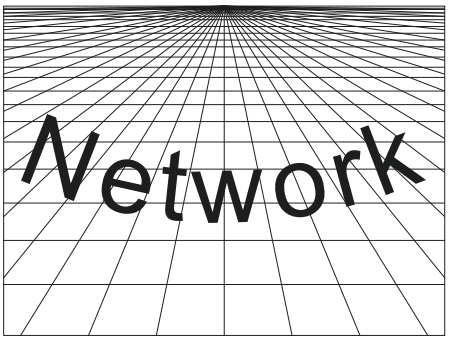
Network for Cooperation in Integrated Water Resource Management for Sustainable Development in Latin America and the Caribbean

United Nations Economic Commission for Latin America and the Caribbean (ECLAC) N° 48 August 2018

CIRCULAR N° 48

According to ECLAC, inequality is one of the most salient features of Latin American societies and overcoming it is therefore a key challenge in efforts to achieve sustainable socio-economic development. The income inequality indices of Latin American and Caribbean countries are among the highest in the world. At the same time, social gaps persist that reproduce income inequalities; for instance, with respect to access to infrastructure and public utility services, life expectancy, infant mortality and illiteracy.



Against this backdrop, all member states of the United Nations committed to the Sustainable Development Goals (SDGs) partly in order to narrow the above-mentioned social inequality gaps. SDG6, in particular, poses the specific challenge of achieving, by 2030, "universal and equitable access to safe and affordable drinking water for all" and "access to adequate and equitable sanitation and hygiene for all".

In the case of water and sanitation, the social gaps to be overcome are both quantitative and qualitative. Thus, as regards access, according to our estimates based on information in the Household Surveys Database (BADEHOG), drinking water coverage is 13% greater in households in the top income quintile than in those pertaining to the lowest income quintile. In sanitation, the difference is almost 26%. In most cases, the differences in drinking water and sanitation coverage are substantially greater in rural than in urban areas. Those gaps have slowly narrowed: faster with respect to drinking water than for sanitation.

These inequalities are also qualitative. For example, the technological solutions used in lower-income households may mean lower quality service than in higher income ones, that is, a public sink or water source at some distance from the home; or there may be a well or a truck that delivers water, rather than a connection in the home to a drinking water network; and a latrine or septic tank instead of a home connection to a sewerage network. Access to drinking water for lower-income households is often intermittent and subject to interruptions (due to droughts and other causes), with only limited control of the quality of the water delivered. Moreover, the water supplied is not always properly disinfected.

These considerations suggest that, in the absence of public policies specifically targeting low-income groups, and without supply subsidies (for utilities) or demand subsidies (for clients), water and sanitation services will not reach a substantial portion of the population. As a result, without a gradual narrowing and, at some point, elimination of the gaps, it will be difficult to maximize the economic, social and environmental benefits of these services and make the most of them for the benefit of society as a whole.

We present the conclusions of the study entitled "***Latin America and the Caribbean towards the Sustainable Development Goals in water and sanitation: recent reforms of sectoral policies***" by Gustavo Ferro (see Circular N° 47).

The efforts of Latin American and Caribbean countries to achieve the Millennium Development Goals (MDGs) entailed not only sizeable financial investments in drinking water supply and sanitation, but also considerable work on building, strengthening and improving institutions to promote efficiency in the provision of these services. Given that the MDGs period was one of highly favourable macroeconomic conditions for the region, which for decades had not experienced such a boom in international (agricultural and mining) export prices, in the new SDG stage, the countries will need to redouble those efforts to strengthen and perfect institutions for two reasons: more financing will be needed because the goals are more ambitious, and resources are likely to be less abundant.

CONTENTS

- **Editorial remarks**.
- **Open discussion**:
  - Recent reforms of drinking water and sanitation policies.
  - The water, energy and food nexus in Latin America and the Caribbean.
  - Climate change in the agricultural sector of the Plurinational State of Bolivia.
- **Meetings**:
  - The Water, Energy and Food Nexus in the Reventazón River Basin.
  - 8th World Water Forum "Sharing Water".
  - Regional Political-Technical Dialogue on the Water, Energy and Food Nexus in Latin America and the Caribbean.
- **News of the Network**:
  - National River Basin Management Strategy in El Salvador.
  - Water, Forest and Soil Master Plan in Honduras.
  - National Sanitation Policy of Peru.
- **Internet and WWW News**.
- **Recent ECLAC publications** on water resources management and drinking water supply and sanitation services.

In terms of institutional development, worldwide, the drinking water and sanitation sector has gone through three stages: a works-

intensive phase, another centred on services, and the third focusing on environmental conservation. Latin American and Caribbean countries have not yet completed the first two stages and are starting the third. As regards the institutions themselves, two stages can be discerned in their sectoral development: the traditional "service providers stage" in which one provider performs all the functions; and a "modern stage" in which various agencies perform separate roles, and services are provided by an enterprise or company with clearly defined obligations that complies with them for purposes that may or may not be commercial, but always using professional and specialized management. Such institutions have been established in most countries of the region. However, with a few exceptions, the part they play is partial, because the service provision continues to be affected by political considerations, detrimental to sound practices focused on efficiency and equity.

