

Network for Cooperation in Integrated Water Resource Management for Sustainable Development in Latin America and the Caribbean



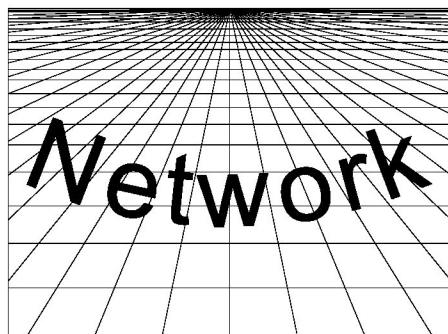
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In Latin America and the Caribbean, there are almost 80 million people who have no access to drinking water supply and about 120 million with no sanitation services. Furthermore, the quality and reliability of services tend to be somewhat unsatisfactory and the infrastructure in poor condition. This situation is made worse by increasing water pollution that has reached alarming levels in many water bodies, mainly due to the general lack of wastewater treatment. It is not surprising that such problems have prompted governments in Latin America and the Caribbean to give maximum priority to the drinking water supply and sanitation sector. The United Nations Millennium Summit agreed to halve the percentage of people with no access to drinking water supply by 2015. Participants reiterated this commitment at the Johannesburg Summit in 2002 and established the same timeframe for halving the number of people who have no access to basic sanitation services.



What can be done to achieve these noble aims? The following are some of the minimum basic principles for the provision of drinking water supply and sanitation services:

- Clear institutional separation between the functions of sector policy formulation (at the ministerial level or equivalent), regulation (by specialised bodies requiring professional and financial resources, independence and stability) and provision of services (preferably with a technical approach to avoid politicisation).
- Self-financing companies that are able to make a reasonable profit if run efficiently.

When companies are self-financing, there should be set up compensation systems for low-income groups. Their design should be based as far as practicable on direct and focused compensation mechanisms and avoid cross subsidies.

- A rational horizontal industry structure that enables the sector to achieve economies of scale and that is compatible with the level of jurisdiction responsible for regulation. While on the one hand, it is impossible to regulate hundreds of different service providers, on the other, regulating a single company disadvantages the regulator both strategically and informationally.

It should also be pointed out that problems of coverage and quality of drinking water supply and sanitation services are inseparable from the need to improve the management of water resources and watersheds. Expanded service coverage results in increased use of water that is already in high demand in many river basins, mainly for irrigation purposes. It also results in an increase in the discharge of wastewater. This is one of the main sources of water pollution and has reached critical proportions, particularly downstream from large urban areas.

As a minimum prerequisite to finding a solution to the problems of drinking water supply and sanitation services, there is therefore a need for good water management systems based on:

- modern water legislation;
- water authority that is independent from sector influences and whose powers and resources are in line with its responsibility;
- effective conflict resolution systems;
- a water allocation system that promotes investment in the development and conservation of water resources, ensures efficient and organised use, avoids monopolies and facilitates control in the public interest; and,
- a water pollution control system able to mobilise the necessary financial resources for the considerable investment required for wastewater treatment systems.



The previous circular introduced the document entitled “*Water management at river-basin level: theory and practice*” (LC/L.1777-P, August 2002) produced by Axel Dourojeanni, Andrei Jouravlev and Guillermo Chávez Zárate. That discussion centred on the importance of river basins as territorial units for water management. This issue concentrates on watershed management.

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Watershed management means acting in a coordinated way on a watershed's natural resources in order to use, protect and, in general, conserve them. It also involves regulating the quantity and quality of the water run-off within the watershed and the length of the process. Watershed management has existed since humans have based their use

of natural resources on water. The most spectacular watershed management systems, based on terraces (“*andenes*”), are found in places such as Peru’s Valle del Colca in Arequipa.

