

Water resources

1. The issue of water resources

At the present time, sustainable standards for the development and use of water resources are not maintained in many parts of the world. The increasing demand for water, the reduction of river flow volumes with serious consequences for users and ecosystems, the over-exploitation of aquifers at rates greater than the rate of natural replacement, the problems of pollution and degradation of water quality, difficulties of access to the resource for basic needs on the part of a high percentage of the population, are challenges that urgently require strategies that enable the numerous tasks of water resources use to be addressed.

In the case of Chile, the sustained economic growth and social development experienced by the country since the 1990s have generated ever-increasing demands on water resources, to the extent that from the city of Santiago to the north demand exceeds the available supply, while the supply-demand situation is much more favourable between regions VI and IX, and in region X the supply comfortably exceeds the demand.

With regard to pressure on the environment, international experience indicates that water resource management is moving from a phase in which problems of a quantitative type predominated to one in which the main constraint is posed by the aspects of water quality and environmental protection.

Water resource management in Chile has to address two issues:

1. Water requirements for environmental purposes: the demand for water should not lead to ignoring the need to maintain the flow volumes and levels of aquifers and lakes, for the protection of ecosystems and their associated scenic and tourism values.
2. Water pollution: water pollution must be tackled from both the perspective of the correct characteristics of the bodies of water themselves and their vulnerability to pollution, and the viewpoint of the sources of pollution and their relationship with the affected resources. In regard to the high persistence of pollution in lakes and aquifers, control is directed at preventive measures rather than mitigation.

The main problems of pollution that need to be addressed in the country are the following:

- Pollution from domestic sewage: the high rates of drinking water coverage and drainage in Chile are in sharp contrast to the general lack of sewage treatment plants. The discharge of large quantities of untreated sewage at specific points of the water resource systems or along the coastline constitute the main water pollution source in our country;
- Pollution from mining effluents and liquid industrial wastes (tailings): major mining operations, mainly in north and central Chile, generate major pollution, especially in regions where the water flows for dilution are small or non-existent. The treatment and disposal of mining residues continue to be of major concern in those regions. Over 60 per cent of industrial discharges flows into sewerage networks, mixes with domestic sewage and is deposited in the river basins through the water system and irrigation channels, or is discharged into the soil or directly into the sea;
- Pollution from farming diffused into underground water: this comes about as a result of the soil salinization associated with farming activity and the increase of nitrates in underground water caused by irrigation with sewage, as well as nitrates from the use of fertilizers in agriculture. Some studies have demonstrated the existence of a degree of major pollution in surface water, but further information is required on the actual status of pollution by pesticides and fertilizers in groundwater.

Lastly, another challenge facing water management is the uncertainty about the future availability of water, as a consequence of variations in climate. Since a large part of the country is situated in an area of climate transition, it may have special sensitivity to global climate change.

2. Water resource policy applied in Chile

The pressing need to halt the deterioration in the quality of life of the population, due to the destruction of ecosystems caused by pollution from liquid industrial wastes and domestic sewage has led the authorities to lay down policies for the monitoring and control of pollution from the urban and manufacturing sectors. Since the 1990s, Chile has required sanitation companies to present development plans, and make the investments necessary for the treatment of domestic sewage. As a result of this measure, the cover of sewage treatment has increased from 20.9 per cent in the year 2000 to 55 per cent in the year 2003. This has been achieved by granting concessions to the private sector for the supply of drinking water and sanitation; each of those concessions is for a specific operational territory and is exclusive and for an indefinite period of time.

With respect to marine pollution, the Department of Maritime Territory and Merchant Marine (DIRECTEMAR) monitors water quality and keeps water quality records, which date back over ten years.

For its part, the National Commission for the Environment (CONAMA), in collaboration with other related institutions, has drawn up seven environmental standards for the management of water resources, as well as a Presidential Directive on the establishment of secondary-level standards of environmental quality for inland and marine surface waters.

Other measures for water pollution control, which have proved to be very effective, are public-private cooperation agreements for pollution control.

For its part, the Water Department (DGA) has drawn up a national policy for water resource management, and developed the first master plans for water resource management, which have the following guidelines for action:

- Improvement of efficiency in water use;
- Identification of water resources;
- Harmonization of water and the environment;
- Technical training and education about water;
- Information about water resources and flood mitigation.

The master plans for water resources in respect of river basins constitute an instrument for indicative planning, for guiding decisions in the public and private spheres and for maximizing the social, environmental, cultural and economic function of water.

3. Programmes and projects

(a) Integrated development and use of water resources

The National Desertification Action Plan (PANCD), approved by the CONAMA Council of Ministers, is the multisectoral instrument designed to facilitate the short, medium and long-term actions to prevent, minimize and/or reverse desertification and/or the effects of drought in Chile. Its final objective is to improve the quality of life of the inhabitants of areas subject to desertification, through sustainable production systems.

