Regional Diagnostic Report
Latin America and the Caribbean
18 – 20 April 2012, Montevideo, Uruguay
Groundwater Governance - A Global Framework for Action (2011-2014) is a joint project supported by the Global Environment Facility (GEF) and implemented by the Food and Agriculture Organisation of the United Nations (FAO), jointly with UNESCO's International Hydrological Programme (UNESCO-IHP), the International Association of Hydrologists (IAH) and the World Bank.

The project is designed to raise awareness of the importance of groundwater resources for many regions of the world, and identify and promote best practices in groundwater governance as a way to achieve the sustainable management of groundwater resources.

The first phase of the project consists of a review of the global situation of groundwater governance and aims to develop a Global Groundwater Diagnostic that integrates regional and country experiences with prospects for the future. This first phase builds on a series of case studies, thematic papers and five regional consultations.

Twelve thematic papers have thus been prepared to synthesize the current knowledge and experience concerning key economic, policy, institutional, environmental and technical aspects of groundwater management, and address emerging issues and innovative approaches. The 12 thematic papers are listed below and are available on the project website along with a Synthesis Report on Groundwater Governance that compiles the results of the case studies and the thematic papers.

The second phase of the project will develop the main project outcome, a Global Framework for Action consisting of a set of policy and institutional guidelines, recommendations and best practices designed to improve groundwater management at country/local level, and groundwater governance at local, national and transboundary levels.

**Thematic Papers**

- **No.1**: Trends in groundwater pollution; trends in loss of groundwater quality and related aquifers services
- **No.2**: Conjunctive use and management of groundwater and surface water
- **No.3**: Urban-rural tensions; opportunities for co-management
- **No.4**: Management of recharge / discharge processes and aquifer equilibrium states
- **No.5**: Groundwater policy and governance
- **No.6**: Legal framework for sustainable groundwater governance
- **No.7**: Trends in local groundwater management institutions / user partnerships
- **No.8**: Social adoption of groundwater pumping technology and the development of groundwater cultures: governance at the point of abstraction
- **No.9**: Macro-economic trends that influence demand for groundwater and related aquifer services
- **No.10**: Governance of the subsurface and groundwater frontier
- **No.11**: Political economy of groundwater governance
- **No.12**: Groundwater and climate change adaptation

[www.groundwatergovernance.org](http://www.groundwatergovernance.org)
GLOBAL ENVIRONMENTAL FACILITY PROJECT
Groundwater Governance:
A Global Framework for Country Action

Latin America and the Caribbean
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18 – 20 April 2012, Montevideo, Uruguay

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Latin America and the Caribbean (LAC) Regional Diagnostic

Introduction

Latin America and the Caribbean is a large region with different realities related to the presence and use of groundwater. This is evident in the Hydrogeological Provinces of South America map (Figure 1) that has been defined on the basis of regional knowledge of climatology, physiography, geology, hydrology, vegetation and soils (UNESCO 1996). Out of this regionalization arises evidence of the complexity of the approach to the management and governance of groundwater resources in a very diverse socio-political-economic-cultural environment.

Figure 1 Hydrogeological Provinces of South America
The project Groundwater Governance: A Global Framework for Country Action is a joint project supported by the Global Environmental Facility (GEF), the UNESCO International Hydrological Programme (IHP) with the Food and Agriculture Organization (FAO), the International Association of Hydrogeologists (IAH) and the management of the World Bank (WB). The objective of the project is to highlight the importance of groundwater resources of the world and promote good practices of governance for sustainable management of the resource.

The initial activity consisted in analyzing groundwater governance at a global scale to elaborate the Global Groundwater Diagnostic on the basis of case studies, thematic papers and five regional consultation meetings.

Then, Regional Consultation Meetings, organized by UNESCO –IHP were held in: Latin American and the Caribbean, Africa, Arab States, Asia and Europe–United States of America and Canada.

1. **Background**

The concepts developed in this Regional Diagnostic arise as a synthesis of the Final Report of the Regional Consultation Meeting of Latin America and the Caribbean, prepared by Nelson da Franca, papers and personal notes as a participant in the consultation.
The 1st Consultation of Groundwater Governance Project Meeting was dedicated to Latin America and the Caribbean. It was held in Montevideo, Uruguay, in April 2012. One hundred and twelve (112) participants from 19 countries attended this meeting. The host country welcomed the participants with warm hospitality and great interest in the subject.

Official authorities participated of the activities such as the Minister of Housing, Territorial Management and Environment; professionals from local agencies related to the topic of this consultation; Deputy Director General for Natural Sciences of UNESCO; representatives from FAO, UNESCO-IHP, GEF, WB, UNIDO, ECLAC, OAS, IAH, ABAS, among others; decision makers, users, ONG’s, journalists, academics, etc.

In order to analyze and synthesize the thematic knowledge on the development of groundwater in the area, challenges and priorities, study cases were presented to share experiences and help increasing awareness about the importance of groundwater and their proper management and governance.

2. Current status of Groundwater Governance in the region
a. Key factors conditioning groundwater governance in the region

As a result of the Regional Consultation, the following aspects have been identified as key factors that explain the current focus, approaches and status of groundwater governance in the region:

- Changes in land use.
- Growing disorganized urbanization due to internal migrations from rural to urban areas.
- Increasing industrial and mining activity.
- Overexploitation and contamination.
- Climate Variability and Change.
- Knowledge: need of good quality information, available and of easy access.
- Legal and Institutional: political support and commitment, laws.
- Public Participation.
- Socio - economical and Cultural Aspects
- Communication.
- Education.
- Capacity Building.

