

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



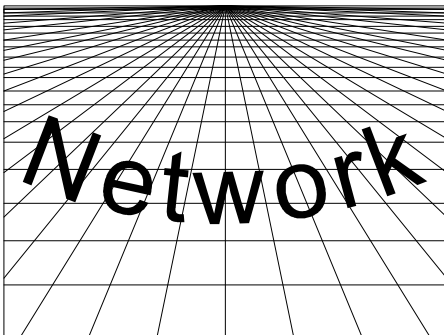
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The mining industry currently plays a key role in the region's economies; and water is a vital element in many of the stages of the industry's production chain. Nonetheless, water utilization is relatively low in the mining sector: depending on the country, water used in mining activities represents between 2% and 8% of total withdrawals, compared to irrigated agriculture which accounts for about 70% of water use. Nonetheless, water use in mining activities is becoming increasingly conflictive. Why?



- Water use in mining activities is generally concentrated in a small number of river basins where mineral deposits are located. In these zones it tends to be the predominant use, accounting for over 40% of total water withdrawals. This makes mining a major competitor for water users already established in the river basins, as well as for potential future uses.
- Disputes with existing users are aggravated by the relative weakness of systems for protecting customary uses. In many cases, a large proportion of agricultural and other uses takes place without any water rights or permits that are regularized or recorded in any public registry; and their characteristics are difficult to ascertain. This lack of identification makes it difficult to protect existing rights and uses.
- The mining industry is generally identified as a source of pollution. Although procedures exist to minimize its environmental impact, in many cases

environmental standards are not properly enforced. Some incidents of pollution have damaged the reputation of the mining industry; and some of the environmental impacts of mining activity can persist long after the offending mines have been closed.

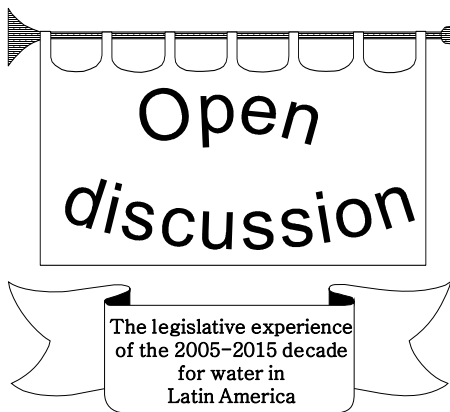
- The location of many mineral deposits in areas of water scarcity (frequently Andean desert zones owing to latitude and altitude). A large proportion of mining activity takes place in river basins that are already overexploited and face extremely critical conditions in terms of water availability.
- A key feature of water use in the mining industry is the large proportion of consumptive use. In non-mechanized irrigation, for example, only part of the water withdrawn from a water source — perhaps 30% — is consumed (evapotranspiration), in the sense of reducing the availability of water for downstream users. The water that is not consumed (the return flow or surplus) returns to the water system either directly (as surface run-off) or indirectly (through groundwater); so it can be used downstream for other uses and by other users. In the mining industry, however, many techniques are applied to maximize the recirculation of water and use it more efficiently. This results in the return flow (liquid mineral effluents) having fewer possibilities for (re-)use by other users downstream. Therefore, water withdrawal by the mining industry has a greater impact on downstream availability than withdrawals intended for other uses.
- Mining activity also alters the river basin in which it operates (elimination or removal of plant cover, diversion or damming of rivers, removal of glaciers, modification of topography, among others). All of this has repercussions on the quantity and quality of run-off and, consequently, on downstream uses and users, and on the risks associated with the environmental hazards caused by mining.

- Mining activity generally tends to be located at the upper part of river basins, precisely where surface water bodies are formed and in aquifers recharge zones. This strategic location means that any impacts, in terms of the quantity and quality of water and associated ecosystems, have the potential to affect all downstream uses.

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As noted in the recent publication "*Hacia una nueva gobernanza de los recursos naturales en América Latina y el Caribe*" (*Towards a new governance of natural resources in Latin America and the Caribbean*) (LC/G.2679-P) by Hugo Altomonte and Ricardo Sánchez, the former Chief and Officer in Charge of the Natural Resources and Infrastructure Division of ECLAC, respectively, the proliferation and increasing judicialization of conflicts arising from extractive projects often reveal the weakness of State policies, and a lack of institutional capacity and expeditious compensation and settlement mechanisms, which can give rise to various abuses. At the same time, in many cases, specific groups may exploit these shortcomings to turn these conflicts to their advantage. These problems are among the key reasons why a new natural resource governance paradigm is needed.



The Natural Resources and Infrastructure Division has published a document titled “*La experiencia legislativa del decenio 2005-2015 en materia de aguas en América Latina*” (*The legislative experience of the 2005-2015 Decade for Water in Latin America*) by Antonio Embid and Liber Martín (see Circular No. 44), which analyses the new water laws passed in Latin America in 2005-2015 (Argentina, Bolivarian Republic of Venezuela, Ecuador, Honduras, Nicaragua, Paraguay and Peru).

Water laws in Latin America have developed in very different ways; but in most cases they are rooted in autochthonous or pre-Hispanic rules and, after the conquest, in the Laws of the Indies and Spanish law. After the region’s countries gained their independence, the substantive legislation on water gradually started to be combined with the incipient legislation of the recently created countries, in what has been referred to as an intermediate period. The Spanish Water Acts of 1866-1879 were a landmark in this evolution, having been projected, and in some cases transposed, into the legislation of many countries, such as in the Mendoza Water Act (Argentina) of 1884 or the Water Code of Peru of 1902.

