

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



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Almost all of the region's countries have incorporated provisions into their legal frameworks on the need for water management systems at the river basin level, which form the basis for moving towards the integrated management of water resources. Despite several successful examples of such river basin organizations in the region, many countries have seen considerable challenges in their creation, operationalization and consolidation. Even the countries that have made the most progress in this area, such as Brazil and Mexico, are not without their share of problem situations.

Controversies usually arise with the creation of river basin organizations to coordinate the activities of the various actors operating in the area of the shared water system. In order to be effective, these entities must consist not solely of councils focusing on representation, participation and deliberation, but also of technical support bodies with legal personality, the ability to self-finance and professional, qualified and dedicated staff. However, the need to combine the executive and deliberative structure with a management body, with solid operational and financial capacity, has not always been well understood. Thus, a river basin management council without the corresponding technical and financial support mechanisms does not have any real possibility of taking, and even less of implementing, informed decisions.

What public policies have been effective in establishing water resource management systems at the river basin level and have helped to formulate, apply and implement plans for the integrated management of human interventions in these areas? Among the considered cases, the following are identified as effective practices:

- Recognizing that water resources management and river basin management form one of the pillars of sustainable socioeconomic development.
- Including provisions in water legislation that promote the creation of organizations for the management of water resources at

the river basin level and that guarantee their existence in the long term.

- Ensuring the effective decentralization and autonomy of water management systems with the elements required to give them stability and management capacity.
- Creating and consolidating water management organizations that have participative and deliberative bodies, as well as technical teams focused on support, implementation and financing.
- Ensuring that these river basin organizations receive substantive and consistent government support, and that they are subject to audit and inspection.
- Having the means to charge for water and invest those funds in a way that benefits all stakeholders in the river basin.
- Retaining qualified staff and providing them with continuous training and adequate remuneration, at both the national or central as well as at the river basin level.
- Seeking to ensure the adequate representation of stakeholders in river basin management bodies (councils) and prevent special interest groups from capturing the decision-making process.
- Fostering dialogue, consensus-building, informed participation and capacity-building among stakeholders and guiding human interventions in the river basin and the water resources in accordance with a shared vision of the projected aims in the medium and long term.
- Establishing formal directives and protocols, well-defined roles and functions, objective decision-making criteria, and clear procedures and guidance for river basin organizations and enforcing their implementation.
- Focusing, guided by a realistic and pragmatic approach, on solving concrete and immediate problems, with an emphasis on promoting coordination and efficiency.

A lack of continuity is probably one of the biggest problems affecting the region in this regard. Only the countries that manage to maintain and progressively improve their water management systems, granting them the powers and resources they need to meet their

responsibilities, will succeed in achieving their goals.

Axel Dourojeanni

CONTENTS

- **Editorial remarks.**
- **Open discussion:**
 - Legislative progress towards sustainable and decentralized water management.
- **News of the Network:**
 - Water institutions and social equity: the Chilean case.
 - State policy on water resources in Peru.
 - Factors shaping the industrial structure of the drinking water supply and sewerage sector.
- **Meetings:**
 - Seminar on “Water Policy and Integrated Water Resources Management”.
- **Internet and WWW News.**
- **Recent ECLAC publications on water resources management and drinking water supply and sanitation services.**



Below we present the conclusions of the study entitled “*Avances legislativos en gestión sostenible y descentralizada del agua en América Latina*” (*Legislative progress towards sustainable and decentralized water management in Latin America*) (*Project Documents Series, LC/W.446*, November 2011) by Michael Hantke-Domas (see Circular N° 36), which reviews recent changes in the legal frameworks on integrated water resources management in Argentina (the Autonomous City of Buenos Aires), the

Bolivarian Republic of Venezuela, Chile, Honduras, Nicaragua, Peru and Uruguay. This study identifies a number of new tendencies in the revised legal frameworks.

One of the most noteworthy of these developments is the increasing public and social valuation of water resources in the countries studied. This is clear from the fact that each country has developed, to a greater or lesser extent, legislative frameworks to regulate water resources and the factors that influence their use, allocation, preservation and management.

