

AMERICAS REGIONAL DOCUMENT



7th World Water Forum 2015

Daegu & Gyeongbuk, Rep. of Korea | April 13-17, 2015

CONAGUA
COMISION NACIONAL DEL AGUA



AMERICAS REGIONAL DOCUMENT



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Daegu & Gyeongbuk, Rep. of Korea | April 12-17, 2015

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COMISIÓN NACIONAL DEL AGUA



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CONTENTS

Prologue	6
Acronyms	8
Executive Summary	10
Introduction	31
1. The Americas: A privileged, diverse and unequal region	34
1.1 Diversity	35
1.2 Demography	37
1.3 A region of contrasts in the economic field	38
1.4 Poverty and inequality	39
1.5 Economic development models	40
1.6 Political situation	41
2. Water security in the Americas	43
2.1 Water wealth and hydrological variability	43
2.2 Exploitation of water resources	45
2.3 Water security	47
3. Governance and funding for sustainability	51
3.1 Context	51
3.2 Water Management Institutions in LAC	53
3.3 The future we want	57
3.4 Strategies for the Region	57
4. Water and sanitation for all	58
4.1 Implementing the human right to water in the Americas	58
4.2 Water and sanitation services in LAC and the MDGs	60
4.3 The challenges	61
4.4 The future we want	67
4.5 Strategies for the region	68
4.6 Initiatives	68
5. Water for food	69
5.1 The challenges	69
5.2 Ensuring food security	72
5.3 The future we want	72
5.4 Strategies for the region	73
6. Water and Energy	74
6.1 The challenges	74
6.2 The future we want	79
6.3 Strategies for the region	79
7. Adapting to change: Risk management	80
7.1 The challenges	80
7.2 The future we want	82
7.3 Strategies for the region	82
7.4 Initiatives	82

8. Managing ecosystems for human beings and nature	83
8.1 The challenges	83
8.2 The future we want	84
8.3 Strategy for the region	84
9 Lessons learned by the Region	86
10 Conclusions and lessons learned	88
References and bibliography	94

ANNEX.....	100
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CHARTS

Chart 1. Thematic process of the 7th World Water Forum	7
Chart 2. The Americas declaration during the 3rd World Water Forum	32
Chart 3. Countries' situation in relation to MDGs	63

FIGURES

Figure. 1 The Americas	34
Figure. 2 Land distribution	34
Figure. 3 Population distribution	34
Figure. 4 The Americas Climates	35
Figure. 5 Gini Index of household income per capita	40
Figure. 6 Relative aridity	43
Figure. 7 Renewable water resources	43
Figure. 8 Water availability per capita by subregion	43
Figure. 9 Water availability per capita by country	44
Figure. 10 IWRM comb	51

INTRODUCTORY MESSAGE

The World Water Forum have sought to excel as a discussion space to resolve, analyse and expound methods, strategies and actions for addressing the issues posed by sustainable water management.

In order to achieve this, the Organising Committees of each of the Forum have the responsibility to foster the committed participation of various organisations and institutions in different regions of the world so that they promote the mobilisation of water community in countries they operate. On this occasion, the responsibility on the region of the Americas was assigned to the National Water Commission (CONAGUA) and the National Association of Water and Sanitation Utilities of Mexico (ANEAS).

Both institutions agreed to coordinate a comprehensive consultation process and mobilisation across our Continent. The attained results are presented in this document summarising the joint effort of the sub-regions of the Americas (North America, Mexico, Central and the Caribbean, and South America) and collects the different voices and visions on water issues that face our nations.

The drawing-up process encompassed the plurality, idiosyncrasies and hydro-geographical conditions that characterise the Americas, thus our expectation for Korea 2015 is to reflect the overview of the situation prevailing in

the water sector in our region. The Regional Document addresses the progress and outstanding; successes and failures, but above all it is the outcome of the efforts from various institutions (public, private), civil society, as well as specialists and experts of our nations who participated in preparing, organising and conducting meetings. We express our gratitude to them for their dedication and generosity to share their knowledge, ideas and perspectives.

As with any collective endeavour, the Regional Document might omit some ideas and suggestions that results from the abundance and richness of the contributions; however, our ultimate aim is to reflect a shared vision narrowing cooperative relations in our America and that enables us to overcome the challenges we face.

This instrument, apart from complying with the Regional Coordination request, aims at providing elements for the discussion to be held 12-17 April in Gyeongju, Korea, and bridging the 7th World Forum and the 8th Forum in Brazil, 2018.

In other words, our intention is to rescue the Regional Platform so it can transcend the world fora triennial organisation and continue the discussion and the search for solutions in the intervening years facilitating and enriching the our region contributions in these international events.

SINCERELY

The Pan-regional Coordination of the Americas

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PROLOGUE

The World Water Forum is the gathering of most visibility and worldwide importance in the field of water. Every three years, since 1997, the World Water Council organizes the forum in close collaboration with the authorities of the respective host country, as a platform which works toward achieving global collaboration to address water challenges.

The Fora are a unique opportunity, where the global water community, policy makers and decision takers of all the regions of the world can work together to find shared solutions. They offer the occasion to exchange information about good practices and learning from mistakes, in the search for solutions that can be taken advantage of in order to benefit society. Likewise, they provide an opportunity to propose agendas in the discussion of policy and the monitoring of common goals.

The 7th World Water Forum will be held in Daegu-Gyeongbuk, Republic of Korea, April 12th to 17th, 2015. Stakeholders from nearly 170 countries are expected to meet in order to discuss water challenges. At a time when the United Nations Millennium Development Goals (MDGs) established in the year 2000 are about to expire, and that the Sustainable Development Goals (SDGs) must be established, the 7th World Water Forum will be an historic even that will identify the course of action needed to address water challenges. The Forum will provide the opportunity to transcend previous accomplishments and represent a step towards the future in the form of detailed discussions on the post-2015.

The 7th World Water Forum will contemplate the three usual processes that have been developed in previous forums: Political, Thematic, and Regional. Each topic will be developed in an environment of cooperation where governments, the private sector, international organizations, and non-government organizations and academic groups will intervene, within a framework of objectives and concrete goals to be achieved.

On this occasion, aside from the aforementioned, a fourth process regarding Science and technology will be discussed, centered on how to solve water problems with the use of technological innovations, particularly related to the area of computer science when applied to the control of water related processes. Likewise, there will be a Citizens Forum to contribute to enhancing awareness of the general public on water and a Forum for Youth and Children.

The Thematic process will focus on four main themes, encompassing 16 sub-themes, which constitute the framework of the Forum (Box 1). These themes and sub-themes are grouped into two broad areas: (i) Action Goals: The Future We Want, and (ii) Action Tools: Engines of Change. The following chart will facilitate understanding of the thematic proposal.

Chart 1. Thematic Process of the 7th World Water Forum

I. Action Goals : The Future We Want

1. Water Safety For All

- 1.1 Enough Safe Water For All
- 1.2 Integrated Sanitation For All
- 1.3 Adapting to Change : Managing Risk and Uncertainty for Resilience and Disaster Preparedness
- 1.4 Infrastructure for Sustainable Water Resource Management and Services

2. Water for Development and Prosperity

- 2.1 Water for Food
- 2.2 Water for Energy
- 2.3 Water and Cities

3. Water for Sustainability: Harmonizing Humans and Nature

- 3.1 Green Growth, Water Stewardship and Industry
- 3.2 Managing and Restoring Ecosystems for Water Services and Biodiversity
- 3.3 Ensuring Water Quality from Ridge to Reef
- 3.4 SMART Implementation of IWRM

II. Action Tools: Engines for Change

4. Constructing Feasible Implementation Mechanisms

- 4.1 Economics and Financing for Innovative Investments
 - 4.2 Effective Governance : Enhanced Political Decisions, Stakeholder Participation and Technical Information
 - 4.3 Cooperation for Reducing Conflict and Improving Trans boundary Water Management
 - 4.4 Water Cultures, Justice and Equity
 - 4.5 Enhancing Education and Capacity Building
-

In preparation for the 7th World Water Forum (Daegu-Gyeongbuk, 2015), The Americas Regional Process (PRA) took the 16 themes of the 7th World Water Forum as a basis to define, after meetings of consultation and exchange, six thematic priorities to be developed in the region, for each sub region to choose:

- i. Water and Sanitation for All.
- ii. Water for Food.
- iii. Water and Energy.
- iv. Adapting to Change: Managing Risk.
- v. Managing Ecosystems for Humans and Nature.
- vi. Governance and Financing for Sustainability.

The six thematic priorities and the regional preparatory process as a whole have been developed through consultation meetings at the regional and sub-regional level, as well as follow-up sessions in videoconferencing format. A report of the meetings that were part of the regional process and each sub regional process can be found in Annex I.

This document is the result of a set of documents that derived from the work developed during the preparatory process, with contributions, comments and input of people who actively participated in the sub regional process, whose collaboration has been invaluable.

ACRONYMS

A

ANA	National Water Agency of Brazil
ABDIB	Brazilian Association of Infrastructure and Capital Goods Industries
AIDIS	Inter-American Association of Sanitary Engineering
ANEAS	National Association of Water and Sanitation of Mexico
AIDIS	Inter-American Association of Sanitary and Environmental Engineering
ASCE	American Society of Civil Engineers

B

BID	Inter-American Development Bank
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C

CAF	Development Bank of Latin America
CELADE	Latin American Demographic Center
CEPAL	Economic Commission for Latin America and the Caribbean
CONAGUA	National Water Commission
CRA	Regional Partnership of The Americas

F

FANCA	Central American Freshwater Action Network
FAO	Food and Agriculture Organization of the United Nations

G

GIZ	German Society for German Technical Cooperation
GWP	Global Water Partnership

H

HDI	Human Development Index
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I

ICWRER	International Conference on Water and the Environment
IMF	International Monetary Fund
IMTA	Mexican Institute of Water Technology
IWRM	Integrated Water Resources Management

J

JMP	Joint Monitoring Program
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L

LAC Latin America and the Caribbean

M

MDGs Millennium Development Goals

N

NGOs Non-Governmental Organizations

O

OCDE Organization for Economic Cooperation and Development

OCSAS Community Organizations for Water and Sanitation

P

PRA Regional Process of the Americas

S

SDGs Sustainable Development Goals

U

UN United Nations

UNCED United Nations Conference on Environment and Development

UNESCO United Nations Educational, Scientific
and Cultural Organization

UNICEF United Nations Children's Fund

UFW Unaccounted-for Water

UFWR Unaccounted-for Water Rate

U.S.A United States of America

W

WB World Bank

WHO World Health Organization

WRI World Resources Institute

WWF World Water Forum

WWI World Watch Institute

WWTP Wastewater Treatment Plant

EXECUTIVE SUMMARY



With a surface area of over 40.6 million km² (more than 30% of the land area of the world), the Americas region extends from the farthest northern regions of Canada and the United States to the southern extremes of Argentina and Chile, including the Island states of the Caribbean. This region encompasses 35 countries and 41 economies¹; in 2013 its total population was estimated at more than 982 million inhabitants: 13.5% of the world population.

Any discussion of water in the Americas has to take two basic into consideration: first, its natural diversity and second, the complex interactions of water with the social, economic, and political realities of an increasingly globalized world.

NATURAL DIVERSITY

As it extends from the North Pole to the South Pole, the region encompasses a great diversity of landscapes, a wide variety of natural resources, and considerable biodiversity. Seven of the twenty megadiverse countries of the world are located in the Americas (Brazil, Colombia, Ecuador, U.S., Mexico, Peru and Venezuela). Brazil has the most amount of flora and fauna on the planet, as it possesses between 10% and 20% of all species; this is due in part to its diverse topography and changing climatic conditions. The climatic diversity of the region translates into a wealth characterized by some of the most important landscapes and ecosystems of the Earth. As a result, the region has glaciers, snowy

mountains, temperate climate throughout the four seasons of the year in some areas, and in others, two distinct periods of drought and rain. The region has the largest number of bodies of freshwater in the world. The largest rivers of the Americas carry more than 30% of the surface water of the planet. Just the Amazon River basin unloads 20% of the surface water that is spilled into the rest of the rivers of the world. Paradoxically, in spite of being considered a privileged region because of its water, 30% of the area receives less than 300 mm of rain per year, contrasting with huge forest tracts, rich in water, which exist in other areas of the region.

Due to its geographical location and changing climatic conditions, the region is also vulnerable to natural disasters, specifically in the Gulf of Mexico, the Caribbean, and Central America.

SOCIETY, CULTURE, POLITICS, AND ECONOMY.

In the Americas, the close relationship of water with social, cultural, environmental, economic, commercial, political scenarios and perspectives, has been decisive. As a result, assessing aspects of water cannot and has not remained only within the realm of science or engineering, but has been influenced by the social, economic, and political aspects of society.

With 30% of the landmass of the world, the region hosts only 14% of the world population and has a density of population of almost 24 inhabitants per Km², relatively low when compared to the world average. More than 80% of the people live in cities or around them, making the region the most urbanized of the developing countries.

The Americas contribute with 32% of the GDP, from which 90% is produced by Brazil, Canada, Mexico, and the United States; the United States alone contribute 67% of the region's GDP. These large economies contrast with some smaller countries with low income, such as Haiti and Nicaragua. The average GDP illustrates so-

1. Some of the economies are not independent countries.

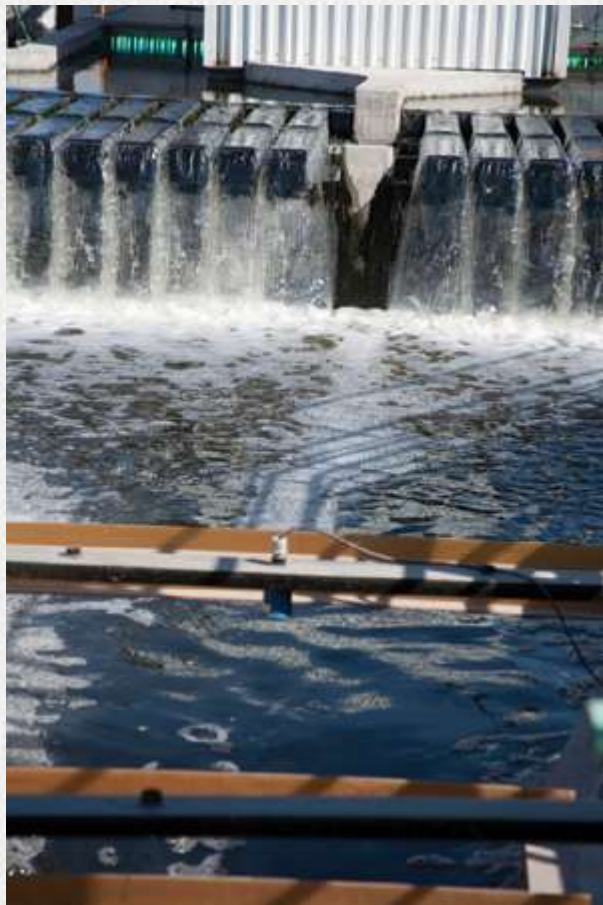
me of the challenges faced by the region; the average GDP per capita is of 41,042 dollars in North America, contrasting with the 4,050 dollars in Central America, 10,098 dollars in South America, and 7,191 dollars in the Caribbean.

Out of the 622 million people living in Latin America and the Caribbean (LAC), 167 million live in poverty and 66 million live in extreme poverty. Almost 2/3 parts of the poor in LAC live in cities, a phenomenon that has been named the “urbanization of poverty”. Most of this urban population lives in precarious areas, which are an expression of both inequality and social exclusion. Therefore, hindering access and the creation of social conditions to obtain a decent job or basic urban services, including water and sanitation.

Poverty is directly linked with the unequal distribution of income, the fragile working conditions, low salaries, underemployment and informality. Compared to other regions of the world, the American continent, with the exception of Canada and the U.S., still shows one of the largest rates of inequality in the distribution of income. This situation affects especially the most vulnerable groups, including women and indigenous peoples.

ECONOMIC IMPORTANCE OF WATER

At a certain point in the history of each country of the region, water has played, and continues to play, a fundamental role in economic development. In the United States, the creation of the Tennessee Valley Authority helped boost economic development of one of the country's poorest regions. In Mexico, irrigated agriculture generates 50% of the national agricultural production and two-thirds of agricultural export production. In Argentina, irrigated land contributes with between 25% and 38% of the total agricultural production, and in Chile, irrigated agriculture produces almost 100% of agricultural exports.



In Latin America and the Caribbean, water-intensive industries (food, pulp and paper, petrochemical, textile, etc.) generate more than 40% of the gross product of the manufacturing sector; tourism, supported by an adequate water supply or by the conservation of aquatic ecosystems generates 10% of the exportations of the region. On average, hydroelectric plants generate more than 56% of electricity, with countries that exceed 70% (Paraguay, Uruguay, Peru, Costa Rica, Brazil and Colombia), to countries where hydropower represents less 20% (U.S., Dominican Republic, Nicaragua, Mexico, and Jamaica).

WATER WEALTH AND HYDROLOGICAL VARIABILITY

Although the vast majority of countries in the region are rich in water, many have severe problems of availability in the arid and semi-arid areas; such is the case of Northern Mexico, Western United States, Northern Chile, some of Bolivia and Peru and the Northeastern part of Brazil.



In 2012, per capita availability of water in the region was of 25,699 m³/capita/year, with significant variation by country. For example, for the Bahamas of 54 m³/capita/year. In El Salvador and Mexico this values were 4,172 and 3,822 m³/capita/year, respectively, while in Canada 83,300, in Guyana 340,881 and in Surinam 185,047 m³/capita/year.

In some urban areas of the western United States, and the arid and semi-arid portions of Mexico, aquifers have been and are being exploited beyond their capacity to recharge. In Mexico as well as the United States, aside from providing the water to urban center and industries, aquifers are exploited significantly in agricultural areas for cultivation of high economic performance. In some coastal areas of the U.S., Mexico, Central America, and the Caribbean, groundwater is threatened by the phenomenon of saltwater intrusion caused by intrusive groundwater extraction.

About 71% of the surface flow of the Americas corresponds to trans boundary water bodies, most notably the Amazon River basin and the Rio de la Plata in South America, the San Juan River, or Lempa River in Central America, and the basin of Grande / Bravo River or Great Lakes in North America. These systems cover 55% of the total area of the continent. In South America, trans boundary basins represent 75% of the total flow, a figure that in Mexico and Central America reaches 24%. In the countries of the Americas there are several agreements and treaties on water systems and trans boundary water bodies; the institutional arrangements for the basins of Canada-U.S. and U.S.-Mexico stand out.

The annual rainfall and runoff in the region are generally concentrated in a few months out of the year. Consequently, it has been necessary to build an infrastructure to control hydrological regimes. It has been estimated that the region has approximately 9,000 large dams; the countries in the region with the largest number of dams are U.S., Canada, Brazil and Mexico, in that order.

The region takes advantage of only a small percentage of its water wealth. Total annual water withdrawals in the Americas accounted for 3.2% of its renewable water resources. This percentage varies from less than 1% in several countries in Central and South America to more than 15% in Mexico, U.S. and some Caribbean countries. Despite the low level of exploitation, within each country, the disparity between the occurrence of water resources and the concentration of population and economic activity has resulted in stress, conflict between uses and users, acute pollution of streams and aquifer depletion due to overexploitation (Western U.S., Argentina, Brazil, Mexico and Chile).

With some exceptions (Canada, United States, Belize, Panama, Colombia and Trinidad and Tobago), agriculture is the main consumer of water. In North America, 12% to 77% of total water withdrawals are for agriculture. This percentage varies from 28 to 83% in Central America, from 46 to 97% in South America and 6 to 94% in the Caribbean.

According to the World Meteorological Organization, from 1970 to 2012, South America experienced 696 disasters that caused 54,994 deaths and \$71.8 thousand millions in economic losses; the most significant event was a flood and water mass movement that occurred in Venezuela in 1999, which caused 30,000 deaths. In North America, Central America, and the Caribbean, most of the hydro-meteorological and climatic disasters reported were attributed to storms (55%) and floods (30%); the most important events in terms of lives lost were hurricane Mitch in 1998 (17,932 deaths), which affected Honduras and Nicaragua, hurricane Fifi in 1974 (8,000 deaths) while hurricane Katrina in 2005 which impacted the U.S, was the costliest disaster in history, resulting in \$146,900 million in losses.

WATER SECURITY IN THE AMERICAS

The concept of water security expresses the main objective of water management which is improving the quality of life for all. It is a concept that provides a common language for politicians, business leaders, water professionals, and stakeholders from other disciplines. Water security is a starting point for negotiating the complexities of allocation of limited water resources between many competing demands that are often conflicting. The following are some of the relevant water security challenges faced in the Americas.

Supply, distribution and sustainability of water sources. The demand for water resulting from rapid urbanization and the needs arising from different models of development exceed the hydrological availability of some basins and aquifers, which has led to solutions based on the overexploitation of aquifers or the transfer of water from a basin to another.

Most Caribbean countries face shortage and/or problems accessing water resources, where the demand is generally equal to, or exceeds, supply capacity; increasing demand driven by demographic growth and development exacerbates the problems. A similar situation is found in many areas of the bigger countries, such as Brazil, Chile, U.S., Mexico, and Peru. Even in countries rich in water resources, with enough water to supply their population and economic activities, the distribution of water is carried out in an unsustainable manner, with the threat of the impact associated with hydrological variability and climate change that could further affect the sources of supply, clarifying the need for amplification of the infrastructure of regulation in a context of intense controversy.