Various projects have been set up in association with PANCD, such as: Control of erosion and reforestation in semi-arid zones; Environmental economy applied to river basin management; Application of the European water system to problems of erosion and flooding in vulnerable water basins in Chile.

Additionally, there is a series of assistance and promotional measures that contributes to mitigating and monitoring desertification processes in Chile, such as the Reforestation Promotion Act, the Programme for Agricultural Soil and Natural Grasslands Recovery, and the Irrigation Promotion Act.

(b) Drinking water supply and sanitation

An analysis of the health sector carried out at the end of the 1980s stressed the usefulness of redefining the role of the State in the drinking water and sewerage sector, removing from the State the work purely relating to service supply and giving pre-eminence to its subsidiary, regulating and monitoring role.

Towards the end of the past decade, the rates of cover of drinking water and sewerage were virtually universal. That cover was obtained with the help of a stable regulatory framework and a tariff-setting system that raised tariffs to an economic level. The great challenge remaining, at the end of the 1990s, was the treatment of sewage. Only a small fraction of sewage was being treated.

The obstacle in the way of investment in treatment was financing. To accelerate this process and enable Government efforts to concentrate on other programmes, it was decided to opt for the financing of this investment through private sector participation, once the regulations had been established for the modality of management of the sector, through the granting of concessions to private companies in 1992.

Two options existed for involving the private sector in sewage treatment. The first was through contracts for the building and operation of treatment plants, the second was privatization of the entire operation (an unlimited concession). The second modality was opted for.

A process of selling the larger enterprises in the country began in 1998. At the present time, 78 per cent of the population receives the drinking water and sewerage services from private operators. At the same time, the privatized companies have made sizable investments in treatment facilities. In the metropolitan area of Santiago, the Aguas Andinas S.A. Company has built two treatment plants, one at a cost of US\$ 150 million in 2001, and another for US\$ 315 million in 2003. This last plant, Farfana, is the largest in Latin America and one of the five largest in the world. An even larger plant remains to be built (and 13 in peripheral areas of the region).

The important aspect of the model adopted in Chile is that those benefiting from these investments are not only the company's customers. Other beneficiaries include farmers, who can now irrigate their farms with clean water, increasing the value of their produce, and improving their options to exploit the opportunities offered by the recently signed free trade agreements with the European Union and the United States. Needless to say, the environment as a whole also benefits from the treatment in place.

In Chile, we opted for the payment by customers for the capital investment and operations of the treatment plants, through sanitation service tariffs. In any case, the impact on tariffs has been slight. In Santiago, the cost of treatment constitutes about 17 per cent of a billing for 15 cubic metres. For other companies, the tariff impact is probably less, as treatment costs may be less (for example at the coast, where undersea discharges may be built), and the tariffs for drinking water greater (since the companies are smaller or high cost). Besides this, Chile has a drinking water subsidy, totally financed from taxation, for households with meagre resources. This subsidy covers 25 per cent or 85 per cent of the water supply billings, depending on the region. In Santiago, it covers 39 per cent of the billing.

The drinking water supply cover in urban areas is close to 100 per cent, and the sewage collection system coverage is over 90 per cent. The treatment of rural sewage is still a challenge, as 39 per cent of rural households lacked sanitation until recently.

To overcome the problem of sanitation in rural sectors, the government launched the Rural Clean Water Programme, the object of which is to provide drinking water to rural centres in the country and to achieve active and responsible participation by rural communities in the management of the systems. By December 2003, the programme had achieved a cover of over 97 per cent in rural centres.

Additionally, a new programme is under way, the National Clean Water Programme for Indigenous Communities (those not living in centres, i.e. where there are less than 150 inhabitants per square kilometre).

(c) Water for sustainable food production and sustainable rural development

There is a programme for degraded soil recovery, whose objective is to promote the recovery and/or conservation of agricultural soils affected by an acute decrease in their free phosphorus content, or by extreme acidity, or which are so fragile that they need to be cultivated using conservation practices to obtain a permanent plant cover.

(d) Safe water plan

As indicated above, the Government has imposed the obligation on sanitation companies of presenting development plans, including timetables, which oblige them to build sewage treatment plants and operate them, with the target of achieving 100 per cent cover by the year 2010.

(e) Industrial discharges

Through the implementation of the Emission Standard for pollutants associated with the discharge of liquid residues: the application of this standard requires the coordinated work of various parastatal bodies, which have to monitor its correct application by means of inspections that require a high degree of training. Work is ongoing in the preparation of environmental standards for inland and marine waters (both primary and secondary levels) and the process will be initiated this year in six water basins in the country. This will permit a review of the basins to be carried out through integrated resources management.

4. Results

The pressing need to halt the deterioration in the quality of life of the population, due to the destruction of ecosystems caused by pollution from liquid industrial wastes and domestic sewage has led the authorities to establish policies for the monitoring and control of pollution from the urban and manufacturing sectors.

