

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



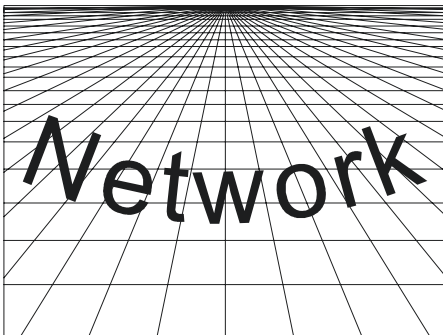
United Nations Economic Commission for Latin America and the Caribbean (ECLAC)

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This year sees the expiry of the deadline that the world's countries set for the fulfilment of the Millennium Development Goals (MDGs), in which they pledged to halve the proportion of people without sustainable access to safe drinking water and basic sanitation. According to data for 2015 published by the World Health Organization (WHO)/United Nations Children's Fund (UNICEF) Joint Monitoring Programme (JMP) for Water Supply and Sanitation, the Latin American and Caribbean region achieved the MDG target on access to improved drinking water sources but did not meet the target on access to improved sanitation facilities. At the national level, the overwhelming majority of the region's countries (75%) achieved the drinking-water target, but just 45% of them met the MDG target on sanitation.



The region has demonstrated considerable success in expanding access to services in the past 25 years: access to drinking water is up from 85% in 1990 to almost 95% in 2015, while access to sanitation has risen from 67% to 83% and the gap between urban and rural areas has narrowed significantly. These coverage levels compare very favourably with the situation in other developing regions. Moreover, several of the region's countries are taking major strides to improve levels of urban wastewater treatment and in the self-financing of services, especially by the largest urban providers.

However, these coverage levels still mean that the region has almost 34 million people without access to improved drinking water sources, while 106 million people lack

improved sanitation facilities, of which 18 million have no option but that of open defecation. These aggregate indicators also conceal significant differences between and within countries. Deficits in service quality and coverage tend to disproportionately affect low-income segments (almost all of those without access to services fall within the two poorest quintiles of the income distribution), other vulnerable and disadvantaged groups (such as indigenous peoples) and rural areas (where drinking-water coverage is almost 14% lower than in urban areas, while sanitation coverage is 24% lower).

There are also grounds to believe that these estimates exaggerate the actual extent of achievements in the sector. For example, they do not reflect shortcomings in service quality (interruptions, water quality, disinfection, etc.), efficiency or sustainability, nor do they consider populations' preferences for specific technological solutions or appropriate technologies, or their ability to pay.

At the same time, attention is concentrated almost exclusively on drinking water and sanitation services, so that the sectoral priority is decoupled from the more general prerequisite of ensuring capacity for water resources management. Expanding coverage means increasing the use of a resource that is already subject to fierce competition in many river basins. This competition will further intensify in the future as a result of economic development and demographic growth. Many water sources—which are irreplaceable for service provision—are threatened by both point-source and diffuse pollution, illegal uses, unsustainable withdrawals, deforestation, other land-use changes and climate change. The expansion of services will also lead to an increase in wastewater discharges; one of the main causes of water pollution which has already acquired critical dimensions, threatening public health, other productive uses and ecosystems.

The MDGs will conclude at the end of 2015. For that reason, as an outcome of the United Nations Conference on Sustainable

Development (Rio+20), a process was launched in 2012 to set out the post-2015 development agenda. In the case of water, international discussions currently revolve around the proposed Sustainable Development Goal (SDG) 6 "Ensure availability and sustainable management of water and sanitation for all", which addresses many of the above-mentioned concerns and constraints of the MDGs. This goal is expressed in the form of six targets:

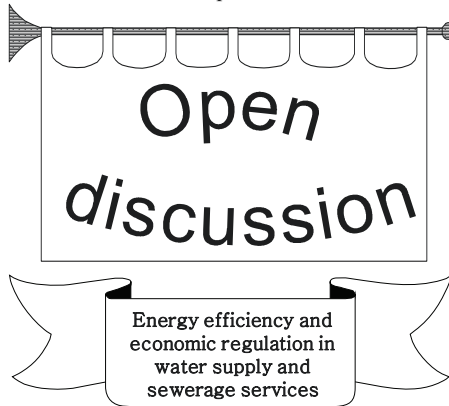
- Achieve universal and equitable access to safe and affordable drinking water for all.
- Achieve access to adequate and equitable sanitation and hygiene for all and end open defecation, paying special attention to the needs of women and girls and those in vulnerable situations.

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- Improve water quality by reducing pollution, eliminating dumping and minimizing release of hazardous chemicals and materials, halving the proportion of untreated wastewater, and substantially increasing recycling and safe reuse.

- Substantially increase water-use efficiency across all sectors and ensure sustainable withdrawals and supply of freshwater to address water scarcity and substantially reduce the number of people suffering from water scarcity.
- Implement integrated water resources management at all levels, including through transboundary cooperation.
- Protect and restore water-related ecosystems, including mountains, forests, wetlands, rivers, aquifers and lakes.