Efficient use of water. The efficient use of water is one of the Greater challenges in most countries in the world and certainly in LAC and western U.S. As a result of the increased attention that has been paid to drought, (e.g. the drought of the Caribbean from 2009 to 2010, Argentina in 2011, Mexico from 2011

to 2012, or California currently), the efficient use of a scarce and vital resource like water has boosted a reform that demands sustainable management of water resources. In LAC, total water losses are around or above 50% and in the agricultural sector they are near to 65%. These high water losses are directly related to deficiencies in operation and maintenance of distribution systems, as well as rates that do not reflect the scarcity and the actual costs of the services provided, thereby discouraging the calls for a culture of water conservation. In the case of food production, the low efficiency in the use of water adds to the waste created from the start of the chain of production in the parcels and culminating in the consumer, to the waste that defines the difference between served foods and food that is actually consumed. In the U.S., for example, it is estimated that water waste caused by food production and consumption could represent a waste of water for agriculture of 30% of the volume currently supplied.

Pollution and degradation of water quality. While water availability problems affect a subset of countries in arid and semiarid regions, the problems associated with water pollution widely concern to all countries of the Americas. Many of the most damaging problems lead to water degradation destroying ecological integrity and vital ecosystems on which a large group of people depend on (e.g. the Amazon River basin, and a big part of the coastal wetlands of the Atlantic and Pacific in most countries). The problems to be solved include pollution caused by untreated sewage, pollution of groundwater due to agricultural and industrial practices and salinization of aquifers.

Infrastructure for water management. The experience recorded in the countries of the region aims, firstly, to the lack of recognition of the need to build new infrastructure in order to meet global, national, and regional sustainability goals, which political, social, and environmental arguments are opposed to; this situation tends to decrease the priority of the investment in water infrastructure and rela-



ted services, and the investment is made in other sectors. On the other hand, there is a pervasive increase in liabilities accumulated by the extinction of a large part of the existing water infrastructure, given the lack of financial resources resulting from inadequate rates and other factors affecting the financial sustainability of potable water, sanitation and irrigation. The development of new infrastructure to regulate hydrological regimes in line with the demands of the population and economic activities, faces opposition from various sectors of society. The lack of infrastructure affects the less developed rural areas, they become more vulnerable to natural disasters. This problem may worsen due to the impacts of climate change, which also transcends the possible impacts on supply sources and covers all aspects related to high water infrastructure and impacts on populations living in cities with high risk vulnerability.

GOVERNANCE AND FUNDING FOR SUSTAINABILITY

Governance models related to water management vary widely between and within countries of the Americas. The fundamental differences respond to government systems of each country as well as the legal framework through which the ownership of the water, and consequently regimes of water rights are defined, this may include ownership or use.

Water governance issues are not new; they have appeared frequently in discussions on how to implement IWRM at the national level, or the nature and purposes of water planning. As with IWRM, there is no single solution to improve the governance of water security. Local conditions determine what will be the “best” governance structure for each specific situation. Building a governance model thus becomes a problem of contexts and realities.

Water property. The concept of water as a public good, and therefore a legitimate concern for the State to regulate its allocation and use, is currently incorporated in the constitutional acts of most countries. In practice, defining water as a national property (Mexico) or, in the case of unitary states like Chile, gives central governments total control over the country’s water, which may or may not be delegated to sub-national entities. On the other hand, the situation in which regional / state governments are empowered to determine the conditions under which water can be used by a third party (Brazil, Canada, U.S.), with central governments that act in a predetermined manner in specific circumstances, generally leads to a heterogeneous set of rules on rights, distribution and use of water, making it difficult to move forward in an integrated management of water, particularly when hydrological and geopolitical boundaries do not coincide, this being the case of all federal countries in the Americas.

Institutional Framework. The water crisis has made clear the limitations of the existing institutions to effectively face a new set of problems, which are not related to the development of water resources, their allocation and management. The new challenges involve strengthening or adequacy of allocation mechanisms and conflict resolution, both in the legal field and in public policy. Water management and decision making process must now accommodate an even greater role in user organizations, nongovernmental organizations and other groups with legitimate interests, as well as incorporating environmental issues and exploring ways in which new technologies and information can be used profitably.

Decentralization and participation. Decentralization and participation are two concepts that in the last two decades have influenced the design of institutional arrangements for water management in most of Latin America, with mixed results. Decentralization reforms and the establishment of water management by watershed, with the active participation of stakeholders, are processes that take time, sometimes decades. In order to keep the reform process it is vital to maintain the necessary support, including the adaptability necessary to modify management arrangements in response to new environmental conditions. Central governments and external organizations that promote integrated management of water resources must then maintain their commitment to reform in the long term and through changes in government. Finally, it is recognized that the financial dimensions of decentralized management by watersheds are important and complex: the success of decentralized management is associated with support from the central government, with financial responsibility for water users and the potential of income that may be generated and applied within the basin.

Institutions for water resources management in LAC. The institutions for the management of water resources and adaptation to climate change in LAC are still incipient or face severe financial constraints. Although many countries have made progress in institutional strengthening

(e.g., Brazil, Chile, Mexico, and Peru), institutional strengthening goes through capacity building and the development of mechanisms for social participation, transparency and accountability, as fundamental parts of an appropriate water governance. The allocation of roles and responsibilities in water management in LAC shows great diversity in the distribution of responsibilities between the ministries and levels of government in the water sector, still, it is possible to identify some common trends:

I. The countries of LAC have decentralized some functions and services: the provision of water and sanitation services is generally delegated locally and irrigation services to associations of users, while the responsibilities associated with the management of water resources tends to be addressed or delegated to the regional/ provincial level according to the principles of watershed management.

II. There is no systematic relationship between the constitutional structure of a country and institutions associated with the implementation of water policy, which is diverse in federal and unitary countries of the Americas. Some federal countries still retain significant powers at central level (e.g. Mexico), while some unitary countries are moving towards greater decentralization in the management of water resources (e.g. Peru).

III. Many countries recently surveyed in LAC have established, within specific contexts, basin organizations according to institutional factors, hydrological considerations, incentives or regulations. The most prominent cases occurring in Brazil and Mexico which are joined by the denominated water compacts set in U.S.

IV. In many cases, (e.g. Chile and Central America), there is a significant overlap of responsibilities between many institutions and agencies, leading to inefficiencies and even contradictory actions in the management of water resources; in this sense, the reform process carried out in Chile is remarkable.

V. The maturity of corporate systems varies widely: some have been created recently, while others, such as Mexico, originated decades ago. Their effectiveness in contributing to the integrated management of water resources depends intrinsically on regulatory powers, planning, management and the funding allocated to them.

Sustainability and Financing. Although resources are generated in some countries (Brazil, Chile, Colombia, U.S., Mexico, Peru) to cover IWRM, these are far from enough. In most countries, the financial resources for water management, including those that are necessary to improve the knowledge about them, are assigned from a mistaken view that does not recognize the strategic value of natural capital, which is fundamental for the development and sustainability of societies according to their legitimate aspirations. With the exception of Costa Rica and various voluntary arrangements for payment for environmental services at local and community level in Guatemala, El Salvador, Honduras and Panama, the development and application of economic instruments for water management is a pending matter, although many countries include these instruments in the legislation.

Pending assignments. The debate about the bond between water and socio-economic and socio-political aspects persists. The role of water in public policy, the required types of water institutions, the role of hydraulic infrastructure for irrigation and hydropower, the role of organizations including trans boundary basin, the practical application of the integrated management of water resources, measures of effective control of pollution from the point of view of costs, the possibility of overcoming deficits in water supply and sanitation, the effectiveness of public and private participation and better management of risks require further study.

One of the biggest challenges is to achieve legal framework and institutional arrangements of water that provide certainty to social agents and facilitate funding for the water sector.

The criteria for these arrangements must be designed to develop an institutional structure, regulatory and operational framework that builds trust in institutions (law, organizations, and authorities) and allows consensual and transparent decisions.

The water scarcity that exists in specific areas of the region is generally a source of conflict between sectors and resource users, especially in the more lacking basin areas, affected by water pollution and geographically concentrated economic development. Conflicts usually occur regarding the water assignments/ concessions to certain sectors, the planning and execution of hydraulic constructions, topics related to pollution control, flood protection and ecological flow assessment. In general, increased demand of water use, especially in urban areas and mining development, has created conflicts with agriculture- involving, in some cases, native peoples.

A theme of relevant impact on water governance and its services is the influence of international agreements protecting investment for the national capacity to manage water resources, the regulation of public utility services, and human rights.

Governance and funding for sustainability

The future we want

- Countries have created the legal and institutional reforms in order to achieve adequate water governance under which the management of water resources is carried out in an integrated and sustainable manner, contributing to the productive economy and environmental care.
- The models of decentralized water management, commensurate with the realities of each country, have substantially progressed to include the effective participation of users and concerned society members, as well as mechanisms that support it financially.
- To promote the reform of Bilateral Investment Treaties, so that the States can be assured

regulation that tends to efficient use and supply of water, is considered legally and, for that reason, compensated economically, and allows the design and implementation of public policy that promotes and protects general interests.

- To encourage the participation of industry and other private sector actors as partners of government agencies and civil society in the implementation of programs that help in the effort to achieve the goals in the Water Agenda of the Americas

Strategies for the Americas

- To internalize the concept of IWRM in regulatory frameworks, recognizing the need to promote a coordinated use of water, and adopting basins and aquifers as units of planning and management of water.

- To improve the process of generation of projects, from planning and project engineering to implementation and final evaluation of their impact.

- To strengthen water authorities in order to possess institutions that are capable to manage the challenges imposed by the management of a complex resource

- To foster the stability of water rights with the necessary regulations to prevent the transfer of negative external factors, and promote flexibility of reallocation as needs and economies evolve, while maintaining natural supply stable.

- To promote the principle that users and polluters must pay for the costs of the resource and compensate for the damage they cause.

WATER AND SANITATION FOR ALL

In Canada and the U.S., the supply of drinking water and sanitation are available to virtually all its inhabitants. The countries of Latin America and the Caribbean also have relatively high coverage for their urban population's drinking water, since practically all countries report a coverage of above 90%, while 82% of the population has improved sanitation. The population with access to services, ranging from about 30% in Haiti to a coverage of over 80% and 90% in other LAC countries.



Even when the advances LAC has made in drinking water and sanitation can be considered substantial, current coverage indicated that there are still 34 million Latin Americans, that have no access to a source of drinkable water, and almost 110 million do not have hygienic facilities to evacuate their excreta. Furthermore, less than 30% of sewage is treated, often times it is deficient, causing 34 out of 1,000 children to die every year from waterborne diseases.

Regional and even national coverage indicators conceal realities and inequalities that may affect a sector of the population. This is the case of the inhabitants of rural and marginalized urban areas, which have the worst conditions of coverage and quality of services, particularly referring to sanitation. Increases in coverage have been slower in Latin American rural areas; as a result, 65% of the population lacks access to clean water, 40% of which have no access to



sanitation and 72% of those who practices open defecation live in Latin American rural areas.

Implementation of the Human Right to Water in the Americas. There has been great progress in water coverage in the region. However, this does not necessarily mean that other inherent elements of this human right are being met. Therefore, it is necessary to be much more demanding on the full implementation of all elements that this right entails, especially with regard to the regulation of providers of water and sanitation, access to information for the population, direct citizen participation in resource managing and decision making, non-discrimination, affordability, among others. Hence, the degree of drinkable water coverage in different countries should not be limited, but it should include the elements listed below, as indicators of compliance with this human right.

A generic conclusion is that there cannot be a direct relationship between the compliance with the various components of the human right to water and sanitation and the presence of positive standards that are recognized within the justice system. Therefore, countries like Chile, for example, that do not recognize this human right in their internal legislation, but maintain high levels of drinkable water coverage and sanitation that is close to 99% or Argentina, which has just recognized this human right in its jurisprudence, but has 98.7% of coverage. On the other hand, countries like Ecuador and Peru, that have recognized this human right in their internal legislation, still show problems in

the coverage of water services and sanitation. Ecuador has an 86.4% in water and an 83.1% in sanitation. Meanwhile, Peru, has an 86.8% coverage of drinking water and a 73.1% in sanitation. There are also countries that have explicitly recognized the human right to water in their legal systems and have high levels of coverage; such is the case of Mexico (94.9% water and 85.3 sanitation), Uruguay (99.5% water and 96.4% sanitation) and Paraguay (93.8% water and 79.7% sanitation). These contradictions exist precisely because many countries that now recognize this human right were those with the worst ratings in potable water and sanitation, leading to social and environmental movements developing comprehensive campaigns and processes so that their governments incorporate this human right into their legal frameworks.

Coverage rates do not include the gross inequalities that occur in many of the countries that have not included the human right to water and sanitation into their legal framework. Among these countries is Chile which, as stated, shows global rates higher than 95% but when considering the coverage of urban and rural areas, significant differences are found (drinkable water: 100% urban coverage and 90% in rural areas; urban sanitation 100% and rural sanitation 89%). The same happens in Paraguay, which has a 100% in urban water and only 83% in rural water, in sanitation urban 96% and 53% in rural areas. If dispersed further, in the figures by country, lower coverage levels in rural regions would be found.

The countries with the greatest inequalities and inequities between access to potable water in urban and rural areas are Nicaragua (97%-68%), Peru (91%-72%), Colombia (97%-74%), Bolivia (96%-72%) and Ecuador (92%-75%). The remaining countries are in ranges from 10% difference in potable water coverage in urban and rural areas. In the case of sanitation, the countries that show the most difference between rural and urban areas are Nicaragua (63%-37%), Paraguay (96% y 53%), Peru (81% y 45%) and Bolivia (57% y 24%). The country with the least inequalities

between rural and urban areas is Uruguay (1%), which has recognized the human right to water and sanitation in its interior ordinance and acted accordingly, developing programs and plans to make it happen.

As for the other elements that make up this human right, relating to quality, affordability, accountability, citizen participation, acceptability, as well as environmental and financial sustainability of systems, very unequal levels are presented from country to country.

Provision of water and sanitation. The provision of safe water and sanitation in the Americas offers a variety of models ranging from private enterprises in Santiago de Chile and several cities in Canada, U.S., and Mexico, to a community service organization for water and sanitation (OCSAS) in a community in the Bolivian Amazon, as an example of the many community organizations that have emerged in all countries in LAC.

The enormous fragmentation of service providers throughout the Americas, especially in LAC, results in tens of thousands of managers in charge of delivering the services, which vary in size, levels of efficiency, capacity of management and service quality. While there are global companies with excellent parameters of operational and financial efficiency, there are also operators who do not possess the necessary capacity to operate at the appropriate economic scale, which results in low efficiency levels and a poor quality of service. The atomization of water providers leads to poor planning and pre-investment, limited access to credit, slow process of enterprise modernization, and greater efforts and costs from the point of view of regulation, supervision, and control.

Quality of services. Beyond the coverage targets set in the MDGs or arising in Post-15 targets, which regarding potable water will be met in nearly all the countries of LAC, the biggest challenges in this area faced by the region are associated with the quality of services (water

quality, efficiency, timelines and continuity of supply). Adequate provision of services means addressing the problems associated with the organizational forms and legal/ regulatory frameworks, financial sustainability of services (result of the existing rate structures) and the conditions of citizen participation, transparency and accountability. Quality deficiencies in water generate an increase in spending on health, on the provision of alternative means of supply and disinfection. Furthermore, as women are the heads of the household they are also responsible for the use of water, and assume the opportunity costs from carrying time or housework, decreasing their employment opportunities to generate income.

Financial Sustainability. Within specific contexts, all countries of the Americas face the problems associated with financial failure generated by rates that are set below the real cost of the services, which has resulted in the inability to replace aging and inefficient infrastructure in the more developed systems and the failure to expand the systems with a lower economic capacity.

Towards universal water services and sanitation. Latin American citizens expect quality water coverage and household connections. While sanitation does apply to having a decent bathroom, it recognizes that the most pressing problems refer not only to the provision for the inhabitants of cities, but require a look at the rural and peri-urban areas, where the most of the population lives without access to these services. Among the many problems these countries face in moving towards universal water services and sanitation, five of them, whose solution can have a multiplier effect in terms of sectorial developments, stand out. These challenges are: (i) Multiplicity and politicization of operators of services, (ii) Need for sector financing and improved implementation thereof, (iii) Weak regulatory activity in services, (iv) Inefficiencies in the provision services, and (v) The need for reliable and comprehensive sector information.

Multiple operators of water and sanitation.

The multiplicity of operators which, among other things, work at different levels of scale, human capital development, efficiencies and minimum vital qualities, make it even more difficult to move forward on the path towards a universal provision of quality services. The wide dispersion of actors reaches its peak when considering the growing number of OCSAS (80,000) that in LAC serve at least 70 million people in rural and some peri-urban areas without services. There are some significant opportunities in LAC to consolidate business development of municipal enterprises in small and intermediate cities, as well as the OCSAS, which involve creating the right incentives and implementing regulatory instruments that promote service delivery to appropriate scales of operation, and direct funding towards projects with high rates of social return. The international cooperation and financing approach should be directed towards this sectors.

Faced with the departure of private companies and the preponderance of public enterprises, it was considered that the strengthening of the latter should be the focus of the strategies to follow in the coming years. It is noteworthy that as in other countries, the U.S., a movement to re-municipalize the provision of water services, currently held by private operators, has emerged from considerations of efficiency and transparency.

Sectorial financing needs and improved application. Sector financing needs and improved application. It has been estimated that investments in infrastructure to achieve universal coverage of potable water and sanitation by 2030, for all LAC countries is an investment with expenditures of around US \$ 12,500 billion annually, equivalent to 0.31% GDP in the region by 2010, for a total of US \$ 250.000 million. This estimate includes reaching coverage targets wastewater treatment (64%), increases in storm drainage structure (85% in urban areas), optimization and capacity increase font (100%

of the incremental demand), institutionalization services in marginal urban areas (the largest investment deficit) and renewal of assets that are in operation.

The current financial problem not only refers to the need for a permanent resource, but also the lack of viable social and economic projects, as well as deficiencies in the planning, implementation and operation of infrastructure, and the inability of the operators to exercise the financial resources at their disposal. Beyond covering the costs of operation, maintenance and the recoverable amount of investment, one of the most important challenges for all countries of the Americas refers to the investments required for the replacement of assets that have reached, and even exceeded, their purpose. Furthermore, it should be recognized that in many cases the fees and connection costs are real barriers to access for the poor. Hence, the commitment required for the allocation of funding to close the gaps and meet the growing needs in infrastructure to provide water and to collect and treat wastewater, with quality services for all. Ultimately, the challenge is the design and implementation of real rates along with the implementation of effective systems of subsidies for the poor, as in the case of the scheme implemented in Chile.

Efficient delivery of services. Despite the substantial increase in the levels of coverage that LAC shows, water services and sanitation show significant deficiencies in meeting health standards and the provision of services in an ongoing basis, seven days a week and 24 hours a day. Furthermore, treatment of wastewater is deficient, since less than 30% of the water is treated. These deficiencies are manifested in an asymmetric and unfair manner, mainly affecting the vulnerable and poor in the peripheries of cities, towns, and rural areas. The efficiency of the services can be measured by the results they generate and the costs incurred. It has been estimated that the annual cost of inefficiency in LAC could be estimated at US \$ 5,000 million. The efforts of countries to improve efficiencies

in the provision of services is a priority consistent with the purposes of globalization and especially with the human right to water and sanitation.

Weak regulatory framework for services. The strengthening of regulatory frameworks is perhaps one of the cyclical aspects in the LAC region. The analysis of current practices indicate that except Chile, Colombia, and Peru, other countries should make greater efforts to improve its regulatory framework to influence the improvement of the coverage and quality of services. Addressing the challenge in regulatory matters would involve the establishment of an autonomous and technically efficient regulatory body, accompanied by legal rules ensuring adequate access to the information operators require for the performance of their duties. Undoubtedly, the municipal companies of medium and small cities is the segment that most requires the application of regulatory mechanisms, because they operate inefficiently, with large gaps in financial sustainability and large investment needs that cannot be covered.

Lack of reliable and comprehensive sectorial information. The effective availability of appropriate information systems is associated with the institutional schemes operating in each country. The type and quality of data are directly related to the existence of regulatory bodies, regulatory and legal framework requirements containing the same. Experience in LAC indicate that regulatory bodies have been pretty lax and permissive in terms of the requirements imposed on operators. Also, the services provided by small operators, cooperatives and OCSAS have been excluded from the database. As a result, the country by country statistics gathered by international agencies are not consistent, and therefore not always reliable.



Water and sanitation for all

The Future we want

- The countries of the Americas have met, or are close to achieving universal access to water and sanitation in line with the elements of quality, affordability, accountability, citizen participation and acceptability that integrate and enforce the human right to water and basic sanitation.
- With the support of public policy based on the size of populations, providers of water and sanitation services are moving towards financial sustainability by increasing their efficiency to levels that are possible and desirable, with rate structures that reflect the actual cost of services and greater rationality in the use of resources and subsidies.

Strategies for the Americas

- Efforts to achieve universal water services and sanitation must be closely linked to programs for food security and poverty eradication.
- It is necessary to prioritize investment in sanitation as a basic measure to control pollution and improve water quality and to prioritize the expansion of urban systems given the increasing concentration of population in cities, taking into consideration the protection of watersheds and wastewater treatment.

- Public policies must consider large cities independently from medium and small cities and rural areas, which will allow progress with greater impacts, the use of resources more efficiently and to have achievements in a more equal manner.