The approach to water rights has been modernized, moving from systems focusing on specific uses of water towards inclusive models of environmental management, the coordination of multiple uses and social participation. Without doubt, the old model contributed to the deficient situation of water resources in the region, with dwindling supplies, intense competition for resources, multiple conflicts, numerous cases of unsustainable use, contaminated sources, and ecosystems suffering as a result of human interventions.

This modernization could be cast as a “greening of the law”. Thus, environmental concerns have been incorporated into the structure of water law, striking a balance between the water needs of society and the economy and those of ecosystems (integrity of species, habitats and other aspects) in line with efforts to achieve sustainable social and economic development. Consequently, these laws contain regulations on permits and licences, prevention and reduction of water pollution, environmental assessment requirements, prioritizing the allocation of water for environmental purposes, criteria on minimum or environmental flows, protected or reserved water supplies set aside for specific purposes, payments for environmental services and water protection areas.

But the greening of the water legislation applies only at the national level, since there is a tendency to ignore the international or transboundary dimension of the resource. Hence, in only two countries (the Bolivarian Republic of Venezuela and Uruguay) does the legislation reflect the use of transboundary water resources, including both surface water and groundwater. This is a cause of concern, since effective resource management in an upstream country should take into account the needs of any downstream countries. This omission could have a potentially destabilizing impact on regional security, while a lack of coordination and a failure to come to a civilized arrangement on the use of transboundary waters could lead more than one country to think in terms of a possible conflict with its neighbours over the flow of this resource.

Another trend is the acceptance of the idea that all men and women have a fundamental right to access to water. This human right is recognized in various ways, but none of them specifies a minimum content of this right; however that is not a matter of major concern, as there is some consensus on the issue (see Circular N° 31). The situation is not clear, however, in relation to other uses, such as irrigation. Many questions are raised in this connection, for example, do farmers have the right to water to irrigate their land in order to guarantee their subsistence? And, at what point can we say that a State has failed to meet its obligation to promote access to water?

There is a tendency for the constitutional recognition of the human right to water and of the fact that water belongs to the public domain of the State. In law, constitutions form the very backbone of a country’s legal structure, and the rights enshrined therein are reflected throughout the national legal system. As the criteria for amending a constitution are generally stricter than for other legislation, the stability and permanence of the principles they contain are thus guaranteed to a greater extent.

Another trend that has been observed is the move towards prohibiting the private ownership of water resources and a rejection of privatization of the water services.

There is a profusion of regulations governing water resources and drinking water and sanitation services. Strictly speaking, the two areas overlap when the water is available in its natural state (for potential use by a company providing drinking water supply and sanitation services). However, when it enters the supply system, the emphasis shifts from water management to the economic regulation of infrastructure. This conceptual gap calls for the application of very different regulatory techniques and it is therefore important to maintain the distinction between these two areas as the methods that work in one area may not be effective in the other.

With this in mind, and in view of the particularities of the different laws and the trends that have been identified, the following policy recommendations seek to consolidate the reforms and promote a legal environment conducive to implementing measures to ensure the integrated management of water resources:

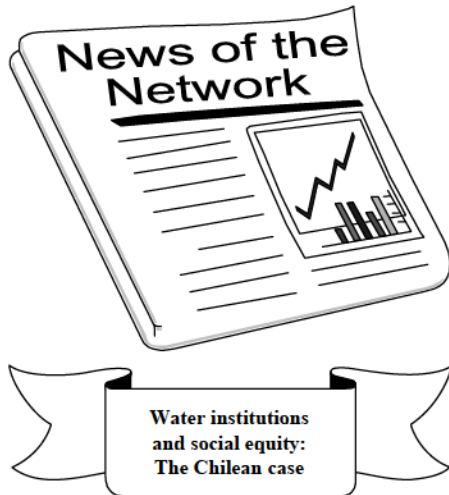
- Having legal frameworks in place that allow for sectoral reform is an important step, but alone they are not enough to ensure the effective and efficient management of water resources. It is therefore important to develop implementation and monitoring policies in order to guarantee that the objectives of the

legal reform can be met. In other words, nothing is achieved by passing a law stating that water resources will be managed in an integrated fashion, if in practice there is no capacity to implement that law.

