

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



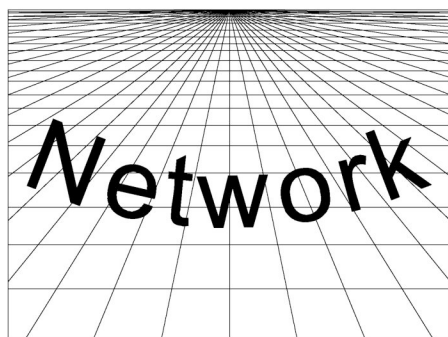
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Bottlenecks in infrastructure services often occur at the level of essential facilities. These include transmission lines, train stations and telecommunications networks, which by their nature are difficult, expensive or impossible to duplicate. The main regulatory issue for this type of infrastructure (generally called essential facilities) is how to ensure access to other service providers. Access can also be an issue in relation to key natural resources such as water, intellectual property rights, airports, and other installations.



When competitive segments coexist in a single sector in the form of natural monopolies segmented horizontally by geographical area or type of service or essential facilities, access by the various players involved in service provision becomes fundamental. An important part of the antitrust effort in the United States, Australia and the European Union is therefore based on essential facilities doctrine. The doctrine specifies the situations in which the owner of an “essential facility” is obliged to provide access to the facility on reasonable terms. For instance, the rules may specify the circumstances under which a transmission network must be made available to a competitor on reasonable terms.

If the doctrine is to be applicable, the following conditions must exist: control of the essential facility by a monopolist, a competitor’s inability to practically or reasonably duplicate the essential facility, the denial of the use of the facility to a competitor, and the feasibility of providing the facility to competitors. The doctrine does

not suggest that access will be free, but that in the absence of agreement among parties, use rights will be allocated by the regulatory authority, and disagreement on the amount of compensation may not be used to deny access. Final indemnification will ultimately be set by the regulatory authority or the judge, based on what is considered reasonable. If the compensation dispute were allowed to affect access, this would create a *de facto* barrier to entry.



The ECLAC Natural Resources and Infrastructure Division has published a document entitled “*Servicios urbanos de agua potable y alcantarillado en Chile: factores determinantes del desempeño*” (*Urban drinking water supply and sewerage services in Chile: determining factors of performance*) (LC/L.2727-P, April 2007, *Natural Resources and Infrastructure Series* N° 123) by Soledad Valenzuela and Andrei Jouravlev. The provision of drinking water supply and sewerage services in Santiago, and in the other urban areas in Chile, is of interest for two main reasons: (i) the high levels of coverage and efficiency achieved in the public sector provision of those services; and (ii) the scale of investment and the lack of significant regulatory conflict or the ability to settle such disputes quickly and pragmatically under the private service provision model. The analysis carried out gave rise to various conclusions about what determined the sustainability of drinking water supply and sewerage services provision in Santiago and the country’s other urban areas.

The first and possibly most important conclusion of the study was that the drinking water supply and sanitation sector “is not an island” (and of course neither it is any particular service provider, no matter how large and significant). In other words, any problems of service coverage or quality do not originate solely in the sector’s institutions (policies, laws, traditions, organization, etc.), and nor can they be solved by these institutions alone.

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As a result, any analysis of sectoral reforms (successful or otherwise) cannot ignore or be separated from their socioeconomic, political and cultural context. One of the implications of this is that public policies cannot be directly transplanted into other realities. Ignoring this has sometimes led to the formulation of over-simplified, uniform and generalized recommendations that turn out to be mainly ideological and even counterproductive. This study therefore analyses factors that are both exogenous and endogenous to the sector, with special

emphasis on the impact of macroeconomic policies on patterns of service sustainability, with a long-term vision spanning over several decades.