It is also clear that these key factors are random and poorly considered under vague methodological approaches in the region, although they may be indirectly involved in some ways of the treatment of the subject. It is therefore an important matter to be solved, because the use and comprehension of these factors under precise methodological outlooks are limited to some technic-academic sectors.
In the region, the term “groundwater governance” (GWG) is used as a synonym of “groundwater management”. Considering the need of global GWG, in many situations actions tending to manage the use of the resource in a particular site are shown as actions of governance.

Nevertheless, examples of successful experiences are addressed on Point 4 “Lessons learnt...”

a.1) Evaluation of key factors:

- **Argentina** presented the conflicts generated among different uses: agricultural, public, industrial, mining, recreational, etc. Agricultural use is one of the most difficult areas in which to apply GWG, because involves public and private interests that affect quality and quantity, including ecological consideration and pollution risks.

- **Bahamas’s** experience is a very important case as regards climatic change and variability and the need to protect the aquifers from overexploitation and contamination. There is a great need of scientific knowledge and protection measures to avoid salt-water intrusion and depletion due to tourism.

- **Brazil** showed a general approach on different aspects related to groundwater and urban water supply. Even though groundwater is very important as a local resource, it becomes difficult to identify the impact of abstraction in quality and quantity on the groundwater reservoirs. There is insufficient technical knowledge and a limited perception of groundwater importance in urban areas. There are also problems with illegal wells and a need of more strategies of mass communication. A useful tool for conflict solution is a joint use of groundwater and surface water.

- **Chile** has important requirements of groundwater for agriculture and mining in arid zones. The Water Code promotes the creation of Groundwater Communities though users are yet getting used to this set up. There is also a Participatory Water Monitoring Committee, but in general users act individually.

- **Costa Rica** heads towards building social stakeholders participation, collaborating with the design of laws and reporting situations that may result in potential risks for the resource. This results in effective participation of stakeholders and the need to enhance knowledge, data and information about the system. As regards scientific knowledge, it needs to be shown in a simple way to achieve a good comprehension by all stakeholders.

- **Paraguay** shows the activity of the Water Councils, which are deliberative bodies integrated by stakeholders that work in monitoring, education and
promotion of good practices. They do not have an executive authority at any institutional level.

b. Legal frameworks and institutional settings

In the legislation of LAC is possible to note that, even though references to surface water prevail, concepts related to integrated water resources management (IWRM) had been incorporated, such as participation, management, hydrological cycle and groundwater. This was made in order to achieve an efficient and sustainable management of groundwater resources, responding to situations of change in land use, urbanization and the growing need for food and energy security.

The information from the Final Report (Da Franca, 2012) and PHI-VII (ISARM Americas series, 2008) were taken into account to describe the state of these issues.

The following items introduce a summary with details about some countries that participated in the consultation:

- **Argentina:** According to Article 124 of the National Constitution (the main law of the country which regulates the use of natural resources), the provinces have the primary ownership of their resources. The Civil Code states groundwater as a public good. There are Water Codes in some provinces and Decrees on contamination and toxic waste.

  There are institutions related to water issues. At a national level there are the Undersecretariat of Water Resources and the National Water Institute (INA). Provinces have their own branches for water resources affairs and there is a Federal Water Council. The Guiding Principles of Water Policy had been developed and a National Groundwater Programme has been created.

- **Bolivia:** Its National Constitution establishes that “…are domain of the State the soil and subsoil with all its riches…” which therefore constitute public property. Among other legal instruments for management, the following can be listed: Water Law, Law of Promotion and Support to the Irrigation Sector, Law of Environment, Regulation for Environmental Management and the Regulation for Water Contamination. The Supreme Decree that regulates mining activities in its Chapter II refers to groundwater. In this legal frame there are the Ministry of Water, Mining and Metallurgy and the National Service of Geology and Mining Techniques.

- **Brazil:** The Federal Constitution establishes that water resources are a public good. The Water Law indicates the National Policy on Water Resources and the National System of Water Resources implemented by the National Water
Agency, which is also under federal jurisdiction. The Federal States exercise the
domain on groundwater and have their own laws, in which there are actual
references to groundwater management and protection.

There are also Basin Committees together with the Secretariat for Environment
and Water Resources, Planning, Science and Technology. State Councils are
very important because they formulate state policy, grant and charge the rights
for use.
Brazil also has a National Water Resources Plan. Its main goal is to increase
knowledge development of institutional and legal aspects, social participation,
training and investment. This plan responds to the fact that, even though good
and sufficient laws are currently in use, it is necessary to continue improving
the technical capacity of the Brazilian States towards a sustainable, integral and
adaptive management.

- **Chile** shows changes in its legislation and incorporates concepts referred to
groundwater. The Water Code has market economy as base concept. Water is a
national good and individuals get right of usage. The General Direction of
Water of the Ministry of Public Works is responsible for allocating water rights.
In the legislation it is included the need for information on annual extraction
volume, relation surface water and groundwater, and the possibility to restrict
the incorporation of new users into the system.