The study "*Eficiencia energética y regulación económica en los servicios de agua potable y alcantarillado*" (*Energy Efficiency and Economic Regulation in Drinking Water and Sewerage Services*) by Gustavo Ferro and Emilio Lentini (see Circular N° 42) sets out analysis and proposals for improving the energy efficiency of drinking water and sewerage service providers. Its main objective is to improve the understanding of energy efficiency problems in the sector, while a secondary aim is to propose courses of regulatory action to improve energy efficiency which comply with standards of economic rationality.

The economic and environmental benefits derived from improvements in the energy efficiency of drinking water supply and sewerage services have aroused heightened interest in implementing and improving policies and regulations. There is considerable potential for improving the energy efficiency of these services, with opportunities for savings on both the supply and demand sides.

Supply-side savings are essentially those made by the company management through a reduction in technical energy requirements thanks to the incorporation of more efficient equipment, better maintenance of existing equipment, changes in process technology, and the reduction of technical losses due to leakage and damage. On the other hand, quality requirements can raise energy demand per unit of output, while energy costs can be kept down by controlling consumption during peak periods and as a result of improvements in the commercial conditions under which electricity is supplied.

Demand-side savings largely refer to the energy that is saved by reducing water consumption by users (and the consequent drop in the production volume of service providers). The main factors that may influence consumer behaviours are the metering of water consumption and the proper treatment of tariffs, subsidies and taxes, along with changes in household equipment that are incentivized by tax measures and complemented by educational campaigns to reduce wastage.

Expenditure on electricity accounts for between 5% and 30% of service providers' total operating costs. The proportion of electricity consumed by the respective drinking water and sewerage services varies greatly between service providers, since this distribution depends on a range of operating conditions (coverage, intensity of pump use and treatment quality, among others).

A significant proportion of energy (particularly in water services) is consumed during transport, distribution and collection, and is particularly concentrated in the pumping function. As regards sewerage, the stage which consumes more electricity is that of wastewater treatment; sludge treatment and disposal is energy intensive, although energy can also be generated during this process.

In developed countries, potential supply-side savings amount to between 5% and 15% of total expenditure and may rise further under certain conditions. Demand-side savings can be even larger in some cases, although it is extremely difficult to quantify the impact in general terms, given the amount and the dispersion of data on end uses. In principle, if network losses of 10%-15% of water produced are deemed acceptable in developed countries, and losses three times this figure are commonplace in the countries of the region, then the margin for reducing water production (and its associated energy requirements) seems to be even greater than in the case of supply-side measures. The direct costs of water loss reduction programmes are acknowledged to be very high, although some savings in production capacity can delay the need for investment and should be weighed against said costs.

It is important to bear in mind that with energy efficiency programmes that impact both supply and demand, service providers run the risk of diminished sales, undermining their financial sustainability and consequently requiring tariff adjustments, even when the loss of revenue is partly offset by lower operating costs.

There are several reasons why energy efficiency levels may be less than desirable, either because of market failures or barriers. Market failures include information that is

unavailable, expensive, difficult to interpret or of poor quality; environmental externalities; externalities in innovation; failures in energy supply; failures in research and development; and liquidity constraints for the financing of equipment and installation upgrades. Market barriers include irreversibility and the option of delaying investment; the heterogeneity of energy consumers and savings that are lower than expected on an average basis; discount rates and failures in conduct.

These market failures and barriers justify public policies to promote energy efficiency in regulated activities. Such policies would include aspects such as the dissemination of information and labelling; prescriptive, performance and regulatory standards to influence behaviour, including monitoring and control of compliance; and financial and fiscal mechanisms (subsidies, tax exemptions, depreciation mechanisms, loans, etc.)

More specifically, the State could regulate the energy efficiency of utilities based on the following functions: establish behavioural rules for service providers, with targets and incentives; monitor the performance of regulated companies; set price levels and tariff structures with energy efficiency in mind; introduce a system of regulatory accounting with sufficient breakdown in the allocation of energy consumption; conduct management audits of service providers; develop human resources in energy efficiency; coordinate with other actors who have a shared interest in energy-efficiency initiatives relating to these services; and report on activities carried out in the sector and by the regulators to the relevant government authorities.

An order of priorities should be established for activities designed to improve the energy efficiency of services. For example, water leakage reduction should come before redesigning the system and installing new equipment; opportunities associated with supply-side measures should be coordinated with demand-side activities; cutting peak water demand would have a corresponding effect on peak energy demand; and micro-metering, combined with realistic tariffs can generate significant reductions in water consumption.

The main steps that may be taken to exert direct supply-side influence to enhance energy efficiency are as follows: reduction of leaks or technical losses in the network; redesign and modernization of pipe systems, pumps, motors, compressors, primary and secondary treatment and disinfection equipment; regeneration and reuse of wastewater, also avoiding the infiltration of groundwater and rainwater into the sewerage system; and energy audits that provide a thorough breakdown of electricity consumption for each production process.

The main demand-side initiatives for reducing drinking water consumption are: installing water-saving devices such as horizontal-axis washing machines, low-flow shower heads, tap aerators and ultra low-flush toilets; the application of voluntary or compulsory restrictions on drinking water consumption, including rules for household appliances and plumbing devices, and labelling; promoting gardening with native plant species that are able to survive on rain and local climate conditions in order to reduce the need for watering; and implementing incentives (rewards or penalties) so that users are motivated to adopt these initiatives.