In the mid-twentieth century, the agrarian reform movement had a major impact on several water laws, such as the Water Code of Chile of 1967, the General Water Law of Peru of 1969 and a number of other water laws that were sanctioned during this period, including the 1972 Water Law of Ecuador, the Water Code of Uruguay of 1978, and the National Code of Renewable Natural Resources and Environmental Protection of Colombia of 1974. The latter two are still in force today.

In the latter part of the twentieth century, under neoliberal influence as expressed in the Washington Consensus, numerous changes occurred in Latin America, particularly in terms of reform of the State, privatization, and the regulation and concessions of public utilities. The Water Code of Chile of 1981 is the foremost expression of this reformist trend in the water domain; and it was quickly used as a model to be replicated by other countries in the region, such as Peru (albeit ultimately

unsuccessfully). Important laws passed during this stage included the National Water Law of Mexico of 1992 and the Water Law of Brazil of 1997.

In this period, the countries also signed several foreign investment protection agreements, which, without directly impacting on water laws, did affect water allocation, services, regulatory frameworks, political decisions and dispute settlements, generating a phenomenon of regulatory “chill” (see Circulars Nos. 26, 32 and 33). The certain threat of cases being brought before international arbitration tribunals —such as the International Centre for Settlement of Investment Disputes (ICSID)— would henceforth be a constant presence in the region, obstructing legislative and economic reforms; and would be used as an instrument to lobby for better bargaining conditions with the countries that signed the commitments in question.

The reaction to this trend was quick to appear, not only in several water statutes but also in the reformed constitutions of some of the region’s countries, including Uruguay (2004), Ecuador (2008) and the Plurinational State of Bolivia (2009). These not only define water as belonging to the public domain and recognize access to water as a human right, but also expressly prohibit its privatization, and in particular the privatization of drinking water and sanitation services. All of this is tempered by the wide variety of meanings and scopes accorded to the concept of “privatization” in the different national contexts. The key example is currently the indefinite postponement of voting on the bill to comprehensively reform the Water Law of Mexico in 2015, precisely because it is considered to have an inherent privatizing bias.

The reform cycle that began in 2007, after nearly a decade without a new water law in the region, is generally driven by a concern to introduce a social and environmental dimension, in line with international trends. This had hitherto been subordinated in many aspects of the old laws to a predominantly economic paradigm that viewed water as a factor of production or resource, whose diverse use had to be regulated. The pre-eminence of the economic dimension as a basic condition for investment, is maintained in the new statutes in the form of water rights, permits and concessions; but it has started to be restricted by the inclusion of the environmental and social dimension, the definition of which often generates conflicts both for countries and society at large.

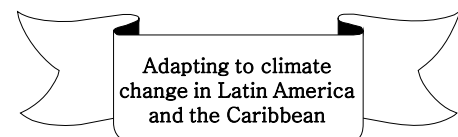
In recent decades, the influence of international law has been increasing. Examples include international waterway law, with the precedent of the pulp mills on the Uruguay River (Argentina and Uruguay) for

example; and the landmark signing of the emblematic agreement on the Guarani Aquifer of 2010, along with international human rights law and international law on the protection of investments, in their respective jurisdictions. Overall, this regulatory system imposes increasing constraints both on the profiles of regulation and on its application and interpretation in domestic law.

Water law reforms have been quite frequent in recent times; and there have been many more attempts. Some countries have introduced wholesale reforms or new laws; and there have also been many partial reforms. Some of these have been very significant, such as the partial reform of the Water Code of Chile in 2005, reforms to the National Water Law of Mexico in 2004, 2008 and 2013, and in Uruguay, the constitutional reform in 2004 and Law No. 18.610 of 2009 on the Guiding Principles of the National Water Policy. In Argentina, several provinces updated or reformed their laws, including Córdoba in 2006 and La Pampa in 2010.

The drivers of this reformist movement are the multiple factors that have changed the basic conditions underlying the dynamic of these previously broadly stable legal frameworks. Factors such as intensive use, demography, urbanization, technology, depletion, pollution, conflicts and climate change, among others, have created a diverse, critical and a more complex reality for the management and operation of water resources today, than in the previous two centuries—precisely when most of the laws currently still in force were conceived and passed, and, given their nature, will continue to operate in the future.

The reformist movement in the region has intensified over the last decade. It seems clear that, for the above reasons, recently passed laws will not last as long as their predecessors; in other words, the increased pressure on those laws will likely result in a process of revision, amendment and reform, possibly not permanently, but more frequently than in the previous epochs. Clearly, everything will depend on how constitutional, legislative and regulatory levels are articulated in each country. In other words, how rigid the constitutional and legal provisions are in responding to the demands for change or adaptation through the regulatory channels. This entails striking a balance between many factors and will vary considerably from country to country.



The Sustainable Development and Human Settlements Division of ECLAC published a

study by Graciela Magrin titled “*Adaptación al cambio climático en América Latina y el Caribe*” (*Adapting to climate change in Latin America and the Caribbean*) (LC/W.692, December 2015).