- It is necessary to maintain the flow of financing required to achieve the goals of universal services, for which it is necessary to promote the search for innovative financing mechanisms and achieve greater efficiency for every dollar spent.

- Public policies and government support should give the highest priority to improving the physical and commercial efficiencies of providers of water and sanitation, along with appropriate structures for rates and subsidy, which form the basis for advancing the financial sustainability of services.

- It is important to take advantage of the success stories that exist in the region to improve regulatory practices to promote efficiency; consistent with good practices, the regulatory framework should be autonomous to minimize political interference in sectorial decisions.

- The definition of public policies for the management of water and sanitation requires a permanent technical monitoring, by generating accurate, complete, comparable and verifiable indicators to adopt the most appropriate strategies for each scenario.

Initiative

Invite countries of the Americas to promote agreements in the various multilateral regional organisms (organization of American states-OEA, Mercosur, Latin American and Caribbean States Community-CELAC, Andean Community of Nations-CAN, among others), in order to define regional goals to progressively achieve the various elements that make up the human right to water and sanitation.

WATER FOR FOOD

Irrigation has played an important role in the development of many countries in the Americas, mainly in Argentina, Brazil, Chile, Mexico and Peru. In countries such as Bolivia, Guatemala,

Haiti, Honduras, Nicaragua and Paraguay, agriculture generally contributes 20% of the GDP while in larger countries like Argentina, Brazil, Mexico and the U.S., this figure varies between 6 and 9%. Almost 100% of Chile's agricultural exports, and 50% of them in Mexico, come from irrigated areas. With some exceptions (Canada, U.S., Belize, Panama, Colombia, and Trinidad and Tobago), agriculture is the main consumer of water with 70% or more of the extractions. In North America, 12 to 77% of total water withdrawals are for agriculture. This percentage varies from 28 to 83% in the countries of Central America, from 46 to 97% in South America and from 6 to 94% in the Caribbean.

Producing less food is not an option. By 2030, half of all produced food and two thirds of all harvested grain will come from irrigated agriculture. Achieving these challenges will require a new mindset in irrigated agriculture, new organizational, institutional, human resources and technological innovations. In fact, food production must double to feed the entire population in 2050, hence the need to address the issue of water use in agriculture, which generally represents 70% of total water use. Moreover, it is worth reflecting on the low priority accorded to investments in infrastructure for food production, when they are key to ensuring food security and competitiveness in foreign markets; this topic is associated with the generation of sustainable projects.

With increasing global demand and prices for agricultural and livestock products, there has been an intensification of crops and an expansion of the agricultural frontier, with the consequent pressure on water resources and changes in land use, with a direct impact on the hydrological behavior of many watersheds and soils. The increased use of fertilizers and pesticides in some countries has led to pollution problems.

Agriculture is expected to suffer "the worst consequences" of climate change. In some regions, changing rainfall patterns and increasing water

scarcity will reduce agricultural performance by a quarter or more by 2050. The challenge facing agriculture in the region is to ensure sustainable water use.

Water productivity in agriculture. Given its impact on the water balance of the countries and their specific watersheds, it is essential to increase water productivity in agriculture to reduce the pressure on water resources, reduce environmental degradation and improve food security. However, that is not a simple process and there is no “magic” solution to achieve it. As to improve water productivity, interventions are required at all stages of their “chain of use”, which involves from improving efficiency in how plants use water to how international trade impacts their use and productivity.

Innovations with significant potential to improve water use correspond to four areas of action: (i) use of water by plants, (ii) improved water use on parcels or units of production, (iii) improved driving and water supply and (iv) innovative watershed management. The advancement of scientific knowledge and participation of stakeholders in agriculture, particularly the (large, medium, and small) producers, who are ultimately responsible for the use of the resource and have the greatest interest in ensuring its conservation and quality are the two determining factors for the implementation of various innovations.

It is clear that improving water productivity and achieving integrated management of water resources is a shared responsibility at all levels. So the participation of researchers, producers, communities, nations and the international community is required to ensure the availability and integrity of this vital resource. Undoubtedly, the individual action of a producer, a community, a government or an investigator will be insufficient to ensure the availability of water required by agriculture in the near future.

Innovations in watershed management. At the basin level, nation and even trans boundary

waters, have made great efforts to improve resource management. For this purpose countries are now widely using technologies of georeferencing and geo-measuring, space technologies and computer models.

Ensuring food security. The solutions for increasing grain demand between 70% and 100% over the next 25–30 years will have to come from the area of water resources and agriculture area. Beyond that, the addition of technologies, negotiable processes involving all stakeholders, focus on the control and reduction of overfishing and wasteful consumption. This results from the rising price of inputs (natural resources) and its reflection in the cost of food. Discussions will focus on the availability, access, quality, innovation and increased investment in agriculture.

The key message of the World Conference on Water for Food 2014 was that the combination of new, complex and large data sets and forms, from the Internet to the digital instrumentation and remote sensing along with greatly enhanced capabilities for processing data, opens up new possibilities for better analysis and decision making with far-reaching consequences for water and food security.

Water for Food

The Future we want

- The countries have eradicated or are close to eradicating hunger, as well as contributing to global food security through the development of an economically viable and competitive agriculture that conserves land, water, plant and animal genetic resources.
- Countries have increased water productivity as a result of programs targeted toward increasing efficiencies at all stages of the production cycle, the application of technology and software innovations, and strengthening user organizations programs.
- The expansion of the agricultural irrigation frontier, which was necessary to meet the needs of the population and other productive

activities, relies heavily on the reuse of treated and / or low quality water.

Strategies for the Americas

- Save water in agricultural use by reducing losses along the chain of production and consumption, including the decline in the global food waste and the adoption of diets with less water.
- To promote the automation and modernization of irrigation schemes in the medium and long term, to take into account the financial capacity of producers and, where appropriate, the private sector.
- Implement, against the threats of climate change, tools (software, agronomic and technological) that allow farmers to adapt to climate change and to improve forecast and productivity; the challenge is to disseminate and implement these tools.
- The safe and efficient use of agrochemicals and other inputs and the elimination of the use of toxic chemicals.
- Assessment of agricultural biodiversity, recognizing its role in ensuring stability, resilience, and nutritional quality of production and its importance in the provision of environmental services.
- Support for applied research and development of techniques for sustainable agriculture, boosting the dissemination of sustainable technological and managerial innovations, adaptable and accessible to all farmers.

WATER AND ENERGY

A common feature of all countries in Central and South America is the high participation of hydropower in the energy matrix, which at least in countries with high availability of natural gas as Argentina and Bolivia, reaches 30% capacity installed. This participation is even higher in Brazil and much lower in Mexico and the U.S. The differences in the participation of hydroelectricity reflect, in part, the challenges faced by each country and the type of organization that it has given its electricity sector. To some extent, these differences are



seen in the establishment of regional free trade blocs; however, this characterization is not enough if it does not include the strength of institutions and energy and water markets, and the capacity for social dialogue.

While hydropower has played an important role in many countries in the region, on average only 26% of economically exploitable hydropower potential has been developed in Latin America, a figure that is higher than the potential developed in Asia (20%) and Africa (7%). The use of hydroelectric potential ranges from less than average value (23%) in Belize, Chile, Colombia, Cuba, Ecuador, El Salvador, Guatemala, Honduras, Mexico, Nicaragua, Peru and Suriname, to over 50% in Paraguay and Uruguay. Hydroelectric plants generate on average over 56% of electricity, with variations ranging from around 10% in Jamaica, Mexico, Nicaragua and Dominican Republic, to over 70% in Brazil, Colombia, Costa Rica, Paraguay, Peru and Uruguay. In contrast, Canada, U.S. and Europe advantage over 60% of its hydropower potential.

The challenges. By 2030, the population of the Americas will exceed 1,120 million and nearly one billion will be concentrated in urban centers. This means a considerable increase in the demand for goods and services. It is estimated that global energy requirements will increase to double or triple by 2050, with uncertainties about the impact that may arise from the evolution of oil prices, so it will be critical to ensure sufficient supply of water and energy to support economic growth and reduce poverty.

In the latter context, another challenge will be to ensure access of all people to electricity, achieving more inclusive development; in 2011 the percentage of people without access to electricity ranged from 0.7% in Brazil, up 72.1% in Haiti.

Hydroelectricity. Environmental and social considerations make it increasingly difficult to promise a large volume of renewable generation energy from water. While large dams have been very important for economic growth in the region, their environmental and social impact has also been recognized. Although the authorities often brag of great hydroelectric potential, recent experiences in Chile and Colombia, as well as those that occurred in Mexico and Central American countries, indicate that the mistakes of the past diminish the credibility of the public, they prevent and obscure the debate leading to delays or even eliminate promising developments. There is much to learn in how governments should meet the basic needs of the regions where energy is produced so that projects do not become hostages and their development is frustrated.

Conflicts over water use for energy production. The conflict in the use of water for power generation exists explicitly in hydroelectricity, when its use does not coincide temporally or spatially with other needs for human use, flood control, irrigation and ecological minimum flow downstream. This occurs when reservoirs are operated or basin transfers are made to better exploit the hydroelectric potential. This is not a serious problem in most hydroelectric developments, either because the seasonal needs match or because the lack of long-term storage does not make flow regulation feasible. In other specific cases, the priority use for potable water or flood control places restrictions on the optimal operation of power systems. In general, the problems of optimal allocation of water between uses are conditioned by priority assignments without being duly established trade-offs. This can lead to inefficient allocation places but it is difficult to reach consensus with stakeholders. The regulation is inflexible and public debate is often heated.

Alternative sources. While hydropower is a source of economic and environmentally efficient energy, there is a strong tendency for countries to develop complementary sources, particularly biofuels and wind power, not only to enhance the reliability of supply, but also to reduce the use of non-renewable sources. In some regions, both wind energy and biomass, have a “seasonal complementarity” with hydro-power, as less rainfall periods correspond to harvest certain crops, such as sugarcane, it is also the season with greater winds. For these regions it will be necessary to develop mechanisms of synergy between the generation of hydroelectricity, wind and biomass energy. Although there is no apparent conflict in the use of water, both in Chile and Colombia, as it happens in U.S. and Mexico, a controversy has sparked with environmental agencies and sectors of society, who argue that there is no assurance that the exploitation by hydraulic fracturing will not affect groundwater quality.

Since energy production generates a significant environmental impact through biosolids and biogas, emissions of greenhouse gases can be avoided while increasing the environmental performance of a wastewater treatment plant (WWTP). For example, the results of some studies such as Life Cycle Analysis of WWTP in California, U.S. have drawn attention to the importance of energy recovery sludge management, product of wastewater treatment. Another example is the WWTP Atotonilco in Mexico, which is the largest of its kind built in a single phase, the world's third largest in terms of capacity of treatment. It will generate biogas for use in the plant for the production of thermal and electrical energy; the estimated electricity generation is 197 million KWh / year.

Energy needs of water use. Energy use can be an important item in the costs of production and distribution of drinking water and wastewater treatment in some places, especially when pumping is used or processes of desalination and water reuse are employed. The need for efficient use of energy is derived primarily from



the opportunity to reduce production costs. Energy costs may represent a heavy burden for water utilities. Making efficient use of energy is a sustainable alternative. It is estimated that in Latin America the cost of electricity to provide water services and sanitation accounts for 30–40% of the costs of water supply. The pumping for irrigation is an important energy use in arid areas of U.S., Chile, Mexico and Peru, but is gaining momentum in other regions, such as Colombia; the existence of subsidized rates for this activity in some countries discourage investment in energy efficiency.

Water-energy nexus. The energy sector has a major impact on the availability and quality of water resources in the countries of the region. Meanwhile, all forms of energy production depend on the availability of water resources. The challenges in this field range from expanding information and research of impacts on water resources, to accelerating improvements in the efficient use of water and energy efficiency, in order to meet growing demand, reduce or eliminate the need to develop capital-intensive infrastructure and provide environmental benefits. Approximately 15 to 18 billion m³ of fresh water are contaminated by the production of fossil fuels per year, with important consequences for ecosystems and communities that depend on water for drinking or for their livelihood. Globally, climate change presented by the combustion of fossil fuels will have significant long-term impacts on the availability and water quality worldwide.

Water and energy

The future we want

- The countries of the region are moving towards the development of their hydropower potential in harmony with other energy sources and with due consideration of the affected communities and the environment.
 - The introduction of new technologies and management systems allow for efficient use of water required for energy production and the energy required to provide water services.
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Strategies for the Americas

- The strategy for the exploitation of the hydroelectric potential of the countries must be supported by a dialogue between business men, government, users and communities, which allows the establishment of the procedures to define a program that is enforceable, with reasonable deadlines and without compromising the quality of the analyzes.
- To run the necessary research to define the sites of localization of the power plants, by working together with the energy, environmental and water resources sectors.
- To update existing inventories of hydroelectric potential to be compatible with environmental and social standards of each country, and strengthen long-term indicative planning, including regional participation and identification of potential conflicts.
- To anticipate, in contact with affected communities, the process of identifying potential environmental impacts of generation and transmission projects.
- To find the harmonization of the energy regulation with water resources for multipurpose projects.
- To consider the the benefits of incorporating the generation of electricity and heat from sludge from waste water treatment.
- To anticipate a rational debate about the costs and benefits of unconventional hydro-

carbons in the region, the potential effects of hydraulic fracturing (fracking) and ways to mitigate them.

- To encourage further programs to improve the energy efficiency of potable water and sanitation, and irrigation systems, especially those that rely on groundwater exploitation.

ADAPTING TO CHANGE: RISK MANAGEMENT

Water is the primary medium through which societies and natural systems will feel the impacts of climate change. These impacts are manifested through increased spatial and temporal variability in precipitation and runoff, resulting in excess or lack of water. Also leading to more intense and frequent extreme weather events. The temperature increases are already strongly affecting glaciers and their role as sources of water and runoff regulators in fragile ecosystems. A concern is the emerging trend toward the reduction of river flows and groundwater recharge in the region. Forecasts indicate that changes in the contribution to the reservoirs will cause a decrease in hydroelectric generation and reduce the availability of water for irrigation, domestic and industrial water supply and other uses of water resources, and affect water quality. The effects of climate change on the rise of sea levels, with the consequent introduction of wedges of salt in nearshore aquifers are also a concern.

Vulnerability and risk. Disasters related to extreme natural events have had a deadly and destructive impact on the region. Vulnerability to disasters related to extreme natural phenomena is worsened by heavy urban concentrations. Early warning systems and timely information are important tools to save lives and property; in this sense, the concept of integrated risk management is essential, even including the principles of efficiency and equity, integration, transversality, responsibility and accountability.

Generating knowledge. The development and effective implementation of climate information is an important challenge for the water sector in the region. An effective response to



this challenge must integrate the needs of users of climate services and capacity building in the current and next generation of scientists, practitioners, administrators and policy makers.

Adapting to change: Risk management

The future we want

- Countries in the region have developed and implemented stronger climate services and integrated their products in the decision making process of the socioeconomic sectors through effective dialogue between suppliers and users.
- Countries have developed comprehensive risk management programs in watersheds and aquifers that have a greater vulnerability to the occurrence of extreme weather phenomena, including both structural and non-structural measures.

Strategies for the Americas

- Encourage activities of legal and institutional strengthening in adaptation of water resources to climate change.
- Integrate national emergency systems with technologies designed for monitoring climate change and water resources.
- Improve the capacity to assess vulnerability and risk conditions.



- Develop technical assistance projects and identify investment opportunities for the development and implementation of IWRM practices and integrated risk management adapted to climate change.

- Support the design and implementation of actions of local adaptation along with institutional support to make these sustainable actions.

- Expedite the exchange of knowledge and experiences and activities throughout the region to provide better services to countries, facilitate the participation of all water-related sectors, integrating adaptation to climate change in their respective projects and increase the number of partnerships public and private, as well as interinstitutional.

Initiatives

- That the organizations concerned (WWC, IHP, Conference of Ibero-American Water Directors, etc.) create a water intergovernmental panel to discuss the issue of water as an essential component in the COP during its XXI Meeting in Paris in 2015.

- The creation of a Category II Center of Water in Water Security in Mexico to increase the scientific cooperation at the regional level and improve the understanding in water research, with an emphasis on water security. All of which

would be focused on risk management to overcome problems in water security in a wide range of socioeconomic contexts.

MANAGING ECOSYSTEMS FOR HUMAN BEINGS AND NATURE

From the coastal estuaries and deltas of Mexico, through Central America lakes, the old meanders of the Amazon and the Pantanal in Brazil, Latin America and the Caribbean have vast and diverse freshwater ecosystems. However, there are significant challenges in different places in the region of the Americas. Thus, the erosion and deforestation of forest watersheds have achieved enormous intensity on the eastern slope of the Andes from Colombia to northern Argentina. Rural development (mostly for rice cultivation) affects wetlands throughout Latin America and the Caribbean.

There is growing concern over the pollution caused by mining and the industry, as well as human settlements. Currently, the major water resources in Latin America are chemically and biologically contaminated to a considerable extent. This makes it necessary to ensure the continuity of environmental regeneration capacity through projects focused on IWRM.

Importance of ecosystems. Although the importance of ecosystems is sometimes recognized by managers and planners, very little is known about the relationship between the use of water resources and the ecosystems that supply them. The conservation of water resources for the future does not seem to be a key consideration in the planning and implementation of water use projects. Environmental concerns and priorities often go into the background to prioritize economic development gains.

Impact on ecosystems. The increasing demand for urban areas, agricultural products, wood and wood products can result in deforestation of natural forests, introduction of alien species and consequent impairment of soil, water runoff and biodiversity. Improper use of water and poor land management are altering hydrological re-

gimes and, therefore, availability, quality and timing of water in the basins. The construction of infrastructure to increase flow regulation faces different views, often conflicting, especially in places where there is strong competition for water use or where resistance is faced by those affected by the constructions and environmental concerns.

Impact of mining and industry. Increasing global demand for metals has led to a growing concern about the water requirements for the exploitation and processing of minerals. Some projects may affect sensitive sources such as glaciers, and contamination, resulting from production processes.

Environmental flows. Although in recent years it has conceptually taken as a new water use to protect ecosystems and biodiversity, some countries still have authorized uses of water for a total equivalent to the availability of some courses, regardless of conservation ecosystems and ecosystem services related to water. A source of conflict revolves around the ecological flow or water system that provides a river, wetland or some coastal areas, and that keeps other ecosystems.

Ecosystem Services. Recognizing the value of ecosystems has become a key factor for ensuring sustainable development of water resources. The natural capital and ecosystem services are an area of investment needed for economic development of the water sector, functioning as a complement to infrastructure investment and not as a substitute. The results of these investments should be considered both in terms of economic returns as in terms of water, energy and food security, social equity, rural development and resilience to climate change.

Managing ecosystems for human beings and nature

The future we want

- Countries in the region recognize the fundamental role that ecosystems have in order to guarantee water security and the provision of environmental services which are essential to sustain life.
- Policies for allocation of water resources have incorporated mechanisms to ensure necessary measures to guarantee the ecological flow required for conservation of vital ecosystems and the provision of environmental services reserves.

Strategies for the Americas

- Encourage activities of legal and institutional strengthening in adaptation of water resources to climate change.
- Integrate national emergency systems with technologies designed for monitoring climate change and water resources.
- Improve the capacity to assess vulnerability and risk conditions
- Develop technical assistance projects and identify investment opportunities for the development and implementation of IWRM practices and integrated risk management adapted to climate change.
- Support the design and implementation of actions of local adaptation along with institutional support to make these actions sustainable.
- Expedite the exchange of knowledge and experiences and activities throughout the region to provide better services to countries, facilitate the participation of all water-related sectors, integrating adaptation to climate change in their respective projects and increase the number of partnerships public and private, as well as inter-institutional.



Initiatives

- Recognize the depreciation of natural resources policies, programs and projects, implementing a system of “green national accounts” and modifying the decision-making processes to consider environmental externalities.
- Consider the “green infrastructure” as a component of infrastructure investment projects in the field of water resources.
- Establish legal protection and financial resources for ecosystem restoration as a national priority, carrying out studies that quantify the benefits of ecosystems in terms of their ability to generate services to various economic sectors water users, and expanding the scope of Water Funds, replicating them and disseminating

lessons learned.

- Consider ecosystem management as a fundamental pillar of IWRM, harmonizing and generating synergies with water user sectors in each of their respective agendas.
- Raising public awareness regarding the protection of ecosystems and the “water-biodiversity” relationship.

Final Reflection

The countries of the Americas have made progress in different measures towards the set objectives. The great achievement of these objectives is the shared vision that the countries of the Americas have provided for their economic development, social equality and environmental protection in the future, taking water management as a starting point. The regional process of the Americas seeks to strengthen the effort to translate this shared vision and create the necessary synergies to contribute to the common learning on how to use the lessons learned and overcome existing challenges.

In the coming decades, our ability to build a future with safe water will depend on our ability to turn challenges into opportunities. By ensuring water supply, security in many other areas will also be guaranteed. The 7th World Water Forum is an opportunity to discuss priorities and aspirations of the region of the Americas, to bring forth from their perspective the development of a paradigm governing the new agenda for the post-2015 development, with a focus on sustainable development, equality and structural change and to support the discussions of the region and the global community about the steps needed to achieve a new paradigm shift.