Factors explaining the success of the reforms include:

- Professional capacity and a vision of national development within the country and the creation of solid institutions with a long-term vision that were able to recruit the best professionals, as well as the high quality of the State apparatus that could take on the implementation of complex public policies (such as regulation and the provision of targeted subsidies) that required a certain level of confidence in the State on the part of corporate management, investors and the public.
- Government discipline concerning criteria for investing fiscal resources, with an insistence on minimum returns, prioritizing investment based on economic and social evaluations and its contribution to national development, as approval criteria.
- In Chile, governments of various political orientations have always managed this sector responsibly and given it priority, even in terms of allocating funds during periods of crisis. The public authorities have therefore never allowed the situation to deteriorate to the point of needing urgent and radical reforms in response to a deep crisis (as has been the case in several of the region's countries where service providers have become so discredited that a social consensus is generated around the need for far-reaching and radical change). In Chile, the process has been one of long-term improvement, where what is learned in one stage is built upon in the next. This is extremely important, as the experiences of several other countries in the region suggest that the drain of human resources and the general deterioration at the organizational level have a prolonged effect over time. After any such crisis, it takes a long time to recover certain standards of management efficiency.
- In terms of the origin of reforms, rather than an externally promoted process against a backdrop of weak and poor-quality institutions, limited government bargaining power in interactions with third parties (investors, multilateral banks, etc.) and structural problems in State finances, Chile has seen a process of reflection and broad consensus built up at the political level and within the professional sector, which has laid the foundations for its consolidation in the long term.
- As for the pace of reforms, rather than sweeping and radical changes of the "big

bang" variety, the strategy has been one of gradual change governed by realistic and pragmatic judgment and a particular concern for ensuring overall coherence and keeping sight of the country's actual capacities. These steps are as follows: to prioritize the State-financed expansion of coverage through an integrated organization which makes use of economies of scale; to improve the efficiency of public providers, which are transformed into corporations subject to the same rules as the private sector; to move over to self-financing charges along with an effective subsidy system for low-income groups; to adopt a regulatory framework and set up the regulatory body and; to use the experience accumulated over all these years to fine tune the subsidy system and the regulatory framework. Only once all this had been done was the decision made to promote private-sector participation. The original regulatory framework was defined and enhanced using general legislation formulated with a high level of participation of relevant stakeholders, and avoiding the rigid approach of contract-based regulation.

In contrast to the public policies implemented in the overwhelming majority of Latin American countries, where drinking water supply and sanitation services are provided mainly by municipalities as a result of decentralization reforms of the 1980s and 1990s, the central government of Chile began to strengthen its presence in the sector in the 1930s, as part of a process that culminated in the creation of the National Service of Sanitary Works (SENDOS), the Metropolitan Sanitary Works Company (EMOS) and the Valparaiso Sanitary Works Company (ESVAL), which all went on to become corporations organized by administrative region. Chile has thus opted for an industrial structure based on the vertical integration of all stages of service provision, as well as on regional companies covering large geographical areas. In addition to taking advantage of the significant economies of scale and scope that exist in the drinking water supply and sewerage sector, this model has the following advantages:

- Facilitates regulatory and control activities, compared with a system of numerous municipal systems.
- Avoids subjecting service provision to a relationship with local governments which in many countries has quite often resulted in the politicization of essentially technical decisions and a misuse of public resources.
- Gives clear signals to companies in terms of watershed protection, optimization of water abstraction and water pollution control. Water law has also had a positive

effect in this regard by making water allocation more flexible and enabling a relatively smooth reallocation of water rights to urban uses in river basins that are in principle saturated by agricultural use, thereby achieving a more efficient use of scarce water resources.

Unlike most other countries in the region, where chronic underfunding of water supply and sanitation services remains a serious ongoing problem, Chile has managed to consolidate a tariff system that not only recovers all the costs of service provision (operation, maintenance, investment, acquisition of water rights), but that also generates significant profits for owners (be they private investors or the State). This process has not been completely free of conflict, and has taken over a decade to become fully consolidated. It has been made possible due to a combination of factors, some endogenous and some exogenous to the sector. The main endogenous factors include:

- The creation of an effective subsidy system for low-income groups. In Argentina for instance, when drinking water supply and sewerage services in the Buenos Aires metropolitan area were privatized in 1993, the financial policy applied to the concession was initially based on long-term self-financing exclusively through tariffs, with the State rejecting all financial responsibility. It was only in a context of growing economic crisis in January 2001 that the authorities decided to create what was known as the "social tariff" to subsidize demand and put an end to disconnections. In any case, this measure in Argentina has more limited scope and coverage than the subsidy system that has been operating in all urban areas of Chile since the early 1990s.
- A gradual readjustment of tariffs until self-financing was achieved over a transition period lasting several years, with a view to easing the impact of change on the population.
- An intelligent and proactive commercial policy on the part of service providers, which were not only firm in applying charges (supply cuts, and disconnection and reconnection charges, etc.) but which also adopted various measures to help customers adapt to higher tariffs (educational campaigns on the true cost of the service and how to rationalize consumption, assistance in applying for subsidies, payment facilities to settle debts, etc.).
- Self-financing tariffs were only introduced following an intense efficiency drive in public companies, so as to avoid passing on any cost of inefficiency to customers.

- The creation of a regulatory system that — although not without shortcomings— avoids an indiscriminate and unjustified rise in tariffs, offers companies incentives to reduce costs and reassures consumers that their interests are being protected.

The most significant exogenous factors are as follows:

- The strong payment culture among the population, thanks to general and sectoral public policies (such as early emphasis on improving collection even with low tariffs).
- The fact that tariff-adjustment coincided with a period of rapid economic growth, major political and social consensus, low unemployment and considerable increases in real wages helped reduce the impact on the population, given that the same process would have been received very differently had the economic situation been worse.

Another major factor in sector sustainability that sets the reforms in Chile apart from those undertaken in other countries in the region was the fact that, hand in hand with tariff adjustments towards self-financing, an effective subsidy system using resources from the national budget was introduced to target low-income groups. This measure had the following positive effects on service sustainability patterns:

- It has been possible to significantly raise tariffs without triggering massive opposition among users or generating payment-collection problems, simultaneously protecting the most vulnerable groups.
- Unlike in many of the region's countries, where cross subsidy systems have weakened the finances of service providers, the subsidies in the Chilean system are paid directly by the State to the companies providing the service, so that the latter have the income stability to be able to invest, offer services, recover their investment and make a profit.
- Subsidies targeting the lowest income groups made it possible to optimize the use of public funds available for sectoral objectives.

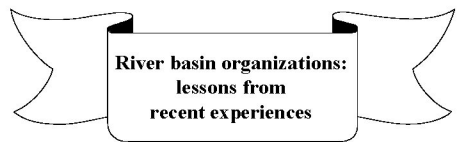
It should be borne in mind that it has been possible to implement a targeted demand subsidy not only thanks to the sector's decision makers and the active collaboration of companies and regulator, but also to following favourable conditions exogenous to the sector:

- Prior existence of a nationwide system that makes it possible to identify and classify

low-income groups and target social-welfare programmes accordingly.

- Efficient and relatively incorrupt public administration at the central and municipal government levels.
- Low levels of poverty and indigence by Latin American standards.
- Orderly public finances and an efficient tax system capable of generating sufficient resources, even in times of crisis.

Lastly, the effects of adequate macroeconomic policies have been clearly apparent in the case of Chile. The country's development model is based on macroeconomic balances and exports that make use of comparative advantages. From the mid-1980s, this strategy has generated buoyant export development and considerable economic growth, which have in turn brought down unemployment, poverty and indigence, while significantly improving wages. As the country's macroeconomic balances and realistic exchange rates keep debt under control, the credit systems and interest rates are relatively moderate and do not deter investment. Furthermore, public policies, in addition to promoting an environment favourable to investment, have been changing in pace with social and environmental goals, while sound macroeconomic policies have helped generate the resources needed to achieve them.



Andrei Jouravlev and Miguel Solanes from the Natural Resources and Infrastructure Division have written an article entitled "*Organismos de cuenca: lecciones de experiencias recientes*" (*River basin organizations: lessons from recent experiences*) (available in Spanish only) for the *AgroAtacama* review, a quarterly publication by the Technological and Agricultural Nexus of the Copiapó Valley, Chile. The main tasks of the Nexus are to: (i) promote initiatives aimed at improving production and management efficiency in table grapes and olives; (ii) establish the nexus as the coordinating entity for technological needs: an interface between companies and technology centres and universities; and (iii) advise on the generation and presentation of technology transfer and innovation projects for the olive and fruit sectors of the Copiapó Valley. The findings of the article are summarized below:

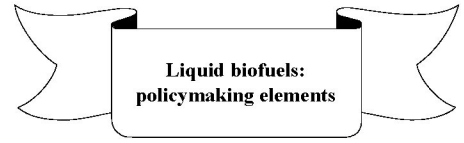
- The functions of river basin organizations should be mainly concentrated on water, and also should be accurately defined and

well coordinated with the responsibilities of other actors.