- **Haití**: The law that regulates the use of groundwater assigns the responsibility
of control to the Ministry of Agriculture, Natural Resources and Rural
Development. Also, the Ministries of Public Works, Transportation and
Communication, Public Health and Population Affairs, Planning and External
Cooperation have attributions to act as regards water supply, sanitation,
hydropower, public hygiene and water quality. GEF-PNUMA-OEA and UNESCO collaborate with experts from Haití and Repúblic Dominicana regarding the aquifer Artibonito-Masacre. It is important
the elaboration of a Plan for Integrated Management of Water Resources.

- **México**: The Political Constitution of the United States of Mexico establishes
that natural resources of subsoil are domain of the Nation. The Law of National
Water states the free availability of groundwater, according to a system of
authorizations. The National Commission of Water subordinated to the
Secretariat of Environment and Natural Resources (COTAS) favors the
participation of users and society in the administration of the resources. It is
considered a priority to stabilize overexploited aquifers. There are agreements
for transboundary aquifers management with the USA.

- **Perú**: The General Law of Water provides the legal frame for studies, use and
execution of groundwater wells as much as the exploitation licenses. The
Intendancy of Water Resources acts on the usage licenses and the Regional
Governments together with the Users Boards authorize the use. The aquifers
management is done by the Technical Administration of Irrigation Districts. It is
expected to be able to set up an Integral Water Resources Programme that includes a joint use of both surface and groundwater.

- **República Dominicana**: There are laws on Terrestrial Water Domain and Distribution of Public Water; a General Law of Environment and Natural Resources, and a law about Control, Exploitation and Conservation of Groundwater. The Secretariat of Environment and Natural Resources manages the water resources and the national Institute of Hydraulic Resources is the regulator of the infrastructure and irrigation systems. There are agreements with Haití for transboundary resources management as the Peace, Perpetual Friendship and Arbitration Treaty. It is considered indispensable to define a programme to control water quality.

- **Uruguay**: The National Constitution provides in its Article 47 the principles of the Water Policy and establishes the access to drinking water and sanitation as a human right. It also mentions the holistic character of the hydrologic cycle and notes that surface water, as well as groundwater, belong to the public domain, and that water supply and sanitation services must be provided only by the State. The Water Code and the laws of the National Water Policy, Irrigation, Environment and Water and Soil Conservation, together with its regulations, fulfill these principles.

  There are also regulations for the use of groundwater. The Ministry of Housing, Spatial Planning and the Environment (MVOTMA) through its National Water Directorate (DINAMA), executes these policies and is responsible for the assessment, management and control of water resources. The plans are elaborated with the support of the Regional Councils of Water Resources, where government, users and civil society are equal represented.

c. **Water sector characteristics: public – private - partnerships models**

Among the Latin American and Caribbean countries, the issues related to water resources are in general handled by specific governmental agencies, such as ministries of water resources, environment, agriculture or even energy. The subordinated agencies apply the regulations and the actions are developed according to the actual situation in each country.

The concept of common property is prevailing and causes conflicts of interests. This highlights the local vs. provincial vs. national actions. In many cases, the fragmentation of services provided by private and public agencies requires an accurate coordination to get good results. The users’ cooperatives dedicated to public water supply as well as irrigation services generally show very good results, thanks to the participation of all the actors involved.
Information regarding the development of public-private partnership is fragmented and totally dependent on the particular characteristics of each country. Thus, in the consultation appear some examples of private companies seeking to adapt its actions for protection and good management of the resource under the control of the State (Uruguay). In other cases there have been situations with the privatization of water and sanitation services. The mismanagement and lack of action by the State Regulators led to the State taking over those services again.

The governmental agencies must take responsibility in the control of the correct compliance of the rules in order to guarantee the protection of the quality and quantity of the resource.

d. Actors and roles

Considering that good governance facilitates the access to water as a human right, it becomes necessary to empower the society in relation to this topic. To identify actors and roles requires social and environmental studies with transdisciplinary approach and different geographical scales.

In this way, direct actors are those who use water:

- Communities;
- Economical activities (agriculture, cattle rising, industry, mining, tourism, etc.);
- Water supply providers (public and private);

In the other hand, indirect actors are those that influence (positive or negative):

- Planning agencies/Decision makers;
- Financial agencies;
- Educational/Research institutions;
- Professional associations;
- The mass media, among the most important.

The interaction among these actors demand strategies that include the creation of educational programmes at all levels, awareness, public hearings, opinion polls, basic research, and mass communication based on knowledge. As a result of this, it is expected that stakeholders can reach social consensus to participate together in the process of planning and policy making that includes the scientific and economical concepts of the protection and management of the resource.
The dominance of these actors is variable both in time and space. Public institutions may vary their effectiveness on planning and control depending on the continuity of political priorities and society sometimes is moved by particular situations of stress. Scientific work such as monitoring is in many countries and even in national regions highly fluctuating as depending on variable sources of founding.

**e. Technical knowledge and scientific methods and tools**

Knowledge about the condition of the resource is fundamental for planning and implementation of governance actions. It is recognized that knowledge is limited in some areas of the LAC region. The main problem is caused by lack of basic data in quantity and quality and their adequate methodological treatment. Financial support is required to acquire knowledge that permits to define the geometry of the aquifer systems, to build conceptual models and water balances, and to determine recharge zones, formational hydraulic parameters, vulnerability, isotopy, socio-economical aspects, ecological needs, etc.

Through cooperation agreements, academic institutions together with geological services and governmental agencies can generate or systematize knowledge. This requires adequate financing and public information systems accessible to all actors.