The concept of watershed management, in the sense of controlling and manipulating a watershed in order to regulate run-off, originated in forestry colleges in the United States. In some cases, the ground is used as a sponge to regulate the quantity and quality of the run-off, as well as the length of the process, by delaying surface run-off and increasing base flow. Another approach is to concentrate snowfall in shaded areas to slow down the melting process in a constant attempt to delay and reduce surface run-off and increase infiltration. Some watershed management projects have the opposite aim of either preventing water from infiltrating in order to capture it in a receptacle or of preventing phreatophyte plants from pumping away subterranean water that has already infiltrated. In areas with high rates of infiltration, water is captured by waterproofing the surface of the watershed in order to store water in reservoirs. Watershed management can also take the form of capturing water from coastal mist in arid areas. In all cases, the aim is to use the watershed as a water catchment area mainly for the purposes of human consumption (municipal watersheds) and for reducing run-off in the interests of protecting vulnerable areas near slopes and riverbanks. Watershed management projects are increasingly concentrating on the need to improve the quality of the water, rather than simply the quantity of water run-off and the length of the process.

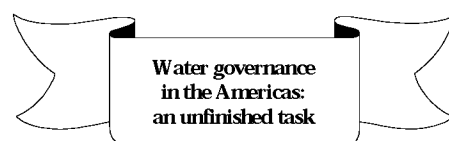
The focus of watershed management has evolved from harnessing water to more complex levels involving the protection of natural resources and reduction of the effects of extreme natural phenomena; erosion and pollution control; soil conservation and rehabilitation; and recovery of degraded areas. The concept of watershed management has also developed to include the improvement of production in terms not only of forestry and pastures but also combining agriculture, agroforestry and agro-forestry-pasture. In more recent times, the original concept of watershed management has expanded to include the integrated management of a watershed’s natural resources and integrated environmental management. There are also projects that are called watershed management projects, but which are more akin to regional development initiatives since they provide for roads, housing, schools, medical facilities and even the use of solar cookers and biogas digesters.

Originally, watershed management was the domain of forestry hydrologists. It then

expanded to include agronomists who were experts in soil, and soil conservation in particular, and then to experts in agroforestry and the management of natural resources for production purposes. Each project emphasises one aspect over the others: some approaches focus on smaller structural features such as terraces and other means of soil conservation and water retention, while others are more geared towards participation. Given that watershed management projects require much more involvement from the local population than hydraulic projects, there are also watershed management specialists within the fields of sociology and anthropology. Watershed protection involves geologists, geomorphologists and geographers. There is still a lack of experts in economic studies, particularly in areas such as environmental services and evaluation of watershed management projects.

Institutionally, watershed management activities are not carried out under clearly defined administrative structures. In some countries, watershed management comes under environmental programmes, in others it is covered by forestry programmes, natural resource management systems or local/community development programmes, to name but a few of the institutional structures responsible for what are all known as “watershed management programmes”. Certain countries, such as Peru, have national watershed management programmes. These are sometimes known as microwatershed management programmes (like the “*microbasias*” in Southern Brazil) or soil conservation/agroforestry programmes. With a few exceptions, it is unusual for watershed management programmes to be part of the activities of water management agencies operating at the river basin level.

It is generally recommended that countries should have a national watershed management programme or equivalent as part of the ministry or department for the environment or agriculture or as part of a forestry organisation. Such a programme should coordinate its activities with water management agencies operating at the river basin level. Both types of institution should complement one another’s interests and, above all, serve as a basis for financing environmental services to provide effective management of watersheds for users downstream and for coastal areas where rivers flow into the sea.



The document entitled “*Water governance in the Americas: an unfinished task*” was prepared by Humberto Peña (Chair of the

South American Technical Advisory Committee (SAMTAC) of the Global Water Partnership (GWP) and Director of the General Department of Water Resources (DGA) in Chile) and Miguel Solanes (ECLAC Regional Advisor on Water Resource Legislation and the Regulation of Public Services and member of the GWP Technical Committee (TEC)). The paper was presented at the “*Water for the Americas in the Twenty-First Century*” Forum, held in Mexico City, Mexico, from 8 to 11 October 2002 (see Circular N° 17). The present Circular concentrates on the conceptual framework of water governance and general areas of consensus and guidelines. In the following issue we shall discuss other aspects of governance dealt with in the above-mentioned document.