- The implementation of public policy requires a sustained effort to train those involved in water management to give them the skills they need to carry out their task, as well as the authority and resources commensurate with their responsibility.
- Plans must be made for the implementation of the reform over the long term, using performance indicators for each stage of the process in order to ensure that the course of action proposed by the reform leads to the desired objective.
- Campaigns to raise awareness of the changes to the legislation should be promoted in order to legitimize the reform and inform the community of the new role it will have to play within a framework of integrated water resources management.
- In that connection, efforts must be made to enhance governance mechanisms, such as participation and transparency. In addition, work should begin to amend the law to allow for effective accountability and access to justice by the community, and to promote integrity and anti-corruption mechanisms.
- It is advisable to separate the legislation applicable to water resources from that pertaining to drinking water and sanitation services, so as not to confuse subjects that are different by definition, since each has a distinct focus, and different professional requirements and clientele. This can be achieved by enacting two distinct laws, or by ensuring that separate provisions are in place where these rules are merged in one body of regulations.
- National laws should incorporate rules on the integrated management of transboundary resources and countries in the region should be encouraged to adopt the United Nations Convention on the Law of the Non-navigational Uses of International Watercourses, so as to regulate the use of shared resources
- In the institutional design of State agencies, it is advisable to separate the function of public policy formulation from that of its implementation, and from those of control and oversight, in order to create an institutional framework that imposes a series of checks and balances among the different public actors. The Comptrollers General in the region—which are independent of the executive, judicial and

legislative branches— are usually responsible for monitoring the legality of government’s actions, and in the particular case of the water sector, they could verify compliance with public commitments and sanction non-compliance. Another alternative would be to create an independent agency of the executive branch, in the style of a regulatory agency.

- The use of groundwater resources should be more closely regulated, as they constitute, in many cases, future water reserves.



The first section of the article entitled “*Institucionalidad de aguas y equidad social: El caso de Chile*” (*Water institutions and social equity: the Chilean case*) by Humberto Peña, former General Director of Water in Chile, which was presented in Circular N° 36, identified six key issues offering insight into how Chile’s institutions address the social dimension of water. These were: the basic right to water for household purposes; the protection of historical uses by the most vulnerable sectors; the concentration of rights by the market to the detriment of the most vulnerable; access to new water resources; access to water-related public goods (monitoring of pollution, flooding and other phenomena); and equity in water-related decision-making processes. In this issue we will present the last three of these topics.

Do the most vulnerable sectors of society have equitable access to new water rights? In Chile, when new water rights cannot be established because the water resources available are insufficient (fully allocated), rights can be acquired through the market. The pattern of water distribution, which was inherited from the land and water redistribution process under the Agrarian Reform, has changed little over the years. The creation of a market for water rights was intended to encourage the better use of water resources (for example, more sophisticated irrigation techniques are now being used in 30% of the total irrigated area in Chile and the mining industry has improved efficiency by

more than 100%) and allow new demand to be met within a socially acceptable framework, notwithstanding the limitations inherent to the mechanism owing to market imperfections, externalities and other issues that would be desirable to correct.

It is worth noting that increased resource productivity is linked to the issue of equity. Using water to the best advantage, by allocating it effectively through the economic system (employment, local transfers, taxes, etc.) can contribute considerably to achieving greater equity in society.

In the context of a water market, social policy aimed at facilitating access to water rights should include direct State support to needy sectors. In that connection, a Land and Water Fund was established under the Indigenous Act, providing explicitly for subsidies to be granted on social or historical grounds in relation to access to new water resources. Furthermore, substantial subsidies are bound up with the granting of water rights in relation to major State infrastructure projects and public funds to promote irrigation, with mechanisms in place to ensure that poorer farmers are the prime recipients so that State investments contribute to social equity. The above examples show that, under the institutional framework in force, the degree of equity in access to water rights in situations where the resources have already been allocated depends on the effectiveness of the targeted programmes and policies designed to foster equity.

If the water source has not been exhausted, applications for new water rights can be submitted to the competent authority, the General Department of Water (DGA), which reviews each application in accordance with the procedures and criteria set out in the relevant legislation. However, the provisions of the 1981 Water Code on this matter, which required the authority to grant the water rights requested if they were available, with no restrictions on flow and without the interested party having to justify its request, led to speculative behaviour that went against the public interest, preventing those who actually needed water rights for productive projects from being able to obtain them.