Monitoring appears as a very important tool that allows obtaining reliable data and verifying the conceptual, management and numeric models. All activities related to technical and scientific knowledge generation demands trained and specialized human resources. This makes the national and international cooperation a necessity which requires promoting actual and effective collaboration among governmental agencies, universities and international organizations.

Among the tools applied for research can be mentioned remote sensing, isotopy, methodological applications of geophysics and mathematical modeling.

**3) Gaps in relation to the state of groundwater governance**

**a) Policy gaps**

Even though policies related to surface water management have been developed, attention has been slowly focused in the need of managing and protecting groundwater as well as considering the holistic nature of the hydrological cycle. Many countries had established clear objectives such as Costa Rica with the National Development Plan 2011-2014; Brazil with its National Water Resources Plan and Argentina through the Federal Water Plan and the Groundwater National Programme.
In other countries, although there are formal policies and legislation, specific actions are developed in order to promote the Integral Management of Water Resources as well as good governance practices. El Salvador, Honduras and Guatemala are awaiting the approval of their respective General Water Law. Perú is working in the creation of an Integral Water Resources/Groundwater Programme. Haití must elaborate an Integrated Groundwater Plan and República Dominicana is generating a programme to enhance the control of water quality. Uruguay tries to implement a National Plan for Integral Groundwater Management.

Many countries report lack of knowledge on groundwater, its potential, use and vulnerability. Population, mass media, legislators and different governmental agencies highlight this at times. Costa Rica and Venezuela say it is priority to increase the knowledge and aquifer monitoring; Mexico asks to reflect on the need to stabilize overexploited aquifers, and all countries agree on the need of more control on groundwater exploitation.

Public participation is other important requirement. This must be understood as a social process in defense of the interests of the society and protection of the resources, all of which requires education and truthful information. In some particular aspects there are successful examples and there is on-going work on social strengthening and empowerment.

The general opinion of the countries is that all levels of public agencies need qualified personnel with specific knowledge on groundwater management and governance. In many cases work is done by analogy with surface water and this tends to minimize the comprehension of the risk involved when decisions on groundwater management are taken under an unspecific conceptual framework.

All countries acknowledge they must improve their training in general technical aspects as much as in construction and maintenance of wells. According to this, some institutions encourage their technicians to perform training courses at universities. Also, many academic institutions offer courses to the general public to strengthen and articulate actions jointly with society.

b) Information gaps

The representatives of the countries at the Consultation agree on the necessity to make public the decisions and the actual implementation of actions that affect the resources. In order to achieve that, it is important to strengthen the institutions and actors involved and to increase their capacity to generate understandable
communication tools. But mostly, in the end, is also essential more institutional coordination avoiding overlapping functions to correct information gaps.

It is clear that surface water management is ahead on water management issues. In Latin America and the Caribbean the investments are not enough to actually fulfill an adequate and sustainable groundwater management. Even though money is collected in many cases of water use rights, this money is not reinvested in management. It is necessary that the agencies correct these inefficiencies of the process to generate sustainable water management and governance scenarios.

It is evident the lack and/or availability of basic data in much of the LAC area. Detailed information is sometimes fragmented and discontinuous, which makes difficult the application of methodological procedures and obtaining results with low uncertainty. A unified protocol for the collection and storage of data and cartography is required to facilitate the evaluation of real-time systems and to respond appropriately to the needs of managers and society.

These inefficiencies, according to the opinions of the participants, have economical components such as externalities and associated costs that are yet to be part of the evaluations. It is necessary to generalize the charging for water use, to identify illegal users, to have register of wells and drillers, and to evaluate economically on cost/benefit.

It is important to appeal to financial organizations (national / international) in order to design future scenarios related to socioeconomic productive activities, its requirements and the effects of climate change as a way to generate good management and governance models.

c) Accountability gaps.

To achieve good groundwater management and governance it is necessary to face the obstacle of the accountability gaps. This issue is in general related with the lack of interest and actual capacity of comprehension of these matters by society, particularly of the users associations to which is a great challenge to implement actions of surveillance and assessment of policy results.

d) Capacity gaps

It is necessary to implement highly trained technical bodies with a solid professional training to responsibly take control of the use of groundwater resources, their management and protection.

In order to accomplish this, efforts must be oriented by two axis:
1) **Technical/Professional:** Strengthening technical and professional formation on Planning, Hydrology, Climatology and Financing; and

2) **Physical:** Creating programmes to improve and renovate infrastructure.

### e) Institutional hurdles

The institutional situations are very particular according to the characteristics of each country and the scale: national, provincial / state, municipal, etc. It is common the overlapping of roles and responsibilities that can generate obstacles and delays in the implementation of policies. The general opinion is that it is necessary to improve the articulation and coordination between different institutional levels.

### f) Funding gaps

Investment levels are insufficient to implement actions for proper groundwater management and sustainability. This is evident in all levels and scales. On the other hand, the founding collected by right of usage are not always reinvested in management and protection actions.

### 4. Lessons learnt and opportunities to address the gaps

#### a. Examples of Best Practices and Success Stories

The cases presented are relevant because they show the identification of the problems and the actions addressed towards reaching solutions in different environments and scale levels.

In the central region of Santa Fe province, **Argentina**, groundwater has a fundamental importance, as there is no other source of supply. The aquifer has been intensively exploited since the early 1970’s. As a result of the exploitation, almost all wells show a drawdown in their piezometric levels and water quality has suffered a progressive deterioration process with an abrupt increment of chlorides and sulfates due to upconing.