It is advisable that these proposals be framed within a “avoid, shift, improve” approach so that both supply-side (avoid) and demand-side (shift) measures are complemented by a systemic and comprehensive vision of the sector (improve). Likewise, insofar as these initiatives aim to improve the overall efficiency of the system, some points are worth noting:

- The pursuit of synergies between supply and demand.
- The exchange of views, opinions and information between key actors, which should include large water users.
- The coordination of the energy, urban planning and land-management sectors, among others.

The viability of bringing energy-efficiency activities, projects and programmes to fruition requires the implementation of sound, effective and sustainable regulation. To achieve this goal, sufficient good-quality information will be needed. Appropriate indicators, the existence of a common terminology, and standardized accounting and comparative performance analysis form part of the basis for an effective regulation that will be capable of: setting performance targets; monitoring their implementation through data collection and analysis; including the goal of energy efficiency in the tariff structure and its values; conducting management audits of service providers in relation to energy efficiency; and coordinating activities and exchanging information with other interested parties.

Regulators require the compilation and use of indicators for comparative purposes. Based on various experiences, a set of indicators was proposed that regulators in Latin America and the Caribbean could use to characterize problems, prior to conducting energy audits of processes, subprocesses and equipment. These are, respectively, contextual indicators (on provision, losses, micro-metering, source, proportion of pumped or gravity-fed water, and wastewater treatment) and specific indicators (energy costs, energy costs as a proportion of the total, energy consumption,

unit cost of energy and greenhouse gas emissions). It is proposed that contextual indicators be measured at the service-provider and (if required) plant levels, and in the case of the proportion of pump or gravity-fed water, the process level (drinking water or sewerage). Conversely, it is suggested that specific indicators be recorded by year, cubic metre per year, persons served per year, customers served per year, at the service-provider, plant (where applicable), process, subprocess and equipment levels, insofar as is possible and reasonable.

Comparative performance analysis consists in seeking a benchmark reference to be used as a comparator or incentive. The process should be systematic and continuous. Progress is needed in formulating definitions, for which the above-mentioned indicators are useful. Variable conditions affecting different service providers may be partially isolated by comparing the same service providers over time and searching for service providers that have similar (topographic and environmental) constraints, so that comparisons are consistent.

The proposal consists in taking the two sets of indicators outlined above, and for those which are relevant, keeping records at the service-provider, plant and process or subprocess levels. As a result, it may be possible to determine better-, average- and worse-performance practices within a sample of service providers at the local and international level. The idea is to move forward initially with imputations, and subsequently carry out energy audits.

Regulators may engage in an array of activities to promote energy efficiency:

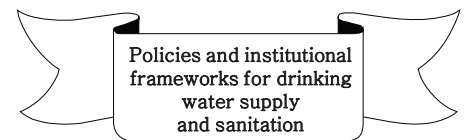
- On the supply side, they may set parameters, request audits and draft plans to reduce consumption, evaluate projects, promote repair and replacement programmes, offer tariff incentives, assess the savings obtained, and encourage the use of renewable energies.
- On the demand side, they may promote changes in user habits, educate and inform, support initiatives by large clients, facilitate the adoption of equipment for efficient water use, promote labelling, etc.

In tariff calculations in particular, starting from the premise that demand for drinking water is price-sensitive (for some specific uses, elasticity is much greater than for the most essential daily uses), a range of policies may be implemented. First, efforts may be made to replace service providers’ and clients’ equipment with water-saving devices, funded in different ways. A second set of measures aims to persuade customers to reduce their consumption (and for service providers to reduce output) by limiting losses and

consumption through taxes, charges and tariffs, designed to discourage wastage and to curb conspicuous consumption. Special consideration is required for non-residential customers that use water as an input.

The interdependence of the drinking water and sewerage sectors on the one hand, and the energy sector on the other, requires study and, potentially, their simultaneous coordination. To that end, institutional, regulatory, economic and informational barriers may need to be overcome.

Lastly, the study outlines a realistic programme of work for regulators in the countries of the region wishing to make changes in the interests of greater energy efficiency. There are a total of eight suggested components (diagnosis, energy audits of equipment, loss control, information and education, encouraging the spread of metering, rewards for savings and penalties for excessive consumption, standards for appliances and mandatory labelling) of varying degrees of difficulty, cost, relative speed of implementation and expected impact.



The second part of the collection of good practices identified in the study “*Políticas e institucionalidad en materia de agua potable y saneamiento en América Latina y el Caribe*” (*Policies and institutional frameworks for drinking water supply and sanitation in Latin America and the Caribbean*) by Franz Rojas (see Circular N° 42) is given below.

### Haiti

The reality of the sector demonstrates the benefits of intersectorality through the preparation of sectoral plans involving constant coordination between the main actors.

### Honduras

The methodology “Escuela y Casa Saludable” (Healthy School and Home, ESCASAL) was adopted in the developing neighbourhoods of Tegucigalpa, with a focus on making schoolchildren aware of hygiene concepts, rational water use and environmental protection, and passing these concepts on to other members of the family through their behaviour. This is a joint effort between the service provider, the Secretariat of Education and the parents’ association. The educational issue was complemented by the improvement of water supply and sanitation infrastructure in schools, with separate facilities for boys and girls, designed for privacy and comfort.