This situation was particularly serious in relation to non-consumptive rights: in the mid-1990s, applications were presented for approximately 50,000 cubic metres per second, which the State had a legal obligation to grant. The documentation submitted by the DGA to the antitrust commission noted that this could lead to a single power-sector operator holding 80% of the rights for hydroelectric purposes and also indicated that the indiscriminate granting of hydropower-generation rights could constitute an obstacle to the development of a wider range of

activities (for example, irrigation) in the different regions of the country.

This serious threat was neutralized thanks to a favourable ruling by the antitrust commission and legal reform. After a long and difficult process, the Water Code was finally amended in 2005 to address these problems, introducing a new balance between the social, productive and environmental dimensions of water resources in order to safeguard the common interest. The new approach is as follows:

- Water rights are to be granted in line with the flow required and not according to the wishes of the applicant.
- The State has the authority to reserve flows for domestic purposes and, in relation to non-consumptive rights, for reasons of general interest. In addition, environmental flows must be set aside for the preservation of the environment.
- When the flows available are insufficient to meet demand, the auction procedure established under the original legislation shall be applied only once the flows to be destined for productive purposes and those that need to be reserved have been identified. In that situation, the State also has the power to allocate water rights directly to a particular applicant without an auction, which could resolve any potential inequities.
- In the case of groundwater, the 2005 reform introduced a simplified process for regularizing small water rights (2 to 4 litres per second, depending on the area), allowing small farmers access to water rights where they may previously have had difficulties in this respect.
- Furthermore, to correct the problem of the unused water rights that were granted under the old system, water rights holders are now required to pay a licence fee for unused rights, the value of which is doubled from the fifth year and quadrupled from the eleventh year. The idea is that the water rights that are not being used and that are being held for speculative purposes will be gradually incorporated into the market, put to use or returned.

Notwithstanding the steps that have been taken towards establishing a system that promotes greater equity in access to water rights, the cost and technical difficulties associated with applying for them constitute a disincentive for poorer sectors who may wish to apply for water rights, unless they receive direct State support in the process.

Is there equitable access to water-related public goods, such as living in an unpolluted

environment, free from flooding and other threats? The problems associated with the provision of these public goods reflect the general deficiencies in the management of water and natural resources in Chile. Consequently, a range of different social groups are affected.

Nevertheless, the financial resources available to implement solutions to these problems vary according to their source and the priority assigned to the problems within the system that allocates public funds. For example, the municipalities in the Metropolitan Region of Santiago with higher incomes have been able to implement solutions to tackle urban flooding with their own funds, while the poorer communities, which depend on State financing, have had to wait for decades. For many years, the high pollution levels of the waterways in the Metropolitan Region affected some sectors of the population. This situation, which was caused by factors such as the weak regulatory and oversight mechanisms of public institutions and the State's economic limitations and priorities, has been overcome by the success of the policy on urban wastewater treatment in the country.

Thus, the equitable provision of these public goods does not depend, in the main, on national water legislation and institutions, but on the State's capacity to manage these common goods, meet demand and prioritize them in the allocation of public resources.

Are the decision-making processes related to water management equitable? The different pieces of legislation relating to water and the environment provide for various administrative and legal resources to defend the interests of each of the actors involved, as well as participatory forums for managing common interests, all of which are designed to act independently. These tools are essential to ensuring equitable decision-making by the water authority or user organizations responsible for administering water resources.

Under these provisions, any individual can oppose an application for water rights by a third party and challenge the decisions of the administrative authority, either before that authority or in the courts.

The environmental assessment system uses public consultations as a way to safeguard the transparency of the process and obtain the views of interested parties. User organizations are created as autonomous self-governing entities to facilitate the democratic participation of the holders of water rights, so that the interests of all users are reflected.

Even though these institutions are designed to guarantee equity in decision-making, in practice that purpose can be undermined by

several factors. First, asymmetries in the capacities of stakeholders are generally detrimental to the weaker sectors of society. Access to information is one area where asymmetries can arise. Even where regulations seek to establish disclosure requirements to ensure that matters of common interest receive a certain level of coverage (for example, the Water Code requires applications for water rights to be announced in newspapers and on the radio, at both the local and national levels), the ability to access information effectively often depends on the capacity to process messages, access to informal networks, and other factors.