- River basin organizations need appropriate and permanent supervision and support from the water authority.
- It is vital to encourage and facilitate the participation of interested parties by giving them access to information, funding and the opportunity to formulate positions and opinions.
- Without adequate financing, sector representatives without their own resources will have less capacity than financially solvent participants, with the associated risk of system appropriation and capture.
- Given that self-financing is desirable but often infeasible for river basin organizations, at least initially, strong and sustained government support is vital for no less than 10 years.

In many cases, river basin organizations have consisted fundamentally in technical ideas, rather than being operational, as they have not been based on political consensus or public acceptance. Other common problems have been their lack of defined jurisdiction, responsibilities and independent sources of funding, which can stop such organizations in their tracks. Sometimes, their functions are too ambitious (environmental or natural resources management) or even impossible. Lastly, in the interests of avoiding political conflict, river basin organizations are often set up with too many actors attached to a large number of consultative, implementing, policymaking and other bodies. All of this can, of course, paralyse the organization due to high financing and transaction costs.

The *AgroAtacama* review (available in Spanish only) can be downloaded at <http://www.nodoatacama.cl>.



One of the priority issues for the Natural Resources and Infrastructure Division is **public policymaking for liquid biofuels**. It is vital to consider several different areas of the three traditional dimensions of public policy and how it ties in with sustainable development. The issue must therefore be studied from many perspectives than cannot always be simply represented by indicators that would provide an overview of different situations. The three dimensions and the various areas within them are as follows:

- **Economic dimension:** main areas: (i) energy (contribution of biofuels to level of self-sufficiency, supply security, diversification of the energy mix and energy savings); (ii) agriculture (type of raw materials, availability of land and water, forms of production organization

and landownership, technology assimilation, linkages with the agroindustrial processes of the production chain and access to financing); (iii) industry and macroeconomic aspects (fiscal issues such as tax exemptions and subsidies, trade balance and balance of payments, including exports, reduction of imports and importation of equipment); and (iv) technological development.

- In terms of the **social dimension**, the most relevant areas are: (i) food security (availability of land and the competitive use of land for a given purpose and upward pressure on food prices); (ii) employment and income distribution (employment in agriculture and agroindustry, quality of employment and level of wages paid in biofuels production compared with similar activities); and (iii) local development (impact of biofuels development on local growth and the availability of goods and services).
- In the **environmental dimension**, the main areas are: (i) greenhouse gas emissions and other pollutants; and (ii) the use of natural resources. The use of soil and water and the impact on biodiversity are particularly important in this context, from the viewpoint of the sustainability of development and that of biofuels. Negative environmental effects have been shown to result from the monoculture system used to grow biofuel crops. Such effects include depletion of soil in the face of insufficient crop rotation; water pollution by pesticides, herbicides and fertilizers; and pressure on natural areas and native forests that affects biodiversity. In many cases, certain raw materials (such as sugar cane) require large quantities of water that produce “water stress” in some production areas.



The right of children and adolescents to a healthy environment

In Latin America, a third of children and adolescents between the ages of 0 and 18 (35.3%) lack adequate access to drinking water supply in the home, while only 27.4% of the adult population suffer such conditions.

The problem of sanitation is even more serious, as the regional average of children and young people with no or inadequate access to sanitation is 42.7%, compared to only 36.7% of adults. In terms of both drinking water and sanitation, the situation is more critical for children under the age of five, poorer children and adolescents, those living in rural areas, and those from indigenous or Afrodescendent communities.