Theoretical framework

The concept of governance as applied to water refers to the capacity of a country to coherently organise the sustainable development of water resources. This definition encompasses both the capacity to design socially acceptable public policies that foster the sustainable development of water resources and to implement them effectively through the relevant institutions. The degree of governance within a society in relation to water management is determined, among other factors, by the following:

- The degree of implicit or explicit consensus regarding the nature of the linkages between society and water.
- The existence of consensus regarding the bases for public policies that express these linkages.
- The availability of management systems that enable effective policy implementation within a framework of sustainable development.

Thus, governance implies the capacity to both generate and implement appropriate policies. These capacities are the result of having established consensus, having devised coherent management systems (regimes based on institutions, laws, cultural factors, knowledge and practices), as well as adequate administration of the system (based on social participation and acceptance, and capacity building). As can be seen, a core element of governance is the capacity of constructing (that is, introducing and developing) institutional arrangements in harmony with the nature of the abilities, limitations and expectations of the system or area under consideration.

The lack of simple answers

As water is so closely linked to society and the environment, there are no simple or easy answers that guarantee governance. The only

possible suggestion is that although governance may be expressed in different organisational systems and its formal content arranged differently (such as laws and institutional arrangements), every society has natural conditions, power groups, power structures, and requirements that must be considered specifically in the process of designing the system. Otherwise, there is a risk of ignoring factors necessary to ensure viability. The following considerations merit particular mention:

- The prevalent ethnic and cultural characteristics, as deeply rooted views of the world may prove decisive in applying certain management formats. In Chile, for example, the prerequisite of individual assignation of water rights has been waived for Aymará and Atacameña communities.
- The institutional history of the sector, considering that this history has generated practices used for generations in many communities and these frequently comprise an extremely valuable social capital for effective water governance.
- The economic framework, social and economic ideas and practices, the capacities of the different players involved and their socio-economic conditions. It should be pointed out that the creation of market incentives in the water sector cannot be the result of applying public policies divorced from the general development trend of the society.
- The management capacity of the State, as this may restrict the practical possibilities for efficient implementation of institutional arrangements.
- Geographical characteristics, for example, the manner in which water is perceived is very different where it is a scarce resource compared to areas where it is in abundance. This kind of difference may require that even within a single country, different regions require different regimes.
- The characteristics of different water sectors and their services may be different even within one country.

It is also important to remember that globalisation affects governance in many ways. External agents and factors influence internal processes, more so now than ever before. The most important consideration is to be aware of the phenomenon and to identify those external factors or conditions that may most seriously affect governance.

Lessons and general consensus

Despite the comments above, one must be aware, when the management of a resource or its services consistently shows certain characteristics, that this is not due to a lack of innovative capacity of the sector, but probably due to the nature of the resource or service involved. This is clear from the typical

characteristics of the legislation governing water and its associated services. In this respect, some considerations are tentatively presented that, in the light of practical experience, may be considered to be generally valid.

In *water legislation*:

- Water laws must clearly state that water belongs to the public domain.
- Water laws must determine specifically that water use rights, when granted under conditions of, or which aim at, effective and beneficial use and that do not cause environmental damage, are protected by private property clauses in the constitution. This is a basic legal element present in the systems that have successfully promoted private investment in the development of the water resource.
- However, and provided there is no functional curtailment of the economic value of the rights, the laws may allow for the exercise of these rights to be generally regulated as needed for ecological and social sustainability.
- Systems for water concessions and the regulations guiding their allocation should be uniform without exception, to prevent manipulation by special interest groups.
- In this context, water rights are assigned when there is enough available water flow, when third party rights and ecological requirements are not affected, and when, in accordance with the opinion of water administrators, the request is aligned within the public interest regarding water use.
- The only functional priorities affecting the allocation of water rights when requested ought to be those for drinking water supply and sanitation purposes, subject to safeguards for ensuring that this does not prevent the generation of clear signals regarding the scarce nature of existing water supplies, and it does not lead to inefficient use arising from this privilege. Such considerations should not affect the preservation of flows for ecological reasons. In cases of concurrent uses for other purposes, water authorities must carefully assess their merits and, if the uses are equivalent, then they must be allocated on the basis of economic tender, order of application, or some other relevant criteria.
- In the case of water rights and uses that were in existence prior to the legislative change, including traditional and indigenous uses, they should be recognised in accordance with their effective and beneficial, historical and current use, without this affecting the possibility of imposing appropriate regulations.
- There is a need for a planning authority to allow for the generation of a shared vision regarding the future evolution of water resources at the river basin level.