Another source of asymmetry is the ability to use the legal and administrative system to defend one's interests. These matters often involve specialized subjects requiring costly consultations and studies, to which the weakest sectors of society have limited access. In this respect, the resources available to large companies to defend their interests go far beyond those of ordinary citizens.

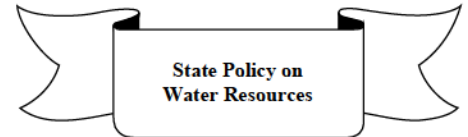
Once again, then, public institutions have a decisive role to play, and they must be endowed with the technical capabilities and independence of judgement needed to defend the interests of all users, especially the most vulnerable. Any weakness in the public sector can therefore be a source of inequity.

In connection with the administration of user organizations, the legislation provides for open and democratic selection mechanisms. However, owing to the different economic, educational and technical capacities of its members, in practice, participation is extremely low and the administration tends to fall for long periods to small groups that have more resources and who are better prepared: over time, these small groups become specialized bodies with low accountability and whose decisions are not subject to effective monitoring by other users. Chilean legislation exacerbates this situation because representation is set in proportion to water rights, without any correction mechanisms to allow smaller users a greater voice.

The examples given illustrate how important it is to go beyond the text of the legislation and analyse the specific manner in which it is put into practice, taking into account the heterogeneous capacities of those involved in water management.

In short, as this article shows through its analysis of various issues relating to social equity, the institutional provisions on water rights in Chile, as amended in 2005, do not constitute an obstacle to achieving higher levels of equity in the management of water resources, as long as they go hand in hand with policies and programmes to that end. The success of these policies depends on the State

taking a leadership role and exerting an active presence to pursue clear social objectives. Furthermore, this article shows how certain instruments incorporated into the water legislation to encourage fair and informed decision-making, such as the obligation to publicize applications for water rights, can face serious limitations in practice owing to the uneven capacities of stakeholders to defend their interests.



In Peru, on 14 August 2012, the National Agreement Forum approved the *State Policy on Water Resources*, under which the State shall:

- Give priority to providing a good-quality, plentiful and timely water supply at the national level for human consumption and food security.
- Ensure universal access to drinking water and sanitation in urban and rural areas in an adequate and differentiated manner in order to meet specific needs, with an institutional framework that guarantees the viability and sustainability of access, promoting public, private and associated investment and taking both a territorial and a river basin level approach, and that guarantees the efficient delivery of services, transparency, regulation, oversight and accountability.
- Guarantee the integrated management of water resources, with the provision of technical support and the involvement of institutions and various sectors in order to achieve the rational, appropriate, equitable and sustainable use of water, with respect for ecosystems, taking into account climate change and promoting the country's economic, social and environmental development and social harmony.
- Protect the balance of the water cycle and the quality of water bodies, taking into account that water in different states and the various components of the water cycle are interdependent; that water must be managed at the river basin level; and that since land use and human activities have an impact on the cycle, these elements should be managed in conjunction taking into consideration the specific features relating to physiographic regions of the country and eco-climatic factors.
- Apply measures so that those who intervene in the river basin protect, rehabilitate and offset any negative impact their actions might have on the environment, taking into account, for example, the combined effect of

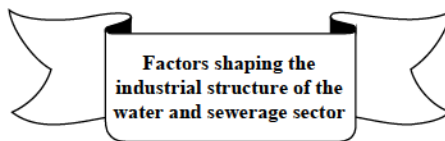
interventions, environmental liabilities, wastewater disposal and the characteristics of each river basin.