The Latin America and the Caribbean region is home to unique ecosystems and great biodiversity. Crop and livestock production and bio-energy cropping are burgeoning, largely thanks to the expansion of agricultural frontiers and deforestation. Land use and changes in plant cover are the main drivers of regional environmental change, which affects ecosystems and biodiversity and causes the physical and chemical degradation of soils. Poverty and inequality are declining slowly, but there is still a high and persistent level of poverty in most countries, despite the economic growth of the last decade. Highly heterogeneous socioeconomic development and deeply unequal income distribution are factors that accentuate vulnerability to weather conditions.

Over the last few years, most of the region has experienced a substantial rise in temperatures and significant retreat of glaciers, most likely associated with global warming. Precipitation levels have risen in the south-eastern portion of South America, parts of the Plurinational State of Bolivia, Ecuador, and north-eastern Peru; while they have declined in north-eastern Brazil, part of Central America, the central-southern part of Chile, southern Peru and Mexico. In Central America, the rainy season has been starting later than ever recorded before. Throughout the region, there has been a significant increase in the occurrence and intensity of extreme weather events, particularly very heavy rainfall that has caused flooding and landslides, hurricanes of great intensity and hot temperature extremes.

By the end of this century, temperatures are expected to have risen by 2.5°C in Central America, with 10% less rainfall and a reduction in summer precipitations. Average temperatures in South America could increase by 4°C with a reduction in rainfall in the tropical region and increases (15%-20%) in the south-east. The frequency of hotter-than-average days and nights and intense rainfall periods is also expected to increase.

Climate change will have a major impact on the region’s countries, given their economic dependence on agriculture and natural resources, the weak adaptive capacity of large segments of the population, and the geographical vulnerability of some countries. Despite uncertainties and spatial variability, agricultural productivity in the south-eastern part of South America is expected to increase slightly, or at least hold steady, until the middle of this century or later. In the central region of Chile and centre-west of Argentina,

losses in productivity are expected, but these should not affect food security. In north-eastern Brazil, however, part of the Andean section and Central America, climate change is expected to affect crop yields and local economies, and compromise food security.

Changes are also expected in the altitude and latitudes of zones that are optimal for cultivating important crops. This could also lead to an increase in diseases. In addition, prices of raw materials are expected to rise, which would benefit some countries but harm others, particularly the poorest sectors of the population. In the future, water supply vulnerability can be expected in semiarid zones and tropical Andes. This could be exacerbated by glacial retreat, lower rates of precipitation and increased evapotranspiration in semiarid zones. This scenario would have a significant effect on water availability for food production and other uses.

This panorama will call for planned actions to adapt to the environmental changes associated not only with climate change and extreme weather events, but also with changes in land use and the properties of natural resources to sustain human and natural systems. Owing to its socioeconomic characteristics, which are compounded by a significant deficit in infrastructure development, the region faces major challenges in achieving environmental sustainability and in adapting to climate change.

Adaptation measures need to span a wide range of options that include physical, environmental, social, institutional, informational and human resource training requirements, as well as the need to engage the private sector in the adaptation process. In the region, when planning interventions to reduce climate change vulnerability, the focus is frequently on alternatives aimed specifically at reducing the impacts of adverse weather events. These include technological measures (water conservation, more efficient water use and efficient irrigation systems); changes in habits (use of alternative crops); infrastructure (construction of dams and defences) and risk transfer (for example, insurance policies). However, measures that enhance adaptive capacity and reduce the underlying vulnerability stemming from socioeconomic and institutional factors are often ignored.

In recent years, various adaptation alternatives have been suggested, based on ecosystems (integrated water resources management and payment for environmental services) which offer a more holistic vision of the climate problem. These make it possible to include adaptation and mitigation options and to create and strengthen the adaptive capacity of communities, foster ecosystem resilience and promote sustainable development. Although these options seem highly

promising for the region, experience and proven results are, as yet, insufficient to be able to objectively evaluate the social consequences of this type of initiatives. It is therefore a good time to carefully analyse the potential collateral effects of each measure, to avoid undesired conflicts.

When planning adaptation, it is important to make a detailed analysis of the relevant opportunities and constraints, along with the additional benefits that the measures could provide. The opportunities are the factors that facilitate the implementation of alternatives such as awareness raising initiatives, the availability of risk assessment tools, human and financial capacities to implement the initiatives, good governance and innovation capacity. The more such factors are available, the greater the chances of success.

Nonetheless, there are constraints and restrictions that hinder or impede adaptation possibilities. Several constraints or barriers identified in the region stem from a lack of information and knowledge. There are also economic and financial, social and cultural, and governance and institutional constraints. In Latin America and the Caribbean, the implementation of adaptation measures is often hindered by access to resources, landholding, insufficient authority available to the institutions responsible for climate issues, institutional weakness and rigidity, scant coordination and interaction between and within public and private institutions, lack of leadership, continual changes in key personnel, interagency competition for available funds, disagreements between technical experts and institutions that work on issues related to adaptation and mitigation, and the lack of contact with personnel responsible for international negotiations.

Other constraints impede possibilities for adaptation using conventional alternatives, in other words making increased use of actions that are normally undertaken to cope with adverse weather conditions. The disappearance of the glaciers in the Andes, or the intensification of droughts in water-stressed zones, could require transformative adaptation actions to deal with the problem, entailing changes in customs or habits.