- It is important to develop a public information system covering all elements affecting resource management, giving transparency to the actions affecting water, which is part of the public domain.
- The procedure for implementing these important considerations must ensure their continued effectiveness.

There are also some fundamental principles for the *regulation of drinking water supply and sanitation utility services*. These include:

- Universal and non-discriminatory service.
- Adequate quantity and quality of service.
- Reasonable tariffs and profits. It is important to bear in mind that privatisation does not miraculously make unprofitable operations profitable.
- A subsidy system that avoids as far as practicable cross-subsidies in favour of the better off and that guarantees the poor a basic minimum supply.
- Control of transfers, holdings and intracompany transactions.
- The right to adequate and opportune information, both for the regulators and for users.
- Obligatory accounting, in accordance with obligatory rules.
- Use of essential facilities.
- Rights to opportune and adequate inspection and participation.
- Maximum use of economics of scale and scope.

There are various levels of consensus concerning *water management institutions*:

- The authority responsible for water allocation and management should be independent from sector influences, with authority and resources in line with its responsibility.
- Inserting water management within environmental agencies may result in minimising its effect as a development factor.
- Therefore, it seems appropriate that the water resources have their own stable and independent institutions, even when these are closely linked to institutions responsible for the strategic vision of national development.
- River basin based institutions are valid options for water management, but their functions must be determined in such a way that they can be implemented and they must be focused on water resources, as demonstrated by the successful models in France and Spain. They must also have adequate powers and funding.
- User organisations are useful management structures; however, they cannot replace the State, as they have inherent limitations and must be subject to appropriate control.
- A conflict resolving system should exist which provides an appropriate balance

between the water administration, the user organisations, and the courts, and defines the limits of their authority.

- There are decisions associated with water and its services that are directly linked to governance, because of the impact that they have on social stability. These considerations should be appropriately dealt with in trade and investment protection treaties.

Regulators of public drinking water supply and sanitation services need a minimum set of attributes to function appropriately:

- The system to be regulated should be manageable. It is not realistic to assume that, for example, a thousand service providers can be regulated. Consolidation is necessary due to its advantages with respect to economies of scale and the requirements of control.
- The regulator must have independence and stability and be subject to rules of good conduct and ethics.
- The regulator must have the necessary powers and resources.
- The regulator must have appropriate legal capacities.

One limitation that administrative systems seem to share at every level is a notorious lack of operational capacity, due to various factors, including limited financial, human, and legal resources and, at times, the lack of importance given to the role of regulation. This is the consequence of a poor understanding of the fact that an administration's roles, adequately defined functions, scope, structure and controls are all vital for the management of a complex resource such as water. Indeed, an appropriate definition of the roles of the administration is vital for protecting sustainable management, the user community and the general public from monopolies and special interests, both in this particular context and more generally.



David Getches, Professor of Natural Resources Law at the University of Colorado School of Law, United States, produced the

document entitled "*Indigenous peoples' rights to water and international norms*" as part of the Water Law and Indigenous Rights (WALIR) project, a joint initiative between ECLAC and the University of Wageningen, Netherlands. The project is a kind of think-tank that critically informs the debates on indigenous and customary rights and their relevance to water legislation and policy, both to facilitate local and national action platforms and to influence law- and policy-makers. Equitable rights distribution and democratic decision-making, as well as support for the empowerment of marginalised water use sectors, are major concerns. Below is a summary of this document.

Indigenous peoples in nearly all countries have seen their traditional water sources exploited by non-native societies to produce economic benefits for the new groups. Depletion and pollution of water sources for these purposes have often limited the ability of native peoples to carry on water-dependent vocations like farming and fishing as well as to perpetuate cultures that may depend on traditional subsistence activities and spiritual practices requiring water. In addition, national governments typically have created water law systems that foster non-native uses and allow depletion or pollution of water supplies on which indigenous peoples depend.