## Jamaica

A database has been set up with a geographical information system for wastewater treatment plants, thus enabling a comprehensive assessment of the situation. This provides the basis for the development of plans for the systematic improvement of infrastructure and effluent quality.

## Mexico

In a federal country, complementarity and synergy between different levels of government are essential, and this has been the case in Mexico for more than two decades. One of the most traditional programmes is Drinking Water, Sewerage and Sanitation in Urban Areas (APAZU), which funds projects in the sector. Under APAZU, criteria were established for the eligibility and combination of various resources, with percentages varying depending on the relative marginalization of the municipality and the component or service that needs to be prioritized. This relatively simple matrix-based arrangement allows for clarity and transparency in terms of the resources allocated.

## Nicaragua

Although a recent development, it is worth noting that various cooperation agencies have aligned their strategies and targets under a common programme, the Comprehensive Water and Human Sanitation Sector Programme (PISASH).

## Panama

The Joint Programme "Economic Governance in Water and Sanitation" helped expand water and sanitation coverage in the Ngöbe-Buglé Comarca, and secured broad community involvement under the precept that human rights should be exercised through criteria of equity and not only those of economic efficiency.



The goal of food self-sufficiency in the Cooperation Council for the Arab States of the Gulf

Berenice García Téllez, Senior Research Analyst at the King Abdullah Petroleum

Studies and Research Centre (KAPSARC) in Saudi Arabia, has contributed an article on "*The goal of food self-sufficiency of the countries of the Cooperation Council for the Arab States of the Gulf*" (Bahrain, Kuwait, Oman, Qatar, Saudi Arabia and the United Arab Emirates). KAPSARC is dedicated to researching energy economics, policy, technology and the environment. Its mandate is to advance the understanding of energy challenges and opportunities.

Water resources in the region are such that a sustainable, long-term supply is far from guaranteed. The situation has been exacerbated by attempts to ensure food security through policies designed to increase agricultural production, a strategy whose main purpose was to mitigate the risks associated with importing agricultural products from abroad. The policy also aimed to promote economic diversification through the investment of the proceeds of oil surpluses.

Since 1980, the countries of the region have established a system of subsidies designed to encourage farmers and investors to improve the agricultural production process through the adoption of new machinery and more advanced technology. Diesel for irrigation pumps was subsidized, while the extraction of well water was not subject to any kind of public tariff. By way of example, these policies resulted in a ton of wheat being sold locally for US\$ 100, while its actual production cost was US\$ 500.

The implementation of this policy was undoubtedly effective. In Saudi Arabia, the area of cultivated land increased from 15,000 hectares in 1975 to 1.1 million hectares in 2005. The proportion of Saudi nationals employed in the agricultural sector rose from 16% to 48%, representing 8% of the total workforce. During this period, the region reduced its dependence on foreign countries for the supply of cereals, especially wheat, which accounted for over half of total grain consumption. In fact, as a result of this policy, by 1990 the region had transformed itself into the world's sixth largest wheat exporter.

These policies also had repercussions for the region's water resources and led to the overuse of aquifers, which have been exploited to such an extent that today it is necessary to drill to a depth of 70 metres to find water. Moreover, by contrast with countries that enjoy greater precipitation, almost all agricultural crops in the region are irrigated. The overuse of water has also been driven by the rapid population growth and enhanced well-being that has ensued from strong economic growth. The response was to invest in desalination to mitigate water scarcity. However, the agricultural sector contributes less than 5% to GDP and alternative water resources, in the form of

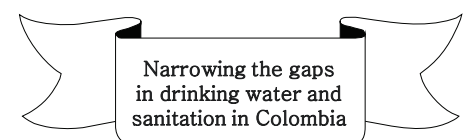
desalination, are not economically viable for large-scale agricultural production.

Water scarcity in the countries of the region forced a policy shift in the early twenty-first century. Some governments decided that cereal production (for example, wheat) be phased out, and set limits on agricultural land use. Unfortunately, this policy has not significantly reduced water consumption because farmers shifted from wheat production to fodder crops, which consume three times as much water per ton.

To relieve the pressure on water resources caused by agriculture, some countries have turned to international trade to satisfy their demand for agricultural products. Others have implemented policies aimed at stimulating investment in agricultural activities abroad. However, this policy carries the risk of potential conflict with the destination country, since the latter could place limits on exports. The consequences of such disputes could also burden investors with obligations to supply the local market with a certain percentage of production at regulated prices, below those offered on the international market, thereby undermining the economic interests of the strategy.

Alternatively, some countries have realized that systematically increasing the water supply is not a sustainable solution and are considering policies focused on limiting the demand for water and using water resources more efficiently (for example, encouraging recycling for irrigation and increasing tariffs for domestic use).

Pressure to take action will build during the next decade as agriculture in the region becomes progressively more energy- and water-intensive. Crops that require less water, improved irrigation technologies and an increase in pumping efficiency could temporarily relieve the situation. Even so, more will need to be done to ensure that the region has a sufficient water supply in the long term. Public policy options on the table include the valuation of water in line with its cost, the selection of better crops for production at local level, and understanding when it is better to turn to international trade for those products that are more water intensive. These issues form part of the research agenda of the KAPSARC on the water-energy nexus.