The choice of adaptation measures requires a full and thorough evaluation of the advantages and disadvantages of each alternative, taking into account the potential conflicts of interest between sectors and interactions with other policies. Multi-criteria evaluations that deploy economic, social and environmental factors to judge the value of an adaptation alternative are more complete and less prone to errors that lead to maladaptation, than cost-benefit evaluations that only take account of the economic advantages of the alternatives in question.

The countries of the region have made headway mainstreaming environmental protection in decision-making processes, particularly in terms of environmental institutions and legislation; however, difficulties remain in effectively incorporating environmental issues in the relevant public policies. One of the main challenges of the climate agenda in the agriculture and forestry sector will be to coordinate climate policies with development, land management and sectoral policies. Today, although there are several laws associated with climate issues, there are major difficulties in really implementing and monitoring them. In addition, some countries display significant contradictions between policies that regulate land use and incentives for increasing productivity.

The great transformation that the region is undergoing requires policies and interventions that are planned, consistent, non-contradictory, and in accordance with development objectives. It is important to achieve a holistic vision of the problem, take advantage of capacities developed for other purposes (such as disaster risk management), connecting the climate issue to development actions, promoting environmental management and planning land use. Effective governments and institutions play a key role in facilitating planning and implementation, and they represent the main opportunity or constraint for adaptation. Governments need to be adequately informed, evaluate the feasibility of the interventions, and decide for themselves (according to the specific context of each particular situation) avoiding pressures that generate resistance and mistrust and slow down action. In all cases it is important to study and adequately understand the interactions and constraints of the climate change-development nexus, since government decisions and actions tend to be wide-ranging and encompass more than one objective, including climate change.



The publication “*Nuestra agua, ¿de dónde viene y para dónde va?*” (*Our water, where does it come from and where does it go?*) by

Ernesto Guhl, contrasts Latin America’s water abundance with the panorama of global shortage. It highlights the importance of using this comparative advantage sustainably to foster development, well-being and equity, and it proposes a new form of water management, aimed at making territories more sustainable. These ideas are then applied to the specific case of the city and region of Bogota, illustrating the changes and strategies needed to apply them successfully.

The study analyses how modes of water management have developed through time, in response to population growth and increasing requirements generated by rising living standards, and the natural and technical capacities available to satisfy them. It also describes technological progress, and how, throughout the process, water management has developed from an essentially technical matter, to become a strategic domain with strong socioeconomic and political characteristics, covering increasingly extensive territories. It has also become increasingly complex, stakeholder-heavy and uncertain, requiring an innovative, systematic and forward-looking form of management instead of the traditional linear and reactive vision.

The foregoing analysis clearly reveals the urgent need to transform the current relationship between society and water, which undervalues the latter’s vital importance and fails to protect its quality. A new relationship must take advantage of water’s high potential for defining land uses and territorial organization, and thus support territorial sustainability as a goal of a society that is responsible towards the future. This new form of management, which is referred to as **integrated water and territorial management** (GIAT), is based on coordination between integrated management of water and territory, recognizing their mutual interdependence and the existence of a plurality of actors with various interests and sometimes potentially conflicting functions. At the same time, it must also simultaneously address the needs of hydrological cycles and water use.

The uncertainty and risk associated with natural and anthropic phenomena, such as climate variability and change, extreme hydro-meteorological phenomena, and the pollution generated by unsustainable socioeconomic activities, require GIAT to have sound scientific foundations and effective systems for monitoring and evaluating the status of the territory. This will facilitate decision-making based on the generation and dissemination of knowledge and information on the territory and water, along with tracking and monitoring systems that provide feedback to GIAT and enable it to adjust and evolve through time.

As an initial step, the territory in which GIAT will be applied needs to be defined.

This must be done with a long-term supra-municipal vision and regional scope, to be defined for each case, given the specific characteristics of nature and society in each territory, and the existence of multiple and diverse territorial entities, environmental authorities, and other public and private water stakeholders, which must coordinate and cooperate to achieve a common end. The lack of water governance with this outlook stems from the fact that, although water is defined as belonging to the public domain, it is managed with a local and narrow focus that fails to recognize spatial interdependencies or the regional nature of the hydrological cycle, or that the forms and ecosystems of the territory often extend beyond municipal boundaries.

The river basin has traditionally been considered the most appropriate territorial unit for water management; but reality does not respect such boundaries. The jurisdictions of territorial entities, which are key players as providers of drinking water supply and sewerage services, do not necessarily coincide with those of the supplying river basin, let alone with the ecosystems that generate and regulate the water, which can encompass much larger spaces.

A new concept thus emerges, of the **water region**, the limits of which are defined by integrating three criteria:

- The **hydrographic**, which is structural and must encompass both the natural and the constructed water systems, including reservoirs, transfers of water that drain into other river basins, canals, and other infrastructure.
- The **political-administrative**, which defines the actions of the State, with the municipality as the basic element of its territorial management with respect to water.
- The **ecological**, which, in the demarcation of the territory, includes the green infrastructure space, the conservation and functionality of which depends on the continuity of the ecosystems that underpin the availability of sufficient good quality water in the region.