There is no body of international law that specifically protects indigenous peoples' ability to prevent overuse or misuse of water by others or to ensure their access to water for their own needs. However, several multinational accords and international norms relate to the conduct, practices, and policies of governments with respect to indigenous populations and individuals. As with indigenous peoples' rights to land and natural resources, potential indigenous claims to rights in water can be derived from international human rights guarantees and environmental protection commitments.

The fact that water has not been specifically addressed is partly because international law only recently has begun to comprehend the unique nature of the natural resource claims of indigenous peoples. Furthermore, indigenous groups or individuals have only recently begun to assert claims to lands and natural resources (except under the domestic laws of a few countries). It is likely that more claims will be brought as international human rights law is read to include indigenous rights to water and other natural resources.

The many international agreements and potential sources of customary international law that could be sources of indigenous rights to water can be divided roughly into categories that correspond with the kinds of claims that indigenous people might assert

when they are deprived of access to water. Some agreements and norms support claims that could fit within the following categories: (i) protections for indigenous lands and resources; (ii) environmental protection; (iii) subsistence rights; (iv) cultural identity; (v) racial discrimination; and (vi) right of self-determination.

International law provides several grounds for asserting indigenous rights to water. Although there is no precedent for using international law to pursue indigenous water rights claims, there is a small but growing number of cases in which native peoples have used international law to protect their rights to other natural resources such as timber or minerals.

The various types of rights that are identified in this paper illustrate different ways to frame claims and some of the international law instruments and norms that could be the basis of those claims. Claims could arise from denial of access to water for traditional uses or commercial uses by tribes and groups. Indigenous peoples also could invoke international law when a government takes action that deprives them of quantities of water or pollutes water within their traditional territories. These claims are more likely to succeed if the boundaries of traditional use areas are defined and specifically include particular rivers and other bodies of water. Indigenous peoples may have to assert rights by challenging activities outside their traditional territories that affect these rivers, such as upstream depletion or contamination.

Although this paper has concentrated on international law remedies for violation of indigenous water rights, it is important to emphasise that there are many potential remedies under domestic law. It is beyond the scope of this paper to identify the domestic laws that could be useful in each country. But these sources of law should be explored in each case, as they may be stronger or at least more familiar to domestic courts. Like the international law approaches to vindicating indigenous rights to water, it has been rare for indigenous peoples to attempt to use domestic law approaches to advance their rights to water and other natural resources, except in a few countries. If and when they seek the aid of the law in asserting water rights in domestic courts and administrative tribunals indigenous peoples and their lawyers should consider citing both domestic and international law sources.

The array of possibilities for using international law, as well as domestic law, to establish and protect indigenous water rights is large and complicated. At a minimum, indigenous peoples would benefit from legal research into their individual situations to

identify the most promising legal approaches to protection water rights. The grounds will vary according to the factual situation of each group. In addition, they need informed advice on the most promising forums for asserting those grounds. The necessary research and advice to indigenous groups demands legal expertise. Indigenous peoples require access to lawyers who know the laws of the particular country and also to experts in international law. If groups in one country bring claims that are not strong or properly presented, and those claims fail, it could harm the efforts of other groups. Thus, it would be wise for indigenous groups from several countries to coordinate regional or international efforts to find the best cases to advance the development of international law as a tool for securing indigenous water rights.

Detailed information about the WALIR project, its activities and publications, is available at <http://www.eclac.org/dm/proyectos/walir>.

Prevention and reduction of the danger posed by natural disasters

ECLAC, through its Natural Resources and Infrastructure Division, and with the support of the German Agency for Technical Cooperation (GTZ), is implementing the project *“Prevention and reduction of the danger posed by natural disasters”* (see Circular N° 16 and 17). The project activities include the following case studies: Arroyo del Medio sub-basin, Argentina; Limari river basin, Chile; Tunjuelo river basin, Colombia; and Sisa river basin, Peru. Local workshops were organised in these areas to discuss preventive action with the community and local authorities. The following stage was to incorporate the workshops recommendations into the final versions for the case studies.