For "modern political economy", a sector's performance is shaped by policies and institutions that largely set the rules governing the behaviour by the actors which produces the final outcomes. Recently these ideas have begun to be applied to sectoral analysis with a view to achieving a better understanding of the problems diagnosed, detecting underlying obstacles, and devising solutions. Institutions constitute a society's "rules of the game" or, put another way, the restrictions developed and imposed by human beings to shape social interaction and outcomes. They are, therefore, collective structures and mechanisms that regulate the conduct of individuals. The term "institutions" is regularly used to refer both to a society's important habits and customs and to its organizations. Institutionalization is a feature of some interaction systems associated with more robust recognition and formalization of particular ways of taking and enforcing decisions.

The trends and common denominators found in the institutional structures of the drinking water and sanitation sector in the region point to slow progress in many countries in defining the roles to be played by the various actors; rushed decentralization processes that have made it impossible to take advantage of the economies of scale and to professionalize service provision; the politicization of technical and financial issues; the freezing or under-indexing of tariffs for macroeconomic purposes or local short-term political gains, all in a context in which universal service coverage has not yet been achieved; as well as serious shortcomings with respect to the quality of the services and efficiency in their delivery.

The main institutional aspects were examined to identify best practices, including a legal framework for organizing the sector; depoliticization and professionalization of service delivery and its regulation through corporatization; aggregation to achieve economies of scale; the terms and conditions to govern the financing of the investments needed to expand coverage; economic and social sustainability with tariffs that cover the actual costs and subsidies to ensure adequate inclusion of disadvantaged groups; and, finally, accountability based on reporting systems.

With respect to these institutional factors, there have been several interesting developments in recent years, from which lessons can be drawn. For instance, Brazil, the largest country in the region with a complex water and sanitation sector, has addressed the issue by passing a law to organize the sector according to constitutional provisions, while at the same time recognizing historical trends. Brazil's solution has been pragmatic and flexible, and has envisaged several ways in which municipalities can exercise their jurisdiction in this sector including delegating service provision to public or private state-level or micro-regional enterprises. At the same time, the system allows for economically self-sufficient entities and autarkic municipal departments. It makes autonomous and professional regulation mandatory and allows for a variety of contractual arrangements by which jurisdictions can delegate delivery of services to companies. Brazil's broad set of rules can serve as a guideline for large, complex and federal countries.

Uruguay —a smaller, more compact and homogeneous country with sound institutions and one of the highest standards of living in the region— completed its institutional set-up with a policy-making body, which also coordinates all the institutions in the sector. The key player there is the centralized national service provider.

At the other end of the spectrum is Guatemala: a smaller, less well-off, densely populated country with a unitary political structure, that has fairly recently emerged from a prolonged internal conflict. It has not yet achieved an orderly drinking water and sanitation sector, despite some ambitious initiatives in that direction. Perhaps it would be best initially to restrict the scope of plans for the sector and gradually achieve the consensus needed for further progress.

Argentina, another large, federal country with one of the highest standards of living in the region, but with serious sectoral shortcomings in terms of infrastructure and institutions due perhaps to a series of macroeconomic ups and down in its recent past, is currently attempting to quickly make up for decades of stop and go policies. It is attempting to improve sectoral institutions but there is no national regulatory framework for the sector as a whole, although a National Plan was recently approved with ambitious goals. Responsibility for the services is fragmented by province and, in some of them, by municipality. The country is attempting to rapidly close gaps in coverage, quality and efficiency.

Several interesting initiatives are also being implemented with regard to incentives for service aggregation, depoliticization and professionalization. Colombia's drinking water and sanitation sector was fragmented and sought to take advantage of economies of scale by consolidating service providers within the same department. Some municipal and regional providers do exist that operate efficiently and on a sufficiently large scale alongside many small poorly managed and economically weak providers. The departmental plans approach (see Circular N° 34) offers pecuniary incentives (national funds) to enterprises that operate under those plans and leave the political structure of the municipalities, report to regulators, gradually bring their management into line with regulatory mandates, and scale up their operations through aggregation. National financing for the sector is centralized in a single window and only those who submit to a plan and discipline themselves to abide by it can apply for funding. Conceptually, this approach is attractive. However, it has been criticized for being too bureaucratic and achieving too little.

In Peru, in similar scenarios but with different players, an effort is being made to bring small service providers together and even to consolidate them at the scale of departments. The procedure devised envisages temporary national intervention —which may, however, last as long as 15 years— in which an *ad hoc* agency rates the service providers and takes over the running of them in the event of financial mismanagement. The core idea is that municipalities cease to manage the sector and instead become shareholders of a separate service provider and that those providers follow recognized managerial practices and abide by national regulations with respect to tariffs and service quality, as well as other requirements.

In both Colombia and Peru, management is guided by a plan with targets and time frames. Unlike in Colombia, in Peru it is not that clear that municipalities can only access national funds if they cede control of their enterprises and, since they are able to obtain funds directly, they do not have a clear incentive to hand over management of those companies to an operator. Moreover, in cases in which the enterprises have been intervened, there have been problems replacing their senior staff with national representatives and getting them to operate due to a lack of budgetary funds. Once again, the mechanism is noteworthy, but actual practice is less promising.

In Colombia, Peru and Chile, good corporate governance practices have been written into the regulations for service providers, which vary according to the particular characteristics of each country, although the points dealing with the practices suggested are very similar. In general, the idea is to safeguard stakeholders from those exercising control over the companies and service provision, and to make the latter accountable, without any special advantage. Their actions and practices must be transparent, so as to avoid acts of corruption, theft and misappropriation of funds.