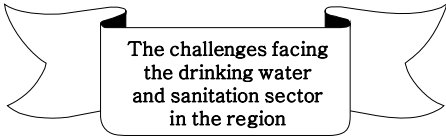
The operational arrangement proposed for GIAT has two fundamental pillars:

- **Participatory planning** of water and the territory, undertaken with a regional and long-term view that makes it possible to construct a sustainable territory.
- **Integrated financial management**, which allows for the necessary resources and financial mechanisms, to undertake the projects and actions defined to achieve regional sustainability.

These two fundamental elements must facilitate participation and articulation between water stakeholders, setting common

targets and goals, sharing resources and cooperating to achieve collectively defined outcomes of common benefit.

The text of the book is available at <http://goo.gl/cyiE3E>



The challenges facing
the drinking water
and sanitation sector
in the region

Rubén Darío Avendaño contributed with an article titled “*Los desafíos del sector de agua potable y saneamiento en América Latina: ¿Estamos ad portas de la tercera generación de reformas?*” (*The challenges facing the drinking water and sanitation sector in Latin America: are we on the cusp of the third generation of reforms?*), which is presented below.

In the first 15 years of this century, several Latin American countries have managed to expand their drinking water and sanitation coverage and attain the Millennium Development Goals (MDGs). Among other factors, this achievement reflects increased investment in the sector, which has been made possible by the fiscal surplus earned from the higher prices of exportable commodities, which generated abundant resources for the sector. This would mean that, more than ever before, the region is ideally placed to attain Goal 6 of the Sustainable Development Goals (SDGs), namely “Ensure availability and sustainable management of water and sanitation for all” by 2030.

Nonetheless, an in-depth analysis of the performance of the drinking water and sanitation sector in Latin American countries, and the effects of the now-ended commodity boom, would show that, on the contrary, we are probably closer to a third generation of reforms in the sector than to achieving the SDGs. The region’s countries face five strategic challenges that will have a decisive effect on long-term sectoral sustainability:

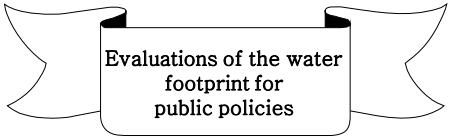
- The goal of sustainable universal coverage in drinking water, sewerage, and wastewater treatment services is backdropped by a constrained macroeconomic context; therefore, new fresh resources for the sector will not be available in the same measures of the recent past, and are likely to be insufficient. It will therefore be necessary to tap traditional sources of financing, which are politically less attractive (such as user charges), and again pursue hitherto underexploited sources (such as private sector participation in management and investment). In addition, the use of scarce public funds, including borrowing, will now need to be rationalized by adopting high-quality public policies.
- The euphoria of low-cost financing in recent years has had mixed effects:

although it succeeded in boosting investments in the drinking water sector, unfortunately it also eroded the quality of public policies, leading to a slackening of the tariff adjustment efforts of the end of the last century, the implementation of unsustainable projects, and the adoption of schemes for transferring public resources to subnational levels without conditionalities in terms of efficiency. This has diminished the technical status that had been envisaged both for sectoral policy-making entities and for the regulators.

- A key challenge is to ensure that the State-owned companies that mostly retain responsibility for providing drinking water and sanitation services in the region are sustainable and efficient, and that they become or behave like genuine companies in the most orthodox sense of the term. State-owned service providers are assets that governments administer on behalf of their citizens; and their function is to create the maximum value for society. Since the reforms of the 1980s, the sector’s operation and development have been based on such service providers; and their poor performance in this century to date shows that they are not creating value; in fact, many of them are destroying it. This suggests that Latin America will have to make structural adjustments in the entities that provide drinking water and sanitation services, by reforming their nature, structure, corporate governance, regulation and operation, so as to enable them to meet coverage challenges on a sustainable basis. In other words, the incentives structures currently facing these service providers need to be redefined, so that today’s pseudo-companies become real ones. Only service providers that operate as genuine companies will be able to meet the challenges of managing and expanding services to society through efficient and low-cost provision.
- Latin America must approach climate change as a reality affecting water resources and the population. The “El Niño” and “La Niña” climate phenomena have affected the region’s most vulnerable populations by increasing the risk of water shortage and endangering the wastewater and storm drainage services, which requires institutional actions, preventive investments and changes in the behaviour of users and communities in relation to water and sanitation.
- Achieving efficient national institutions and quality public policies is not an option, but an imperative. However, ensuring that they act on a synchronized basis and in coordination with the service providers, with a view to providing efficient and sustainable universal access to the services,

is a remaining challenge. Entities at the national government level, not just sectoral ones, need to adjust, change and in some cases merge, to give the Latin American countries a system of sectoral institutions and policies that provide an effective system of incentives to, firstly, promote the creation of providers, and then, as a result, foster their sustainable and efficient performance. The region’s governments face the challenge of ensuring that the service providers have environments that give adequate incentives for economic efficiency and transparency, backed by appropriate levels of autonomy and accountability to enable them to create value.