The following is an article by Jorge Martin Salinas Ramirez on "*Narrowing the gaps in drinking water and sanitation in Colombia*" (see Circular N° 34).

In the past 20 years, Colombia has undertaken major legal and political reforms to improve the coverage and quality of drinking water and sanitation services, coupled with the implementation of an efficient institutional framework of regulation, monitoring and control. These reforms have spurred progress in the large and medium-sized urban centres where 70% of the population lives, with total coverage standing at 97% for water supply services and 92% for sewerage services.

The sector has not developed to the same extent in urban centres with fewer than 10,000 inhabitants and in rural areas, which account for 75% of municipalities and about one third of the population. Coverage rates in these areas stand at 73% for water supply and 70% for sewerage. Only 8% of the rural population is connected to the drinking water network.

Aside from these lags in coverage and service quality, the entire country suffers from low levels of wastewater treatment, with just 44% of municipalities having treatment systems. Of the 74 cubic metres of wastewater that is generated per second in urban areas, only one third is treated.

There are many factors behind the uneven performance of these public services and the persistence of gaps, notably the gulf between macroeconomic and sectoral planning and the needs of the various regions, the dispersion of operators (which number close to 11,000 in rural areas and 1,500 in cities), the lack of transparency in the use of resources for operations and investment, local and regional political interference and operators' scant capacity in small and medium-sized populations. In rural areas, the institutional and legal system does not have the capacity to establish a presence through effective policies and the monitoring and control of indicators, or to implement investment and technical assistance projects. This has forced communities to forge partnerships in order to deliver these services, often without the appropriate know-how or the financial capacity required for long-term sustainability.

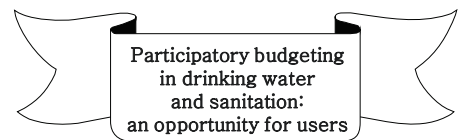
An initial attempt to reduce the number and the dispersion of operators and to boost their technical and financial capacity was launched in 2007 with the creation of Departmental Water Plans. This ambitious regionalization policy achieved some progress in formulating regional projects for the delivery and implementation of major infrastructure projects (see Circular N° 34 and 35); however, the PDA policy did not have any impact in reducing the number of operators, or in substantially improving the quality of services in urban centres with fewer than 10,000 inhabitants, and has since been sidelined in favour of targeting individual projects.

In October 2014, the government announced a policy of promoting access to drinking water and sanitation in rural areas, through the organization of structured schemes for service provision that would include health-promotion and disease-prevention programmes, investments in rural infrastructure, support for effective public-health and environmental management practices and the creation of a different monitoring and control system for small-scale service providers in keeping with their particular characteristics. The target is to increase the number of people benefiting from drinking water solutions by almost 1.8 million, and the number of beneficiaries of wastewater management by 2.5 million, with investment of US\$ 2.8 billion to 2024.

This rural policy tackles one of the problems facing the sector, but the following courses of action could provide a route towards a more comprehensive solution:

- Simplify the market structure by stepping up the regionalization and consolidation of markets, which in turn would reduce the number of service providers in urban municipalities with a population of fewer than 10,000, especially those with substandard coverage and quality indicators. This could involve modifying the legal framework so that regionalization is compulsory for national and regional authorities, as well as revisiting the Departmental Water Plans, adjusting their regulatory framework where necessary in accordance with lessons learned, reducing transaction costs of a political nature and scaling down bodies that have no added value; strengthening the functions of monitoring and control agencies so that they have the power to liquidate inefficient operators and replacing them with regional schemes, as well as empowering the regulatory body to deal with mergers and order compulsory liquidations in cases of inefficiency; reinforcing the legal framework so that only specialized operators are able to provide these public services, which could mean setting requirements for market entry and strengthening regulations so as to establish criteria for efficient operation and commercial and financial management by service providers, thereby ensuring that the sustainability of the supply system is viable in the long term.
- Protect investment in the sector by coordinating various funding sources for regional and local projects, organized at the level of the river basin, and by strengthening instruments for combating corruption. Achieving this goal might involve drafting a regulation to define clear and flexible procedures in preparing the terms of reference, the selection, implementation and supervision of building and operating contracts;

strengthening regional and municipal citizen oversight of the use of resources, which would necessitate the training and payment of overseers to ensure their suitability and impartiality; improving the recording of transactions associated with each investment, coupled with swift and reliable audits that are remunerated and reported to the ministry and the offices of the Comptroller General, the Public Prosecutor and the Inspector General; enhancing the functions of the sectoral superintendency to ensure effective tariff control over investment so that resources are used in accordance with an investment plan submitted by the operator; strengthening the sanctions regime with severe penalties and forcing offending parties to reimburse all resources they may have wrongfully appropriated or whose proper investment they have impeded; and the adoption of schemes for good corporate governance by regional and municipal State-owned, private and mixed operators, with a view to the efficient management and follow-up of investments in these services.



Below we present an article by Agustina Mohando and Anna Berti Suman, entitled "*Participatory budgeting in drinking water and sanitation: an opportunity for users*".

Porto Alegre, the capital of the State of Rio Grande do Sul in Brazil, is noted for having the most efficient drinking water and sanitation services in the area, not just in terms of coverage, wastewater treatment, and the reduction of losses and environmental impacts, but also because it covers all of its costs in spite of having the lowest tariff.