- Create the conditions for the sustainable reuse and recycling of treated wastewater, protecting ecosystems and environmental services as well as public health.
- Strengthen the National Water Resources Management System, ensuring its representation at the inter-agency level and guaranteeing the administrative, economic and functional independence of the National Water Authority (ANA) as the lead agency in that system with the powers to act as an independent and decentralized specialized autonomous body, with the participation of regional and local governments, user organizations and others involved in water management at different territorial levels.
- Promote the institutionalization of integrated management at the river basin level with a move towards setting up River Basin Councils, backed by tools and technical bodies endorsed by the National Water Authority and with a shared vision in line with the national, regional and local development plans and land-use planning.
- Prioritize the prevention and management of disputes over water and related issues, through decentralized bodies and with the active participation of water users. A specialized autonomous branch of the National Water Authority will be the final administrative authority in dispute resolution. Where necessary, it will impose any sanctions required in the exercise of its authority over water as a natural resource by applying the rules in accordance with due process.
- Strengthen the integrated management of water resources in transboundary river basins, establishing agreements with neighbouring countries and supporting organizations created for this purpose.
- Plan and promote public and private investment in the capture and availability of water, to optimize the efficient use and reuse of water, prevent risks, mitigate the effects of extreme events, treat effluents and obtain alternative future water sources, including desalination, to balance and regulate the supply and demand of water for different uses.
- Ensure the formalization of water use rights, and strengthen planning, managing and funding mechanisms to cover the costs of water management, recovery of water quality, protection and management of watersheds, disaster risk management, monitoring of water uses and wastewater

discharges, as well as the construction, operation and maintenance of water infrastructure.

- Foster the study, recovery, preservation and dissemination of traditional and ancestral knowledge, technologies and organization mechanisms of the Amazonian and Andean peoples and communities in relation to the management of water resources, combining that knowledge with recent technological developments and management techniques.
- Promote research, development and innovation and the diffusion of these elements by building synergies between academia, business, the State and others in relation to the management and use of water resources, and improve the capacities of the actors involved at the different levels of intervention.
- Ensure users' access to transparent and comprehensive information on the availability, quality and management of water resources through the National Water Authority.

Information on the State Policy on Water Resources is available at: <http://www.acuerdonacional.pe>.



The second part of the preliminary results of a study entitled “*Factores condicionantes de la estructura industrial en el sector de agua potable y alcantarillado*” (*Factors shaping the industrial structure of the drinking water supply and sewerage sector*) conducted by Gonzalo Delacámara are presented below (see Circular N° 36).

Aggregation versus decentralization

There are three possible approaches to aggregation (defined as the grouping of several municipalities into one administrative structure for the provision of services): scale (neighbouring municipalities are grouped together), scope (aggregated structures provide a single service—such as raw water abstraction—or several services—from water extraction to wastewater treatment) and process (municipalities group together either because they share common interests or because they are forced to by higher levels of government).

Traditionally, the main driver of aggregation has been the potential to capitalize on economies of scale (see Circular N° 34) to provide services to a broader consumer base, resulting in more efficient and lower-cost service provision. However, while the incentives for aggregation are easy to

explain, it is surprisingly difficult to find examples of aggregation processes in practice. This apparent contradiction is attributed in the literature primarily to an absence of political will (on the contrary, there are incentives to maintain decentralized service provision). Outlining the potential benefits of aggregation are easy to explain in theory, but difficult to estimate accurately and the process of aggregation is seen as challenging.

The basic argument in favour of atomization (decentralization), in terms of general administrative and political considerations and not necessarily in reference to the water sector, is that it encourages a shift from more bureaucratic and hierarchical management models towards a nested system focusing on government cooperation and participation and a more active role for consumers (that is, an improved accountability process). This model presents numerous problems, however.

The aggregation processes analysed in this study were either voluntary (at the initiative of local authorities, as for some cases in France), developed at the local level but with incentives provided by higher levels of government (to some extent, this is the case for Brazil) or at the instigation of higher levels of government, despite local resistance (clearly the case in Italy and in England and Wales, though there are notable differences between these two examples and changes have been made recently to the British model; it is also the case, to some extent, in the Netherlands).

Interestingly, aggregation can occur spontaneously if sector operators are aware of the incentives and benefits (primarily in terms of capitalizing on economies of scale). However, in most cases, despite the existence of these tacit incentives, aggregation processes are imposed by governments.