The challenge of service provider sustainability is a priority, because they form the basis of the service provision model, stemming from the sectoral reform that began in the last century in most of the region’s countries. The other challenges can only be successfully addressed by tackling the root causes that have rendered the service providers unsustainable. Nonetheless, actions on service providers will not be sufficient in themselves. They need to be complemented with actions at the national government level, to address the problems currently posed by the complex institutional environment in which the providers, which are mostly State-owned, operate. National-level actions aimed at the whole industry must provide incentives for attaining the goal of universal coverage with sustainability, through efficient service providers. The region must correct and complete the implementation of the sectoral reforms launched in the last century, to put the sector back on the road to sustainable development. In other words, we are closer to the third generation of reforms in drinking water and sanitation sector in the region.



Evaluations of the water
footprint for
public policies

The following paragraphs present the article “*Evaluaciones de la huella hídrica para las políticas públicas en América Latina*” (*Evaluations of the water footprint for public policies in Latin America*) by Justin Boreson, Daniel Chico and Ashok Chapagain.

The concept of “water footprint” provides a methodology for quantifying the water consumed throughout the value chain of a given product or service. The concept measures the total volume of water consumed, starting with its direct withdrawal from water bodies (known as blue water), to the consumption of rainwater in evapotranspiration (green water) and the additional volume of water used in assimilating pollutants generated by the production process (grey water). Recently, the

public sector in several of the region's countries has shown considerable interest in including water footprint evaluation in water management. The following recent initiatives are examples of this concept being applied in the region.

In Peru, the National Water Authority (ANA) has been working with the concept for several years. Recently, ANA published a national study of the water footprint for 16 agricultural products, which concluded that its evaluation will make it possible to design and implement public policies and regulations to promote efficient water use. Consequently, ANA launched the "Blue Certificate" in 2016, which will be awarded to firms that voluntarily measure, report, and commit to a plan for reducing their water footprint.

In Colombia, the Institute of Hydrology, Meteorology and Environmental Studies (IDEAM) has been studying and applying the water footprint concept since 2009. In 2014 the Institute made a multisectoral evaluation of the water footprint in the agricultural, industrial, energy and oil sectors, and also in domestic consumption. The evaluation incorporated the concepts of virtual water exports and indicators of water shortage in the water resource planning strategy. Several key points were identified, such as potential pressure on "strategic ecosystems", in addition to potential risks and conflicts between different water users.

In Chile, the General Department of Water (DGA) made an evaluation of the national water footprint, and implemented a pilot study in the Rapel river basin in 2015. The results were combined with socioeconomic and environmental indicators to identify areas where water consumption is unsustainable, and thus prioritize actions to reduce the water footprint.

In Mexico, in early 2016, the National Water Commission (CONAGUA) issued a regulation to improve the efficiency of water consumption in its different uses, particularly in river basins with low availability. The regulation defines the methodology for users to calculate their blue water footprint and demonstrate an efficient consumption volume in their production processes. It also specifies the information needed to approve water users' plans of action to achieve and monitor water use efficiency. A similar regulation on the methodology for evaluating the grey water footprint is currently being developed.

There are also similar initiatives at the municipal level. The Cities Footprint Project has been applied in 11 cities of the Plurinational State of Bolivia, Brazil, Colombia, Ecuador and Peru. It consists of the following six phases: calculate the water footprint of municipal government activities; calculate the footprint of the city as a territory;

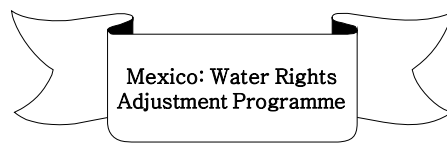
propose measures and targets for reducing the footprint; implement pilot projects to attain those targets; involve key sectors and the public at large in the process of measuring and reducing the footprint; and develop capabilities to measure and monitor footprints in the future.

These initiatives show that the region's public organizations, both national and local, are increasingly interested in adopting water footprint evaluation in their activities. Although the initiatives differ widely in their approaches, scopes and methodologies, all pursue the common goal of making the consumption and allocation of water resources more efficient. It is worth noting that these initiatives could help the countries fulfil Goal 6 of the SDGs, particularly Target 6.4, which aims to "Substantially increase water use efficiency across all sectors and ensure sustainable withdrawals and supply of freshwater to address water scarcity."

The initiatives described are in their infancy, so the challenge now is to monitor their results and adapt their implementation to effectively reduce water consumption and ensure sustainable withdrawals, which will eventually contribute to the countries' water security. An analysis must also be made of how water footprint evaluation can support water management and its implications for other public policies, such as those of energy, trade or economic development in these countries.



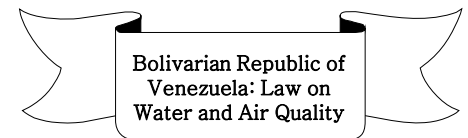
The *Safe Water Access Programme*, created through Resolution No. 908/2015 and published on 12 November 2015, is a permanent activity of the Secretariat of the Environment and Sustainable Development, which aims to promote the human right to access to safe water, equitable and sustainable use of water resources and the conservation of aquatic ecosystems and associated land areas. Its goal is to provide technical and financial assistance to municipalities, rural populations, peasant-farmer communities and indigenous peoples for the provision of safe water; arsenic abatement in water for human consumption; conservation, recuperation and sustainable use of water bodies; and also the harvesting, storage and use of rainwater.



The guidelines for implementing the *Water Rights Adjustment Programme*, published on 29 July 2015, set out requirements and

procedures for providing economic support to users who voluntarily renounce their water rights, with the aim of balancing sustainable supply from water sources with the volumes allocated to irrigation district user associations. This programme could benefit the users of irrigation districts in which the volumes of water allowed under the concession are 20% greater than what is sustainably available from the supply sources.