The results of the project will be published in January/February 2004. In April/May 2004, experts and politicians are expected to attend a technical seminar in order to discuss how to prevent natural disasters at the national and local levels.

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SAMTAC

ToolBox is a tool designed by the GWP to facilitate the exchange of experiences of good and bad practices for water resources management (see Circular N° 17). There is

also a series of case studies to illustrate how to use ToolBox. Below is a summary of three SAMTAC case studies carried out in the countries of the region:

- *“Privatisation of the drinking water and sanitation system in the Buenos Aires Metropolitan Area: institutional and regulatory shortcomings, and lessons learned”* by Daniel Azpiazu;
- *“Water war or resistance to the attempted privatisation and commercialisation of water in Cochabamba, Bolivia”* by Rocio Bustamante; and
- *“Integral policy for the recovery of water resources in Talcahuano, Chile”* by Jaime Valenzuela.

Lessons learned from the water concession in Buenos Aires, Argentina

In 1993, the Argentine government signed a 30-year concession contract with Aguas Argentinas for the provision of drinking water supply and sewerage services in the Buenos Aires Metropolitan Area. The results of privatising the services were predictable considering the combination of shortcomings in the design and conditions of the concession, which were in turn aggravated by the inadequacy and insufficiencies of the regulatory framework and its own institutions, repeated contractual renegotiations, weak regulations, lack of real incentives to attend to the most deficient areas of service provision, and in summary, the systematic subordination of social interests.

The relevance and validity of the case study lies in the lessons it offers in terms of the discrepancy between the project aims (universalisation and considerable service quality improvement) and the inadequate results achieved to date. The necessary prerequisites for avoiding such a situation include the following:

- Social and parliamentary debate prior to the adoption of a specific law (in the interests of legal certainty).
- Complete analysis of ways of incorporating competition mechanisms that would hold in check the monopoly power of the successful bidder.
- Ensure that there is a payment for the concession for the economic use of public property or demand capital investment to prevent the submission of opportunistic bids.
- Incorporate “business risk” into the regulatory framework, i.e. ensure there is no reinsurance that can eliminate it, even in the event of operator inefficiency. The “reasonableness” and “fairness” of rates should be a fundamental part of the regulatory framework.

- Encourage service universalisation through effective operator incentives, adequate cross-subsidies and, if necessary, social tariffs that would not only provide access to the lowest-income groups, but also allow those who already use the service to pay for it. This should be combined with increasing micro-metering to bring about more rational water use.
- Ensure that the regulatory agency is independent and self-sufficient to ensure total autonomy, with a trained technical staff, budgets independent of the invoicing of the regulated utilities, policies that actively give priority to protecting user rights and an organisational structure that precludes capture.
- Ensure that development programmes for local providers are included in discussions concerning regulatory framework and establish strict controls on transfer prices in intracompany transactions of the concessionaire.
- In economies where need and poverty are as high as they are in many countries, drinking water supply and sanitation services should not be considered as goods subject to market forces but as a fundamental part of a population’s quality of life.
- Apply principles of transparency, specific regulatory accounting and sanctions for the violations thereof. This should include the economic, accounting, social and infrastructure-related information necessary to develop controls and regulations in a way that minimises informational asymmetries, irrespective of the mechanism that is adopted for environmental and tariff regulation.
- Bring the water sector’s rules into line with the provisions of antitrust legislation.

Lessons learned from the attempted privatisation in Cochabamba, Bolivia

In September 1999, the Aguas del Tunari consortium was awarded a concession contract to provide drinking water supply and sanitation services in the city of Cochabamba, Bolivia. Six weeks later, parliament adopted Law N° 2029 (drinking water and sewerage services law) to provide the legal framework for sector regulation. However, the country’s lack of modern water legislation meant that the law also included provisions on water resources management. In addition, despite the advanced nature of discussions and analyses concerning the recognition of the rights of indigenous peoples and farmers in the formulation of a new law, Law N° 2029 had no such provision. It should also be pointed out that there was limited public participation leading up to the awarding of the concession contract and the adoption of Law N° 2029.