The risk was alerted to local (municipal) and provincial authorities. Both started working with the Sanitation Regulatory Agency and called for National University of El Litoral to elaborate a diagnosis and then a management model that could allow the protection of the supply source. With the participation of civil society, governmental organizations and non-governmental organizations, the evolution of the aquifer system is monitored in real time by the installation of a Laboratory in Nature.
Construction of aqueduct from the Paraná river: impact of imported water evaluated by the Geohydrological Research Group.

Need: approval of Law of Waters of the Santa Fe province and its adequate regulation.

Frame: IWRM; process.

Knowledge and legal tools.

Example Argentina by Ofelia Tujchneider
Laboratory in Nature


**Bahamas**, with the support of GRAPHIC-IHP-UNESCO Programme, has started a project to increase knowledge and to protect the resource at Andros Island. There, the tourist industry controls the water resources despite the current regulations. Risks related to climate change demand prevention and adaptation mechanisms.

**Brazil** shows the integrated use of superficial and groundwater as a solution of conflicts and displays very good legislation though still has problems of implementation.

The successful cases are: Riberao Preto that can protect the recharge zones from real State activity and speculation; Recife, limiting the well drillings in urban areas and the diagnostic studies to plan the exploitation between the states of Ceará and Rio Grande do Norte.

Since 2007, Sao Paulo State is developing a plan on Groundwater Protection that includes: basic information about groundwater, control of wells, guides for protecting groundwater, control of quality and quantity, research and capacity building.
Example Brazil by Humberto Albuquerque

Implementation of the Basic Network for Monitoring of Groundwater - RIMAS

NE+T - automatic / daily measures
EC – under analysis (possible manual monitoring / quarterly measures)

The “Pan de Azúcar Bureau of Monitoring” was presented in Chile and acts aiming to protect the resource of damages caused by mining. The creation of the “Groundwater Communities” is being difficult due to users prefer to act individually.

Cuenca Estero Culebrón, Región de Coquimbo, Chile
Estero Culebrón Basin, Region of Coquimbo, Chile

Water comes out through the Culebrón estuary generated mainly by spills of irrigation (50-450 l/s)

Groundwater leaves towards the north (300 l/s)

The direct recharge by rainfall in the basin is low, from the hills is somewhat higher (100 l/s)

Water enters through the Bellavista channel and is distributed through splitters frames (1500-2000 l/s)

Groundwater leaves to Lagunillas to the West (20 l/s)

Groundwater enters from Lagunillas to the East (60 l/s)

Legend: Wells

Splitters frames and surface irrigated by the frame.

El Salvador, Guatemala and Honduras have signed a Trilateral Treaty in which “…the region of Trifinio is acknowledged as area of special interest, which represents an indivisible ecological unit, in which only conjunctive and coordination action of the three countries could give satisfactory solution to the problems of its populations and to the sustainable management of its natural resources…” (Article Nº3)

El Trifinio: Una experiencia Trinacional en la Gobernanza de Aguas Subterráneas

Aguas Subterráneas

El agua subterránea se aloja en los acuíferos bajo la superficie de la tierra. Acuífero: Es una formación geológica capaz de almacenar agua subterránea útil a pozos y manantiales. (se utiliza en los escuelas de la zona Trifinio para la educación ambiental social)
The aims of this treaty are to continue promoting integrated management of water resources, to incorporate its social content in its actual dimension, to minimize the effects of climate change and to develop a participatory process of trinational strategic planning that involves all three countries actors.

**Trifinio: a trinational experience in groundwater governance**

Groundwater
Groundwater is housed in aquifers located under Earth’s surface.

Aquifer:
It is a geological formation capable of supplying useful groundwater to wells and springs.

(This image is used in Trifinio for environmental education in schools).

The Water Councils of **Paraguay** (case Arroyo Capiibary Basin) composed by different actors, and even though they have no executive capacity, they work in the monitoring, environmental education and promotion of good agricultural practices.

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**La experiencia de la Comisión Local de Apoyo al Proyecto Acuífero Guaraní (CLAP)**

Apoyar las actividades relacionadas al Proyecto Piloto en las etapas de planificación, ejecución y evaluación de actividades como contrapartida de los países afectados al Proyecto de Protección Ambiental y Desarrollo Sostenible del Sistema Acuífero Guaraní. La Comisión participará en el diseño de mecanismos de protección y conservación de las aguas subterráneas mediante la gestión integrada y sostenible a corto y largo plazo en la que la población civil esté involucrada.

Example Paraguay by Alicia Eisenkobl

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The experience of the Local Assistance Committee to the Guarani Aquifer Project (CLAP)

To support activities related to the pilot project in the stages of planning, implementation and evaluation of activities as a counterpart of the countries affected
to Environmental Protection and Sustainable Development of the Guarani Aquifer System Project.

The Commission will participate in the design of mechanisms for protection and conservation of groundwater through the integrated and sustainable management in the short and long term, in which the civil population is involved.

The case of **GEF Project Guarani Aquifer System (Argentina, Brazil, Paraguay and Uruguay)** shows the success of a project on transboundary groundwater and it embodies an example at global scale. Governance, in the context of this project, is considered in a wide range of technical, political, legal, economical, administrative, management, communication and educational actions, all of which were carried out during the development of the project and continue once it was finalized on the effort of implementing the Strategic Plan of Action.

Parallel actions are being developed on a pilot scale under a strategy called “SER”, in Spanish: Sostenibilidad (Sustainability), Expansibilidad (Expansibility), Replicabilidad (Replicability).