These revealing data are highlighted by ECLAC experts in the fifth edition of **Challenges**, a four-monthly bulletin on childhood and adolescence published jointly by ECLAC and the United Nations Children’s Fund (UNICEF). In the main article, “**The right of children and adolescents to a healthy environment. A diagnosis from Latin America and the Caribbean**”, specialists Martín Hopenhayn and Ernesto Espindola analyse the subject of water and sanitation and its impact on childhood.

Persistent inequities in access pose a serious threat to the almost 21 million children under the age of five in the region, who are at risk of infant mortality and undernutrition — a situation that could be avoided by substantially improving access. These are the challenges set by the Millennium Development Goals and the Convention on the Rights of the Child.

The **Challenges** bulletin is available, in English and Spanish, at <http://www.cepal.org/dsd/desafios>.

New norms for the drinking water supply and sanitation sector in Peru

The mandate of the Ministry of Housing, Construction and Sanitation in Peru is to improve the living conditions of the population by facilitating access to adequate housing and basic services while encouraging good management, growth, conservation, maintenance and protection of population centres and their surrounding areas, as well as promoting the participation of civil society organizations and private companies and investment. The Ministry recently adopted new norms for the drinking water supply and sanitation services sector:

- Code of Good Corporate Governance for Sanitation Service Providers.
- Model Operation Contract.
- National Strategy for Promoting Private Sector Participation in Sanitation Service Providers.
- Guidelines for the Formulation of Regional Sanitation Plans.
- Capacity Building System for the Sanitations Subsector.

The norms (in Spanish only) can be consulted at <http://www.vivienda.gob.pe>.

National Water Resources Policy in Panama

In Panama, Executive Decree N° 84 of 9 April 2007 was adopted on the **National Policy for Integral Water Resources Management, its underlying principles, overall objective, specific objectives expected to be reached, and the action lines set to form the framework for activities planned for its implementation**. The aim of the National Water Resources Policy is to ensure that current and future generations have sufficient water availability (in terms of adequate quantity and quality) for various uses, through integrated and effective water resources management. Such management would result in the provision of drinking water supply and sanitation facilities to the entire population, preservation of ecosystems, the adoption of measures to prevent and deal with extreme environmental disasters and the supply of water for productive activities in an economically viable, environmentally sustainable and socially equitable way.

The National Water Resources Policy is based on the following principles:

- **Principle of equity.** It is a primary responsibility of the State to guarantee access to drinking water for the population throughout the entire country. The administration of water sources must incorporate the equity criteria to ensure that they are accessible, safe and unpolluted. This responsibility involves establishing and constantly strengthening stable and transparent rules to guide the actions of the public and private sectors and to constantly improve sanitation systems, while leaving space for citizen participation through the appropriate channels to ensure social balance.
- **Principle of environmental sustainability.** Water is recognised as a finite and vulnerable resource that is essential for life, development and the environment. Effective management of such a resource requires an integrated approach that combines economic and social development with the protection of natural ecosystems. Given that water is a good whose quantity cannot be increased by human beings, its current use must ensure the preservation, renewal and continuation of water resources, so as to avoid compromising the needs of future generations.
- **Principle of prioritization.** Water is a good in the public domain, and the State must ensure that its use takes account of social interests. Guaranteeing water resources is a priority element in combating poverty.

Water is characterized by a wide variety of uses, with the main one being human consumption. The State must manage the quality and quantity of water resources by prioritizing the various uses of water for the population, without ignoring the rights of future generations.

- **Principle of valuation.** Water is recognized as an economic good, in other words a scarce resource with a value. In most of the world's countries, water is usually a good in the public domain of the State, for which use rights are granted to private parties. Proper price setting policies encourage ecologically responsible behaviour in the rational use of water, thereby ensuring adequate supply and sustainability.
- **The polluter pays principle.** Water is a public good that fulfills a social function and whose quantity and quality must be protected. Water pollution is recognized as involving the entire population, and in particular those who carry out acts of pollution through fault or malice. All agents must therefore introduce measures to prevent and mitigate water pollution and bear the costs involved. Similarly, repairing any environmental damage shall be the direct responsibility of the polluter.
- **Principle of governance.** The water resources policy must encourage the social capacity to coherently mobilize energy around the sustainable development of this vital resource. As water utilization often generates rivalry among users, all parties need to change the way they act. This change should be promoted by the political, social, economic and administrative framework for the allocation, development and management of water resources and for providing the services to the population.
- **Principle of graduality and flexibility.** The policy must be flexible and should be implemented gradually to move from a sectoral approach to an integral ecosystem approach, in keeping with the various realities on the ground. The institutional changes involved in this new policy, and the design and implementation of new water resources management plans and programmes, are part of a process that should be implemented gradually. Policy flexibility ensures that the progress in the implementation plan can incorporate new elements that arise from changes in the needs of the population, without affecting the fulfilment of the rights and duties of users.
- **Principle of information.** The policy must ensure that information on water resources is accessible, systematized and timely. It