While they look good, regulatory frameworks are, however, indicative; they do not necessarily establish penalties and rewards. They are a first and certainly insufficient step towards getting rid of undesirable practices and thereby achieving efficiency and greater transparency in the drinking water supply and sanitation sector.

In Peru, a regulation has been approved for fostering public-private partnerships in the water and sanitation sector. In the region as a whole, there is one country (Chile) that has successfully privatized the sector. There have also been occasional partial successes and several resounding failures. Some countries have even banned privatization in this sector. Peru has not undergone any traumatic experiences and private sector participation is not looked down upon, as it is in other places. For that reason, the strategy allows for several public-private partnership options and assigns roles to various state entities for taking part in such processes. The strategy is broad, although no major contracts have yet materialized under its institutional umbrella. It views political viability and social acceptance as preconditions for progress.

In several countries, sectoral indicator systems are up and running, and in some of them, like Brazil, they have been in place for many years. The most notable systems are found in Brazil, Chile, Colombia, and Peru. Argentina is planning to implement one soon. These various national efforts are not coordinated, even though the type of information gathered and accumulated in each system has many common features thanks to international and regional cooperation and that of sectoral agencies that strive to reach consensus as to which data are relevant and which indicators should be used.

Here it is worth highlighting the work done on this for over a decade by the Association of Drinking Water and Sanitation Regulators of the Americas (ADERASA) through its Regional Working Group on Benchmarking (GRTB) (see Circular N° 15). For its part, the Latin American Association of Water and Sanitation Operators (ALOAS), is working on its own selection of indicators.

Nevertheless, close scrutiny of the existing databases reveals breaks and temporary discontinuities, missing data, better coverage of indicators for large, rather than small, service providers, and for physical rather than financial parameters, weird shifts over time in the values of some variables that for an outside observer or expert are difficult to explain, and so on.

Finally, as an important step toward getting away from political tariff-setting, several countries have standardized and implemented technically sound tariff calculation mechanisms that attempt to project the future of companies based on some master plan covering operation, maintenance, and improvement of existing infrastructure and works, designed to expand service coverage and capacity. Relatively recent methodologies in Colombia and Peru are being analysed that have several features in common and are moving in the right direction.

Some features in common worth highlighting are the separation of macroeconomic factors (inflation, for instance) from microeconomic data (costs of delivering the services) and more or less automatic indexation between tariff-setting periods. In some cases, there are "trigger" clauses when a certain inflation threshold is reached, which prevent the accumulation of too big a lag in tariffs. In other cases (as in Uruguay), a polynomial cost equation is used, which actually condenses several indices. Brazil uses a procedure involving a hybrid system with automatic linking to a set of costs and an adjustment for higher costs of certain specific items considered "unmanageable" for the companies.

The reforms referred to above point to a major institution-building effort accompanying the expansion of drinking water and sanitation coverage called for in the SDGs. They provide excellent lessons to replicate in countries that are lagging, relative to others.

The water, energy and food nexus in Latin America and the Caribbean

Below are presented the findings of the study entitled "***The water, energy and food nexus in Latin America and the Caribbean: planning, regulatory framework and identification of priority interconnections***" by Antonio Embid and Liber Martín (see Circular N° 47).

It is important to emphasize one factor that needs to be considered in any analysis regarding the water, energy and food nexus: financial issues, in general, and specifically the level the economy that is taken as a point of reference. Thus, mention must be made of energy, food, or water prices at the time the investigations are carried out and, above all, when conclusions or recommendations are adopted. By that token, the years 2007-2011 were characterized by high oil and food prices. In contrast to that period, today's scenario is one of relatively low prices, for both oil and most foods and other raw materials.

In the context of high oil prices, renewable energy sources become competitive, so that it is understandable, based on even financial considerations and not just for environmental reasons, to recommend increasing the use of these other forms of energy (wind power, solar energy, hydroelectricity, and the utilization of energy from the biomass of agricultural and food waste, otherwise known as biorefining). But that can become harder to accept, from a purely financial point of view, when, on the contrary, oil prices are low, given that thus far it has been costlier to produce most of the renewable forms of energy, most likely because costs comparisons do not always take into account environmental impacts or externalities involved in traditional forms of energy production.

From another standpoint, low food prices may pose a problem for exporting countries, whereas for importers they help increase welfare. In any case, those low relative prices are a major obstacle to implementation of certain policies normally singled out as being useful for the water, energy and food nexus.

That is true, for instance, of the policy aimed at modernizing irrigation systems which, theoretically, boosts efficiency in water use. However, in many cases, water consumption intensifies (which reduces return flows and aquifer recharge, which means that less water is available for uses and users downstream; see Circular N° 40), water quality declines (because of effluents contaminated with agricultural chemicals), and there is greater parallel energy demand for implementation of technologically more sophisticated (drip or sprinkler) irrigation systems. Finally, this whole scenario requires a volume of investment that farmers producing low-price crops may or may not be able to sustain over the long term.

