regard to water distribution. The economic environment and opening up of new markets and marketing channels are encouraging farmers to intensify growing of corn and beans, two crops a year, or new crops such as vegetables and fruits. However, the availability of water limits crop productivity.

In Urcuquí, the irrigation water flow rates at each plot of land are high—nearly 35 l/s—but the times between irrigation turns are too long; once every three weeks or even only once every month in some areas.

The Caciques, by contrast, have access to all the water in the canal every two weeks, since they have this historical right as the descendants or heirs of the people who built the canal. Some users now feel that this right is more like an unjustifiable privilege.

In addition to heavy losses in yields, this situation has led to strong rivalries and conflicts among different irrigation system user groups vying for access to water. These conflicts have further degraded the system's infrastructure, due to lack of established norms, regulations and agreements, among users or among water boards, for system upkeep. This poses a threat, in the medium term, for agriculture in this zone overall.

5.2 What does the Riegus Project Consist of?

Since this irrigation system is operating, the fundamental aim of intervention by the International Center of Co-operation for Agricultural Development (CICDA) through the Riegus Project (an acronym for Rehabilitation of the Irrigation Systems of Urcuquí and San Blas) is to support the Water Board so that it can manage and distribute the water better. This calls for:

- Consolidating administrative and financial organization of the Water Board to develop mechanisms and tools that will enable the system to be truly self-supporting in the future.
- Improving and rehabilitating some segments of the existing infrastructure in order to curb seepage and enhance the efficiency of water transport and distribution.
- Implementing a more equitable, consensus-based water distribution system that will make it possible to optimize current water use and abate conflicts, while updating irrigators' rights and obligations.
- Improving agricultural production systems.

To strengthen the Water Board's capacities, the project must be implemented jointly by the Board and by CICDA, through decision-making mechanisms that can involve the member boards and users effectively in pursuing their main activities.

Participation must not be limited to reports for users attending General Assemblies, since this is not a fully democratic opportunity for the different user groups to be able to express themselves.

Without belittling the role of the Assembly, the Project has created new ways of discussing and participating, to reach decisions among users representing their different interests before plans are implemented. The Coordinating Committee has been formed, comprising leaders from the Central Board of Urcuquí, the Caciques Board, the San Blas Economic Board and the CICDA team. This Committee meets monthly as the project's planning, evaluation and follow-up authority for all activities.

5.3 Participatory Infrastructure Construction: The Investment Fund Mechanism

Although benefiting from recent improvements, the irrigation system has been operating for 400 years with earthen ditches and rustic intakes. They do not necessarily have to be totally overhauled or changed.

The project seeks to effectively involve the boards and users in rehabilitating certain facilities, as a mechanism to help strengthen their organization and to ensure that new undertakings will not interfere with the current system and customs, which are directly linked to existing infrastructure and changes in distribution that are being prepared.

For this purpose, the project has created the **Investment Fund Mechanism**, which enables the boards to take responsibility for projects directly, from planning through implementation, and even to handle project funds. The Urcuquí and San Blas Board Presidents and Treasurers handle these funds.

The boards receive user applications directly and forward them to the Coordinating Committee. The Committee then approves the projects after conducting inspections along with CICDA.

The Coordinating Committee has established certain criteria for approving projects, including the following:

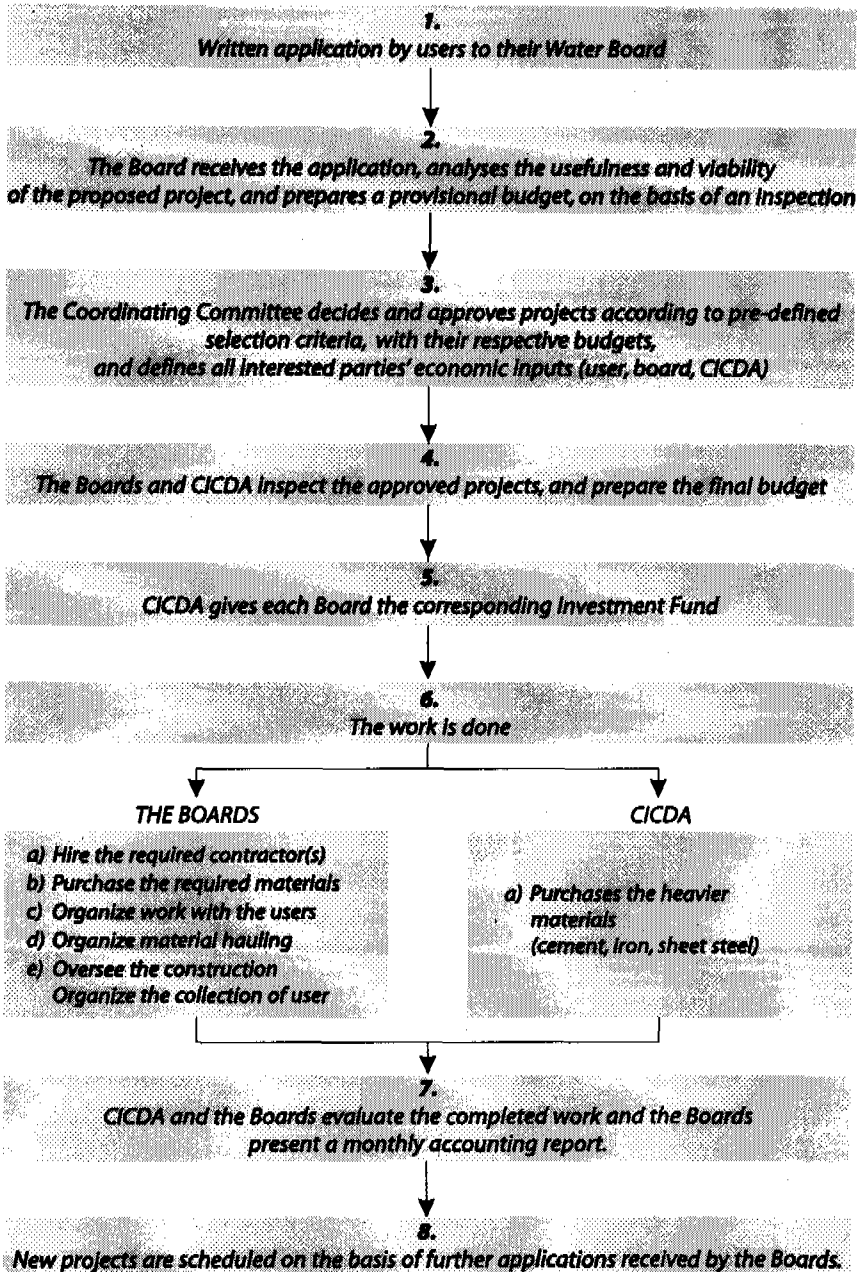
- The project must provide a collective benefit.
- The amount granted must not exceed 65 thousand sucres (about 20 US dollars, at current exchange rate) per beneficiary.

Once the funding is arranged, the boards hire contractors, purchase materials, organize work with the users, and collect fees from users to supplement project funding.

Complex blueprints for such elements as the distribution systems or gates are prepared by civil engineers and submitted to the boards and Coordinating Committee for analysis and possible changes. The aim is for technical proposals to go along with the boards' organizational models for water distribution and management.

This process of blueprint analysis is facilitated in Urcuquí, because the boards there are highly literate and educated, with extensive knowledge and experience with their own irrigation system.

Figure 4. Operation of the Investment Fund for Infrastructure.



This process helps people learn and promotes transparency in the administrative and financial processes of irrigation system maintenance. Users are actively involved in rehabilitation project design and implementation. This process has also considerably reduced *construction* costs.

This practice helps consolidate existing organizations, and enhances their image and respectability in the area. It is also an educational experience, making Water Boards aware of how much projects cost, and of the need to find ways to make them self-supporting, so the system will continue to operate and be maintained in the future. This has led the Board to prepare, with Project advisory assistance, **Irrigation System Maintenance Regulations**.

Maintenance is still a major problem for this irrigation system, even with new projects, since collective work parties have faded away over the years, as the local population has changed. Aside from general canal cleanup, in which all participate once yearly, there are no other agreements to assure that the irrigation network will be kept up.

By drafting these new Maintenance Regulations, the Board has more clearly defined users' obligations, with the respective norms and penalties. The Regulations are based on users' own views regarding system management, considering users' shortcomings and the Board's 50 years of experience.

5.4 Consolidating Rights and Organisation

Another top priority of the Project is to improve water distribution among users, to reduce conflicts and better meet crop requirements. Users and technicians agree that distribution must be improved; however, this high-conflict area involves adjusting and reducing some users' rights, so that water can be available every fortnight, as most require. In some cases, this will entail changing water-use customs and practices that have acquired the force of law over the last 50 years in the zone.