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**Sistema Acuífero Guarani (SAG)**

Example SAG By Julio Kettelhut

Guarani Aquifer System
Area of 1.084.064 km²
Estimated volume of 29,000 km³
Flow up to 800 m³/h in depths of 1000 m
Temperature of 60° C (maximum) at some points.
Water with good quality, with local pollution from salts and fluorides

The programme “Cultivating Good Water/Pora” of the Brasil/Paraguay Itaipú Binational Agency (hydropower dam) presents an innovating management model based on the cooperation among governments and society. It begun in 2003, focused on the socio-environmental management of the Paraná River Basin, with a systemic way of addressing the issues and a wide participation of the community in actions aimed at construction of sustainability. Excellent achievements were accomplished by this initiative.

Example Itaipu Binacional Brasil/Paraguay by Nelton Miguel Friedrich.

<table>
<thead>
<tr>
<th>Programme Cultivating Good Water</th>
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<tr>
<td>Conception, methodology, results and replicability</td>
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**República Dominicana** stated that groundwater governance in this country is in its initial stage. The application of rules and control by monitoring shows a low intensity meanwhile the wide use of the resource lacks of necessary studies for its exploitation. Nevertheless, the participation of the actors is promoted and it is recognized the need to apply the current laws with more rigor as much as to establish and to include the basic principles of governance into the legal tools. Others objectives consist in to spread the word on governance and management of groundwater widely and to create bonds with the users.

Some of the main challenges to face forward are based on to estimate with greater objectivity the risks and impacts of human activities and climate variability on the resource; to implement programmes that allow integration of uses of both, superficial and groundwater resources, and to be able to protect the aquifers from agricultural pollution and saltwater intrusion.
Aspects relative to the use of groundwater

Groundwater in República Dominicana is used for different activities due to surface waters are often not enough to satisfy the demand:

- Irrigation
- Drinking water
- Industries
- Tourism

This cause pressure on the resource and affect the availability in terms of quantity and quality because there are not the necessary controls for a sustainable use.

**Mexico** has 653 aquifer systems, and 101 of them are overexploited.

An interesting experience is the Technical Groundwater Committee (COTAS), which promotes the effective participation of actors in groundwater governance. The Aquifer, located in the valley of the San Juan River was exemplified. There are 1.273 users and a management structure that represents them. A 12-year plan of integrated aquifer management was carried out through participative activities.

There is an important need of monitoring the aquifer evolution by the users and a more effective control by the authorities. They have identified some aspects of good and bad governance, the last one specially related to the lack of link between institutions and transparency.
Groundwater Governance: a global framework for local actions
Balance of groundwater (Version Cotas.SJR)
Full recharge = 203.6
Pumping = 324.6
Springs = 0.35
Aquifer Valley of San Juan del Río
Natural outlet for underground flow
Horizontal flow input
The above figures indicate that:
The aquifer is overexploited
There is a reduction of static level average of 0.86 m/year
There is no volume available in the aquifer

b. Main lessons learnt

The Latin American Countries and the Caribbean Islands are two different regions as regards the occurrence of groundwater and the actual possibility of applying governance criteria. In each of both particular actions are required. It is not advisable to generalize management/governance models. Each particular case includes a construction process of a model where the key to good practices and sustainability can be found.
The concept of Sustainable Management is accepted and acknowledged by legislation, but there are significant problems to apply it. Institutions, in general, seem to be adequate to national/provincial levels but must be strengthen at local/municipal one.

The following items can be considered as common problems:

- Overexploitation with its consequential drawdown.
- Saltwater intrusion in coastal areas.
- Up coning.
- Pollution in urban, rural and industrial areas.

There are also problems due to “natural quality”, as for instance in Argentina, caused by presence of arsenic, fluorine and associated elements identified along over a hundred years of studies.

Agriculture uses more than 70% of groundwater. This turns difficult the management and governance especially because different public and private interests involved contrast with the rest of the socio-economical usage needs.

Groundwater also plays a very important role in urban water supply. In many cities it constitutes 100% of the supply source.

All countries face different kind of obstacles towards reaching good groundwater governance. Some of them are common, such as lack of knowledge on groundwater systems behavior, uses, vulnerability, etc., detected in civil society as well as government. It is necessary a better organization of the users in issues related to mining, agriculture and drinking water. Also, updated studies and researches, monitoring networks, basic data and capacity building require regular funding.

c. Opportunities

The role of international organizations is very important to support and facilitate the groundwater management and governance process in Latin America and the Caribbean. In that way, UNESCO-IHP promotes the generation of information and knowledge. A good example is a very important PROGRAMME, called ISARM Americas, with more than ten years of work on transboundary aquifers in the LAC.

The results obtained are available in three books; and the fourth is currently in press. These books provide very good support about governance issues.

OAS, GEF and World Bank collaborate with funds to promote projects and exchange of information and results. The FAO can contribute to the policy design related to food production. The background of IAH specialists could be highly significant to collaborate in diagnosis for governance and planning GW management and governance models.
LAC countries have already worked in networks constituted by ISARM Americas, GRAPHIC and GAS, among others. This increases the possibilities of cooperation and exchange of experiences; otherwise countries usually interact on the basis of conflict of interests both actual and potential, more than seeking a joint approach of environmental issues. The collaboration achieved by the participation on networks facilitated by international agencies also provides and helps to introduce common methodological frameworks, which in the end comes to meet the need of data, information and strategical analysis harmonization.