In general, economic cycles are sensitive to any nexus-related considerations. The economic crisis that began in the United States in 2007 and in Europe in 2008 spread at varying intervals through a number of geographical areas, with consequences for manifestations of the nexus that public policy-makers need to take into account, along with their future, projected sequels. Nevertheless, and paradoxically, all considerations regarding the nexus are based on permanent, global growth of the economic parameters used to project increases in the demand for

water, energy and food. Despite that, experience with the current economic crisis should alert us to the possibility that future economic growth may not be as buoyant as it was in practically all the first decade of the Twenty-first Century. The impact that falling oil prices have had in the region and, in particular, on countries such as Bolivia, Ecuador and Venezuela, which are highly dependent on oil and gas exports, serves as a powerful lesson regarding the need to diversify the currently dominant development model.

Another factor that needs to be taken into account is the diminished economic importance of water-related transactions in comparison with the energy and food markets, above all in the context of countries where no "water market" exists, which is the case for most of the world. In general, the cost of water is incorporated into that of other products and services (food or electricity prices), which may cause the predominance of water in global consideration of the nexus to be distorted due to the unequal economic levels of the respective markets. That harbours a risk of over-exploitation of the resource that serves other considerations or other elements of the nexus (energy and food).

Consideration also needs to be given to the role of research and innovation in the quest for new technologies for the production and distribution of food, water and energy. Innovation is tied to the requirement to meet high demands for water, energy and food in the projections for the years 2030 or 2050.

It is worth noting, finally, that nexus-related instruments and policies also need to help prevent and resolve the multiple social and environmental conflicts surrounding water, that often have a lot to do with the other two elements of the nexus (see Circular N° 44). Conflicts over water resources in general, and in the region in particular, are indicators of priority and especially problematic nexus interactions, because they are manifestations of local and specific conditions that need to be addressed with flexibility and innovation. Addressing them is therefore an urgent top priority.

Climate change in the agricultural sector of Bolivia

The Sustainable Development and Human Settlements Division published a study entitled "***Impactos, medidas de adaptación y costos sociales del cambio climático en el sector agrícola del Estado Plurinacional de Bolivia***" (*Impacts, adaptation measures and social costs of climate change in the agricultural sector of the Plurinational State of Bolivia*) by Federico Ernesto Viscarra Riveros, Carlo Giupponi and Robert Mendelsohn.

In recent years, the expansion of the agricultural frontier in the Plurinational State of Bolivia has rapidly picked up pace. One of the factors driving the expansion has been the production of soya on dryland, with very low yields compared to those of neighbouring countries. Furthermore, and due to climate change, variations in both temperature and rainfall are expected that could further reduce yields. That situation, together with growing demand for food, will lead to further expansion of the agricultural frontier.

In order to reduce the pace of deforestation, enhance farmers' welfare and guarantee food security, agriculture must become more efficient and include microeconomic adjustments to increase crop yield. At the same time, it should pursue macroeconomic policies to protect natural resources in order to achieve sustainable and inclusive development.

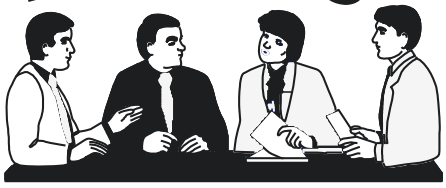
To quantify the impact and effectiveness of the policies, mathematical simulation models are used for crop yields, tied to the Computable General Equilibrium (CGE) model. On the one hand, the exercise assesses microeconomic adjustment measures that counteract the impacts of climate change and increase crop yields: fertilization, irrigation, changes in sowing dates, and comprehensive improvement of production technology (all three measures together).

The findings show that the comprehensive improvement of production technology is the most effective microeconomic adjustment measure for increasing crop yields, gross domestic product (GDP) and average household income. However, the increase in crop yields is accompanied by an adverse incentive for more demand for land.

To counteract that demand, a set of macroeconomic policies is implemented; that is to say, the comprehensive improvement of production technology is applied along with the following macroeconomic policies: taxes on agricultural assets and agricultural activity, and export price restrictions. Here the best macroeconomic policy is restrictions on export prices, which reduce the pace of deforestation stemming from microeconomic policy, but maintaining GDP growth rates.

Based on the outcomes of applying these policies and after identifying the best policy-mix, an estimate is made of the social costs of protecting forests per hectare in the short and long term. These estimates provide a good starting point for negotiation processes relating to Reducing Emissions from Deforestation and Forest Degradation (REDD) or Payment for Environmental or Ecosystem Services, in connection with the global agreements on climate change mitigation and adaptation.

Meetings



The Water, Energy and Food Nexus in the Reventazón River Basin

The ***National Workshop "The Water-Energy-Food Nexus in the Reventazón River Basin"*** took place in San José, Costa Rica, on June 7 and 8, 2017. The discussions focused on the following topics:

- The concept of the water, energy and food nexus and the priority interrelations between its components in Latin America and the Caribbean.
- Regionally important public policy instruments for better management of nexus interdependencies.
- Conclusions and recommendations of the case study of the Reventazón river basin in connection with the interdependence of the Costa Rican Electricity Institute (ICE) and the Costa Rican Water Supply and Sanitation Institute (AyA) for the supply of drinking water to the Greater Metropolitan Area (GAM) of San José.
- Conclusions and recommendations of the case study regarding the shortage of water for agriculture and its availability for hydroelectric power generation.
- Conclusions and recommendations of the case study regarding the implications of an outdated legal framework of the energy sector for multiple use of water.
- Experience with applying the nexus approach in Germany, the Economic Commission for Europe (ECE) and in the Inter-American Development Bank (IDB).