Until 1961, services were provided by a municipal department, which subsequently became an autonomous municipal company, the Municipal Department of Water and Sewerage (DMAE). The key element in the success of this new company was precisely its financial and administrative independence from the municipal government, which retains only a steering capacity in the form of policy directives and regulations. Economic autonomy was achieved by replacing tariffs based on property value with those based on consumption, while administrative autonomy was guaranteed through the creation of an independent deliberative council in charge of corporate decision-making.

The company is also remarkable for its deliberative mechanism, in which the municipal budget council exercises social control over its policies. Only financial

decisions are subject to this type of control, since the “participatory” scope of the mechanism applies only to the budgetary process. The system is founded upon three principles: all citizens have the right to participate in council meetings, although only registered residents may vote; the process is governed by a combination of direct and representative democracy; and investments are decided through a participatory mechanism.

The “participatory budgeting” process is structured into two rounds of assemblies. Before the first, preparatory meetings provide individuals with the opportunity to review the previous year’s budget, express their concerns and receive information about the topics under discussion. Between assemblies, there is an interim phase so that a list of priorities can be prepared, which will then be put to a vote. During the second round, the representatives of 16 budget districts are elected by the budget district forum and the municipal budget council. At this stage, priorities are discussed and the budget is determined in accordance with a “criterion of need”. Budget allocation concludes with the inclusion of technical criteria, adapting the budget to quantitative indicators such as the population of different geographical areas.

The process enjoys a high participation rate and is not identified with any particular social class. Groups from different socioeconomic backgrounds work towards common objectives. It is a self-sustaining process, since the more people become involved, the greater the popularity of participation among citizens. Moreover, the process is not confined to budgetary aspects, since the implementation of financed projects is also subject to citizen oversight in the form of *ad hoc* committees. Lastly, citizens are kept abreast of the debate on the management of services, which creates a double commitment: the service provider accepts citizens’ control by providing them with the required information, while citizens undertake to give it serious consideration and thus discharge their duties more conscientiously.

In 1989, DMAE services were concentrated in the central part of the municipality, but with the launch of the participation process it began to invest in expansion. Inclusion thus became another feature of the Porto Alegre system. Another decisive factor in the company’s success is that of environmental, financial and technological sustainability in the planning of strategies, as well as reliability in service provision. A high percentage of tariff income, around 70%, is reinvested in improving the system, while other investments have enabled training grants for employees.

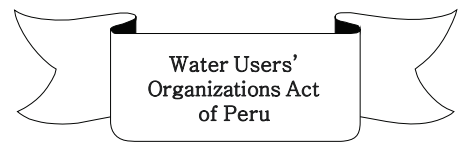
The participatory approach is advantageous for councillors as well as for the company:

information received from the community means that planning takes users’ preferences into account. Citizens are more willing to pay for the service because they see the company as their own. All of these factors explain why, some years ago, the municipality was identified as one of those with the greatest potential for attracting investments.

Two questions stand out in relation to the initiative. Can the process be successfully applied to larger communities? And how can citizens’ commitment be sustained over time? It must be considered that with a larger number of inhabitants, the costs incurred in training participants may increase to detrimental levels, leaving two options: either citizens are trained to understand “technical” issues or, in the absence of such training, they will need somebody to “translate” their requirements into viable proposals, which requires constant oversight by the government and social organizations. Both choices are costly in time and resources.

There are also worries over the future sustainability of the system. One concern relates to how people can continue to participate without being tempted to exploit their position for self-interest. Another refers to the risk that there are insufficient incentives for long-term participation, given that places on the district forums and the municipal budget council are honorary. In fact, members of the community —unlike the paid elected members— tend to be concerned only about short-term goals. On the other hand, if they were paid there is the possibility that they would act like “politicians”, which might discourage genuine public participation and perhaps give rise to bad habits and practices.

The true sense of participation resides somewhere within these questions, in which two sides of the same coin can be discerned: on the one hand, expanding civic commitment is an opportunity for the improvement of society; on the other, the risk of endowing (untrained) citizens with decision-making responsibilities will always cause concern to politicians.



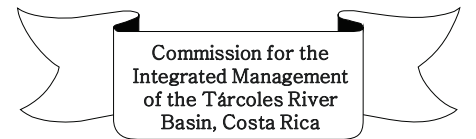
On 19 January 2014, Peru passed the *Water Users’ Organizations Act* (Law N° 30157) which governs the formation and operation of these organizations.

Water users’ organizations are made up of individuals and legal entities that channel the participation of their members into the multisectoral management and sustainable use of water resources. They are stable, not-for-profit institutions whose activities in

managing hydraulic infrastructure and water resources are in the public interest.

Water users are organized into users’ boards, commissions and committees. Users’ committees are the basic organizational unit, and make up the users’ commissions, which in turn form part of the users’ boards. The latter are legal entities that are set up to manage a shared water system. Each user has the right to one vote.

The National Water Authority (ANA) has supervisory and control powers and the authority to impose penalties in respect of the following functions of users’ boards, when such actions are in the public interest: compliance with the Hydraulic Infrastructure Operation, Maintenance and Development Plan, the Multi-Year Investment Plan and other technical instruments; the application of tariffs and the collection and transfer of economic compensation; distribution of water in accordance with water use rights; and the auditing of their financial statements and management reports.