These adjustments will be done for the "normal" schedule, which correspond to the water rights recovered by the people in 1945. It does not, however, involve the special entitlement of the Caciques, which has been in effect for five centuries, although some other users feel that this is an unjustified privilege. This is a point of great contention and a decision about the matter must be taken at some future date by a significant majority of users.

Negotiating redistribution of water is a delicate process, which has to overcome rivalries, jealousy, abuse, theft and privileges among the farmers. This is a tough job for technical staff, although users feel it is necessary, as indeed it is. Urcuqui's system features entitlements ranging from 3 hours per hectare to as many as 20 hours.

To address this situation and improve irrigation water distribution, the Riegus Project has applied different strategies:

Social, technical and historical research regarding the zone's irrigation water

Since 1987, the Scientific Research Institute for Development Cooperation (ORSTOM) has been conducting research on the Urcuquí irrigation system. The Project's first activity was therefore to exhaustively review these findings, in order to understand the system's historical evolution and current problems with water distribution and system management.

The project has complemented this analysis by conducting further research on social usage and practices for water management, societal and power relationships regarding irrigation, and the economic value of water rights for farmers. This last study showed that water rights are also a way of building up capital, as the hours of water entitlement increase land values.

This research has helped significantly to understand how the system works, to discover the dynamics of economic and political relations, to identify the historical causes of water conflicts, and understand why previous attempts at reorganizing distribution had failed. It has helped in foreseeing possible user reactions to potential institutional proposals for improving distribution, and in deciding about the type of intervention to undertake in the area.

Multi-media communication to sensitize people regarding the need for more equitable distribution

On the basis of research findings, the Riegus Project decided on a strategy of **multi-media, systematic, sustained communication**, based on *community meetings, exchanges with other Water Boards*, and the use of *group and mass media*, such as *bulletin boards, illustrated newsletters, and radio programs*, among others, to raise the San Blas and Urcuquí people's consciousness about the need for more equitable, consensus-based water distribution. This communication strategy conveyed the implications and benefits for users of technical proposals (from an economic and agricultural standpoint).

This strategy was accompanied by another participatory process, formation of a **Special Committee for Water Scheduling**. The Committee's membership (representatives and leaders from Urcuquí, San Blas and Los Cacicques) analyzed Project proposals and reported to users regarding the possibilities for improving current water distribution.

This Commission has played a fundamental role in Project development, enriching the technical proposals with new alternatives. It has also performed

as a community mediator, inclining area residents toward a positive attitude, so that a preliminary agreement could be reached. People agreed that, on a trial basis, some plots with entitlements of over four hours could give up some of that time in order to collectively analyze the validity of the technical proposal suggested by the Project.

This joint work by the Commission, the Board and CICDA made it possible to apply, gradually and with user approval, various complementary proposals geared to improve the irrigation system. These included:

- Increasing salaries of water inspectors
- Installing safety gates to prevent theft from main or secondary canals
- Decreasing the flow allocated to each plot by adding another irrigator (increasing from 5 to 6)
- An initial revision of the penalty regulations for stealing water or harming facilities, etc.

Demonstration and testing of the new Distribution Proposal

Throughout this phase, the project made a series of demonstrations and farmer exchanges, so that they could see for themselves that it is indeed possible to irrigate properly in less time—as they put it, **seeing is believing**.

Another fundamental activity in the redistribution process was to **prepare a new cadastral record**, by the users' own decision and with their support. This yielded *clear data regarding the benefits and constraints of the proposed new distribution system*.

This proposal is currently undergoing **testing** in the communities. On the basis of an analysis of each area's findings, final agreements will be reached regarding the water distribution system to govern the community in the future.

Although a new distribution system requires approval by the users' General Assembly, the Project has created new channels for discussion and participation, without bypassing the role of the Assembly. This has enabled users to reach preliminary decisions embodying the interests of the different irrigation sectors.

Ongoing follow-up and evaluation of the change process

The Project has generated an ongoing mechanism for **follow-up and evaluation of the technical and social change process** entailed by water redistri-

bution. This calls for day-to-day monitoring of each farm's irrigation (done jointly with the Water Board) and ongoing process evaluation through informal interviews and individual interviews, to gauge how well changes are being accepted.

This process is really a new way of conducting research, which has made it possible to correct some mistakes in the cadastral records, and to define common strategies for CICDA and the Board to deal with conflicts or disagreements among users.

In this new phase, the Water Board and CICDA have jointly published a **newsletter**, "El Guachuco." This has been provided for continual communications and information among irrigators and their families.