8th World Water Forum "Sharing Water"

The Natural Resources and Infrastructure Division worked with the Inter-American Development Bank (IDB) on the ***Regional Process of the Americas in the run-up to the 8th World Water Forum "Sharing Water"*** (Brasilia, Brazil, 19-23 March 2018). The main focus was on the drafting of the Regional Report for Latin America and the Caribbean. The report argues that the role of water in the economy and its contribution to national welfare depend on a set of economic, social and geographical factors that are external to the way it is managed and on how

the institutional system responds to the characteristics of water resources and the challenges involved in developing them. In this issue, we present the proposals put forward with respect to improving governance. In the next, we will conduct a more in-depth discussion of participation and financing.

Sometimes there are inconsistencies, lacunae, or shortcomings in the legal instruments envisaged in the institutional framework for responding to the need to develop and regulate water resources. Areas in which lacunae or insufficient development are often found include, but are not limited to, resource inventories, the registration and granting of titles and water rights, planning, conflict settlement, groundwater, land planning, basin and flood management, environmental and water quality regulations, dam safety, diffuse pollution and the development of green infrastructure. Thus there are cases in which, in certain matters that need to be regulated in the public interest, there are no instruments, regulations, or institutions for addressing the issue. Likewise, planning, evaluation, and control or oversight functions very often lack the instruments needed for their implementation so that they have no real effect on water management or on users.

Public policies and institutional arrangements need to take into consideration current high levels of insecurity due to hydrological fluctuations and climate change as well as far-reaching social, economic and political changes. This means that governments have to espouse methodologies and criteria that contemplate the possibility of prioritizing the formulation of robust yet flexible policies, plans and programmes in a wide range of possible future scenarios. Resilient institutional arrangements need to be developed that are capable of detecting the issues and endowed with the mechanisms, instruments and procedures needed to adapt to those new scenarios.

It is vital to overcome the scattered and fragmented institutional set-up for managing water and other related natural resources and the dearth of institutional structures and instruments needed to coordinate and find integrated, long-term solutions to the interactions that arise in connection with river basins. The resource occurs in natural systems and fragmented management of it, whether for political or administrative reasons, detracts from the effectiveness and efficiency of water use, in addition to facilitating erratic transmission of negative externalities. Fragmentation adds to the costs of managing water resources and of providing public services related to it.

The issue of scale is important when designing institutional arrangements, both in respect of productive and sustainable management of the resource and the handing of natural disasters related to it and for the delivery of public services in which water is an input. In all these cases, there are optimal scales from an effectiveness and economic efficiency perspective that need to be taken into account.

Often enough, State agencies lack both the capacity and resources needed to fulfil their responsibilities; have failed to adopt professional criteria for selecting, promoting and training their technical staff; lack the oversight and implementation authority they need to perform the duties entrusted to them; or else they are plagued by acts of corruption or collusion. There are also innumerable cases of legal provisions that in practice are a dead letter due to the weakness of institutions or lack of political will on the part of the agencies in charge.

Even though significant progress has been made in several countries, in general, water sector institutions, like most public sector organizations, are sorely lacking in transparency and openness about their activities and in effective accountability to users and the general public.

Water is associated with conflicts. In some countries, these can only be settled by the judiciary, usually through long and expensive proceedings, in which users with fewer resources are normally at a disadvantage. In others, arbitration is used. This option, by definition, is voluntary and the parties benefiting from the *status quo* normally have no incentive to accept it. Finally, there are places, like Mendoza in Argentina and the United States, where administrative jurisdiction is mandatory for settling conflicts at the request of one of the parties. These systems have the advantage of being based on expertise; they are relatively straightforward; and they cost less than exclusively judicial systems. In addition, the dissatisfied party can always file an appeal through the courts. At the same time, it is worth bearing in mind that the longer conflicts last without being settled, the less willingness there is to cooperate and invest in the development of water resources.

It is also to be noted that many of the region's water resources pertain to river basins shared by different countries and state and provincial jurisdictions. More in-depth consideration needs to be given to the principles applicable in those cases, such as the principle of equitable and reasonable use; the obligation not to cause significant harm; and protection of existing economies.

For water use to benefit a country, it must be economically efficient. Some countries have managed to achieve objectivity in their programmes, plans, subsidies, and public investments, separating water management and management of the sectors that use it, requiring utilization permits or licences for public and private users; and evaluating and approving subsidy or investment programmes by State agencies independent of the sectors (economy and finance, for example) based on pre-established objective performance criteria. The same countries have attempted to ensure that the risks and guarantees granted and taken on by the State are shared with the beneficiaries of programmes related to them and with the companies running them, as a way of reducing the associated moral hazard and financial risk.

The ***Regional Political-Technical Dialogue on the Water, Energy and Food Nexus in Latin America and the Caribbean***, organized by the Natural Resources and Infrastructure Division, with German Cooperation and European Union support, was held at ECLAC headquarters on 14-15 May 2018.