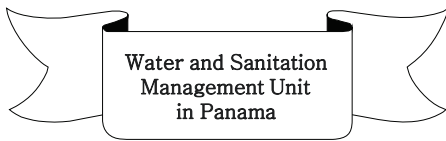


On 18 February 2014, the Ministry of the Environment and Energy (MINAE) of Costa Rica issued Decree N° 38071, thereby creating the *Commission for the Integrated Management of the Tárcoles River Basin*. The aim of this agency is to manage aspects of coordination, planning, protection and restoration through the joint design and construction of viable technological solutions, with a view to achieving sustainable development, improved living standards, and the protection of natural resources and biodiversity in the territory covered by the river basin. The Commission’s activities will be based on the technical proposal of policy guidelines for comprehensive river basin management and the exchange of experiences and knowledge between entities and actors through coordination and shared advice. Its primary goal is to coordinate the respective abilities of its constituent members with a view to the restoration and integrated management of the river basin.

The Commission comprises the representatives of: MINAE through the National System of Conservation Areas, which it chairs, the Ministry of Agriculture, the Ministry of Health, the national power company Compañía Nacional de Fuerza y Luz, the National Service for Groundwater, Irrigation and Drainage (SENARA), three universities, municipalities, non-governmental and local organizations, and the Ombudsman’s Office, which will participate in the capacity of public prosecutor.



The functions of the Commission are as follows: provide advisory services, participate in formulating policy guidelines on watershed management; identify coordination needs by order of priority; promote the creation of an information system for the exchange of experiences at the national and regional levels; devise and contribute specialized technical criteria in respect of watershed management activities; analyse and support institutional, municipal, communal and private proposals aimed at the comprehensive management of the river basin; participate as a member of the national watershed network; disseminate the progress achieved in the management of the watershed; foster agreements with international organizations and safeguard their proper implementation; and prepare technical progress reports as requested by courts and administrative bodies.



It is estimated that more than 34% of the population of Panama does not have 24-hour access to drinking water, while more than 300,000 households use latrines. The government has made it a priority to address these problems through the implementation of the 100/0 Basic Health Plan, designed to provide the entire country with 24-hour-a-day drinking water and to eliminate latrines nationwide by building hygienic bathrooms.

Pursuant to Executive Decree N° 1221, issued on 3 July 2014, the government created the **Water and Sanitation Management Unit** as part of the Secretariat of Presidential Goals. It will be responsible for organizing the Basic Health Plan by establishing the technical guidelines required for its implementation in the area of drinking water infrastructure, sewerage and latrines.



Further to the agreement between ECLAC and the Ministry of Social Development of Chile, the Latin American and Caribbean Institute for Economic and Social Planning (ILPES) organized the course "**Aspectos Estratégicos del Riego**" (Strategic Aspects of Irrigation)

(Santiago, Chile, 13 to 17 April 2015). Its purpose was to contribute to strengthening the National Investment System of Chile by training public officials in the social assessment of projects. Among the issues addressed were: hydrology, climate change, integrated water resources management, drought risk management, simulation models for irrigation, legal aspects of irrigation, aquifer recharge and irrigation methods for small-scale agriculture.



Some websites worth visiting for information on water-related issues are listed below:

- The **Energy Efficiency Working Group** of the National Association of Water and Sanitation Companies (ANEAS) of Mexico aims to improve the energy performance of water and sanitation operators, and to reduce costs (<http://www.aneas.com.mx>).
- An interesting document on "**Lineamientos de Política de Gestión del Riesgo de Desastres en la prestación de los servicios públicos de acueducto, alcantarillado y aseo**" (*Policy Guidelines for Disaster Risk Management in the provision of water, sewerage and waste disposal services*) is available on the website of the Ministry of Housing, Cities and Territories of Colombia (<http://www.minvivienda.gov.co>).
- The **Reconquista River Basin Committee** (COMIREC) was established to analyse and address problems relating to the pollution of the Reconquista River in the Province of Buenos Aires, Argentina (<http://www.comirec.gba.gov.ar>).
- The Organization for Economic Cooperation and Development (OECD) published a report entitled "**Water and Cities: Ensuring Sustainable Futures**", which analyses urban water management challenges in OECD countries, and national and local policy responses regarding water-risk exposure, urban infrastructures and dynamics, and institutional and governance systems (<http://www.oecd.org>).
- The purpose of [aysagperu.blogspot.com](http://aysagperu.blogspot.com) is to provide a "virtual window" for sharing knowledge and information about issues and events relating to drinking water

supply and sanitation services in Peru and other countries.