Users in trial neighborhoods have expressed their agreement with the redistribution and their approval of the changes proposed, which enable them to water their crops every two weeks. This would suggest that the process and the Project's proposal will be successful.

In any event and whatever the outcome of this negotiation, dialogue or ongoing discussion process among the system's various stakeholders, it has enabled users to question the previous distribution. It has opened up collective channels for discussion in a situation that was initially very highly charged with conflict.

The community has begun discussing and defending certain criteria of equity regarding access to water and distribution of rights. Even if these criteria do not actually call for equal rights for all, they are closely related to the historical and social processes that have occurred in the zone. For example, many users have stated that the redistribution involves being careful "not to give too many hours to farmers who already have too much land." In other words, they are against taking away from the poor to give more to the rich.

This process has also led the Board to prepare **Regulations for Proper Water Use and System Administration**, based on the problems brought up by users themselves in their discussions, namely, theft, waste, individualism in using and sharing water, and so on. These regulations specify irrigators' rights and obligations, after collective reflection.

In view of the changes under way, the project is currently developing a new strategy for farmer-to-farmer training and exchanges, to support the following processes:

- Changes in production systems resulting from the redistribution

- Changes in system administration and enforcement of new rights and obligations
- Changes in the functions of system inspectors and employees

In this way, the Project will attempt to demonstrate that water distribution in a long-standing system such as Urcuquí's must be improved on the basis of adapting users' rights and obligations, redistribution, and participatory construction efforts.

Consequently, the implementation of an irrigation project is not just a question of simple technical calculations. Rather, it calls for an integrated overview and a change in the mind-set of technical experts and institutions, because it is necessary to:

- Understand the history of water distribution and water rights rules, modalities, uses and customs in this society, and the criteria on which they are based.
- Understand the rivalries and conflicts related to water resources that can impede or prevent a change process among user groups.
- Investigate and understand the significance of water in a rural society, not only as a production factor but also as a key element of social and economic strategy, which are often unrelated to agricultural production.
- Understand the concept of equity as the local folk do, since (in Urcuquí and other cases) they do not always think the same as a standard project technician.
- Develop a technical proposal for construction and distribution that is responsive to social and economic strategies that have been identified, will not contradict current uses and customs, and will be discussed, validated and accepted by users.

Throughout this process, it is a high priority to **strengthen Water Boards as the cognizant authority**. This will help:

- Assure long-term sustainability of the system's operation and maintenance

- Safeguard the people's water rights from new threats such as the seizing of water by new owners and intensified competition in drinking water systems, especially as urban centers grow

In Conclusion

There are no blanket prescriptions, or predetermined activities for irrigation system interventions, whether in new or old systems. However, these two experiences do suggest certain conceptual and methodological guidelines to be taken into account.

The following recommendations are grounded in an integrated theoretical and methodological approach to Andean irrigation, and also involve the attitudes of advisory institutions and development practitioners in dealing with the rural folk, their practices and ancestral lore.

An irrigation system is much more than a physical facility; it is a social construction. Therefore, it is indispensable to undertake processes of research, capacity building and communication that will make it possible to interrelate the participatory construction of infrastructure with the creation and consolidation of their organization, and with the system of rights and obligations.

- Interactive design does not require technical or organizational procedures. Rather, **creativity and capacity for innovation** are needed, to develop **varied strategies to encourage farmers to participate** in the process, since this is the foundation for defining the type of irrigation system to be developed.
- The **openness to dialogue and creativity** of professional teams working on irrigation projects are fundamental to the analyzing of how societal relationships operate, to discover the specific context in which they are working, and to understand how the people in that zone think.
- The **capacity building and communication strategies** developed must be responsively matched to the specific situation of the project zone, to the history, codes and culture of the local social groups, to their agro-ecology, to the dynamics of their rural economy and to the prevailing power structures.
- It is indispensable to **tap and strengthen the potential of existing organizations**. For this purpose, the communication and capacity

building process must encourage discussion among irrigators and build their capacity to express opinions and negotiate. Both users and the technicians and institutional promoters must develop this critical capacity.

- The **gender approach** makes it possible to recognize obstacles and differing aims in the way men and women approach irrigation. Therefore, this vision must be applied both in the technical and social design of the system, and in the training methodology used.
- Finally, the normative system, i.e., **the rights and obligations** that irrigators have created through agreement and consensus during system construction and usage, **is the fundamental framework assuring coherent, sustainable system operation**. Therefore, projects must support the creation and consolidation of rights as a top priority activity, strengthening collective action in system management.