The contract and the law, combined with irregularities in the tender procedure, brought about a strong reaction among the public in the form of protests against excessive rate hikes in urban areas and the new legislation's effects on traditional rights in rural communities. Social unrest broke out in February 2000 and again in April that year when there occurred several days of violent clashes followed by a declaration of state of siege. Social discontent was such that it was only quelled when the contract signed with Aguas del Tunari was terminated and Law N° 2029 amended to become Law N° 2066. The conflict might have been avoided if the process had included more participation, dialogue and consultation between all those involved.

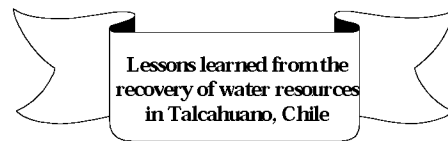
The Cochabamba "water war" gave the world a striking example of resistance to the privatisation of drinking water supply and sanitation services that lead to a more participatory process of formulating norms and policies concerning water resources. Hence, in 2002, the Interinstitutional Water Council (*Consejo Interinstitucional del Agua* – CONIAG) was created with a view to opening a forum for dialogue and consultation between the government and economic and social organisations to adapt the existing legal, institutional and technical framework related to water issues.

The main lessons learned from the attempted privatisation of drinking water supply and sanitation services in Cochabamba are as follows:

- There exists a difficulty in formulating and implementing water policy and legislation "from above" in areas where water has long been independently managed by farming communities and social organisations on the basis of locally defined and justified rules.
- There was a radical movement against the privatisation of water, which is considered almost like a living entity in the local culture.

of increased effectiveness. Otherwise, government weakness allows companies to impose conditions that eventually affect users. On the other hand, there should also be social control mechanisms to increase transparency in the regulation of basic services.

- Social participation, public access to information and transparent management of services and of the resource itself are clearly fundamental. Excluding the public from the decision-making process creates a breeding ground for problems and conflicts. In that sense, laws and policies should be a social creation. It is therefore necessary for public participation to be considered in the formulation of laws and policies, especially when the resources and services in question are as essential to life and health as water.
- Lastly, it is important to invest time, effort and resources into dialogue and consultation in order to avoid conflicts with incalculable costs in both social and economic terms.



From 1950, Talcahuano's location, natural conditions and proximity to energy supply centres in Chile were the sources of considerable growth in terms of its industry, fishing, its military importance and its status as a port. Such development resulted in rapid urban growth, and pollution from the above-mentioned activities surpassed the municipality's natural capacity and affected its natural resources, thereby reducing the quality of life of its inhabitants and creating a potentially critical risk to economic development. The deterioration in the quality of life, water, air and soil pollution and the image of being one of the country's most polluted municipalities prompted the municipal authorities to undertake a recovery strategy that consisted of first dealing with problems which although serious could be

The most important lesson to be gleaned from this case is that municipal governments are in the ideal position to successfully tackle the recovery of water resources and environmental management. Analysis of the Talcahuano experience shows that municipalities can be successful by managing the situation in an effective and informed way using a strategy conducive to reconciling interests and negotiating a successful association of the community, private companies and national and regional government. The main contributing factors to the successful outcome were as follows:

- The political and technical leadership of the authorities when faced with the problem of environmental degradation. The authorities also carried out informed diagnoses, monitored problems appropriately and developed realistic solutions.
- Clear identification of the direct and indirect causes of the deterioration of water resources, and of the variables to be considered for solving the problem and ensuring the sustainability of water resources in the future (improved education, infrastructure, technology, training, motivation and the introduction of incentives, sanctions, etc.). An important aspect is the integrated approach to water resource management. This shows that problems are not isolated and due to a particular circumstance, but are part of a system that is poorly managed by those responsible for pollution.
- Realistic and participatory diagnostic methodology resulting in a complete report identifying the commune's main environmental problems and the causes of each type of pollution (water, air, etc.). The mere fact of presenting the information in such a form prompted public institutions with control and inspection responsibilities to adopt a series of measures to resolve the problems. This participatory approach also extended to the proposals stage. Given that the sectoral work commissions were comprised of those responsible for the

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