The work done at the Regional Dialogue revolved around the following core themes: the water, energy and food nexus in Latin America and the Caribbean; national case studies; sectoral and intersectoral nexus perspectives; regional and international approaches; public policy guidelines for better handling of the interrelations between the nexus components; the appropriate sectoral regulatory framework; intersectoral coordination systems; planning in the three components of the nexus; economic, fiscal and financial framework; support for agriculture; promotion of renewable energies; plans and national demands for institutional support on nexus issues; and conclusions and recommendations.

The participants of the Regional Dialogue recognized the importance of the nexus as a framework for inter-agency coordination and activities to support implementation and follow-up of the 2030 Agenda for Sustainable Development and the Paris Agreement, and they underscored the desirability for the countries of the region to adopt that approach as State policy. To advance in that direction, they reached consensus on the following recommendations:

- That ECLAC, the European Union, and German Cooperation continue research and technical advisory assistance activities for countries in the region on the subject of the nexus and that other regional, bilateral and international agencies and countries in other parts of the world join this process.

- That advantage be taken of the results achieved in applying the nexus approach

by ECLAC and the German Agency for International Cooperation (GIZ) in order to deepen and expand those experiences to other countries and assist them with the design, restructuring and development of integral policies and sustainable implementation frameworks that incorporate this approach.

- That support be given to building institutional capacities, information systems and conceptual frameworks for implementing the nexus approach, evaluation methodologies and technical cooperation activities, paying particular attention to countries' specific needs.

- That periodical regional, subregional, national and local meetings continue, bringing the key public and private actors together to exchange experiences and best practices for analysing and managing interrelationships among the components of the nexus.

- That bilateral, multilateral and regional technical and financial cooperation agencies be called upon to continue supporting and cooperating with research and technical advice activities related to the water, energy and food nexus.

National River Basin Management Strategy in El Salvador

The Ministry of Agriculture and Livestock (MAG) of El Salvador, with the support of the Food and Agriculture Organization of the United Nations (FAO), has used a participatory process of consultations with national stakeholders to formulate a ***National River Basin Management Strategy***, aimed at identifying, defining and adopting actions that can contribute to a more orderly exploitation of natural resources, especially water and soil, in an effort to develop sustainable agriculture, resilient to climate change.

This Strategy proposes actions to reduce vulnerability and strengthen risk management and the ability to confront the challenges posed by climate change. It strives, also, to incorporate the strengths and capacities of the main players so as to identify and propose solutions to conflicts over the use of natural resources, especially water and soil, throughout the country, as this will boost productive system resilience in agriculture, forestry, aquiculture and fishing.

Given El Salvador's vulnerabilities with regard to climate change, the Strategy proposes identifying options for adapting to it, which include efforts to reduce poverty and foster sustainable socioeconomic and environmental development. The Strategy includes disaster prevention management, combining awareness-raising among the population, capacity-building, technology transfers and adaptation and mitigation measures to diminish the impacts of climate change.

The Strategy is built around four pillars:

- ***Promoting inter-agency and intersectoral coordination for sustainable and adaptive management of river basins***. This pillar envisages establishing opportunities for dialogue regarding joint work to facilitate consensual coordination, decision-making, and the implementation, monitoring and evaluation of actions in different parts of the country.

- ***Sustainable agriculture resilient to climate change***. This pillar is geared to fostering a type of agriculture that includes the restoration and conservation of resources in their natural setting and combines productive adaptation, sustainability and profitability of crops.

- ***Management of agro-climatic risks***. The purpose of management of agro-climatic risks is to prevent and reduce hazards and vulnerability to the effects of climate change and the volatility associated with them; to enhance disaster preparedness and the speed of response; and to facilitate the recovery of production systems. The Strategy likewise envisages integrating the management of risks and climate change hazards into river basin management plans and municipal environmental plans.

- ***Strengthening institutional capacity and actors***. The purpose of this pillar is to reinforce the ability of institutions and organizations to handle the processes involved in comprehensive management of river basins, adaptation to climate change and agro-climatic risk management through informal education.

Water, Forest and Soil Master Plan in Honduras

The Government of Honduras has launched its ***Water, Forest and Soil Master Plan***, which was drawn up with ample participation by the government entities responsible for those areas. This initiative is an attempt to establish guidelines that will strengthen comprehensive resource management by harnessing efforts already under way through effective inter-agency coordination. The Plan addresses three key processes identified as:

- The ***"governance" process*** pursuing two strategic lines of action: local governance for integrated management of water, forest and soil resources; and strengthening of the legal-institutional framework and financial mechanisms.

- The ***"knowledge management" process***, which also pursues two strategic lines of action: the generation and management of information needed for decision-making; and human capacity-building and skills development.

- The ***"implementation of sustainable practices" process***, to be executed through two more strategic lines of action: conservation, restoration and sustainable exploitation of water, forests and soil; and the development of infrastructure for treating and making efficient use of rain and waste water.

National Sanitation Policy of Peru

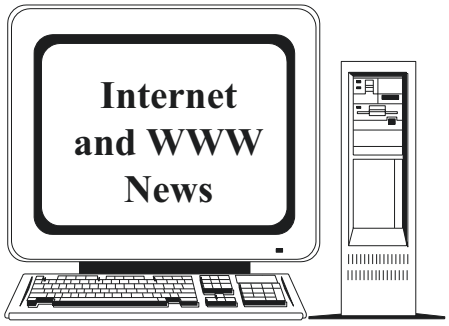
The chief objective of Peru's ***National Sanitation Policy***, adopted by Supreme Decree N° 007-2017-VIVIENDA, is to achieve universal, sustainable, and quality access to sanitation services. The entire urban population is expected to have access to sanitation by 2021, with 100% of the rural population covered by 2020.