must be accessible so that it is available to all users of the system. It must be systematized so as to reduce costs and ensure data is continuously updated. It must be timely to facilitate the planning of development programmes and plans and also decision-making in emergency situations.

- **Principle of participation.** This recognizes that there is a shared duty of the State and all the country's inhabitants (both genders) to manage and conserve water resources. Fulfilling this duty requires multisectoral entities that bring together the various actors of integrated water resources management. The administrative unit, knows as a river basin, makes it possible to adopt community participation actions and mechanisms in the river basin territory, while promoting co-management and self-management. Setting up coordination and discussion forums at the river basin level helps to build consensus between the population and government authorities active in the river basin territory.
- **Principle of awareness-raising.** Successfully changing current trends of irrational water use and wastage (typified by depletion and other harmful activities) calls for raised awareness and a change in attitude, behaviour and practices at all levels of society. It is therefore vital for the State to implement formal and informal educational campaigns to raise public awareness by disseminating knowledge on the principles of conservation and the sustainable use of water. This will help the population in the fight to eradicate poverty.

The text of the *National Water Resources Policy* is available (in Spanish only) on the website of the National Environment Authority (ANAM) at <http://www.anam.gob.pa>.

organized a seminar entitled "**Challenges of conservation and energy agendas in protected areas**", at the ECLAC headquarters in Santiago, Chile, on 13 and 14 June 2007. Discussion focused on the following topics:

- protected areas and energy production in the region;
- economic value of protected areas;
- river basins;
- recent experiences;
- hydrocarbons and non-conventional energy; and
- use of protected areas for hydrocarbon energy.

As a result of discussions, the experts formulated the following recommendations:

- Development of land-use planning that guides investment and helps to identify areas that are sensitive, vulnerable or of biological interest where energy activities should either not be carried out or should be undertaken with considerable environmental precaution.
- Promotion of policies to encourage efficient energy use. The general idea should be to do more with less energy.
- Promotion of and incentives for the use of renewable energy (and avoiding the Clean Development Mechanism (CDM) becoming an obstacle).
- Strengthening of inter-agency coordination between those responsible for the environment and energy sectors, so as to generate synergies between the two agendas.
- Generation and updating of information on the impact of energy production on protected areas, and on the importance of these areas for the generation of energy.

The report from the meeting is available (in Spanish only) at <http://www.eclac.org/dmri>.



The main aim of the TWINLATIN project, which is funded by the European Union (EU), is to develop methods and tools to promote integrated water resources management in river basins, based on the EU Water Framework Directive. As part of the project, the Swedish Environmental Research Institute (IVL) organized a workshop on **testing the economic elements of the European Water Framework Directive in river basins of the TWINLATIN project**, which was held at the ECLAC headquarters in Santiago, Chile, from 9 to 12 April 2007.

The aim of the event was to discuss the economic elements of the EU Water Framework Directive and its possible application in Latin America. As a result of

With a view to creating forums where energy-sector actors and those responsible for conservation agendas in Latin America and the Caribbean can meet and have discussions, the Natural Resources and Infrastructure Division and the non-governmental organization The Nature Conservancy (TNC)

discussions, the experts reached the following conclusions:

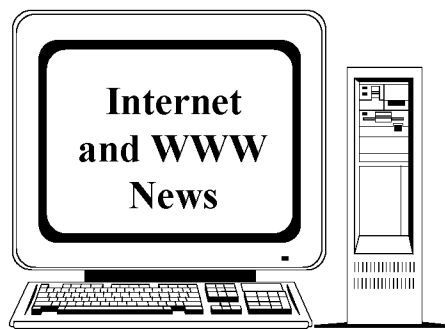
- The workshop provided economists and water management experts from various Latin American and European countries with a forum for exchanging ideas and concepts on the potential role of economics in integrated river basin management. Generally speaking, the workshop emphasized the many limitations in terms of data availability, scale of assessment, integration between technical and economic skills, citizen participation and institutional weaknesses.
- The systematic use of economic assessment to support political decisions is still at an early stage in Latin America. The growing experience of European countries through the implementation of the Water Framework Directive is particularly interesting in this regard.

Andrei Jouravlev from the Natural Resources and Infrastructure Division gave a presentation on integrated water resources management, economic instruments and river basin organizations. On the subject of river basin organizations, he pointed out that the river basin is the most widely accepted territorial unit for integrated water resources management. The issue had returned to the fore in recent years, as part of the discussions of water reforms in many Latin American and Caribbean countries. As a result of this renewed interest, both recently approved water laws and many new legislative proposals explicitly and consistently state an intention to strengthen and supplement the management capacity of water authorities at the central or national level by creating participatory and multisectoral coordination and discussion structures in the area of river basins.

Relevant examples, with varying degrees of consolidation, include the River Basin Committees in Brazil, River Basin Councils in Mexico, Autonomous River Basin Authorities in Peru and the Regional Irrigation Advisory

regulation bodies, etc.) taking decisions that have an effect on user behaviour or on water resources themselves. Second, in many countries, water management is diffuse, fragmented and lacks intersectoral coordination mechanisms, with limited participation by users and other relevant stakeholders. Coordination among those taking decisions that affect a shared and interconnected resource is vital in order to settle conflicts and ensure coherence among the various actors whose activities overlap, and also to guarantee the efficient and orderly use of water. The optimum territorial unit is often the river basin, hence the interest in setting up consultation and coordination bodies at that level. There are also functional reasons for this interest, as it is an approach advocated in the sphere of international and bilateral cooperation.

River basin organizations of this kind are usually collective and mixed bodies, comprised of representatives of a wide variety of actors: water authority, public agencies, local governments and water users (often with between 40 and 50% of the vote), as well as NGOs, universities and landowners in some cases. The functions of such organizations are mainly to promote debate on water issues, consult and coordinate actors, give an opinion on new requests for permits and rights of use or discharge, draw up local water plans, agree measures to deal with extreme situations, arbitrate in water-related conflicts and compile information.



The web sites worth visiting for information on water-related issues include the following:

both sanitation and drinking water. For sanitation, trends in using improved, shared, and unimproved sanitation facilities are shown, in addition to the trend in open defecation. The drinking water ladder shows the percentage of global population using piped connections into a dwelling, plot or yard; other improved water sources; and unimproved sources (<http://www.wssinfo.org>).

- The **National Association of Water and Sanitation Enterprises** (ANEAS) in Mexico brings together the country's drinking water supply and sewerage operating agencies, whose mandate is to support the improvement of efficiency in service provision and to increase the level of professionalism and autonomy (<http://www.aneas.com.mx>).
- The **Environmental Protection Agency** (EPA) of Guyana was established under the Environmental Protection Act of 1996 (<http://www.epaguyana.org>). Its mandate is to promote, facilitate and coordinate effective environmental management and protection, and the sustainable use of Guyana's natural resources.
- In Panama, the **National Authority of the Environment** (ANAM) is charged with promoting a healthy environment by advocating the sustainable use of natural resources, the organization of environmental management and a change in the environmental culture of Panamanians with the participation of all sectors of society, so as to improve the quality of life (<http://www.anam.gob.pa>).
- "**The Caribbean and climate change: the costs of inaction**" is a study by Ramón Bueno, Cornelia Herzfeld, Elizabeth Stanton and Frank Ackerman, which analyzes the potential economic effects of continued climate change for the entire Caribbean region (<http://ase.tufts.edu/gdae/CaribbeanClimate.html>). The report compares two possibilities: an optimistic

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