During the past decade (as mentioned above), the first regulatory environmental processes were initiated through the procedure of regulations prepared by the National Environment Commission. This initial work, together with the strengthening of environmental institutions in Chile, has triggered major progress in controlling water pollution, particularly with the implementation of the Emission Standard, regulating discharges of liquid wastes into drainage systems, rivers, lakes, the sea and underground waters, and with the development idea of primary and secondary-level quality standards for inland and marine surface waters.

Another outcome to be stressed is the application of and/or search for management instruments that complement the traditional ones, mainly monitoring programmes for water pollution, the analysis leading to the application of economic instruments, public-private agreements, development of the integrated management of water resources, the sanitation plan promoted by the Government, among others.

The following are some of the specific examples of the results achieved over the past ten years of environmental management in Chile:

Pollutant loading

In 1992 only 9.3 per cent of the population had access to some type of treatment or final disposal of sewage; by December 2003, after the establishment and implementation of the Clean Water Plan, it became possible to treat 60 per cent of the sewage and it is hoped that the target of 100 per cent will be reached by 2010.

In 1992, liquid industrial effluents were discharged without any appropriate treatment; in 2002 75 per cent of all industries that discharge effluents into the sewerage system have approved treatment systems, and, in addition, the regulation covering discharges into surface inland and marine waters will enter into force in the year 2006.

Drinking water supply

Drinking water cover in urban areas is close to 100 per cent and sewage collection cover is over 90 per cent. In the rural sector, by December 2003 there was drinking water cover of over 90 per cent in the country's rural centres.

Water resource protection

In 1992, Chilean law placed under the official protection of the Water Department (DGA) the aquifers that feed the water meadows and wells of regions I and II, which was a major step forward.

The environmental impact analysis system is an effective preventive instrument, which has been applied since 1997, and has entailed a major advance in the protection of water resources, by foreseeing, mitigating, restoring and compensating for the impacts provoked by relevant projects and activities.

Water resource exploitation

For some years now, the Government has been promoting a programme aimed at making use of idle water resources and improving efficiency in the use of water. This programme targets the construction of large waterworks to regulate surface water resources, the rehabilitation of watercourses, the stimulation of private investment in minor development works such as boreholes, and increased efficiency through such promotional measures as the Irrigation Act.

Identification of water resources

Water networks have been an important development, and we have one of the most advanced water systems of Latin America. Knowledge has been gained about surface and underground water in all the major water basins in the country, and most of them have been the object of water resource assessment studies, while for several basins mathematical performance simulation models have been developed.

5. Future tasks

Achieve 100 per cent cover for drinking water and sanitation

Despite significant progress in this area, the Government proposes to reach this target by the year 2010, which means focusing on improving the living conditions of the urban and rural population through the implementation of the aforementioned programmes and plans.

Pollution loadings

The monitoring of liquid waste discharges into bodies of water and watercourses has been minimal. It is necessary to draw up a register of direct discharges of tailings into filtration wells, and to put in place measures for monitoring diffused pollution.

Ecological flows

It is necessary to make advances in the relevant studies so as to complete the baseline and validate methodologies, and identify the standardization of procedures needed to define them.

The market for user's rights must be fine-tuned, and the use of water rationalized, taking into account the interests of society as a whole, and to do this we need a clearer definition of the establishment of a water inspection system.

The official protection of wetlands must be extended to the all the regions in the country.

To complement the foregoing, one important item to highlight is the need to put into practice the National Water Resource Policy, drawn up by the Water Department, which poses the question as to what the country must do so that, within the framework of environmental sustainability, the issue of water does not become a serious limitation to the economic and social development of the country, but is rather something that boosts development.

The management of water resources must take every user into consideration, and that should not exclude the environment in all its aspects. For that reason, institutions need to be strengthened and information generated, to form the basis of any analysis that may be needed. That management must also involve the concept of the quantity of water resources, and for that reason the establishment of appropriate use, through the rights to exploit water resources, is one of the aspects we hope to define with the modification of the DGA Water Code, so as to render the resource more sustainable.

Within the sphere of environmental management instruments, we should stress the fresh challenges posed to the various public, private and academic institutions of the country with regard to the implementation, follow-up and checking of environmental regulations. Another factor to be considered is the formulation of secondary-level quality regulations for both inland surface waters and marine waters, so as to develop and implement decontamination or preventive plans, as the case may be. With regard to environmental management instruments, the search for other tools must continue, to ensure the maintenance of environmental quality in line with international standards and the requirements of the country. All of the foregoing would enable integrated management and protection programmes to be developed to complement the specific challenges indicated above.

One of the latest lines of work being developed in Chile is an analysis of the use of additional management instruments for the monitoring of water pollution, such as commercial instruments, in the light of the Transferable Emission Bonds Act, forwarded by CONAMA to the Congress of the Republic.