INTRODUCTION

The scenario of water in the Americas reflects the diversity and contrasts of the region, ranging from water abundance, the world's largest basin in the Amazon, to shortage in one of the driest deserts in the world, the Atacama. Populations which inhabited the region developed mechanisms to establish some of the most advanced civilizations of the world, which include various water infrastructure for water supply and flood control. Currently, the region of the Americas continues its effort to adapt to the new challenges that the current environment presents in the management of water resources.

Globally, water problems have reached remarkable relevance and international attention for the past five decades. The first important meeting worldwide related to water in the twentieth century was the Water Conference of the United Nations in Mar del Plata², Argentina, in March 1977. The Plan of Action of Mar del Plata laid the foundations for management of water worldwide and included more than 290 recommendations. It also gave rise to the "International Decade of Water Supply and Sanitation 1980-1990", which helped improve the coverage of potable water and sanitation in Latin America and the Caribbean (LAC). The last decade of the twentieth century witnessed a renovated international effort directed at water management, with an emphasis on water supply and sanitation³, development of capacities⁴, integrated water resources management (IWRM) and the relationships between water and the en-

vironment⁵. The "Dublin Principles"⁶ were established, which remain in effect as part of the paradigm of water management.

The new millennium brought forth the "Millennium Declaration of the United Nations" at the closing of the Millennium Summit in 2000, which was adopted by 191 countries. Among its 18 goals was that of halving, by 2015, the percentage of people without sustainable access to safe drinking water and adequate sanitation. These Millennium Development Goals (MDGs) were highlighted at the Summit on Sustainable Development in Johannesburg, South Africa in 2002, and since then have been included in the strategies of developing countries, as well as international financial organizations.

The twenty first century has also witnessed the development of the World Water Forum⁷. The level of participation of the Americas in the World Water Forum has been significant, except in the 1st Forum in Marrakech in 1997, which was only attended by some professionals in the region, mainly as individual specialists. For the 2nd World Water Forum, (The Hague, 2000) a document - based on national reports - was created on "Water Vision and Framework for Action" covering the North, Central and South American continent and the Caribbean.

During the Third World Water Forum, held in the year 2003, seven challenges to water security were identified, including the eradication of

2. United Nations water conference report, Mar del Plata, March 1977, E/CONF.70/29, Nueva York, ONU, 1977.

3. Global Water and Sanitation Consultation for 1990, New Delhi, India, 1990; Water and Sanitation Services Conference, Brussels, Belgium, 1992; Water and health round table, Sophia Antipolis, France, 1994; Ministerial Conference on Drinking Water and Environmental Sanitation, Noordwijk, The Netherlands, 1994.

4. Symposium "A Strategy for Capacity Development in the Water Sector", Delft, the Netherlands, 1991.

5. International Conference on Water and the Environment, Dublin, 1992; United Nations Conference on Environment and Development-Chapter 18, Rio de Janeiro, Brazil, 1992.

6. The Dublin Statement on Water and Sustainable Development was given at the conclusion of the International Conference on Water and the Environment (ICWE), held in Dublin between January 20th and 31st 1992, a technical meeting prior to the United Nations Conference on Environment and Development (UNCED) held in Rio de Janeiro in June 1992. At the closing of the session the Dublin Statement on Water and Sustainable Development was adopted.

7. The first was held in Marrakesh, Morocco in 1997; the second in The Hague in 2000; the third in Kyoto, Japan in 2003; fourth in Mexico City, Mexico, in 2006; fifth in Istanbul, Turkey in 2009 and sixth in Marseille, France in 2012.

Chart 2. Declaration of the Americas in the 3rd World Water Forum

We will use our experience, as well as our available logistics and financial resources to search and negotiate for solutions to the following priority water challenges faced by the region:

- Negotiate the elimination of agricultural subsidies in developed countries.
- Search for the transparency of international and bilateral trade agreements with respect to their effects on local and national water rights.
- Effective decentralization, participatory governance, and regulation of water services.
- Development of water policies, including regulations for equitable and effective water distribution and for the eradication of poverty in rural and urban areas, maximizing the use of available technology.
- Implementation of participatory and efficient systems for the management of natural risks, both at the local and national levels.
- Inclusion of the environmental variable in the management of water resources through watershed, following an ecosystem approach and including environmental services that can be traded on.
- Improving the quality of water for human use and reduce pollution.
- Meeting the financial needs that will increase and improve the infrastructure of the water sector in order to provide safe water to the poor and increase their income to meet the MDGs.

Source: Organizing Committee of the Day of the Americas (2003)

poverty. The Day of the Americas, within the Third Forum, achieved greater regional participation and representation and produced a declaration that is still in effect (Table 2). The Declaration of the Americas in the 3rd World Water Forum in Kyoto, stated the concerns of Latin America and the Caribbean regarding: the existence of subsidized agriculture in the developed world.

Under the theme, “ Local Actions for a Global Challenge “, at the 4th World Water Forum (Mexico, 2006), the participation of the region was of greater magnitude –due in part to the headquarters of the meeting – and the most significant, as reflected in the quality of the Regional Document of the Americas, which was prepared taking advantage of the experience gained from previous encounters. It is worth noting that at this forum was when the initiative on the human right to water gained momentum. For the 5th World Water Forum (Istanbul, 2009) the Regional Partnership of the Americas (CRA) was established, whose responsibilities include

the preparation of the “Regional Document of the Americas”, from which the unifying thread was the theme “Global Changes” concept chosen as the main focus of the respective political process.

For the 6th World Water Forum (Marseille, 2012), the Regional Process of the Americas (PRA), where more than 40 organizations grouped around six thematic priorities participated, culminated in the production of the document “Water Agenda for the Americas”, which was based on analytical reports on each of these priorities. The analysis and recommendations of the Water Agenda of the Americas were directed primarily towards decision makers of the institutions involved in the definition of public policies and allocation of fiscal resources related to water, some of which are not within the “water box “, such as the Secretary of Treasury, Finance, and Planning.

Looking towards the 7th World Water Forum, this document presents an overview of the region, its richness and contrasts. The report presents the advances in the Americas since the 6th World

Water Forum, held in Marseille, France in March 2012. It seeks to highlight the region's strengths and weaknesses, as well as the successes and failures that have occurred in regards to water management. The document includes the challenges faced by the Americas in relation to the conservation, management and development of water. The purpose of the report is to also share the experiences of the Americas with other regions, and to find answers to questions that are still outstanding; aspects that unite the countries are mentioned, and those which set them apart.

The report includes challenges faced by the region in relation to the conservation, management and development of water resources. It seeks to show the actions that have been made by the

communities, local and national governments, international organizations, NGOs and civil society to address these challenges.

In keeping with the diversity that characterizes the Americas, not only in terms of its geography, but also in terms of development models and systems of each country government, this document includes various approaches, actions, activities and controversies that persist in the region, in order to show the different ways that water contributes to improving the economic, social and environmental conditions of the region and its role in fighting poverty, promoting growth and development as well as in the conservation of the unique biodiversity of the region.

1. THE AMERICAS: A PRIVILEGED, DIVERSE, AND UNEQUAL REGION

With a surface area of over 40.6 million km², representing just over 30% of the land area of the world, the Americas extends from the northern end points in Canada and the US to the southern end points in Argentina and Chile, including the island states of the Caribbean (Figure 1). The region includes 35 countries and 41 economies⁸; in 2013, its total population was estimated at more than 982 million inhabitants: 13.5% of the world population⁹.

As shown on Figure 2, more than half the territory of the region corresponds to the sub region of North America (Canada, U.S. and Mexico); Also, the combined area of five of the thirty-five countries in the region, Argentina, Brazil, Canada, U.S., and Mexico, represents over 81% of the total area of the region. The distribution of the population shows a similar pattern to the distribution of the territory (Figure 3); Brazil, Mexico and the United States are the most populous countries and together represent 66% of the total population of the region.

Figure 1. The Americas



Figure 2. Land distribution

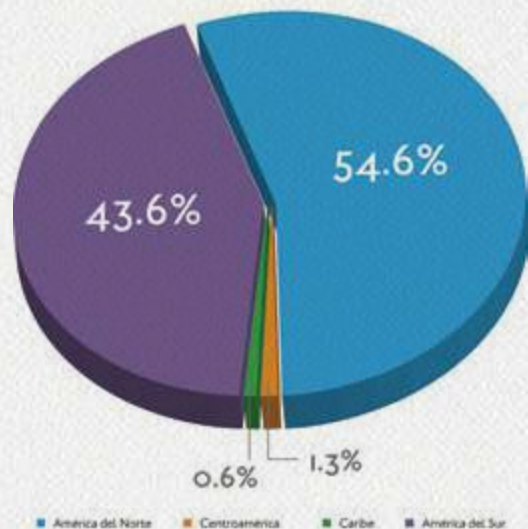
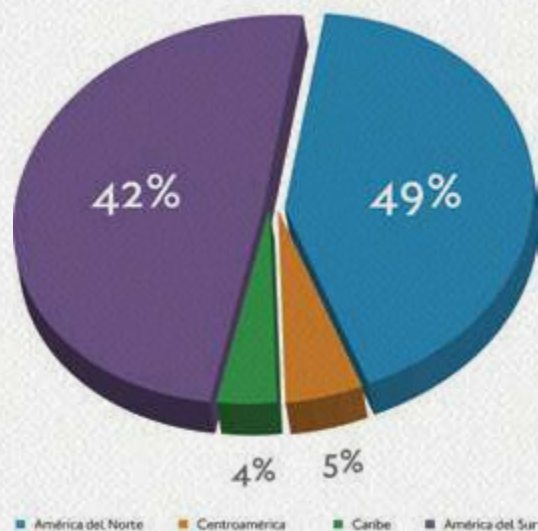


Figure 3. Population distribution



Any discussion about water in the Americas needs to consider two basic aspects: first, its natural, cultural, and socioeconomic diversity. Second, the complex interactions between water and the social, economic, and political realities of an increasingly globalized world.

8. Some of the economies are not independent countries.

9. United Nations. Department of Economic and Social Affairs. Population Division. World Urbanization Prospects: the 2014 revision

1.1 DIVERSITY

Nature

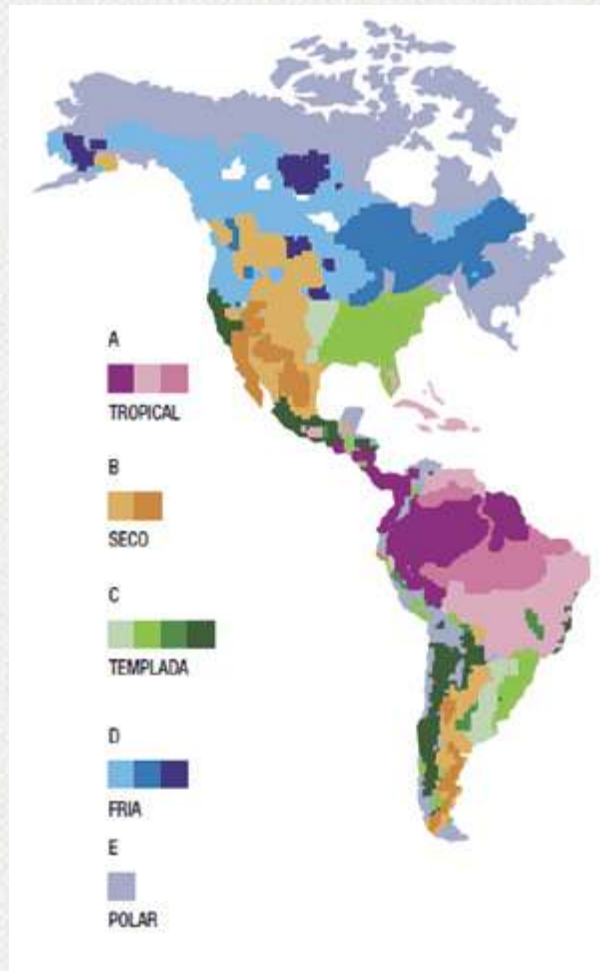
By extending from the North to the South Pole, the region comprises a great diversity of landscapes, a wide range of natural resources, and considerable biodiversity. The Americas contains seven of the twenty mega-diverse countries (Brazil, Colombia, Ecuador, U.S., Mexico, Peru, and Venezuela). Brazil has the greatest wealth of flora and fauna of the planet, possessing between 10 and 20% of all species; this is due, in part, to its diverse topography and weather variables.

All climatic categories are present in the continent (Figure 4). This climatic diversity results in natural wealth characterized by some of the most important landscapes and ecosystems of the world. As a result, the region has glaciers, snowy mountains, year round temperate climate in some areas, and two seasons marked by drought and heavy rainfall in others.

The average annual rainfall in the region is about 1,084 mm per year, equivalent to 44,000 km³, more than 41% of the total world rainfall (Annex 2, Table 2.2). Rainfall is mainly seasonal, concentrated in a period of 4–5 months and distributed irregularly. Two thirds of the region is classified as arid or semiarid, 30% receives less than 300 mm of rain per year, contrasting with huge tracts of forest, rich in water, which exist in other parts of the region.

In the area of the Great Lakes of North America, the Americas has the largest number of bodies of freshwater in the world. In the region there are several rivers, such as the St. Lawrence, Mississippi, Rio Grande / Bravo, Usumacinta, Magdalena, Orinoco, São Francisco, Paraná, Paraguay and Amazon. The Amazon, Orinoco, San Francisco, Paraná, Paraguay and Magdalena rivers lead more than 30% of surface water in the

Figure 4. The Americas Climates



world. The Amazon Basin covers approximately a third of South America and 20% discharge surface water discharging into all the world's rivers. The annual discharge of the Amazon (6,700 km³) is equivalent to five times the volume of water from the Congo River, the world's second largest; the number of species in the basin, which is estimated at just over 3,000, is greater to that in all other basins in the world. More than 100 trillion¹⁰ tons of coal and vegetation is fixed by the Amazon in the basin and releases 7 trillion of water to the atmosphere through evapotranspiration.

10. A trillion = a million million



In the region extensive tropical rainforests can be found, as well as arid and semi-arid areas with annual rainfall greater than 6,000 mm in Central America to areas where virtually no rainfall occurs and are therefore considered as the most arid in the world. This is the case of the Atacama Desert in northern Chile. Due to its geographical location and climate variability, the region is also vulnerable to natural disasters, specifically in the Gulf of Mexico, the Caribbean, and Central America. The region has a considerably large natural forest coverage (greater than 50% in South America and over 30% in Mesoamerica), from which derive a range of environmental services that are the substrate of many primary economic activities such as tourism, such service is associated with water supply.

Society, Culture, Policies and Economy

The Americas are characterized by their diversity and contrast. The region comprises 35 countries with an estimated 980 million inhabitants. In it Spanish, Portuguese, English and French, as well as 400 indigenous languages are spoken. Ethnic and cultural diversity is also typical of the region. The largest indigenous population is located in southern Mexico, Central America, and the northern Andean countries of Ecuador, Bolivia and Peru.

With 30% of the landmass of the world, the region hosts only 14% of the population and has a population density of almost 24 inhabitants per square kilometer. This is relatively low when compared to the world average of 51 inhabitants per square kilometer, and with countries like China (133 inhabitants / km²) and India (309 inhabitants / km²). The highest population densities are located in the West Indies, especially in the Lesser Antilles, and in El Salvador, with values ranging between 101 and

564 inhabitants / km², while the lowest values correspond to Suriname and Guyana with 3 and 4 inhabitants / km², respectively. Despite its low density of population, over 80% of people in the region live in cities or around them; most are concentrated in the 617,000 Km of coastline, making it the most urbanized countries in the developing world.

The Americas contribute 32% of global GDP, of which 90% in the region is produced by Brazil, Canada, Mexico and U.S.; The United States alone provides 67% of regional GDP¹¹. These large economies contrast with some smaller countries with low incomes, such as Haiti and Nicaragua. The average GDP illustrates some of the challenges faced by the region; the average per capita GDP of \$ 41.042 in North America and contrasts with the \$ 4.050 of Central America, South America \$ 10.098 and \$ 7.191 Caribbean. As far as Latin America and the Caribbean are concerned, out of the 622 million people living in this area, 167 million live in poverty and 66 million live in extreme poverty (with less than a dollar a day¹²).

Water issues cannot be separated from the socio-political scenarios and trends that prevail in the countries of the region. In the Americas, the close relationship between water and the cultural, environmental, economic, commercial, political, and social scenarios and perspectives have proven to be key factors. As a result, the assessment of water issues cannot and does not pertain exclusively to the field of science or engineering, but has also been influenced by social, economic and political aspects of society.

Economic importance of water

At some point in the history of each country in the region, water has played a key role in

11. World Bank Figures. World Development Indicators (2012)

12. <http://www.cepal.org/es/comunicados/la-pobreza-sigue-la-baja-en-america-latina-pero-aun-afecta-167-millones-de-personas>

economic development. In the United States, The creation of the Tennessee Valley Authority helped boost economic development in one of the poorest regions of the country. Also U.S., irrigated land generated 55% of total sales value of crops in 2007, while also supporting the livestock and poultry sectors through the production of fodder crops and animal feed.

In Mexico, irrigated agriculture generates 50% of the national agricultural production and two-thirds of the agricultural export production. In Argentina, irrigated land contributes between 25% and 38% of total agricultural production. In Chile, irrigated agriculture produces almost 100% of the agricultural exports. In Latin America and the Caribbean, water-intensive industries (food, pulp and paper, petrochemicals, textiles, etc.) generate over 40% of the gross product of the manufacturing sector; tourism, supported by an adequate water supply or the conservation of aquatic ecosystems, generates 10% of exports.

On average, hydroelectric plants generate more than 56% of electricity in the region, with countries that exceed 70% (Paraguay, Uruguay, Peru, Costa Rica, Brazil and Colombia) to countries where hydropower represents less than 20% (Dominican Republic, Nicaragua, Mexico and Jamaica). LAC has a large availability of waterways that outperforms the U.S.; however, while more than 14% of the loads are mobilized along these routes, 3% is not reached in LAC, suggesting a great potential for the future.

1.2 DEMOGRAPHY ¹³

The annual regional population growth is of 1.12%, slightly lower than the world average of 1.18%; the average population growth is 1.04% in North America, in Central America 1.78%, 0.54% in the Caribbean and 1.18% in South America.

Rapid urbanization poses significant challenges

According to CELADE, the urban population in LAC increased from 73.2% in 1995 to 75.6% in 2000, and 77% in 2005, and in 2014 to about 80%¹⁴, exceeding the world average, which is 54%, with some interregional differences between North America (81%); Central America (59%), South America (83%) and the Caribbean (69%), which makes this the most urbanized region of developing countries.

The change from a region with a high percentage of rural population to a predominantly urban one has contributed greatly to the growth of LAC; economies of scale have increased the productivity of expanding cities and reduced the cost of providing basic services to their citizens, even when the urban gigantism leads to situations of diseconomies of scale. The value of urban concentration is strongly defined by the countries of the region where large cities are located (Mexico City, New York, Sao Paulo, Los Angeles and Buenos Aires are among the 20 largest cities of the world)¹⁵.

Overall, urbanization has generated significant benefits in terms of economic development of the region and the quality of life of its population, but also poses significant challenges, many of them linked to water.

Sub-regional differences in urbanization and the pace of the process pose different challenges depending on the requirements of each country. Those that still go through active processes of urban growth, among which are Antigua and Barbuda, Barbados, Belize, Bolivia, Costa Rica, El Salvador, Guatemala, Guyana, Haiti, Honduras, Jamaica, Nicaragua, Paraguay, Trinidad and Tobago, face a greater demand for land and will require expanding their infrastructure to provide, among other, water and sanitation and wastewater treatment; infrastructure that will be needed to cover,

13. The details of demographic data by country are presented in table I of Annex.

14. <http://celade.cepal.org/redatam/PRYESP/CAIRO/>

15. LAC has 36 cities of more than 500 thousand inhabitants, within which are 4 metropolis and 198 cities with more than 200,000 inhabitants spread throughout its entire land, and which contribute in generating 62% of the GDP of the region. 65% of its population lives in them. It is also worth noting that 10 of the largest cities, out of the 198, contribute in a disproportionate manner in generating 30% of the GDP, and a little over the one fourth of the Latin American population lives in those cities. (McKinsey Global Institute, 2011).

in addition to natural growth, the needs of migrants arriving in cities.

In Mexico and in most of South America, where urbanization is more consolidated and increased employment opportunities and social inclusion have enabled the formation of “educated middle classes” who demand constant improvements in their quality of life and environmental conservation. In these cases, the main challenge is related to the expansion of infrastructure for integration of metropolitan areas and urban corridors but above all, with the improvement in the management and quality of services, especially in existing suburban areas. Urbanization, even in Canada and U.S. Poses a major challenge to the sustainability of water and sanitation services requiring significant investments for the replacement of assets that have exceeded their use¹⁶.

As a result of urbanization, the nearest sources have become insufficient. In many cases the quality of the water from these sources has been deteriorated by the discharge of domestic sewage, industrial discharges, and those resulting from mining activities, as well as agrochemicals and discharges resulting from agricultural activities. For several decades, the search for new sources for some Latin American cities in growth has required water transfers, with expensive purification processes, piping and pumping them also require significant amounts of electricity. This is the case, for example, of Mexico City with the Cutzamala system; Caracas with the Comatagua system; and Lima with tunnels leading water from the Mantaro river basin, located in the Amazon, to the Pacific. This situation tends to increase and requires strong incremental investments in many cities of the region.

The problems associated with urbanization may worsen due to potential impacts associated with climate change, which also transcend the impacts on supply sources and covers other aspects of water infrastructure and possible effects on populations living in cities and are located in high risks areas. The challenge here is to increase the resilience of cities and countries in general, with respect to the new climate reality.