The specific objectives of the National Policy are:

- To serve the population currently without sanitation services, according priority to low income strata.
- To guarantee funding and the efficient use of those resources by service providers.
- To develop and boost service providers' management capacity.
- To develop sustainable and technically, administratively, economically and financially efficient sanitation projects.
- To consolidate the leading role of the Ministry of Housing, Construction and Sanitation and step up coordination with all leading players in the sanitation sector.
- To develop a civic culture of appreciation for sanitation services.

The National Policy is geared to six sets of measures corresponding to the specific objectives of: the population's access to

sanitation services; financial sustainability; strengthening service providers; optimization of technical solutions; coordination among actors; and appreciation of the services.



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

- The ***Secretariat for Energy, Natural Resources, Environment and Mines*** (MiAmbiente+) in Honduras is the government agency responsible for advancing sustainable development by formulating, coordinating, implementing, and evaluating public policies geared to preserving natural resources and conserving the environment (*http://www.miambiente.gob.hn*).

- The goal of ***Escenarios Hídricos*** 2030 in Chile is to work collectively to forge different water resource scenarios for 2030-2050 that contribute to water safety and sustainability, as an input for national debate and the formulation of related water policies, by identifying the risks and opportunities for the various sectors and encouraging the implementation of concrete systemic solutions that prove to be effective, well-coordinated and cost efficient (*http://escenarioshidricos.cl*).

- The publication entitled "***Reutilización de aguas para agricultura en América Latina y el Caribe***" (*Water reuse for agriculture in Latin America and the Caribbean*) is the result of a joint effort by FAO and the International Water Management Institute (IWMI) to report on the status of water reuse in the region, identify successful examples and promote safe and productive reuse in a better informed manner (*http://www.fao.org*)

- The 2018 edition of the United Nations World Water Development Report aims to demonstrate how ***nature-based solutions*** (NBS) (*http://www.unesco.org*) can offer a vital means to address many of the world's water challenges while simultaneously delivering additional benefits central to many aspects of sustainable development. NBS use or mimic natural processes to enhance water availability, improve water quality and reduce risks associated with water-related disasters and climate change. NBS include green infrastructure that can substitute, augment or work in parallel with grey infrastructure in a cost-effective manner. The goal is to find the most appropriate blend of green and grey investments to maximize benefits and system efficiency while minimizing costs and trade-offs.

- The ***Coordinating Unit of the Sanitation Programme of Panama*** provides administrative and operational management of the sanitation system it constructed in Panama City, Arraiján and La Chorrera, and also seeks to raise the standard of living of the population by collecting and treating wastewater (*http://saneamientodepanama.gob.pa*).

- The main objective of the ***Federation of Electricity and Public Utility Cooperatives of Buenos Aires Province*** (FEDECOBA) in Argentina is to establish a common policy for cooperatives vis-a-vis all the domestic and external agents it deals with (*http://www.fedecoba.com.ar*).

- The ***Water Resources for Agriculture and Mining Centre*** (CRHIAM) focuses on deploying a multidisciplinary approach to resolving the various problems associated with the availability of water besetting Chile's agricultural and mining sectors, which are two of the most important sectors for the national economy (*http://www.crhiam.cl*).

- The web page of the Spanish Institute for Strategic Studies (IEEE) posted a link to a book entitled "***El Agua: Fuente de conflicto o de cooperación?***" (*Water: source of conflict or of cooperation*), which argues that water management is the art of striking a balance between the natural sciences (the sphere that water belongs to) and the social sciences, which speak to users helped by science and technology to ensure social harmony among all users and make water a source of cooperation among users and countries (*http://www.ieee.es*).

- The Organization for Economic Cooperation and Development (OECD) has published the report "***Implementing the OECD Principles on Water Governance***", which seeks to support governments and stakeholders in addressing challenges and pressures from megatrends on water demand and supply through more effective institutions (*http://www.oecd.org*). The report proposes two supporting tools for interested cities, municipalities, regions and countries to improve their water policies. First, the Water Governance Indicator Framework is intended as a voluntary self-assessment tool to engage in multi-stakeholder dialogues on the performance of water governance systems. Second, a set of 54 evolving practices seek to provide a source of inspiration and stimulation for bench-learning.

- The ***Centre for Development and Research on the Highland Jungle*** (CEDISA) is an organization that seeks to promote sustainable development and equal rights in the Peruvian Amazon (*http://www.cedisa.org*). It has established itself as an actor that helps formulate public policies and initiatives for the conservation and sustainable exploitation of forests and ecosystem services, as well as for the promotion of sustainable and inclusive rural development and the mitigation of climate change impacts.

- In its ***Management Report of the Sanitation Sector 2016***, Chile's Superintendency of Sanitation Services (SISS) states that climate change is associated with relatively less availability of water resources and the occurrence of extreme meteorological events, that trigger turbidity in rivers and blackouts, all of which threaten continuity in the provision and quality of water and sanitation services (*http://www.siss.cl*). For that reason, there needs to be a transition to safer service provision systems with more robust back-up in the event of emergencies, enabling people to live in more resilient cities. The challenge is, moreover, to do this as at the lowest cost possible.