In terms of the maximum amount of support, CONAGUA can provide subsidies of up to Mex\$ 3.00 per cubic metre of surface water and up to Mex\$ 6.00 per cubic metre of ground water. The amount of the subsidy is calculated in relation to the net income obtained from the four main crops in each irrigation district. The volumes of water that users renounce will help restore the balance between the sustainable supply of water in river basins and aquifers, and the concessions granted to user associations.

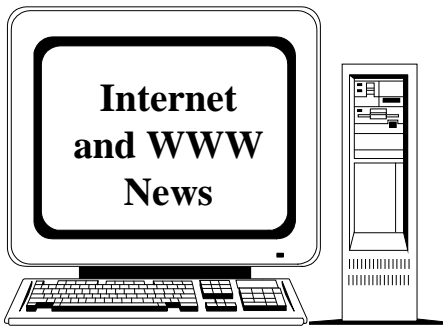


On 28 December 2015, the Bolivarian Republic of Venezuela published the *Law on Water and Air Quality*, which sets water and air quality standards, mechanisms for controlling water and atmospheric pollution, environmental hazards, the conditions under which solid waste and liquid and gaseous residues are handled, and any other operation that involves them, with the aim of protecting health and the environment.

Under this legislation, water quality is defined in terms of a set of physical-chemical and bacteriological parameters that make it possible to determine a water body's potential use for different purposes. These parameters are basically represented through dissolved oxygen, biochemical oxygen demand, phosphates, suspended solids, pH, faecal coliforms, and other pathogens. Water quality management includes aspects relating to its classification in terms of its potential for different uses; activities capable of degrading natural water sources, their circuits and their damming; re-use of treated wastewater; wastewater treatment; integrated river basin protection; continuous long-term monitoring of the quality of water bodies; and continuous monitoring of land uses and their impacts on the main river basins that supply water to human populations and irrigation systems in agricultural areas.

The law has 10 titles (general provisions, institutional organization, citizen participation, incentives, water quality, air quality, liquid and gaseous residues and wastes, environmental hazards, mechanisms for controlling air and water quality and

environmental hazards, and sanctions for violations of water and air quality regulations) and final provisions.



Websites worth visiting in relation to water issues include the following:

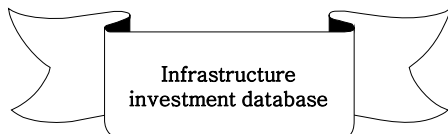
- In Guatemala, the **Ministry of the Environment and Natural Resources** (MARN) coordinates, implements and enforces policies and laws on the prevention of pollution, and conservation, protection and improvement of the environment, to ensure the rational, efficient and sustainable use of natural resources (<http://www.marn.gob.gt>).
- The **Regional Water Infrastructure and Management Plans** address the challenge of planning regional interventions by the Ministry of Public Works of Chile towards 2021. Each plan identifies a short and medium-term investment portfolio that responds to the respective plan's objectives and to strategic ministerial guidelines that aim to contribute to the key pillars and desired image that each region has defined in its regional development strategy (<http://www.dirplan.cl>).
- In Spain, the main functions of the **Hydrographic Confederation of the Ebro** (<http://www.chebro.es>) are: preparation of the river basin's hydrological plan, and its monitoring and revision; administration and control of the public water domain; administration and control of water works of general benefit or those affecting more than one Autonomous Community; and the projecting, construction and operation of works using the organization's own funds, and those allocated to it by the State.
- In the **Management Report of the Sanitation Sector 2014**, the Superintendency of Sanitary Services (SISS) of Chile (<http://www.siss.cl>) identifies the following issues that need updating and improvement under the current regulatory framework: the problem of very small firms that cannot maintain service quality levels; the water shortage faced by several service providers and how to finance new investments without significantly raising charges; low levels of investment to replace infrastructure; the proliferation of firms engaging in

unregulated businesses; the complexity of the pricing process based on the model-company approach; and the lack of consumer participation mechanisms.