Finally, the central problems in the provision of water and sanitation and their relationship to urban water management gravitate around four areas that require coordinated solutions within an integrated focus¹⁷: i) informal occupation urban land and the consequent poor housing; ii) environmental degradation, iii) the problems of urban drainage and iv) depletion of sources of supply.

1.3 A REGION OF CONTRASTS IN ECONOMIC MATTERS¹⁸

According to the World Bank, 9 of the 41 economies are classified as high income; only two are classified as low income (Haiti and Nicaragua); 14 as lower-middle income and 16 as upper-middle income. From the point of view of development, Haiti is the only country that has been ranked among the countries with Low Human Development Index, while 13 countries are among those with a High Human Development Index and the rest is in the Middle class index.

According to CEPAL¹⁹, in 2014, the gross domestic product (GDP) in Latin America and the Caribbean grew 1.1%, the lowest rate of growth since 2009. Despite the regional result, significant differences were verified in the growth rates of countries. The lowest regional growth in 2014 is mainly due to sluggish growth or the contraction of some of the largest economies in the region:

16. For example, in U.S.A, it is estimated that the needs for investment for the replacement of obsolete infrastructure exceeds a billion dollars (Public Works.com, February 17 de 2015).

17. Mejía, A. 2012. La infraestructura en el desarrollo integral de América Latina. Agua y saneamiento. IDEAL 2012. Caracas, Venezuela. CAF. 52 p.

18. A breakdown of the economic indicators by country and sub region is presented in Table I of Annex.

19. CEPAL. Preliminary overview of the economies of Latin America and the Caribbean. Santiago de Chile 2014.

Argentina (-0.2%), Brazil (0.2%), Mexico (2.1%) and Venezuela (-3.0%). The median growth rates of GDP of the countries of the region was 2.8%, similar to that observed in 2013.

The economies with the highest growth within the region were Panama and the Dominican Republic (both 6.0%), followed by Bolivia (5.2%), Colombia (4.8%) and Guyana and Nicaragua (both 4.5%). In turn, the following countries reported contraction of the economy: Argentina (-0.2%), Santa Lucia (-1.4%) and Venezuela (-3.0%). Other economies grew at rates between 0.5% and 4%.

By analyzing the evolution of economies by sub region, it can be seen that South America showed growth of 0.7% (compared to 2.8% in 2013), while Central America, including the Spanish-speaking Caribbean countries and Haiti, were expanded by 3.7% (compared to 4.0% in 2013). Mexico scored a growth of 2.1% in 2014, representing an increase of its momentum with respect to 2013 (1.1%). Meanwhile, growth in the Caribbean economies (1.9%) showing acceleration compared to previous years.

In dynamic terms, the evolution of economic activity in LAC was differentiated. The slowdown in momentum of the regional economy became more apparent in the second quarter, simultaneously with contraction of investment in several economies in South America and a general slowdown in growth in consumption, mostly private. In the third and fourth quarters of 2014 there has been a slight improvement in the growth rate.

Driven by stronger consumer spending, partly as a result of increased oil and gas production, it is estimated that the U.S. economy will grow at a rate of 3.3% in 2015 – from 2.4% in 2014²⁰.

Consumer spending in the fourth quarter of 2014 grew at the fastest pace in more than eight years. Moreover, with unemployment declining, consumer confidence is at a maximum of seven years. Based on strong growth the Canadian real GDP is expected to grow at an accelerated rate through 2015, driven by increased exports and business investment; exports will be supported by stronger growth in foreign markets and recent depreciation of the currency.

1.4 POVERTY AND INEQUALITY

As previously stated, by the end of 2012, about 167 million people found themselves in a situation of poverty, a million less than in 2011, which is equivalent to 28.8% of the inhabitants of LAC. This reduction was mainly due to economic growth and improvement in the incidence of social spending as a result of the application of more extensive and better designed programs. Meanwhile, the number of people in extreme poverty or indigence (living on less than one US dollar a day) would remain stable in 2012, totaling 66 million, the same as in 2011²¹. There are high levels of poverty and income variables in virtually all indigenous²² populations.

Urbanization of poverty

According to demographic trends, by 2015 almost 2/3 of the poor in Latin America will live in cities, a phenomenon that has been called the “urbanization of poverty”. Most of the urban poor live in precarious areas, and are an expression of both inequality and social exclusion, and the lack of public policies on access to land, services and housing.

Existing conditions of life in these peri-urban settlements represent a physical and symbolic barrier that prevents large populations from

18. A breakdown of the economic indicators by country and sub region is presented in Table I of Annex.

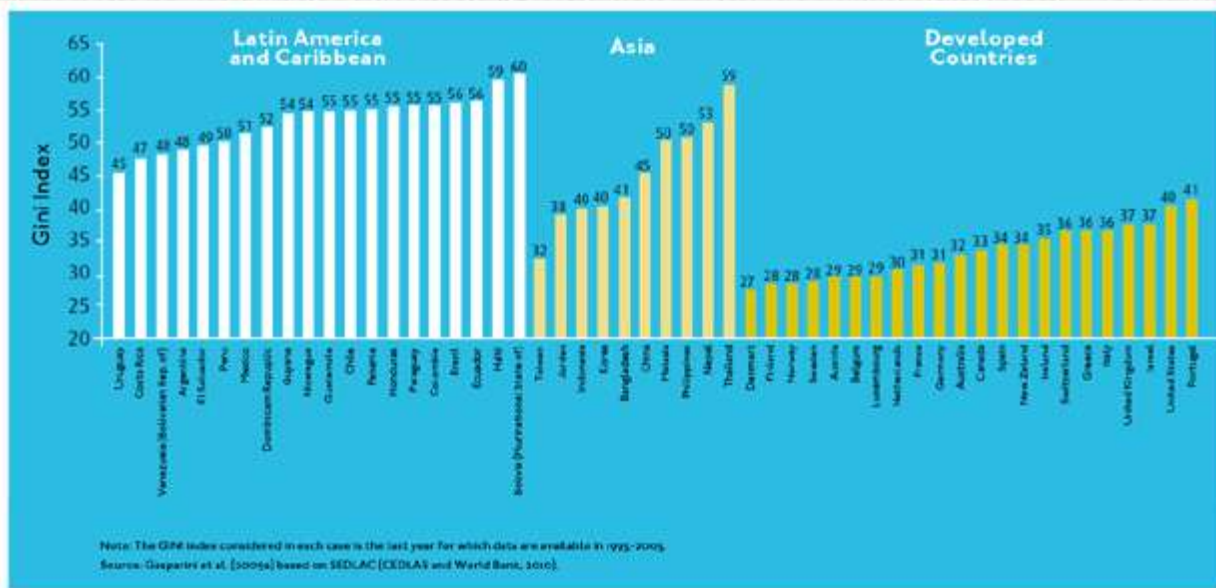
19. CEPAL. Preliminary overview of the economies of Latin America and the Caribbean. Santiago de Chile 2014.

20. <http://www.forbes.com/sites/billconerly/2014/01/22/economic-forecast-2014-2015-looking-better-with-help-from-oil-and-gas/>

21. <http://www.cepal.org/es/comunicados/la-pobreza-sigue-la-baja-en-america-latina-pero-aun-afecta-167-millones-de-personas>

22. Vaughan, 2005

Figure 5. Gini Index of household income per capita



reaping the benefits of the city and integrating into the formal labor markets. These conditions feed the intergenerational cycle of poverty and exclusion, which hinders access and the creation of social conditions for obtaining decent employment, and access to basic urban services, including water and sanitation.

Conditions of inequality to overcome

Poverty is directly linked to the unequal distribution of income, the fragile condition of employment, low wages, underemployment and informality. In recent decades, informality and job insecurity have grown in LAC, with a corresponding effect on the inability of families to cover the costs of housing and decent services.

Unfortunately, compared to other world regions, the Americas, with the exception of Canada and U.S., still show one of the highest rates of inequality in income distribution. The high distributive inequity observed in LAC (Figure 5), is a particular feature of its reality, being in this region where the most acute and persistent levels of concentration of income are observed. This inequity affects especially the most vulnerable groups, including women and indigenous peoples.

Several countries have launched major redistributive efforts through programs to combat poverty and in particular to improve education levels and prevent defection based on conditional cash transfers, such as Progresa in Mexico, Bolsa Familia in Brazil, Venture in Costa Rica and Families in Action in Colombia.

1.5 ECONOMIC DEVELOPMENT MODELS

In the context of a constant growth in different sectors, the economy of the countries of LAC, remains highly dependent on the exploitation of natural resources and raw materials. Also in LAC, highly extractive primary economic sectors and generating negative externalities, remain as central to the production dynamics and bastions of economic dynamics of many countries – almost 5% of GDP in LAC is generated by agriculture and 6% by the mining sector. The oil resources of the Americas, to which now stock shale gas and oil shale are added, play and will play a key role in the evolution of world economies.

Economic policies and their impact on the development of water resources

A lesson learned in LAC from the crisis of the 80s (the lost decade), is that the efficiency of public policy, legislation, institutional arrangements

and investments linked to water, is conditioned by macroeconomic policies and the unfavorable or favorable environment they create. In the long run, these policies are so powerful and structurally determining that not even the best legislation or sectorial public policy can counteract their influence.

This has been seen, for example, in the provinces of western Argentina and in the highlands of Mexico, which once made a significant part of its economic policy the substantial subsidies for the use of groundwater for agriculture and so far, there has not been legislation or other level of public policy that could prevent the deterioration of groundwater against the powerful economic incentive for these policies. Consequently, it is important to note that when economic policies do not consider sustainability criteria, perverse incentives that cannot be offset by other instruments and are highly counterproductive for the sustainable management of water resources are generated.

1.6 POLITICAL SITUATION

In recent decades, LAC countries have moved towards greater democratization through different processes that respond to their national realities. These processes have had a significant impact on the management of water resources, especially in the design of water governance, where new institutional arrangements open greater opportunities for social participation in decision-making and conflict negotiation within a framework which tends to promote transparency and accountability. In the latter, there is still a long way to go.

The institutional is regarded as weak in many countries

Unlike Canada and the U.S., with some nuances that would identify common points, studies on the perception of public institutions in society often show that in LAC, they maintain a low credibility in its operation, efficiency and effectiveness. The latter is due in large part to the perception that the institutions have been unable to meet the specific needs of the population with

respect to social demands for public utilities, including water and sanitation.

The weakness of these institutions has been largely associated to obsolete and inefficient managing practices; to an excessive and inconvenient participation of politicians in managerial, operational, financial, economic, or administrative decisions, with opportunistic or short term electoral purposes; a lack of financial and human resources: a poor institutional design, as might be the lack of a clear authority figure, confusions in roles and responsibilities, and an absence of mechanisms of resolution of conflict, among others.

Often, the problem is compounded locally as a result of decentralization policies devoid of analysis of the gaps between the existing and necessary capacities, on the definition of scales commensurate with the nature of the problems to be solved, and the lack of processes of institutional strengthening and development of abilities.

Faced with the emergence of different models for the management of water resources, but especially those associated with services, there is a broad debate on the role of the state vis a vis the private sector and the role of organized society.

An emerging role for the state: effective and independent regulation

Several countries have made progress in implementing policy and institutional reforms that seek to adopt modern models through which strengthen the work of the state through effective and independent regulation. There is strong evidence of this progress. For example, the existence of regulatory frameworks for public services is almost universal, including water and sanitation, with formal contents that are inspired by international best practices. Just as important is the regulatory role of the state in the management of water resources.

After highlighting the situation of the U.S., the process of sectorial regulation on water and sani-



tation began in Colombia, about 30 years ago with the creation of a pioneer superintendence fare for the purpose of applying marginal costs and establishing the system of cross-subsidies and rates strata that, with few conceptual changes, prevails today. Later, in the late 80s, it began in Chile as a phase of reform of the sector, and then in Argentina because of the concessions granted to the private sector. There are regulatory agencies in more than 50% of LAC countries where regulatory instruments have been issued that contemplate specifically the regulatory chapter. With some exceptions, the adopted regulatory models still show significant obstacles.

Increasing participation of civil society

Apart from the operation of services (claims, information, etc.), it can be said that in the Americas positive legislation has been enacted which contains various rules that enable the performance of civil society and / or particularly water users and associated utilities. However, currently the effective implementation of this legislation in LAC has generated limited results.

Still, the involvement of users (and civil society) in public policy decisions are expressed through different mechanisms: consumer protection, ombudsman, public hearings, committees and directly through the judiciary system.

The emergence of mechanisms to encourage the participation of users and society members interested in managing water resources in the area of a specific watershed, like the river basin councils established in Brazil and Mexico, or the compact operating in various basins in U.S., has enabled decision-making and actions for the allocation of water resources in actual or potential scarcity situations and situations of conflict.

In relation to water and sanitation it is important to emphasize the role of community organizations for water and sanitation (OCSAS²³) which provide water and sanitation services to a large percentage of people in each country, with ranks ranging from 10% to 50% of the total population.

23. Water cooperatives (Argentina), utility cooperatives and water committees (Bolivia), community water systems (Colombia), managers and community associations aqueducts sewers (Costa Rica), administrative boards of drinking water and sanitation (Ecuador), committees drinking water (Guatemala), water management boards (Honduras).

2. WATER SAFETY IN THE AMERICAS

Although the vast majority of countries in the region are rich in water, many have severe problems of availability in the arid and semi-arid areas; such is the case of the north of Mexico, western United States, northern Chile, some parts of Bolivia and Peru, and the northeastern part of Brazil. Two thirds of the region is classified as arid or semi-arid; 30% of the continent receives less than 300 mm of rain per year, which contrasts with huge tracts of forest, rich in water, which exist elsewhere in the region (Figure 9). The basins of the Colorado, Bravo / Grande and Yaqui (the first two in the Mexico-US border.), are among the ten most arid in the world.

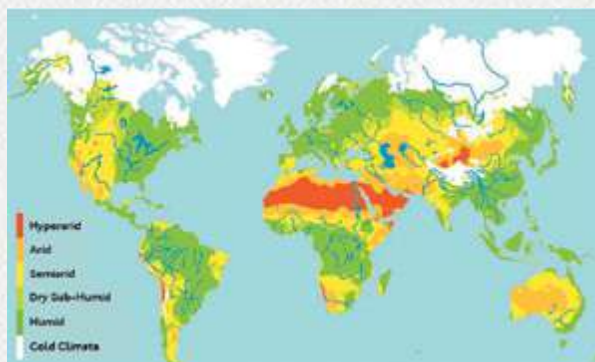
2.1 WATER WEALTH AND HYDROLOGICAL VARIABILITY

The climatic and orographic diversity that characterizes the Americas causes varied hydrological regimes. Figure 6 shows the distribution of values of renewable water resources in North, Central and South America and the Caribbean. In 2012, water availability per capita in the region was of 25.699 m³ / capita / year, with significant variation by country, e.g. for the Bahamas it was of 54 m³ / capita / year. In El Salvador and Mexico these values were 4,172 and 3,822 m³ / inhabitant / year, respectively, while in Canada it was of 83,300 and in Guyana and Suriname 340.881 185.047 m³ / capita / year. Figure 7 shows the values of North, Central and South America and the Caribbean; while Figure 8 shows the specific values of some countries.

Aquifers

There are major aquifers in North and South America, like the trans boundary Guarani Aquifer in Argentina, Brazil, Paraguay and Uruguay, which is one of the reserves of the world's largest groundwater storage with approximately 37,000 km³ and natural recharge of 166 km³ per year. It is considered that these aquifers will become increasingly important in the future, to the extent that water scarcity and increasing climate change become more pronounced.

Figure 6. Relative aridity



Fuente: UNEP

Figure 7. Renewable water resources

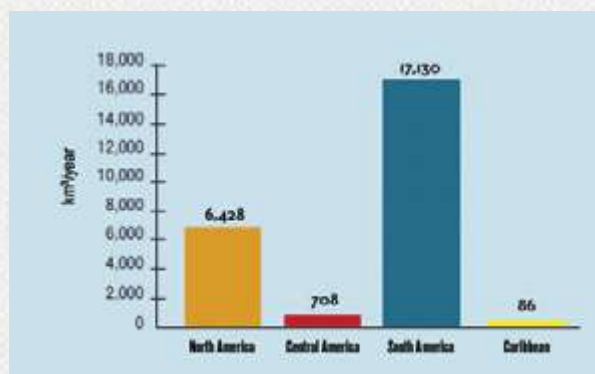
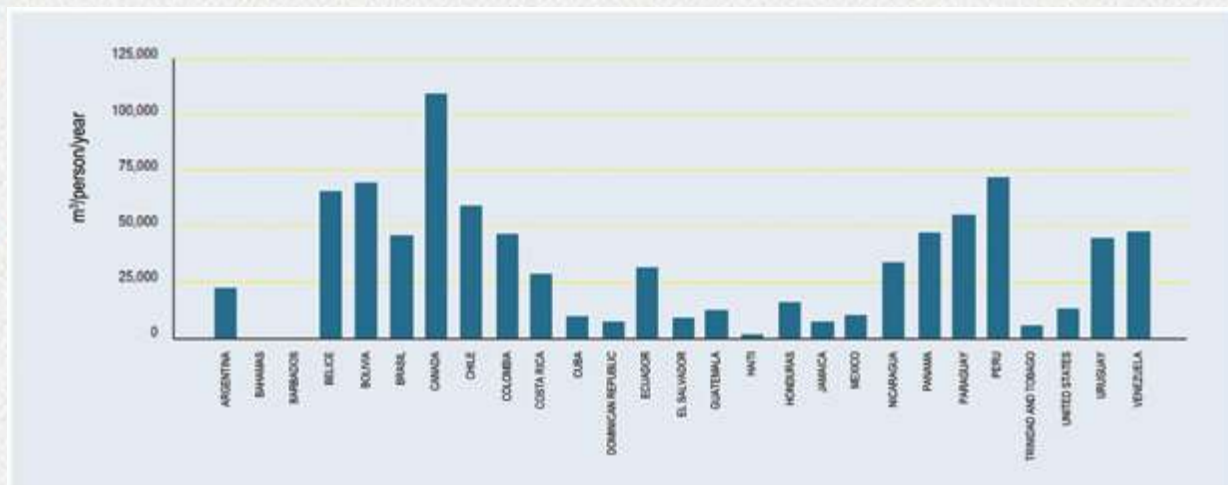


Figure 8 Water availability per capita by sub-region



In some urban areas of the western United States and the arid and semi-arid portion of Mexico, aquifers have been and are being exploited beyond their capacity to recharge. Both in Mexico and the U.S., besides providing water to urban centers and industries, aquifers are exploited significantly in agricultural areas for cultivation of high economic performance.

Figure 9. Water availability per capita



In recent years, large urban concentrations, increased agriculture and industrial development have increased water requirements and the need to extract groundwater. In some coastal areas of the U.S., Mexico, Central America and the Caribbean, groundwater is threatened by the phenomenon of saltwater intrusion caused by intensive groundwater extraction.

Trans boundary water bodies

About 71% of the surface flow of the Americas corresponds to trans boundary water bodies, most notably the Amazon basin and the Rio de la Plata in South America, the San Juan River or the Rio Lempa in Central America, and the basin of Grande / Bravo River or Great Lakes in North America. These systems cover 55% of the total area of the continent. In South America, trans boundary basins represent 75% of the total flow, a figure that in Mexico and Central America reaches 24%. In the Caribbean islands, there is one trans boundary basin which is the Artibonito, shared by the Dominican Republic and Haiti, it represents 17% of the surface flow of the island of La Española.

In the countries of America there are several agreements and treaties on water systems and trans boundary water bodies. In North America the institutional arrangements for the basins of Canada-United States and United States-México²⁴ stand out. In South America there is a set of bilateral agreements, some for the development of hydroelectric projects, among which are included Salto Grande, shared by Argentina and Uruguay; Itaipu (Brazil and Paraguay) and Yacyretá (Paraguay and Argentina), as well as the Amazon Cooperation Treaty, comprising eight countries. The Guaraní Aquifer Agreement signed between Argentina, Brazil, Paraguay and Uruguay, with which seeks to expand knowledge on the aquifer and contribute to its management should also be mentioned.

Storage infrastructure

The annual rainfall and runoff in the region are generally concentrated in a few months. Consequently, it was necessary to build the infrastructure to control hydrological regimes, in accordance with the requirements of the population and economic activities. During

24. The agreements between Mexico and the United States for the exploitation of surface trans boundary water that date back to 1944 in a context of great economic and sociopolitical asymmetries, may constitute a model of good practices that deserves further analysis.

the last century a rapid increase was observed in the construction of large dams. In the year 1949, approximately 5,000 large dams built worldwide, 75% of them in developing countries. By the end of the twentieth century, there were more than 45,000 large dams in over 140 countries²⁵. Of the 25,400 large dams registered with the International Commission on Large Dams, it is estimated that the region has approximately 9,000²⁶ and 75% of them are located in the U.S. The countries in the region with the largest number of dams are U.S., Canada, Brazil and Mexico, in that order²⁷.

Natural Disasters

The region is particularly prone to natural disasters²⁸, whose effects are often aggravated by high urban concentrations. The vulnerability of the region to natural disasters continues to represent one of the most important challenges for the Americas. The temporal occurrence of rainfall and runoff causes both droughts and floods, influenced by macroclimatic, such as “El Niño” and “La Niña” phenomena. In this sense, droughts in arid and semiarid areas of the northeastern part of Brazil and northern Mexico, floods and volcanic eruptions in Central America, as well as floods and landslides in various suburbs are frequent metropolitan and peri-urban areas. Recurrence of hydro meteorological extreme events (hurricanes and tropical storms) is a constant threat to most of the Atlantic, especially for the Caribbean islands, as well as to the Pacific coast. Frost also affects important agricultural activities in the region, such as coffee production in South America.