5. Recommendations and conclusions

Previous to the Consultation Meeting, the participants received a questionnaire with 12 questions. A very representative result comes out of the 43 answers of 19 countries, as depict the actual situation and perception of the topic of each of them.

On the following table a synthesis of the answers is presented.

<table>
<thead>
<tr>
<th>Country</th>
<th>Statement</th>
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<tbody>
<tr>
<td>Argentina</td>
<td>“Inasmuch as groundwater resources constitute the planet’s largest reserve of freshwater, their governance, management and protection should represent a priority for all. Accordingly, multilateral dialogue between all stakeholders is fundamental and groundwater governance must be coordinated with the integrated management of water resources”.</td>
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<tr>
<td>Bolivia</td>
<td>“The governance of groundwater must be targeted at all who participate in its management at local, departmental, national and international level. The diversity of approaches and vision which form the basis of coexistence must be respected by creating practical mechanisms for the coordination and convergence of management processes, considering water as a unifying factor and balancing the technical and political input”.</td>
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<tr>
<td>Brazil</td>
<td>“Groundwater should be treated as a factor for integration, bringing together users, technicians and politicians.”</td>
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<tr>
<td>Chile</td>
<td>“The effective governance of groundwater requires proactive measures by the State and a cultural change among users”.</td>
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<tr>
<td>Costa Rica</td>
<td>“Groundwater is invisible to the public, to politicians and even to engineers, and therefore its impact takes time to become apparent”.</td>
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<tr>
<td>Cuba</td>
<td>“With a view to groundwater governance it is necessary to increase planning, education and control of that vital resource in all sectors of society and to use groundwater rationally”.</td>
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<tr>
<td>Dominican Republic</td>
<td>“It is necessary to reinforce the institutions that apply the laws and enable the bodies governing groundwater to act with the full power of the law to prevent the quality and quantity of this resource being affected by communities, which often act in ignorance of policies for the protection of the resource, without realizing the damage they are causing”.</td>
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<tr>
<td>Country</td>
<td>Quote</td>
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<tr>
<td>El Salvador</td>
<td>“Good governance of groundwater requires good legislation, effectively applied”.</td>
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<tr>
<td>Guatemala</td>
<td>“Groundwater governance must be taught as a formal course in schools, colleges, universities and rural communities since almost the entire population is unaware of it. The first step would be to train staff to publicize the subject”.</td>
</tr>
<tr>
<td>Haiti</td>
<td>“Groundwater is vital for the health, the environment and the economy of countries. Good governance of groundwater makes this possible, enabling the sustainability of the resource for future generations. This requires the participation of all users (public and private institutions, NGOs, professional associations etc.) and the identification in each country of the priorities and challenges for better management of the resource”.</td>
</tr>
<tr>
<td>Jamaica</td>
<td>“Sustainable groundwater governance is vital for the agriculture, industry, human needs, tourism and environmental viability of countries, especially with the impact of climate change. Politicians, decision-makers, technocrats and the population must be alert to the issue and its importance”.</td>
</tr>
<tr>
<td>Mexico</td>
<td>“For some time, groundwater in Mexico has been considered as a national security priority for the country, which is how it is treated by the National Water Resources Law of 2004. Still, there is currently a growing awareness of the water crisis and its impact on the physical environment and on society; but there is not yet any agreement in society on the way to mitigate it. The change needed to achieve such agreement would involve proactive initiatives by all stakeholders including the authorities the participation of society in decisions and government commitment at three levels: federal, State and local”.</td>
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<tr>
<td>Uruguay</td>
<td>“Groundwater represents a strategic resource for countries, hence the particular attention paid to its specific aspects at national level and its international implications, its protection and rational use, which should be considered with great interest by civil society and the State”.</td>
</tr>
<tr>
<td>IAH LAC</td>
<td>“The governance of groundwater will depend on the management structures, and the proposed legal and institutional developments involving all stakeholders at all administrative levels”.</td>
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</table>

**Working Group Results**

During the Consultation Meeting five Working Groups were formed and addressed the following topics each:

1) Groundwater Governance and policy;  
2) Legal and Institutional Frameworks;  
3) Development of Groundwater governance Studies and Research;  
4) How to Increase the Level of Investment for Groundwater Governance and,  
5) Groundwater Governance and Stakeholder Participation.
The recommendations of the Working Groups constitute a very important contribution to the conclusions.

**WG1: Groundwater Governance and policy**

- To identify which specific governance challenges should be addressed related to country specific realities.
- It is very important to consider the differences in the region laws, address knowledge and skill issues.

**WG2: Legal and Institutional Frameworks**

- In LAC area the resource is generally public commons.
- Countries establish their institutions accordly with their constitutional political organization.
- For effective implementation of water legislation it is necessary to have institutional and financial resources.
- It is necessary to establish and updating of groundwater registers of water usage rights.

**WG3: Development of Groundwater governance Studies and Research**

- Assessment of basic knowledge, proper tools.
- On-line information systems.
- Monitoring, training.
- Researchers and representative of scientific centers to be taken into account in decision making.

**WG4: How to Increase the Level of Investment for Groundwater Governance**

- Water rates should be charged generally. Governance should be paid on the basis of actual water resources use.
- Investments in knowledge and in prevision of human and material resources must be increased.
- Control of illegal users by means of electricity consumption data and detailed piezometric maps.
- Drillers must be registered with the authority and the reports of their work organized in a data base.