- The **Barbados Water Authority** (BWA) is responsible for supplying the island with drinking water, the provision of wastewater treatment and disposal services, as well as the monitoring, assessment, control and protection of water resources (<http://barbadoswaterauthority.com>).
- **Revista de Gestión Pública** recently published an interesting article entitled "**Intermunicipalidad como un Arreglo Institucional Emergente: El Caso del Suministro de Agua en la Zona Metropolitana de Aguascalientes, México**" (*Intermunicipality as an Emergent Institutional Arrangement: the Case of Water Supply in the Metropolitan Area of Aguascalientes, Mexico*) (<http://www.revistadegestionpublica.cl>).
- The mission of the **Association of Regional Autonomous and Sustainable Development Corporations** (ASOCARS) of Colombia is to coordinate and represent Regional Autonomous and Sustainable Development Corporations before various authorities, acting as a spokesperson on matters of interest for the performance of their functions, for the benefit of environmental sustainability (<http://www.asocars.org.co>).
- The AQUASTAT database of the Food and Agriculture Organization of the United Nations (FAO) has a **wastewater section**, which provides data on the availability and use of municipal wastewater (<http://www.fao.org>).
- The project **Payment for Environmental Services in the Yaque del Norte River Basin** (PSA-CYN) in the Dominican Republic (<http://coraasan.gob.do>) is being carried out under an inter-institutional cooperation agreement between the Ministry of the Environment and Natural Resources and the companies Empresa de Generación Hidroeléctrica Dominicana and Corporación del Acueducto y Alcantarillado de Santiago (CORAASAN), with the technical support of the German Agency for International Cooperation (GIZ).
- **Montserrat Utilities Ltd.** was formed through the merger of the existing electricity and water utilities. It became an umbrella company for the predecessor organizations, Montserrat Electricity Services and Montserrat Water Authority, which continue to be responsible for electricity and water on Montserrat (<http://www.mul.ms>).
- The report "**La incertidumbre de los recursos hídricos y sus riesgos frente al**

- **cambio climático: herramientas para los tomadores de decisiones de los sectores público y privado**” (*The uncertainty of water resources and climate change risks: tools for public- and private-sector decision makers*) (LC/L.4030, May 2015, *Seminarios y Conferencias Series* N° 82), brings together the studies that were presented at the seminar organized by ECLAC on this subject (see Circular N° 42) (<http://www.cepal.org>).
- The mission of **Water Authority** of Cayman Islands is to ensure that the population has access to drinking water supply; to regulate other entities that are licensed to provide water supplies; to protect and develop groundwater resources; to provide for the collection, treatment and disposal of sewage; and to operate with financial self-sufficiency (<http://www.waterauthority.ky>).
- The General Department of Water (DGA) of Chile has published a new edition of its four-monthly review **Sendas del Agua** (<http://www.dga.cl>).
- The Laboratory for Intelligent Integrated Networks of Engineering Systems (LIINES) has presented a new **engineering model describing how the energy-water nexus works** (<https://li2nes.wordpress.com>). It uses bond graphs to develop models that characterize the salient transmissions of matter and energy in and between the electricity, water and wastewater systems.
- Issue 18 of **Revista de Regulación**, published by the Regulatory Commission for Drinking Water and Basic Sanitation (CRA) of Colombia, sets out the new tariff framework for drinking water supply and sewerage services (<http://www.cra.gov.co>).
- The **Caribbean Weather Impacts Group** (CARIWIG) activities concentrate on the provision of locally relevant information on the weather impacts of climate change for a range of time horizons, training for stakeholder technical staff in the use of such weather information, the development of support networks within the region and development of partnerships with United Kingdom research institutes specializing in the management of a range of hazards and impacts (<http://www.cariwig.org>).
- In Belize, the **Ministry of Natural Resources and Agriculture** is a key agency responsible for the management of the country’s natural resources and agricultural industry (<http://www.mnra.gov.bz>). Its Hydrology Unit is responsible for data management, planning, water allocation, water quality protection, technical assistance and water conservation.
- The **National Hydraulics Institute** (INH) of Chile is an organization devoted to applied research in hydraulics, which disseminates requirements and knowledge for optimizing the use of water resources at the national level (<http://www.inh.cl>).
- “**Análisis, prevención y resolución de conflictos por el agua en América Latina y el Caribe**” (*Analysis, Prevention and Resolution of Water Conflicts in Latin America and the Caribbean*) (*Natural Resources and Infrastructure Series* N° 171, LC/L.3991, April 2015) by Liber Martín and Juan Bautista Justo. Conflicts over water in Latin America and the Caribbean have proliferated in recent years, reaching high levels of complexity and seriously impacting economies, political spheres, social stability, populations and the environment. This study aims to provide a conceptual framework for the analysis of these conflicts, and identifies shortcomings in national systems of water governance. These weaknesses are one of the main causes of water conflicts in the region, whose prevention and resolution is beyond the capacity of existing water management systems. In order to gradually overcome these deficiencies, the study proposes a set of public policies, whose common denominator is a human rights-based approach to water resources, and, accordingly, explores themes such as the human right to water and sanitation, intergenerational equity, access to information, the prior, free, informed consent of communities and integrated water resources management.

## Publications



Recent publications of the Natural Resources and Infrastructure Division on water resources management and provision of drinking water supply and sanitation services:

The publications of the Natural Resources and Infrastructure Division are available in two formats: (i) electronic files (PDF) which can be downloaded from <http://www.eclac.org/drmi> or requested from [Caridad.CANALES@cepal.org](mailto:Caridad.CANALES@cepal.org); and (ii) printed (hard) copies which should be requested from the Publications and Web Services Division (either by e-mail to [publications@cepal.org](mailto:publications@cepal.org) or by mail to ECLAC Publications, Casilla 179-D, Santiago, Chile).

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