- The ***International Groundwater Resources Assessment Centre*** (IGRAC) facilitates and promotes international sharing of information and knowledge required for sustainable groundwater resources development and management worldwide. It provides an independent content and process support, focusing particularly on transboundary aquifer assessment and groundwater monitoring (*https://www.un-igrac.org*).

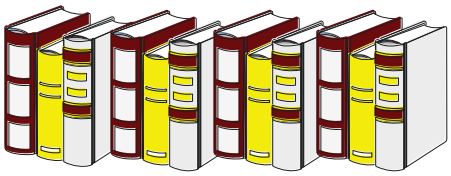
- Colombia's ***National Economic and Social Policy Council*** (CONPES) is the country's highest planning authority and acts as an advisory agency for the government on all matters pertaining to Colombia's economic and social development. Notable recent documents approved by CONPES include the studies on the policy guidelines and national programme of payments for environmental services for peacebuilding and the follow-up report on the drinking water and sanitation sector (*https://www.dnp.gov.co*).

- The Drinking Water Regulation and Basic Sanitation Commission (CRA) in Colombia issued Resolution 830 in 2018 aimed at presenting the ***variables of the comparative efficiency model for***

standard comparable administrative and operating costs per monthly subscriber for drinking water supply and sewerage services (*http://www.cra.gov.co*).

- The Mexican Institute of Water Technology (IMTA) has been evaluating the performance of drinking water operating agencies since 2005. This work has been carried out in the Urban Hydraulics Subsection and is called the ***Programme of Management Indicators of Operating Agencies*** (PIGOO). It is done using a large set of indicators to evaluate more than 207 operating agencies supplying almost 67 million inhabitants (*http://www.pigoo.gob.mx*).

Publications



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

- "***El Nexo entre el agua, la energía y la alimentación en Costa Rica: el caso de la cuenca alta del río Reventazón***" (The water, energy and food nexus in Costa Rica: the case of the Reventazón river basin) by Maureen Ballestero Vargas and Tania López Lee (Natural Resources and Infrastructure Series N° 182, LC/TS.2017/105, November 2017; only available in Spanish). This document analyses the water, energy and food nexus in the Reventazón river basin in Costa Rica. It focuses on the upper part of the river basin, especially the northern part of Cartago province, home to the major conflicts and nexus interrelationships. This river basin's particular features make it strategic for the country's development and are deemed to be suited to specific analysis of the interrelationships of the nexus. The Reventazón river basin is the largest source of electricity in Costa Rica, accounts for 85% of the country's vegetables, and has been meeting the drinking water needs of 25% of the population of the Greater Metropolitan Area. In addition, for this river basin there is unique and specific legislation governing the organizational planning and management of water and other natural resources. It also has a river basin agency, the Commission for Planning and Management of Reventazón River Basin (COMCURE). The interrelationships of the nexus that have been studied show that, even with the abundance of water in the Reventazón river basin, conflicts are increasing due to competition for the water, triggering social movements and a quest for solutions. The study identified a number of problems that affect the nexus, affording particular attention to those of governance. Hence the need to break with the sectoral approaches that traditionally shape public policy formulation. The nexus approach starts from the premise that a shared vision and joint actions in respect of natural resources favour progress towards better balances between and among sectors, facilitate development of the river basin and may prove to be a model to follow in the administration of the country's other priority river basins, where multiple water use is needed.

- "***La eficiencia en el uso del agua y la energía en los procesos mineros: casos de buenas prácticas en Chile y el Perú***" (*The efficiency in the use of water and energy in the mineral processing: cases of good practices in Chile and Peru*) by José Luis Lewinsohn and René Salgado (*Project Documents Series*, LC/TS.2017/141, December 2017; only available in Spanish). The report sets out to identify and analyse case studies in Andean countries (Chile and Peru) in which mining companies are adopting methodologies, instruments and technology to ensure efficient use of water and energy in production processes. These processes pose an enormous challenge for extractive companies, particularly because of the regulatory frameworks being promoted for the sector and because of social concerns and pressures regarding the impact on the environment, the intensive use of water and energy in "water-stressed" and complex geographical areas. The first case study has to do with large-scale copper mining in Chile. It analyses the incorporation of the "big data" tool in decision-making so as to be able to recognize early warning signals in production processes (risk conditions, critical episodes, and so on). The second case study looks at the modernization of water and energy use operations in two medium-sized gold mining companies in Peru. The theoretical framework for the study addresses the issue of natural resource governance, where the main objective is to foster an equity-conscious structural change and emphasis on the distribution and use of the tax revenue from sectors such as mining, oil and gas. This is a paradigm that offers new tools for achieving sustainable development, social and economic equity, and progress in other areas of regional concern, such as protection of the environment, gender equity and the human right to water. Finally, the study also addresses the role of water resources management with an emphasis on the water-energy-food security nexus and possible relations with the mining industry in Andean countries.

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.cepal.org/drni* 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* or by mail to ECLAC Publications, Casilla 179-D, Santiago, Chile).

UNITED NATIONS

NACIONES UNIDAS NATIONS UNIES

Economic Commission for Latin America and the Caribbean
Natural Resources and Infrastructure Division
Casilla 179-D
Santiago
Chile

PRINTED MATTER
AIR MAIL