**WG5: Groundwater Governance and Stakeholder Participation**

- Pilot projects. Social participatory and environmental research.
- Opinion polls, mass communication.
- Groundwater syllabus in the curriculum of educational institutions.

The attendants of consultation meeting participated very enthusiastically exchanging views and providing suggestions, which are listed below:
• The creation of the International Groundwater Year. The implementation of an International Groundwater Ambassadors Programme, by UNESCO.

• To revise and improve the Groundwater Governance definition, considering it as a mechanism of integration that covers both groundwater and surface water.

• To adapt the Thematic Papers of the Groundwater Governance Project for a better and easier comprehension, stressing the most fundamental aspects together with a Study Cases Summary.

• To provide this material also in Spanish and Portuguese, for facilitating disclosure in the entire LAC region.

• To include groundwater in the political agenda of all countries.

• To strengthen administrative government agencies to ensure continuity in administration at groundwater managers level, for avoiding human resources training. It will be useful the implementation of Training Courses for different levels of participants: stakeholders, technicians, policy makers and the whole society.

• Exchange of successful study cases at local and regional levels and replicability evaluation.

• Interaction between institutions on specific issues.

• To achieve more effective cooperation among regional and international organizations.

• Creation of incentives to increase the efficiency of the use and protection of groundwater, especially in the Caribbean, in order to deepen the insight on the exploration of scenarios relative to climate change/variability. In this sense, the Small Islands Developing States (SIDS)- could create a “Groundwater Group” to pursue planning, capacity building and local strategies for good governance.

• It was more prudent to act “concomitantly” than “sequentially” and to begin on a pilot scale.

• Efficient communication system contributes to transparency of technical information, state of the resource, vulnerability. Agencies, users and all stakeholders must be part of this governance system.

• Social participation must be based on scientific hydrogeology. Link between science and management policy.

• Government and external agencies that collaborate can act effectually in cooperation for surveillance towards achieving Integrated Water Resources Management (IWRM) and governance models. The local authorities must take responsibility for the continuity of the actions.
It is necessary for the countries to generate legal frameworks and adequate institutional sets tailor made according their particular needs.

Groundwater is a strategic, social, economic and environmental good. Most attention must be paid at all levels to ensure its protection. Its protection, management and governance must be priorities as much for States as for society.

Reflections

The participants of the LAC consultation meeting freely expressed their views on management and governance of groundwater in the area. As it’s shown, multiple concerns and aspects were discussed and that is consistent with the heterogeneous state of situation in each country. This fact, together with difficulties in achieving constant experiences, both in time and space, and at larger scale than particular examples or contingencies, makes it a real challenge to come up to generalizations valid to all actual situations, which, on the other hand presents the risk of falling in abstract considerations denaturing the use and power of methodological approach.

Land Use, Knowledge Construction and Social Participation appear as the main key factors to take into consideration, as the nature of their interactions subordinate their dominance and set the actual power range of actors and stakeholders.

The Legal Frameworks and it’s conceptual and philosophical nature provides the basic matrix in which each country and the region acts and interacts, and there are very different essential concepts expressed on the own countries legal tools, even to the state of polarity, from holistic consideration of the water cycle and both superficial and groundwater as a public good and water supply as a State Mater of social inclusion to other legal frames to which water is a market good whereas it is marketed directly by the State or by private dealers under public authorization.

This characteristics, responds to the different moments in which the national legal frameworks were conformed. So the actual challenge for management and governance is to provide a complementary conceptual matrix to enable legal balance.

The Legal Conceptual balance becomes essential when it comes to meet the financial requirements of any management and governance strategy and structure. It is evident that all kinds of capacity building towards achieving good practices and governance need proper and continuous founding. And this aspect is a core challenge to all the LAC countries.

But as it is seen in other regions and developed countries that have successful, or at least correct, management experiences well settled in time, founding, given a stable macro-frame, is a logistic contingency that can be met.
In developing countries, the difficulties on founding makes it look as an essential matter, when in fact the essential and dominant matter to good management and governance is that access to safe water to all is, and must be, guaranteed, and founding is a basic logistic concurrent aspect that once is solved is only a part of the equation.

Only when understanding this it comes clear that the principal axis of all actions must be based on the Human Right to Safe Water and Sanitation Access. For its construction society must be empowered and the first objective must be the individual user of groundwater. It should be clear that the need for funding to provide services in a sustainable manner means that all actors should play a definite role. The cost-benefit analysis can reduce the conceptual and actual importance of the management and governance of GW simplifying this as a matter of fee and charging all the management costs to the individual user without rendering a solidary fee frame which allows fair access to water and sanitation, both for human and industrial needs. Otherwise, if management and governance become another market good, poverty and deterioration of the resources will prevail, excluding those unable to pay from social and productive frames, all of which in the end resides afar from sustainability.

Knowledge of the ecological importance of groundwater should be reinforced and disseminated. Also, the holistic comprehension of the hydrologic cycle, the relation between groundwater and surface water as well as groundwater contribution to wetlands should be deepened worldwide.

Considering that groundwater resources constitute the planet´s largest reserve of freshwater, their governance, management and protection should represent a priority for all. Accordingly, multilateral dialogue between all stakeholders is fundamental and groundwater governance must be coordinated with the integrated management of water resources as a part of integral strategic planning towards sustainable social bonds and productive approaches.
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