The analysis of aggregation processes on the basis of considerations of economies of scale and scope faces certain limitations. While it is helpful to consider the optimal size of the provider (which could well be very small or very large, before the measures taken to rationalize the sector), the analysis does not take into account other links that need to be considered: the dependence of service provision on the decisions taken in relation to resources at the river basin level, the optimal scale for defining environmental standards, the effects of introducing economic instruments on the management of shortages or droughts, etc.

Atomization may take place as a result of factors outside the water sector. A fragmented structure can be the result of a wider process of decentralization of public services (characteristic of federal States such as

Germany and Brazil, and quasi-federal States such as Spain).

The factors that have traditionally justified aggregation, beyond the efficiency gains realized through economies of scale, are improved professional capacity in larger scales of operation, access to water resources and integrated water management, access to financing or combining it with the promotion of private participation in management (which, among other things, can also lead to capitalization on economies of scale) and cost sharing between areas with high and low costs of service provision.

The definition of the aggregation model is highly dependent on the regulatory framework in place with regard to the sector and the water resource. Other factors, such as the quality of institutions, the general level of decentralization of public services and investment needs, also play an important role. Challenges tend to crop up in relation to the institutional design of the aggregate structures (in terms of both the provision and oversight of services, including, for example, the legal framework and government systems, etc.); provisions to confer legal powers on the aggregate structure; the definition of property rights over the infrastructure (and rights of use); the establishment of conditions conducive to maintaining the aggregate structure in the long term; and decisions on tariff harmonization or in relation to qualitative issues (service quality)

On the basis of the analyses conducted on aggregation processes, a number of conclusions were drawn. **There are incentives (financial and economic) beyond the potential efficiency gains from capitalizing on economies of scale and scope.** On the other hand, it is important to distinguish between the diminishing returns of a factor of production (diminishing marginal productivity of capital) and returns to scale: these are separate concepts and should be analysed as such.

mitigate the impact of systems with high associated costs.

The transfer of responsibility for these services to lower levels of the State administration should not diminish the role of the central government. The ideal situation is when the aggregation process is carried out voluntarily (when municipalities or service providers autonomously weigh up the costs and benefits of aggregation). The central government can assist, reduce information asymmetries, minimize transaction costs, etc. If financial incentives (subsidies) are being used to further the process, a full cost-benefit analysis should be carried out.

Aggregation is a dynamic process. There are numerous institutional challenges in connection with the administration of the new entities responsible for more centralized service provision.

Aggregation is possible without transferring ownership of assets (easements, infrastructure, etc.). Indeed, it is important to emphasize that aggregation at the management level is not synonymous with aggregation at the level of the physical systems for service provision.

Aggregation is not possible without adjusting how services are regulated. Perhaps that explains why the aggregation process is given a boost (as in the case of Colombia, where the process is still in its infancy) by the existence of laws and independent regulators at the national level. On the other hand, it is important to note that, while privatization may lead to aggregated forms of service delivery and aggregation is itself an incentive to private-sector participation, these should be treated as independent processes.

In view of climate change and shortages attributable to supply-side (decreased rainfall or lower-quality production) and demand-side (population growth) factors, a key benefit of aggregate structures is that supply

The latest evidence on economies of scale

In England and Wales, the unit costs of water distribution have been shown to decrease as population density increases; dispersion generates diseconomies of scale in distribution; and, where density remains constant, economies of scale are evident, especially in relation to capital costs.

It is generally assumed that infrastructure leads to economies of scale. Should that be the case, it would be reasonable to expect infrastructure to play a prominent role in economies of agglomeration in urban areas. However, while there are some studies that support that theory, there are more that downplay the role of infrastructure in that connection.

Many of the studies analysing economies of scale in the industry take account of population size. However, it is also necessary to take into consideration population density and dispersion (average density, contours away from the centre of the urban area, density gradient). The effects of scale generated by infrastructure works depend on both the density and the size of the population.

The analyses show that increased density leads to significant economies of scale (at least in drinking water supply) and has a positive influence on agglomeration. In addition, agglomeration resulting from a higher population density has advantages in terms of cost (at least until the point where congestion costs begin to be significant).

In Japan, where services are administered mainly at the municipal level and the involvement of the private sector is limited, operations are performed independently (extraction, purification, transportation, billing and maintenance). In France, these operations are often outsourced to a small number of large private companies, allowing providers to operate on a larger scale by

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