This type of interventions pursue the fundamental goal of assuring future system sustainability by enabling **the farmers to adopt the proposals as their own and fully grasp the logic of system operation**. This is possible only when there is a consolidated irrigators' organization and a consensus-based normative system, which will make it possible for the users to manage their own irrigation system.

Annexes

More About the Andean Irrigation Video and Booklet

The video and booklet prepared jointly by CESA, SNV and CICDA, entitled **Andean Irrigation: A Social Construction**, are designed for use as teaching aids in the training processes pursued by the different institutions working in rural development with Andean irrigation.

These two documents complement each other: the former's characteristics lend it to motivational use, whereas the latter, as printed material, can be used for more analytical reflection regarding the intervention methodology for new and old irrigation systems.

The fundamental aim of both items is to provide professional teams, community promoters and rural leaders with working guidelines for developing irrigation projects. These include:

- **An integrated concept of Andean irrigation** that is grounded in recognition of the way farmers think and dynamically link the technical work of design/construction and/or rehabilitation with the socio-organizational work geared toward defining the system's operational mechanisms (rights and obligations) and in consolidating the irrigators' organization that will maintain and oversee it.
- **A working methodology** based on acknowledgement of usage, customs and ancestral practices, promoting active involvement of groups (both men and women) throughout the process, especially in decision making. The idea is to achieve future user management and self-sustainability for the system.
- This requires the development of **creative, innovative strategies for research, training and communication** that will make it possible to better understand rural logic and reality, to ensure that farmers will

genuinely be involved in the project's different activities: infrastructure construction and/or upgrading; establishment of users' rights and obligations; and consolidation of the irrigators' organization that will see that the irrigation system works properly.

Older systems and newly built ones, as well as those currently under construction are not just economic, physical undertakings with a given social organization. Rather, they are social constructions in which human groups, with interests that may vary widely, come together to build the infrastructure, while constructing the organization and defining irrigation usage norms, according to the specific situation and logic of their zone and its residents.

Facilitator's Guide

The booklet and the video share the same theoretical and methodological proposal, as summed up in the preceding section. However, it is likely that when two different intervention experiences are presented together with different working methodologies (such as Licto and Urcuquí), the audience will not readily grasp the message.

Therefore, to enhance the assimilation of our core messages it is necessary to promote collective reflection on the proposal, which will make it possible to understand it more profoundly, facilitating the training process.

Suggestions for Analysing the Video

Eliciting Reactions

Once a group has viewed the video, some time should be spent listening to the feedback from them. During this stage, the group should be encouraged to participate in discussions in order to gather their comments regarding the following aspects:

- **Appeal** (ask what they thought of the video: if they liked it or not, what parts they liked best, etc.)
- **Understanding** (identify what message[s] have been grasped / identified by the viewers)
- **Relevance** (whether the video is useful [important for pursuing other irrigation projects], and what contributions it makes).

Drawing Out Core Ideas of the Proposal

From this standpoint, it is advisable to pass the booklet around. The booklet explains the theoretical proposal and describes the two Andean irrigation experiences in greater detail, for more in-depth analysis.

Once they have looked the material over, the facilitator should guide the group to reflect collectively so that, as a group:

- They reconstruct the **integrated concept** of the approach to irrigation projects, understanding the inter-relationships among their basic components, such as infrastructure, social organization, and societal norms setting users' rights and obligations.

(This activity may be based on brainstorming about the implications of this concept, touching on its main features. The facilitator can then summarize and clarify the concept, to make sure that it is clear enough for the entire group.)

- They discover the **differences and similarities** between the Urcuquí and Licto irrigation projects.
- They bring to light the common aspects of the **intervention methodology**: ways of working with the community; implied concepts and strategies for participation; the purpose of the intervention.

(For these two activities, a flipchart can be used to visualize the differences and similarities between the two projects and to summarize their common aspects.)

- They discuss the message that both the video and the booklet embody, regarding the **attitude of technical staff** in irrigation project development (respect for rural logic, openness to dialogue, participatory, creative, innovative, educational; etc.).

(For this phase, individual cards can be used for each participant to summarize in three words the message conveyed regarding attitudes and behaviors.)

The basic concepts mentioned above, the intervention methodologies and the technicians' attitudes all relate to the experiences in other projects and to participants' own experiences.

It would be very helpful if facilitators would document this reflection process, and let us know about the results. We will use this feedback as an input for preparing future educational materials.

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