Environment

Some areas in the Americas, such as the Amazon are highly recognized for their biodiversity. In

1998, the World Resources Institute (WRI) and the World Watch Institute (WWI) conducted a classification and characterization of 106 basins and 39 sub-basins considered as the most important watersheds in the world. According to this study, the Amazon basin has the largest number of fish species, endemic species of fish, and bird populated areas in the world. The basins of Colorado, Yaqui, and Bravo / Grande among the ten driest. Moreover, a total of nine basins were classified according to their number of dams, the first four are located in the region: Paraná, Columbia, Colorado, and Mississippi. The Colorado River is among the ten basins with the highest percentage of forest loss and the Orinoco, Usumacinta, and Yaqui are among the ten with the highest percentage of protected areas. None of the basins of the region is among the ten that have the highest values in terms of population density or changes in land use.

2.2 EXPLOITATION OF WATER RESOURCES

The region takes advantage of only a small percentage of its water wealth in order to meet the requirements of the population and economic activities. Total annual water withdrawals in the Americas accounted for 3.2% of the renewable water resources. This percentage varies from less than 1% in several countries in Central and South America to more than 15% in Mexico, U.S. and some Caribbean countries.

A noteworthy asymmetry in the supply and demand of water resources.

Many countries have a significant disparity between the location of the water resource, the distribution of the population and economic activities.

25. WCD (2000). “Dams and Development, a New Framework for Decision-Making”. World Commission on Dams. Earthscan Publications, UK and USA, 2000.

26. Dams with a height of over 15 meters. The resulting figure would be difficult to estimate if smaller dams were included. This number is greater than 80,000 in the United States alone.

27. Gleick, Peter (2002). “The World’s Water; The Biennial Report on Freshwater Resources 2002-2003”. Island Press, Washington, D.C. 2002.

28. ECLAC/IDB (2000). “A matter of development: How to Reduce Vulnerability in the Face of Natural Disasters”. LC/MEX/L.428, México, DF, México, 2000. Environment Canada (2005). Text of the 1987 Federal Water Policy. http://www.ec.gc.ca/water/en/info/pubs/fedpol/e_fedpol.htm

In Peru, with an availability of 58,000 m³ / capita / year per year, 70% of the population and 90% of economic activity is located on the Pacific coast and in the Andean highlands where s just a little over 1 % of water resources is found.

In Mexico, with an average availability of 3,982 m³ / inhabitant / year, 77% of the population and 79% of GDP is located in the arid and semi-arid territory, where only 32% of water resources are generated.

On the other hand, many of the countries face strong resistance to the development of the infrastructure that is necessary to adapt to the occurrence of water demand patterns in the different sectors of use, which explains the existence of areas with apparent scarcity.

Water uses

With some exceptions (Canada, United States, Belize, Panama, Colombia and Trinidad and Tobago), agriculture is the main consumer of water with 50% of extractions (Annex 2, Table 2.3). In North America, 12% to 77% of total water extractions are for agriculture. This per-centage varies from 28 to 83% in Central America, from 46 to 97% in South America and 6 to 94% in the Caribbean. There are nearly 42 million hectares of land under irrigation. Of this area, 18.4 million hectares are located in Latin America and the Caribbean, accounting for 14% of the total cultivated area.

The levels of water use in irrigation are relatively homogeneous throughout South America and the Greater Antilles, varying from 9,000 m³ / ha / year to 12,000 m³ / ha / year. Given the socioeconomic characteristics and long history of investment in water development, figures for Mexico are slightly higher, averaging 13,500 m³ / ha / year. These figures are higher in Central

America due to the development of important crops from the economic point of view (banana and sugar) and high temporal levels in intensive crops such as rice.

While water for domestic use only represents 15% of extractions in the region, it is the largest or second use in magnitude in many of the countries except the United States, Guatemala, Honduras, Chile and Peru.

The use of water for industry represents 35% of extractions in the Americas, but is especially important in Canada, where 69% of extractions are for this purpose, well above those for agriculture (12%). In the United States there are similar situations, where water use for industry accounts for 46% of extractions compared with 41% for agriculture; In Trinidad and Tobago, 6% of extractions are for agricultural use compared with 27% for industrial use; and Belize, 89% of the water extracted is for industrial use. The volume of water for industry is higher than the water employed for domestic use in Canada, the United States, Belize, Guatemala, Honduras, Chile and Peru.

The Latin American and Caribbean countries have large energy resources, including oil (13% of world reserves), natural gas (5.4%), carbon (1.6%), biomass and other renewable resources as well as a large hydroelectric potential (22%). The total electricity generation in Latin America and the Caribbean is a million GWh: 55.9% hydroelectric, 40.1% thermal, nuclear 3.1% and 0.9% of other sources²⁹. In the United States, hydropower generation is about 10% of the total, but in many countries of Central and South America it represents over 60% of its energy generated, including Brazil, Paraguay and Uruguay with more than 90%. In 2000, Latin America and the Caribbean developed 33% of its economically exploitable hydropower potential.

29. OLADE. (<http://www.olade.org>).

To the countries with a long tradition of mining developments such as Chile and Peru are being added others, such as Argentina, driven by increased global demand for metals, which has generated a growing concern about the water requirements for the operation and processing of minerals. For example, it has been estimated that in Chile one liter is required per second of water per million dollars of mining investment, with costs reaching 10% of the investment, this is how some projects may affect sensitive sources such as glaciers and the possible contamination resulting from production processes.

River navigation has great potential in South America, which is reflected in the approximately 40,000 km of navigable waterways of the Brazilian river system, of which about 27,000 km are navigable in almost natural conditions, although only 8,000 km are exploited by a permanent commercial shipping. Although the availability of waterways in LAC outperforms the U.S., the latter has mobilized more than 14% loads along these routes while in LAC has not reached 3%, showing great potential for future development. Among the river systems that are reaching a higher level of development are the Paraguay-Paraná serving, with its 3,600 km long, five countries of the River Plate Basin (Argentina, Bolivia, Brazil, Paraguay and Uruguay) and the Tietê-Paraná, which crosses the most industrialized region of Brazil, producing 35% of its GDP.

2.3 WATER SECURITY

Water is a dynamic resource which is challenging to measure precisely; its impact on economic, social, and environmental development is difficult to gauge; its seasonal variations and cycles of abundance and drought test its management and exploitation. The problem associated with water is to make the supply and demand correspond to the availability of time and space, in

quantity and quality for all of its uses, consistently with society's aspirations of quality of life and surroundings.

The water crisis projected in the future is currently manifested in several regions of the world and, according to world forums, is more a result of a case of mismanagement than scarcity; which, among other things, causes that large sectors of the population, especially the poorest, do not have access to adequate water supply and sanitation. The problem has been registered for a long time; however, efforts to solve it during the past three or four decades were disappointing. This was probably because of the precarious economic situation, lack of governance and appropriate legal framework in some of the region.

The concept of water security expresses the main objective of water management, which is to improve quality of life for all³⁰. It is a concept that offers common ground for politicians, business leaders, water professionals and stakeholders. Water security is a starting point for negotiating the complexities of the allocation of limited water resources, among many competing, and often contradicting, demands.

The following highlights some aspects that are relevant to the challenges faced by the Americas in achieving water security.

Supply, distribution and sustainability of water sources

The demand for water that derives from rapid urbanization and from the needs that arise from the different development models exceed the hydrological availability in some basins and aquifers. This has led to solutions based on the overexploitation of aquifers or the transfer of water from one basin to another. The increasing demands of large urban centers, in quantity and

30. The United Nations defines water security as "the ability of a population to safeguard sustainable access to adequate amounts of water of acceptable and sustainable quality for livelihood means, human well-being, and economic development in order to guarantee the protection against waterborne pollution and water related disasters, and to preserve the ecosystems in a climate of peace and political stability". (UN Water: Water Security & the Global Water Agenda. A UN-Water Analytical Brief. 2013).



quality, often conflict with the needs of rural areas. Most Caribbean countries face problems of scarcity and/or access to water, where the demands generally match or exceed supply capacity; increasing demand driven by demographic growth and development exacerbates the problems. A similar situation arises in many areas of the larger countries, such as Brazil, Chile, U.S., Mexico, and Peru.

Even in the countries that are the richest in water resources, which have enough water to supply the population and perform its economic activities, the distribution of water is carried out in an unsustainable manner, with the threat of the impact caused by hydrological variability and climatic change that could further affect supply sources, or clarify the need to expand the infrastructure of regulation, in a context of intense controversy, and accelerate the process towards management models that ensure the sustainability of water sources.

Given the global nature of climate change and its effects on rainfall; and because natural distribution of water does not recognize border limits and that several trans boundary rivers and aquifers of strategic importance are located in the Americas, it is necessary to move towards its joint administration by the signing of a bilateral or multilateral cooperation agreement that allows its joint management. In these sense, there are a successful examples in the region. Such is the case of the management of surface waters in the borders between Canada and the U.S. and Mexico and the U.S..

A situation similar to trans boundary basins occurs in the interior of each country, especially in the countries with a federal government, where the hydrological boundaries differ from the geopolitical boundaries.

Efficiency in the use of water

Efficient use of water remains as one of the most important challenges in most countries in the world and, certainly, in LAC and western U.S. as a result of the increased attention paid to drought (e.g. drought in the Caribbean from 2009 to 2010, Argentina in 2011, Mexico from 2011 to 2012, or California currently), the efficient use of a vital and scarce resource like water has generated a strong impetus to the reforms that demand the sustainable management of water resources; for example, Mexico has created a mechanism for coordinated action by the federal government institutions for the development and implementation of actions that prevent and mitigate the occurrence of drought³¹.

While recognizing that it is important to overcome the inertia to favor the growth of water supply, rather than addressing demand management more forcefully, it is also necessary to recognize that the construction of new infrastructure constitutes an even more important aspect of water policy, according to even the most conservative projections about the growth of the demands to guarantee food and energy security. It is also important to admit that even countries that have experienced shortages (as is the case of Argentina and metropolitan Mexico city), infrastructure projects are designed to increase water production, with less emphasis on what should be the priority, which is the improvement of the efficiency of existing systems.

In LAC, total water losses are around or above 50%³² and in the agricultural sector, which is responsible for almost 80% of the water used in countries like Peru, the losses are close to 65%³³⁻³⁴. Such high losses are directly related to deficiencies in the operation and maintenance of distribution systems, as well as rates that do not reflect the scarcity and real costs of the services

31. Comisión Intersecretarial para la Atención de Sequías e Inundaciones en <http://www.pronacose.gob.mx/>

32. Ministerio de Economía y Finanzas (2010); information to prepare the Water Resources Policy Based Loan PE-L I 024.

33. <http://www.slideshare.net/hugogc/per-el-agua-en-cifras>

34. Intendencia de Recursos Hídricos (actual Autoridad Nacional del Agua) (2010); information to prepare the Water Resources Policy Based Loan PE-L I 024.



provided, thereby discouraging a cry for a culture of preservation and conservation of water.

In the case of the production of food, the low efficiency of the use of water is accompanied by the waste generated from the chain of production that begins in the parcel and ends in the consumer, and the waste that defines the difference between the food that is served and the food that is actually consumed. For example, in the U.S., it is estimated that production and consumption waste of water for agricultural use represents 30% of the total volume of supply³⁵.

Increasing the efficiency in water use is therefore one of the greatest challenges in the Americas. Raising the efficiencies of use to values that are desirable and possible is currently the target of support offered by the multilateral institutions active in the region. The existence of regulatory bodies associated with the provision of water and sanitation is, among other, an effective means to achieve this purpose.

Pollution and degradation of water quality

While water availability problems affect a subset of countries in arid and semiarid regions, the problems associated with water pollution concern all countries of the Americas. Many of the most damaging problems lead to water degradation undermining the ecological integrity

and vital ecosystems a significant number of people depend on (e.g. the Amazon River basin and much of the coastal wetlands of the Atlantic and Pacific in most countries). The problems to be solved include the pollution caused by eliminating untreated sewage, pollution of groundwater due to agricultural and industrial practices and salinization of coastal aquifers.

Infrastructure for managing water resources

The experience recorded in the U.S.³⁶, can be extended, with added nuances, to all countries of the region. On the one hand, it points to the lack of recognition of the need to build new infrastructure in order to achieve global, national and regional sustainable development goals against which arguments of political, social and environmental order are opposed; this situation tends to decrease the priority of investment in water infrastructure and associated services. On the other hand, it highlights the increasing liabilities that are accruing as the life of existing water infrastructure is coming to an end, given the lack of financial resources resulting from inadequate rates and other factors affecting the financial sustainability of water, sanitation and irrigation services. The development of new infrastructure to regulate hydrological regimes in line with the demands of the population and economic activities, faces opposition from various sectors of society.

35. 7th World Water Forum. Americas Regional Process. North American Sub-Regional Process.

36. Americas Regional Process. North American Sub-Regional Process



Every year, floods resulting from extreme weather events result in extensive damage and loss of human lives, and also prevent the development of many countries, especially in Central America and the Caribbean; these events greatly impacts poor regions of higher population density (e.g., Rio de Janeiro, Nicaragua and Haiti). The lack of infrastructure also affects the less developed rural areas, they become more vulnerable to natural disasters and climate change. This problem may worsen due to the effects of climate change, which also surpasses the possible impacts on supply sources and cover all aspects related to water infrastructure and impacts on populations living in cities with high risk vulnerability. Therefore, it is important to work on increasing the resilience of cities and countries in general, to correspond to the new climate reality in which they live.

3. GOVERNANCE AND FUNDING FOR SUSTAINABILITY

The models for governance related to water management vary greatly between and within the countries of the Americas. The fundamental differences are a result of the government system of each country, as well as the legal framework through which water property is defined, and consequently, the water rights regimen, which may include rights of ownership and use.

The concept of water security is closely aligned with integrated water resources management (IWRM) and its guiding principles. In particular, the idea of integration is embedded in the concept of water security. Indeed, IWRM offers an integral and important part of the route to greater water security. During the last two decades, the road to integration of water resources management has matured. Today, water management is recognized as a crosscutting theme which includes water for people, food, ecosystems and economic activities in a sustainable framework consistent with a desirable future.

The concept of IWRM is not without its criticism. On the one hand, it is suggested that it focuses too much on the process (enabling environment,

institutional framework and management instruments) and is not specific about what is to be achieved. On the other hand, it states that rarely, if ever, IWRM has been achieved in reality. The concept of water security overcomes these criticisms based on the process for performance-based, approach. So IWRM is important, but not a goal in itself.

What matters ultimately is to improve the services that a good water management provides, such as water quality, protecting people from droughts and floods, and providing a healthy environment for people and ecosystems. These are the ultimate goals of an integrated approach and together comprise the concept of water security.

Since water security focuses on the ultimate goals of water management, there are implications for water governance. IWRM places the water system in central planning and operational management. The horizontal nature of the management of water resources has been outlined through what is known as “comb IWRM,” which is shown in Figure 10. In addition to managing the interface in coordination with the va-

Figure 10. IWRM comb





rious water use sectors and environmental objectives expressed in the form of water demand, IWRM is based on a series of instruments that together shape the governance model adopted by different countries.

IWRM encourages an approach to governance at the watershed scale through river basin organizations, in which all stakeholders are represented. However, some aspects, such as sufficient water for food and energy security, beyond the scope of watersheds as they often respond to national targets and are derived from higher levels of decision. The IWRM process accommodates these results at different scales.

Also, a risk-based approach to water security has an important consequence for governance. Since the future is uncertain, an adaptive approach to water management, which in turn requires a structure of adaptive management, partly based on social learning, is necessary.

Water governance issues are not new; they have appeared frequently in discussions on how to implement IWRM at the national level or the nature and purposes of the water planning. As with IWRM, there is no single solution to improve the governance of water security. Local conditions determine what will be the “best” governance structure for each specific situation. Building a governance model thus becomes a problem of contexts and realities.

3.1 CONTEXTS

The concept of water as a public good, and therefore a legitimate concern for the state to regulate its allocation and use, is currently incorporated in the constitutional acts of most countries. In this way, although there is room for private property in all cases, the overall

evolution of water legislation confirms that water rights have always been incomplete property rights. Even the most liberal approaches tend to limit the rights of private property when water triggers conflicts, such is the case in Chile and the United States.

Water property

In practice, defining water as national property (Mexico) or in the case of unitary states, like Chile, give central governments total control over the country's water. Power which cannot be delegated to subnational entities³⁷. On the other hand, the situation where regional /state governments are empowered to determine the conditions under which water can be used by others (Brazil, Canada, U.S.), with central governments acting by default in specific circumstances, generally leads to a heterogeneous set of rules on rights, distribution and use of water, making it difficult to advance in integrated water management, especially when hydrological and geo-political boundaries do not coincide, that being the case of all federal countries the Americas.

Institutional Framework

The water crisis has made clear the limitations of existing institutions to deal effectively with the new set of problems, which are not related to both the development of water resources and their allocation and management. The new challenges involve strengthening or adequacy of allocation mechanisms and conflict resolution both in the legal field and in public policy.

Water users who were “clients” in the era of surplus, have now become major players in the era of scarcity. Water management and decision making processes must now accommodate an ever greater role of the user organiza-

37. The balance of power between central and state government Vis a Vis a unitary state with delegation, greatly defines the difficulties that deferral governments face in the allocation of water rights within a unified group of laws. As well as the definition of agreements that are influenced by geopolitical factors. With the exception of Mexico, where the role assigned to federal government in relation to water is a result of the constitutional law on water property, the United States and Brazil face a more unbalanced situation which forces central and state governments to participate in long and complex negotiations with the purpose of achieving legal and institutional solutions that are appropriate for the allocation of water and conflict resolution.

tions, nongovernmental organizations and other groups with legitimate interests, as well as incorporating environmental issues and explore ways in which new technologies and information can be used profitably.

Decentralization and participation

Decentralization and participation are two concepts that in the last two decades have influenced the design of institutional arrangements for water management in most of Latin America, with mixed results. Here one can argue that taking separately the “bottom-up” approach of a “top-down” approach, supplementing the establishment of an appropriate legal and administrative framework, can result in a weak solution. While decentralization offers the promise of lower financial and transaction costs, greater flexibility and efficiency, local control and accountability, establishing the preconditions for carrying it out is essential, especially given the historical, socio-economic circumstances which are faced by many developing countries³⁸.

A successful decentralization requires: (i) having a revenue base large enough to carry out the activities to decentralize; (ii) the existence of clearly defined water rights among potential stakeholders; (iii) complying with a series of previous sociopolitical conditions to initiate participation and minimize resistance of privileged minorities; and (iv) requires transparency, clear roles and responsibilities with legal authority and quality information. For those hoping that decentralization can solve problems in a context of weak organizations and financial constraints, it is worth noting that decentralization works best in the context of a sufficiently strong central government that can implement decentralization in time and with financial resources.

Decentralization reforms and the establishment of water management by watershed, with the active participation of stakeholders, are processes that take time, sometimes decades. In order to keep the reform process, it is vital to maintain the necessary support, including the adaptability necessary to modify management arrangements in response to new environmental conditions. Central governments and external organizations that promote integrated management of water resources must then maintain their commitment to reform in the long term and through changes in government.

Finally, it is important to recognize that the financial dimensions of decentralized watershed management are important and complex: the success of decentralized management is associated with support from the central government, with financial responsibility for water users and the potential of income that may be generated and applied within the basin.

3.2 INSTITUTIONS FOR MANAGEMENT OF WATER RESOURCES IN LAC

Institutions for management of water resources and climate change adaptation in LAC are still emerging and face heavy financial restrictions³⁹. Even when many countries have made significant progress in the strengthening of institutions (ie. Brasil, Chile, Mexico and Peru), they must go through capacity building as well as the perfecting of mechanisms for the involvement of civil society, transparency and accountability, as fundamental pieces for an appropriate water governance.

While most countries in the region have developed a water legislation in tune with the principles of an integrated management of water resources— one that considers basins and aquifers

38. Blomquist, W., Dinar, A. and Kemper, K. 2005. Comparison of institutional arrangements for river basin management in eight basins. World Bank Policy Research Working Paper 3636, June 2005

39. Miralles, Fernando. 2014. Documento temático: Adaptación al Cambio y Gestión de Riesgos. Proceso Regional de las Américas. Sub región América del Sur.

as management units (Brazil, Mexico, Peru and others), this concept has yet to be consolidated and attuned to environmental management and corresponding institutional responsibilities (ie. Argentina, Brasil, Colombia and Central America).

Governance is usually cited as an important limitation towards the creation of an efficient water policy⁴⁰. However, before undertaking the improvement of water governance in LAC, decision makers need a clear image of who is doing what; such is the case, for example, of the reform process being held currently in Chile⁴¹.

The assignment of functions and responsibilities in the water management of LAC shows a great diversity between ministries and levels of government in the water sector⁴², and even so, it is possible to identify a few common trends:

- LAC countries have decentralized certain functions and services: water supply and sanitation services are usually delegated at a local level, whereas irrigation services are allotted to user associations. Meanwhile, responsibilities associated with management of water resources tend to be delegated in the regional/provincial level, according to management of river basins.