- The **QUINAXI Institute for Sustainable Development** generally serves as a vehicle for reflection, discussion, research and monitoring of the process of constructing sustainable development in Colombia, and among other things, for water resource issues (<http://www.quinaxi.org>).
- The **Sustainable Chile Programme** is an initiative of ecological, academic, professional and citizen-based organizations created to promote the preparation of a citizen proposal for the social, political and economic transformation of Chile towards development based on sustainability criteria (<http://www.chilesustentable.net>). The thematic areas of its work include water, the right to water and protection of glaciers.
- The **Supervision and Social Control Authority for Drinking Water and Sanitation** (AAPS) of the Plurinational State of Bolivia (see Circular No. 31) regulates the activities undertaken by the different entities in the drinking water supply and basic sanitation sector (<http://www.aaps.gob.bo>).
- Edition No. 5 of the journal **Agua y Territorio** focuses on the topic of landscape and urban development in hydraulic mapping; and No. 6 is devoted to urban water resources management (<http://revistaselectronicas.ujaen.es>). The latter contains the article “¿Está relacionada la eficiencia en el servicio urbano de agua con la titularidad del gestor?” (*Is efficiency in the urban water service related to ownership of the management entity?*) which reviews the literature on the ownership of urban water services in terms of management efficiency. It concludes that there is no irrefutable evidence that one form of ownership, public or private, is superior to the other.
- In Peru, on 26 September 2015, Legislative Decree No. 1240 was published, amending Law No. 26338, the **General Law on Sanitation Services** and Law No. 30045, the **Law on the Modernization of Sanitation Services** (<http://www.sunass.gob.pe>) (see Circular No. 40).
- The objective of the **Interagency and Interdisciplinary Network for Research, Consultation and Scientific Coordination for the Recovery of the Lerma-Chapala-Santiago River Basin** (the Lerma network) is to set up a forum of excellence which, by coordinating organizations, analyses the problems of the river basin and generates alternative solutions for restoring it, with the aim of guaranteeing sustainable development of the region in the medium term and improving the quality of life of its communities (<http://redlerma.uaemex.mx>).
- The website of the Argentine Association of Sanitary Engineering and Environmental Sciences (AIDIS Argentina), contains a statement made by this association on **floods in the province of Buenos Aires**, stating that integrated river basin management, together with the formulation of environmental and land management policies, are unfinished business in Argentina (<http://www.aidisar.org.ar>).
- In Chile, the **Centre for Research and Development in Water Resources** (CIDERH) (<http://www.ciderh.cl>) was created in 2010 as part of a public policy promoted by the National Commission for Scientific and Technological Research (CONICYT), which aims to promote and install research capacities and the formation of a critical mass, at the regional level, in specific disciplines or subjects, to become national benchmarks in their thematic area.
- In Belize, the mission of the **Public Utilities Commission** (PUC) is to regulate the electricity, water supply and telecommunications sectors, in order to efficiently provide high-quality services at affordable rates, ensuring viability and sustainability (<http://www.puc.bz>).
- The International Water Management Institute (IWMI) has published a study on **hydro-economic models (HEMs) to address river basin management problems**, which reviews recent advances in HEMs and characterizes the types of issues that are typically explored in the HEMs literature (<http://www.iwmi.cgiar.org>).
- The Nature Conservancy's water programme has published a global report titled “**Beyond the Source: The environmental, economic and community benefits of source water protection**”, which analyses the source watersheds of more than 4,000 large cities around the world and illustrates how nature-based solutions (such as reforestation, forest protection and improved agriculture practices) can make a difference in mitigating and adapting to climate change, conserving biodiversity and contributing to the health and well-being of people (<https://global.nature.org>).
- In the United States Virgin Islands, the mission of the **Public Services Commission** (PSC) is to regulate all public utilities operating in the territory to ensure

a fair and reasonable rate of return while providing rate-payers with the highest-quality service in a safe, consistent and efficient manner (<http://www.psc.gov.vi>).

- **Water Governance in Cities**, by the Organization for Economic Cooperation and Development (OECD), analyses key factors affecting urban water governance, discusses trends in allocating roles and responsibilities across levels of government, and assesses multilevel governance gaps in urban water management (<http://www.oecd.org>).



ECLAC, the Development Bank of Latin America (CAF) and the Inter-American Development Bank (IDB) have launched the **INFRALATAM** web portal to report data on infrastructure investment carried out by the region's countries (<http://infralatam.info>). The joint initiative, which seeks to measure and promote the analysis of investments in this field, initially presents data on infrastructure investment for 15 of the region's countries in 2008-2013. INFRALATAM will also record annual data and include investments by the public and private sectors for the purpose of acquiring economic infrastructure assets (drinking water and sanitation, flood defences, energy, irrigation, telecommunications and transport). The figures

will be updated annually, and coverage will be expanded to more countries, with the available data being continuously improved.

Publications



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

- **“Desafíos de la seguridad hídrica en América Latina y el Caribe”** (*Water security challenges in Latin America and the Caribbean*) (*Natural Resources and Infrastructure Series* No. 178, LC/L.4169, April 2016) by Humberto Peña. Since the 1980s, water security has become a global paradigm of the strategic objectives of water management. This report analyses the definitions and scope given to this term in the international debate; and it concludes that the nature of the challenges facing Latin America and the Caribbean recommends understanding water security as follows: (i) a water availability that is adequate for domestic supply, subsistence uses, ecosystem protection and production; (ii) capacity to access and make use of that

water on a sustainable basis, and to consistently manage the interrelations that exist between the different sectors; and (iii) an acceptable level of water risk for the population, the environment and the economy. The study identifies the water management challenges for the region in achieving adequate water security. These relate to the rapid social, economic and political changes being experienced by Latin American and Caribbean societies. The priority areas in which water security is a critical element for the region's socioeconomic development are: (i) access of the population to adequate levels of drinking water supply and sanitation services; (ii) the availability of water to ensure sustainable productive development and reduce the associated conflicts; (iii) the conservation of water bodies in a state that is compatible with the protection of health and the environment; and (iv) the reduction of risks associated with excess water, particularly in urban zones and those affected by hurricanes.

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/dmi> or requested from andrei.jouravlev@cepal.org; and (ii) *printed (hard) copies* which should be requested from the ECLAC Distribution Unit (either by e-mail to publications@cepal.org, by fax to (56-2) 2 210-20-69, or by mail to ECLAC Publications, Casilla 179-D, Santiago, Chile).

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