- There is no systematic relationship between the constitutional structures of a country and the institutionalism associated with the execution of a water policy which is diverse within the federal and unitary states of the Americas. Some federal states still maintain significant powers at a central level (ie. Mexico), while some unitary states are moving towards a greater decentralization of water resources management (ie. Peru).

- Many countries recently surveyed in LAC⁴³ have established, inside specific contexts, basin organizations depending on institutional factors, water considerations, incentives or regulations. The most prominent cases can be seen in Brazil and Mexico, to which the denominated water compacts of U.S. are added.

- In many cases (ie. Chile and countries in Central America), a significant overlap of responsibilities exists between institutions and agencies, which leads to inefficiencies and in some cases contradicting actions in the management of water resources. In this respect, the reform process lead by Chile is remarkable.

- The maturity of institutional systems varies widely: some of recent creation, while others, like Mexico, were originated decades ago. Their efficiency in the contribution of an integrated management of water resources depends intrinsically of the regulatory, planning, management and financing powers that they are assigned.

Sustainability and Financing

Water's economic value is intrinsically related to governance and water resource management. Presently, the "conventional wisdom" of LAC believes that the water problem is not one of physical shortage, but one of governance. The latter is not necessarily correct. The physical absence of superficial or subterranean water may not be a problem in many areas of the region⁴⁴, but the general notion that LAC is rich in water is far from accurate.

As mentioned earlier, with the exception of the west coast of the United States, two thirds of LAC are classified as semi-arid and arid areas,

40. OECD (2012), Water Governance in Latin America and the Caribbean: A Multi-level Approach, OECD Studies on Water, OECD Publishing. <http://dx.doi.org/10.1787/9789264174542-en>

41. Banco Mundial LAC. 2013. Estudio para el mejoramiento del marco institucional para la gestión del agua.

42. Miralles, Fernando. 2014. Documento temático: Adaptación al Cambio y Gestión de Riesgos. Proceso Regional de las Américas. Sub región América del Sur.

43. OECD (2012), Water Governance in Latin America and the Caribbean: A Multi-level Approach, OECD Studies on Water, OECD Publishing. <http://dx.doi.org/10.1787/9789264174542-e>

44. En ocasiones, el problema se asocia a la falta de infraestructura de regulación para adaptar la ocurrencia del agua a las características temporales de las demandas de agua.

such as northern and central Mexico, northeast Brazil, Argentina, Chile, Bolivia and Peru⁴⁵. In such cases the problem lies in the adjustment of demand to supply, in insuring the existence of water at the right place and the right time of year, at a cost that people can and are willing to pay. Difficulties in this are in part institutional and certainly include issues of governance, but they are also associated with an “artificial scarcity” derived in one part to technical, social and financial difficulties while facing the development of new infrastructure, and on the other part, to an inefficient management supported in many cases by perverse incentives that underlie in some government subsidies.

While some states (Brasil, Chile, Colombia, U.S., Mexico, Peru) generate enough resources to cover an integrated management of water resources (IWRM), this is far from enough. In most of these, the financial resources- including those necessary to obtain a better knowledge of the subject- are assigned through a misguided vision that doesn’t recognize the strategic value of natural capital. The latter is essential to the development and sustainability of societies according to their legitimate aspirations.

It is true that certain emotional and symbolic features make the demand for water different from the majority of other basic products. But there are also distinctive physical and economic characteristics that make water supply different and more complex than other goods⁴⁶. The sustainability of water supply and the services associated with it are linked to an appropriate management of upper basins, which provides a number of benefits in the overall process of water and sanitation services⁴⁷. Experience

related to the financing of IWRM in upper basins varies from one country to the next; in the case of Brazil⁴⁸, U.S. or Mexico it can differ depending on the diversity of users of the basin’s water. With the exception of Costa Rica and of different volunteer programs involving payment for environmental services, both at local and community level in Guatemala, el Salvador, Honduras and Panama, the development and application of economic instruments for water management is still pending, even when these may be already included in existing legislation⁴⁹.

Other advances and pending issues

Substantial progress has been made in order to achieve a better management and conservation of water resources. But a debate still persists between the relationship between water and socioeconomic and sociopolitical aspects. Further studies must be pursued on the role of water in public policy, the types of water institutions required, the role of water infrastructure in irrigation and hydropower, the role of basin organisations (including trans-nationals), the practical appliance of integrated management of water resources, cost-efficiency of pollution control methods, possibility of overcoming deficits in water supply and sanitation, the efficacy of public and private involvement, as well as a better risk management.

One of the biggest challenges is to achieve legal framework and institutional water arrangements that provide certainty to social agents and favor financing in the water sector. The criteria necessary to establish these must be oriented towards developing an institutional structure, a regulatory and operative framework which will generate trust (in the law, the agencies, the

45. Comprehensive Assessment of Water Management in Agriculture (2007). Water for Food, Water for Life, International Water Management Institute, London, Earthscan.

46. Hanemann (2006), The economic conception of water, in: Water Crisis: myth or reality? Eds. P.P. Rogers, M.R. Llamas, L. Martinez-Cortina, Taylor & Francis plc., London.

47. OECD (2011), Benefits of Investing in Water and Sanitation, an OECD Perspective, OECD publishing. <http://dx.doi.org/10.1787/9789264100817-en>

48. Autoridad Nacional de Aguas – ANA (2009), Boletim sobre Cobrança pelo uso de Recursos Hídricos, V.2, n.1, 2009.

49. Echeverría, Jaime. 2014. Gestión y Restauración de Ecosistemas para la Generación de Servicios de Agua y Biodiversidad. Elaborado para el Banco de Desarrollo de América Latina (CAF) y The Nature Conservancy (TNC). San José, Costa Rica.

authorities) and that will allow for consensual and transparent decision making. Institutionalism must be strengthened with an active and articulated participation of every entity in the sector and engaging other sectors so that these can simplify the planning of supply and demand of the resources.

Public involvement. As an effect of the democratization process of the late nineties, the growing participation of civil society in issues of national interest is significantly affecting the management of water resources. For example, non government organisations pushed the six following principles during the 4th World Forum (Mexico, 2006): water as a fundamental human right; water as a priority in public policies; equity in the use and distribution of water; ensure that rural communities have access to water supply; and the conservation of the link between water and forests, wetlands and other natural vegetation.

Water conflicts. Water scarcity in specific areas of the region provides a source of conflict between sectors and users, especially in the most deficient basins, affected by water pollution and with a geographically concentrated economic development. These conflicts tend to manifest around the assignments/ concessions of water towards specific sectors, planning and execution of large hydraulic projects, issues relating to control of pollution, protection against floods and assessment of ecological flow. Overall, the greatest demand in water usage, especially in urban and mining areas, has caused conflicts in the agricultural sector – involving, in some cases, native communities– considering that this sector usually provides water for other sectors.

Transboundary waters. Transboundary water bodies are managed through bilateral and multilateral agreements, varying their level of

cooperation and degree of institutionalization. The existing bilateral treaties reveal that, in general, governments are reluctant to delegate attributions to an international body that is not their subordinate⁵⁰. Transnational entities are only given power of decision over strictly technical matters. The use and development of transboundary water resources requires a constant and well-planned financing that will ensure the continuity of the projects. This, together with a real and effective coordination of the federal policies of both states, will allow the sum of the combined practices in the transboundary water systems to translate into the achievement of cooperation at a regional level.

International agreements for the protection of investments. A subject of relevant impact in water governance and services is the influence of international agreements of investment protection over a nation's capability of managing water resources, regulating public utility services and human rights. These treaties, which hold legal primacy over domestic laws, roles and functions of both federal and local governments have been very limited, a fact that weakens the ability of countries to design and implement public policies for strategic sectors of the economy, as in the case of public services and water resources. Additionally, a certain tension can be observed in the system of protection of foreign investments and economic, social and cultural rights, many of them considered human rights by different international standards. This calls for greater analysis, not only in the legal aspect, but also in the political, social and economic realms for the resolution of these conflicts⁵¹.

3.3 THE FUTURE WE WANT

Within the context that defines the political, social, economic and environmental realities of each country, the future of the Americas to–

50. A unique case can be found in the United States – Mexico border with the establishment of the International Boundary and Water Commission (USIBWC).

51. Solanes, Miguel. 2014. Documento temático: Gobernanza y finanzas para la sostenibilidad. Proceso Regional de las Américas. Sub región América del Sur.

wards the year 2030, in terms of governance and financial sustainability, is as follows:

- Countries have passed the legal and institutional reforms that will allow for an adequate water governance, by which the management of water resources is lead in an integrated and sustainable way, thus contributing to the productive economy and the protection of the environment.

- Decentralized management models for water resources, in accordance to the reality of each country, have progressed substantially with the effective participation of users and concerned society, as well as with mechanisms that sustain them financially.

3.4 REGIONAL STRATEGIES

- To internalize the concept of IWRM through legal framework, recognizing the need to promote a coordinated use of water and adopting basins and aquifers as planning and management units.

- To improve the generation of projects, from planning and engineering to execution and impact evaluation.

To strengthen water authorities in order to count on an institutionalism capable of living

up to the management challenges of such a complex resource.

- To promote the stability of water rights with necessary regulations in order to prevent the transference of negative externalities, as well as to promote flexibility in their reassignment as needs and economy evolve, and while natural supply remains stable.

- To advocate the principle that users and polluters should pay for the costs of managing the resource and compensate any damage they cause.

- To promote a reform of the Bilateral Investment Treaties (BIT), in order to guarantee each state that the regulation of use and efficient supply of water is considered legal and therefore compensable economically, as well as to allow the design and implementation of public policies that promote and protect the general interest.

- To foster participation from the industry and other private sector actors as partners to government entities and civil society in the implementation of programs that aid in the effort of achieving the goals set in the Water Agenda for the Americas.

4. WATER AND SANITATION FOR ALL

In Canada and the United States, safe drinking water supply and adequate sanitation is widespread, with virtually all the population covered. Latin American and Caribbean countries also present relatively high drinking water coverage in urban populations, with all countries registering above 90%, while 82% in LAC and close to 100% in Canada and the U.S. have improved sanitation. The population with access to services goes from 30% in Haiti to up to 80 or 90% in the rest of the countries in LAC. Meanwhile, United States and Canada achieved universal coverage three decades ago.

What global data conceals is a large intraregional disparity, reflected in the difference in access to water between urban and rural areas, or between the richest and poorest areas in a country, as well as the quality, sustainability and efficacy of services. There is also a clear distinction between access to safe drinking water and sanitation, as well as between these and wastewater treatment. The lack of priority wastewater treatment has in the public agenda cause big quantities of untreated liquid residues to be spilled in the soil and water bodies, which in turn causes surface and groundwater resources to get polluted, constituting a severe environmental damage and high social cost.

4.1 IMPLEMENTING THE HUMAN RIGHT TO WATER IN THE AMERICAS⁵²

The subtheme on “Human Right to Water and Sanitation” is part of the theme priority “Water and Sanitation services for all”, established for the Americas at the seventh World Water Forum. It was discussed broadly previous to the sixth World Water Forum through a series of subregional forums, national workshops and online mailing lists, allowing for the involvement of a diversity of institutional, academic and civil society sectors.

During this process, the contents of Human Right to Water and Sanitation in the framework of the UN’s resolutions and its implications in internal laws were discussed, followed by an analysis of how Latin American countries incorporated the premise in their own legislation and policy framework. A series of recommendations was issued to be developed during the next few years. The document produced during this process⁵³ will be used as a baseline during the 7th World Water Forum. Also, a comparative analysis between the current situation and that of 2012 was made, with the purpose of evaluating the evolution of the incorporation of this right within the policy and legal framework of each country, as well as the main challenges in achieving the full realization of its components.

The basic premise is that the formal acknowledgment of the Human Right to Water and Sanitation within the legal framework of a country is not enough, but that states should also establish legal, policy, evaluation and monitoring instruments for its full achievement.

Huge progress has been made in the matter of water coverage in the region. Nonetheless, this does not necessarily mean that other elements of this human right are being met. As the UN Human Rights Council has said “official numbers do not acutely reflect the dimensions of safe drinking water, the affordability of the services and the management of human waste and waste waters. They underestimate the extent of individuals without access to safe drinking, affordable water and sanitation operated in safe, accessible conditions”.

It becomes necessary then to be much more demanding over the full compliance of each and every element this human right involves, especially in terms of regulation of providers

52. Texts within this section were adapted and supplemented by: P. Mora, Jorge and Dubois C, Vanessa. 2014. Subtopic on Human Right to Water and Sanitation: Safe Water for ALL Axis. Regional Process of the Americas. Sub region of South America.

53. FANCA/FANMEX. 2011. Derecho Humano al Agua y al Saneamiento. San José, Costa Rica: Foro del Agua de las Américas, Grupo temático de agua potable y saneamiento. VI Foro Mundial del Agua.

of water services, public access of information, citizen involvement in the management and decision-making related to the resource, non-discrimination, affordability, among others. It is important not to limit the degree of coverage of safe drinking water in these states, but to also include other elements, which will be mentioned further on in this document, as compliance indicators of this human right.

In broad terms, the Americas have progressed somewhat in the implementation of two mechanisms put forward by the international human rights system for the fulfillment of water and sanitation as a basic human right. First, in the development of plans, policies, programs and strategies to enforce the different elements that make up this human right. The results of these processes will only be able to be measured through time, given that they have a long term horizon which has not yet been attained. In this regard, it becomes extremely important that the region implements indicators and other verification mechanisms, as well as accountability, so that the different states can monitor and evaluate progress, obstacles and deficiencies in their policies, strategies and implementation plans.

Formal acknowledgement of the Human Right to Water and Sanitation

Additional progress can be seen, though less apparent than previously mentioned, in terms of the formal acknowledgment of the Human Right to Water and Sanitation within national legal frameworks. The region needs to design processes that will allow a search for consensus and allow it to homogenize the constitutional and legal mandates which recognize the right to water and sanitation, so that both rights can be effectively incorporated into domestic regulations, in their respective constituent elements. Secondly, so that they can determine the implications, obligations and legal responsibilities of the state, operators and communities regarding this right. Thirdly, so mechanisms and legal remedies can

derive and allow each competent entity to act in case of potential violations of this human right.

One generic conclusion of the analysis made is that a direct relationship between the level of compliance of the many components of the Human Right to Water and Sanitation and the presence of positive norms that recognize it within the legal system cannot be made. We have, for example, cases like Chile, which does not recognize the human right within their internal legislation - even though it voted yes on the resolution of the General Assembly on July 28th, 2010- and yet holds coverage levels of safe drinking water and sanitation close to 99%. The same applies to Argentina, who has barely recognized the right in its legislation, but has a coverage of 98.7%.

On the other side there are countries like Ecuador and Peru, who have acknowledged the human right in their internal laws, but still present multiple problems in the coverage of water and sanitation services. Ecuador holds an 86.4% in water and an 83.1% in sanitation. Peru has an 86.8% in safe drinking water coverage and a 73.1% in sanitation. There are also countries who have explicitly recognized the human right within their legal systems and at the same time maintain high levels of coverage, as in the case of Mexico (94.9% in water and 85.3% in sanitation).

Many of the countries that currently recognize this human right once held the lowest rates of coverage in water and sanitation, which led them to kick start social and environmental movements that demanded the development of campaigns and processes so that their governments would incorporate the right into their legislations. Countries like Bolivia, Ecuador and Paraguay, among others, had - and many still do - serious issues in this respect. By recognizing the human right in their laws and launching a series of consecutive institutional and legal reforms, they began to develop successful programs that have slowly improved their coverage indicators, even though they still face multiple challenges.

Inequalities

One serious concern pointed out by the UN's Human Rights Council is that coverage rates do not take into consideration inequalities presented in many of the countries that hold high global indicators, especially in states that have not yet incorporated the human right to water and sanitation into their legal frameworks. Among these is Chile, which as mentioned earlier, exhibits global figures surpassing 95%, but when considering rural and urban areas, presents important differences (safe drinking water rates are 100% in urban areas and 90% in rural areas; urban sanitation is at 100% while rural sanitation is at 89%). The same happens in Paraguay, which holds 100% in urban water and barely 83% in rural water, whereas sanitation is at a 96% rate in urban areas and at a 53% in rural regions. If we continued to break down these rates by country, we would find rural regions with even lower coverage indicators.

Currently, the countries that hold the highest inequalities between urban and rural areas in terms of access to safe drinking water are Nicaragua (97%-68%), Peru (91%-72%), Colombia (97%-74%), Bolivia (96%-72%) and Ecuador (92%-75%). The remaining countries are all in a range of a 10% difference between rural and urban localities. In the case of sanitation, those with highest urban-rural disparity are Nicaragua (63%-37%), Paraguay (96% - 53%), Peru (81% - 45%) and Bolivia (57% - 24%). Uruguay is the state that holds less difference between rural and urban areas (1%).

Implementation

Other elements that make up this human right, those related to quality, affordability, accountability, public involvement, acceptability as well as financial and environmental sustainability, can be found in highly uneven levels from country to country. One possible road would

be for these countries to establish agreements through different multilateral and regional agencies (Organization of American States-OAS, Mercosur, Community of Latin American and Caribbean States-CELAC, Andean Community-CAN, among others) so as to better define regional goals that could aid in progressively achieving the different elements that make up the Human Right to Water and Sanitation.

4.2 WATER AND SANITATION SERVICES IN LAC AND THE MILLENNIUM DEVELOPMENT GOALS (MDGs)

Even though advances in the matter of water and sanitation in LAC can be considered substantial, current coverage indicates that there are still 34 million Latin Americans without access to a source of safe drinking water, and nearly 110 million without hygiene facilities to discharge. Moreover, less than 30% of waste water is treated- mostly inefficiently- causing 34 in every 1000 children to die every year of diseases related to water.

Regional and internal coverage indicators often conceal realities and inequalities that can affect a specific sector of the population. This is the case of inhabitants of rural and marginalized urban areas, which present the worst coverage conditions and quality of services, especially those involving sanitation. The Inter-American Development Bank (IADB)⁵⁴ points out that efforts to augment these coverages have focused mainly on urban populations, where the expansion of networks and systems is more technically feasible, and financial recovery of investment, operating and management costs is safer than in rural or marginalized areas. The increases in coverage have been slower in Latin American rural areas: 65% of the population without access to safe drinking water, 40% without access to sanitation and 72% defecating in the open live in rural areas of the region.

54. BID (Banco Interamericano de Desarrollo). 2011. Agua, Saneamiento. Argentina. en el marco de la preparación de la estrategia del Banco país: 2012 - 2015. (Nota Técnica Sectorial).

The existing gap between coverage of safe drinking water and sanitation is directly related to the political prioritisation implicit in public policies and budget assignments within the sector, as well as to high urbanization rates, the industrial structure of the sector, the population's socioeconomic situation, the lack of formal housing for low income families and the lack of appropriate policies for self-financing. In a region where most countries are considered middle income – and yet are distinguished by a high inequality in the distribution of wealth, financial capacity becomes the decisive factor in access to these services.

Provision of services

The provision of drinking water and sanitation in the Americas is offered through a diversity of models ranging through private entities in Santiago de Chile and cities in Canada, the U.S. and Mexico, to community organisations for water and sanitation (OCSAS) in the Bolivian Amazon.

This extensive fragmentation of service providers across the Americas, especially in LAC, is translated into dozens of thousands of entities in charge of catering water services, all with different sizes, efficiency levels, management capabilities and quality of service. There are large global corporations with astounding parameters of operating and financial efficiency, as well as operators who lack the necessary capability to operate at adequate financial scale, resulting in low levels of efficiency and bad quality of service. Fragmentation within water providers leads to a poor planning and pre-investment, limited access to credit, slow processes of business modernisation and greater efforts and costs in terms of regulation, oversight and control.

Quality of services

Beyond the coverage goals established by the MDG as well as those that might arise in the objectives Post-15 – which in the matter

of drinking water will be satisfied in almost all countries of LAC, the greatest challenges faced by the region are those associated with quality of services (water, efficiency, opportunity and continuity of supply). An adequate provision of services involves tackling problems associated to forms of organization and their regulatory and legal framework, financial sustainability (a result of existing tariff structures) and conditions of civil society participation, transparency and accountability.

Defects in the quality of water and sanitation services generate incremental costs in health care, in the provision of alternative sources of supply and decontamination. Additionally, they hinder women's opportunity to generate income, due to the fact that it is women who are usually at the head of a household and are therefore responsible for the use of water, throughout their domestic work.

Financial sustainability

Within their specific contexts, all countries in the Americas face problems associated with financial insufficiency associated to tariffs, far below the actual cost of the services. This has translated into an inability to substitute obsolete and inefficient infrastructure even in the most developed systems and an insufficiency to expand the systems with the least financial capacity.

4.3 THE CHALLENGES

While the MDGs certainly generated a boost towards achieving a more inclusive development and constitute the main agenda in global development, the goals laid down for water and sanitation homogenize the existing needs between different continents and states. In this regard, it must be clear that the claims of Latin American citizens are quite different from the aspirations of citizens of other countries with lower development levels, whose needs are met by having access to a public tap or communal latrines. Latin American citizens

expect quality water coverage with home connections, as well as the dignity of a toilet, in terms of sanitation⁵⁵.

Towards a globalisation of water and sanitation services

It is possible to claim that the goals presented in the MDGs represented, for LAC, a first step towards the universalization of drinking water and sanitation services, recognizing that the most pressing issues do not only concern provision for urban citizens, but refer to rural and peri-urban areas, where most of the population without access to these services lives⁵⁶.

Despite the improvements, there is an observable slowdown in the increase of drinking water coverage rates, as well as in the annual growth rate of populations with access to sanitation⁵⁷. This is a result of the greater time, investment and work needed to incorporate populations in the most isolated and dispersed regions, in the outskirts of cities or with particular issues to access.

Difficulties in achieving sanitation goals can be attributed mainly to two causes: (i) access to safe water represents a greater priority to governments at the time of making corresponding investments and (ii) parameters used to set millenium goals require a greater effort in terms of sanitation.

Regional totals conceal some very different scenarios⁵⁸ (Table 3). In terms of access to improved water, only 15 out of 26 countries had attained their goals by 2011. In terms of improved sanitation, only 11 countries had attained their goal by the same year. Only 11 out of the 26 member states of the IADB were well on their way to

achieving their goals for 2015, incorporating safe water and improved sanitation to populations at the required annual rates. It should be noted that, when considering the slowdown of the expansion rates in coverage, the number of countries well on their way seems to be closer to decrease than to increase. IADB's report on fulfillment of MDGs in LAC published in 2010 with 2008 data shows that 13 countries presented a growth rate that would allow attainment of goals set for 2015.

Within the many challenges faced by countries towards a universalization of water and sanitation services, five stand out. If solved, these could have a multiplying effect in terms of sectoral developments. These are:

- Multiplicity and politicization of service operators.
 - Sectoral financing needs and their adequate implementation
 - Weak regulatory activity of services.
 - Inefficiencies in the provision of service.
 - Inadequate coordination between water resources management and provision of services.
- Need for widespread trustworthy sectoral data. Within each country's specific context, the challenges listed above vary; they are not the same for a state company operating in a large city than for one that operates in a smaller city or even for community organisations (OCSAS), which provide services in rural areas.

Multiplicity of water and sanitation operators

Multiple studies agree that one reason behind LAC's deficiencies in terms of sanitation and quality of service standards is the extensive fragmentation of service providers across the region, compared to other public service sectors that do not face the same organizational problems, apart from the social and environmental implications

55. Ballesteros V., Maureen. 2014. Thematic document: Drinking water and sanitation for all. Regional Process of the Americas. Sub region of South America.

56. Universalization of water and sanitation services refers to coverage of the entire population with quality services at a household level. It requires a comprehensive approach and differential treatment, which should translate into positive action for those who are different in terms of their basic opportunities or recognize dissimilar paths of human development.

57. BID. 2013. Agua Potable, Saneamiento y Los Objetivos de Desarrollo del Milenio en América Latina y el Caribe. Nota Técnica # IDB-TN-522. Washington D.C., EE. UU.

58. Ibíd.

Chart 3. Status of countries in relation to MDGs

Criteria				Number of countries	Countries
¿Attained MDG in 2011?		¿Making desired progress?			
Water	Sanitation	Water	Sanitation		
YES	YES	YES	YES	9	Argentina, Barbados, Belize, Chile, Ecuador, Honduras, México, Paraguay and Uruguay
NO	YES	YES	YES	1	Costa Rica
YES	NO	YES	YES	1	Guatemala
YES	NO	YES	NO	5	Bolivia, Brasil, El Salvador, Guyana and Panama
NO	YES	NO	YES	1	Venezuela
NO	NO	NO	NO	9	Bahamas, Colombia, Dominican Republic, Haiti, Jamaica, Peru, Surinam, Trinidad and Tobago, and Nicaragua

Source: Inter-American Development Bank BID (2013)

of producing water and generating waste water⁵⁹. This multiplicity of operators act at different scales, human capital development, efficiencies and minimum quality standards, which makes it even harder to obtain the universalization and provision of quality service.

According to an analysis carried out in nine South American countries⁶⁰, from which conclusions can be extended to the rest of LAC, in cities above 100 thousand individuals⁶¹ an excessive

amount of operators does not present a challenge, considering most of them function at an according scale to minimize costs, which are in turn translated to users via tariffs. The most common problem lies in municipal public corporations operating in medium-sized and small cities, who's user numbers don't achieve economies of scale. In addition, a lack of management and operative capacities translates into important deficits in infrastructure and operational control.

59. CAF (Development Bank of Latin America). 2014. State and Market Infrastructure and Urban Water Services. Caracas, Venezuela. Unprinted.

60. Ballesteros V., Maureen. 2014. Thematic document: Drinking water and sanitation for all. Regional Process of the Americas. Sub region of South America.

61. This limit may vary from country to country depending on technical, economic, social and even political factors.



The decentralization of water and sanitation services, as part of public policies that strived to reduce the size of central governments and apply principles of subsidiarity, has not proved to be the entire solution to the water problem. In most countries public corporations at a municipal level lack incentives to be efficient and frequently follow highly politicized governance schemes, where local authorities have a direct relationship to those who manage them, undermining the technical aspects of the service. An example of this is the prolonging of lower tariffs with electoral purposes, derived from a type of universal subsidy that benefits those who need it and those who don't equally⁶².

The wide dispersion of actors attains its highest note if we consider that a growing number of OCSAS in LAC cater to at least 70 million inhabitants of rural and peri-urban areas, even in the case of remote rural concentrations⁶³. It is because of OCSAS that many in these areas now have access to water resources, and yet this represents another challenge in the standardization and universalization of quality and services.

LAC offers significant opportunities to consolidate business development into municipal enterprises within small and intermediate cities, as well as in the OCSAS. This would imply creating right incentives and implementing regulatory instruments that promote the provision of services at adequate operative scales and guide financing towards projects with high rates of

social return. Focus of international cooperation assistance and financing should be directed towards these sectors.

Since the late eighties and within specific contexts, many countries in LAC launched a structural reform of water and sanitation suppliers as a solution to huge gaps in coverage, efficiency, quality of service and financial state of the public enterprises that operated. Said reform sought to, among other things, reduce the participation of the State by allowing the private sector to act as investor and operator, especially in cities with enough population to attract a private operation of services.

However, the participation of the private sector began to plummet from 2005 on. Most large scale international operators have withdrawn from the region, with others announcing their intentions to leave the market, resulting in the nationalization of companies. Such is the case of Argentina, where private companies operated 70% of drinking water coverage during the mid-nineties, and today hold a mere 30%. With private companies leaving and a preponderance of public enterprises in the sector, it has been considered that a strengthening of the latter should be the focus of the strategies to follow during the following years⁶⁴. It is worth noting that on the grounds of efficiency and transparency, other countries, like the U.S., have had important movements towards putting water services, currently in the hand of private operators, back into the hands of municipalities⁶⁵.

62. It is estimated that there are close to 80 thousand community organizations in LAC. See <http://www.avina.net/esp/11797/mas-de-80-000-ocsas-celebran-dia-de-la-gestion-comunitaria-del-agua/> According to data from the World Bank's Water and Sanitation Program, OCSAS have the capability of serving an additional 18 million people. In Central American and Andean countries, the percentage of population catered by OCSAS ranges between 30 and 40%.

63. Ducci, J. 2007. Salida de operadores privados internacionales de agua en América Latina. Washington D.C., Estados Unidos. BID.

64. http://www.municipalservicesproject.org/sites/municipalservicesproject.org/files/2013-W-Remunicipalisationswater_0.pdf

65. http://www.municipalservicesproject.org/sites/municipalservicesproject.org/files/2013-W-Remunicipalisationswater_0.pdf

Needs for sectoral financing and improvements in implementation

Despite the economic downturn registered as a consequence of the 2008–2009 financial crisis, between 2003 and 2012 LAC registered a median annual growth of 4%⁶⁶. This growth, however, was not reflected in the amount of investments for drinking water and sewage systems, needed to attain MDG. The largest expenditure in investment in the water and sanitation sector in LAC happened during the period between 2005–2008, when it attained 0.11% of the region's combined GDP⁶⁷.

It is estimated that in order to reach a universal coverage of drinking water and sanitation systems for 2030 for all countries in LAC, infrastructure investments should be of the order of US\$ 12,500 million annually, equivalent to 0.31% of the region's GDP in 2010, for a total of US\$ 250,000 million⁶⁸. This estimate includes achieving coverage goals for treatment of wastewaters (64%), increasing storm drainage structures (85% in urban areas), optimizing and increasing source capacity (100% of incremental demand), institutionalizing services in marginalized urban areas (the greatest deficit in investment) and renovating functioning assets.

This estimate of financial requirements, based on investments equivalent to 0.3% of the region's GDP may seem unreachable, but comes at a realistic level for some countries that have been investing higher values. Furthermore, this estimate not only includes an expansion of sys-

tems, but also important investments in protection of water sources, water treatment and urban drainage. It is important that these investments be coupled with important increments in operating and financial efficiencies. Taking into consideration every specific condition, it is possible for the majority of LAC countries to obtain universalization between 2020 and 2030.

The current financial problem relates not only to the need for a permanent flow of resources, but also to the lack of feasible projects, both socially and economically, as well as to the inability of operating entities to manage the financial resources at their disposal. Problems are enhanced due to administrative (bureaucratic) processes associated to the assignment and execution of the investments, which in most countries come from different sources of financing, due to a lack of tariff structures that would allow operators to adequately face financial needs.

In reference to the sustainability of the services, it is worth noting that during the past 15 years, the capacity of operators (whether public or private) in covering operating and maintenance costs via tariffs has greatly improved, even enough to cover a portion of capital costs, especially within companies that operate in cities and large scale towns. Nonetheless, it is safe to say that, in broad terms, billing of these services does not cover the costs previously mentioned⁶⁹ and few companies are sustainable financially⁷⁰. Because of this, financing has to be obtained through budgetary transfers, loans from internatio-

66. (OECD) Organisation for Economic Cooperation and Development (OCDE, for its acronym in Spanish); (ECLAC) United Nations Economic Commission for Latin America and the Caribbean (CEPAL, for its acronym in Spanish); (CAF) Development Bank of Latin America 2013. Economic perspectives for Latin America 2014. Logistics and competition for development. Paris, France. Editions OCDE. 169 p.

67. Mejía, A.; Rais, J. 2011. La infraestructura en el desarrollo integral de América Latina. Diagnóstico estratégico y propuesta para una agenda prioritaria. Agua y Saneamiento. IDEAL 2011. Caracas, Venezuela. CAF. 45 p.

68. CAF (Banco de Desarrollo de América Latina). 2013. Equidad e inclusión social en América Latina: acceso universal al agua y el saneamiento. Caracas, Venezuela. 183 p. (Serie Reflexiones sobre Políticas Sociales y Ambientales N°2)

69. According to the Organization for Economic Cooperation and Development (OECD), the existing tariff structure in Mexico – of the order of \$ 0.49 / m³ – is very low when compared to average international prices. This has led to a steady degradation of drinking water and drainage networks due to lack of maintenance and the impossibility of bringing quality service to remote communities.

70. Fernández, D.; Jouravlev, A.; Lentini, E.; Yurquina, A. 2009. Contabilidad regulatoria, sustentabilidad financiera y gestión mancomunada: temas relevantes en servicios de agua y saneamiento. Santiago, Chile. Naciones Unidas. 74 p. (Serie Recursos Naturales e Infraestructura N° 146)

nal and domestic entities, donations and other specific sources.

Beyond covering operative, maintenance and the recoverable part of these investments, one of the greatest challenges faced by all countries in the Americas involves the necessary investments for the replacement of assets that have reached or even exceeded their life expectancy. On the other hand, it is worth noting that in many cases tariffs and connection costs represent real access barriers for poor populations. Thus, the necessary commitment for an assignment of financing that will allow to close the existing gaps and cover growing needs in water infrastructure, recollection and treatment of wastewaters, with quality service for all. The challenge consists in the design and application of real tariffs, along with the implementation of effective subsidy schemes for those in most need, as is the case of subsidies instituted in Chile.

Weaknesses in the regulatory framework of services

The strengthening of regulatory frameworks is perhaps one of the conjunctural aspects of LAC. An analysis of current practices indicates that with the exception of Chile, Colombia and Peru, more efforts should be made by the remaining countries in order to improve their regulatory frameworks so as to improve coverage and quality of services. In the case of Argentina it was estimated that a deficient regulation is equivalent to an implicit tax of 16% for the average consumer, paid directly to the owner of the assets of the services. In contrast, Chile, who has much better regulation, would only face a loss of 5% of the GDP⁷¹.

In order to tackle regulatory challenges an autonomous and technically efficient organism must be established, accompanied by legal re-

gulations that guarantee an adequate access to information on the operating entities, required for carrying out their functions. Public companies from medium and small-sized cities constitute the segment in most need of an adequate application of regulation mechanisms. These operate in a very poorly efficient way, with huge gaps in financial sustainability and enormous needs for infrastructure investment that cannot be covered.

Efficiency in the provision of services

Despite a substantial increase in coverage levels for all of LAC, water and sanitation services still present major deficiencies in terms of meeting sanitation standards and a continuous provision of services, 7 days a week, 24 hours a day. Additionally, only 30% of wastewater gets treated⁷². These deficiencies tend to manifest in an asymmetric and unjust manner, mainly affecting vulnerable and poor populations living in rural areas and the outskirts of cities. A service's efficiency can be measured by results generated and the cost involved in its attainment. It has been estimated that the annual cost of LAC's deficiencies could add up to US\$ 5.000 million⁷³.

One of the most common indicators used by the systems is that of Non Revenue Water (NRW). In LAC, on average, more than 45% of the water produced is lost before it reaches the customer, through accuracy issues, leaks, illegal connects, non-effective billing processes, among others. These losses not only complicate the challenge of increasing access to drinking water, but also leads to an increase in prices. There are some examples of operating companies who have made substantial efforts to improve this indicator. For example, Compañía de Agua y Saneamiento de Alagoas (CASAL) and Compañía de Saneamiento Básico de Sao Paulo (SABESP), in Brazil, increased

71. Fernández, D.; Jouravlev, A.; Lentini, E.; Yurquina, A. 2009. Contabilidad regulatoria, sustentabilidad financiera y gestión mancomunada: temas relevantes en servicios de agua y saneamiento. Santiago, Chile. Naciones Unidas. 74 p. (Serie Recursos Naturales e Infraestructura N° 146).

72. Mejía, A.; Rais, J. 2011. La infraestructura en el desarrollo integral de América Latina. Diagnóstico estratégico y propuesta para una agenda prioritaria. Agua y Saneamiento. IDEAL 2011. Caracas, Venezuela. CAF. 45 p.

73. CAF (Banco de Desarrollo de América Latina). 2013b. La infraestructura en el desarrollo integral de América Latina. Tendencias y novedades en la infraestructura de la región. IDEAL 2013. Caracas, Venezuela. 194 p.

access to water from 13 to 24 hours by reducing losses of NRW. A program launched by Obras Sanitarias del Estado (OSE) in Ayuí, Uruguay, achieved savings of 382.000 m³ of water, thus reducing their NRW from 73 to 21%⁷⁴.

Efficiency in the provision of water services has slowly acquired a greater relevance within the public agenda and that of financial agencies. Nonetheless, in many cases the price of services is affected by political reasons, especially in medium and small-sized cities where those responsible for setting tariffs are municipal governments, or in the case of Mexico, local congresses.

Operating, commercial and investment deficiencies have negative impacts in the quality of services and thus limit the expansion of the systems. The inefficiency of state operators also reduces local, federal and donor finances. Efforts toward overcoming these deficiencies should be a priority in order to achieve universalisation, and to enforce the Human Right to Water and Sanitation.

Lack of comprehensive and trustworthy sectoral information

The disposition of adequate information systems is related to the institution schemes operating each country. The type and quality of data is directly related to the existence or absence of regulating entities, of a legal framework and of the demands within. The experience of regulators in LAC is one of permissiveness towards operators. Cooperatives, OCSAS and other small scale operators are excluded from databases. One consequence of this is that statistics collected by international agencies will not reflect the situation accurately and therefore, cannot be trusted 100%.

Sectoral omission of information has an important impact in terms of the information consumers receive in terms of quality and efficiency of services, as well as in the statistics and indicators needed to shape public policies.

Separating water management from provision of services

Though most LAC countries have made great efforts towards providing safe drinking water to their populations, there is great uncertainty, due to the fact that water sources are presenting greater pollution and over-exploitation, thus becoming insufficient to meet growing levels of demand. Disturbing as it may seem, public policy has not yet turned its eyes towards the preservation and upkeep of water ecosystems.

Ecosystem preservation is not unseen in LAC, where protected wildlife areas make up to 10% to 20% of the territory, and yet most countries, with the exception of Colombia, present a disconnection between water and sanitation services and green infrastructure. It is absurd to increase drinking water coverages without protecting the ecosystems that provide said water. This could end in waterless pipelines and lost investments⁷⁵.

4.4 THE FUTURE WE WANT

Along with the approaches that will be laid out in the definition of the Sustainable Development Goals Post-15⁷⁶, LAC's general aspirations in the matter of water and sanitation are as follows:

- Countries within the Americas will have achieved or will be close to achieve a universalization of water and sanitation services, consistent with the elements of quality, affordability, accountability, civil society participation and the notion that they fully integrate and assert the Human Right to Water and Sanitation.

74. BM (Banco Mundial). 2013. América Latina: ¿Por qué las empresas de agua y saneamiento intentan ahorrar energía? Washington, D.C., Estados Unidos de América, 3 set. Consultado 30 oct., 2014. Disponible en: <http://www.bancomundial.org/es/news/feature/2013/09/03/latin-america-water-loss-energy-efficiency>

75. Hantke-Domas, M. 2012. A Review of Water Policies and Infrastructure in Latin America: The Situation of Green Infrastructure. Latin American Conservation Council. The Nature Conservancy. 40 p.

76. The definition of Post-15 SDGs will result from a broad discussion and analysis process culminating in September. e.g.: UNESCO. 2014. Water in the post-2015 development agenda and sustainable development goals: Discussion paper



- With the help of public policies tailored to the size of a specific population, water and sanitation providers move towards financial sustainability by raising their efficiency levels with tariffs that reflect the real cost of the services and a greater rationality in the application of resources and subsidies.

4.5 REGIONAL STRATEGIES

- Efforts made towards a universalization of water and sanitation services must be intimately related to food safety and eradication of poverty programs.

- Investments in sanitation must be prioritized to better control pollution and improve the quality of water. This includes the enlarging of urban systems in order to cope with the growing concentration of population within cities, thus considering the protection of basins and the treatment of wastewaters.

- Public policies must consider large cities independent from medium sized and small cities, as well as rural areas. This will allow a better use of resources, higher impact and a more balanced success.

- The flow of funding must be maintained in order to achieve the universalization of services, by which innovative financing mechanisms need to be launched and a higher efficiency must be attained for every monetary unit spent.

- Public policy and government support should give priority to the improvement of commercial

and physical efficiencies of water providers, which, together with the right tariff structures and subsidy policies, constitute the base on which to make progress towards a financial sustainability of the services.

- It is important to learn from the region's success cases so as to improve regulatory practices; regulatory framework must be autonomous in order to reduce political interference in sectoral decisions.

- The definition of public policies for management of water and sanitation services requires constant technical monitoring. This will only be possible through the generation of precise, complete, comparable and verifiable indicators that will allow the adoption of adequate strategies for each scenario.

4.6 INICIATIVES

With the purpose of strengthening the process that will make water a human right, the sub-region of South America proposes:

- To invite countries within the Americas to launch agreements between the different multilateral and regional organisations (Organization of American States-OAS, Mercosur, Community of Latin American and Caribbean States-CELAC, Andean Community-CAN, among others), so that regional goals can be defined that could progressively attain all the elements needed to achieve the human right to water and sanitation.

5. WATER FOR FOOD

Irrigated agriculture covers an area equivalent to 280 million hectares around the world and produces around 44% of the total agricultural production. Indicators suggest that irrigation will represent 40% of the expansion of agricultural land and approximately 55% of the increase in food production in the world. These estimates suggest that by the year 2030, half of all produced foods and two thirds of all grains will come from irrigated agriculture. Overcoming these challenges will require a new way of envisioning irrigated agriculture, with new organization, institution, human and technological resources.

Close to 50 million irrigated hectares are located in the Americas (45% of which are located in LAC), representing 12% of their total available arable land (38% in the world). The expansion of irrigation in LAC, at a mean annual rhythm of 250 thousand hectares over the past five decades, reflects its financial relevance.

Irrigation has played a key role in the development of many american countries, principally Argentina, Brazil, Chile, Mexico and Peru. In countries like Bolivia, Guatemala, Haiti, Honduras, Nicaragua and Paraguay, agriculture generally contributes up to 20% of the GDP, while in bigger countries like Argentina, Brazil, Mexico and the US, the figures vary between 6 and 9%. Almost 100% of the total agricultural exports of Chile and 50% of Mexico originate in areas with low irrigation.

With a few exceptions (Canada, U.S., Belize, Panama, Colombia, Trinity and Tobago), agriculture is the number one water consumer, with 70% or more in extractions. In North America, between 12 and 77% of total water extractions are destined to agriculture, a percentage that fluctuates from 28 to 83% in Central America, to 46 - 97% in South America and 6-94% in the Caribbean.

Water usage level in irrigation are relatively uniform in all of South America and the Greater Antilles, varying from 9,000 m³/ha/year to 12,000



m³/ha/year. Given its socioeconomic features and a long history of investments in hydraulic development, the numbers are larger for Mexico, with an average of 13,500 m³/ha/year. The numbers are even greater in Central America, due to the development of economically important crops (banana and sugar) and the high seasonal levels of intensive crops, such as rice.

5.1 CHALLENGES

Produce less food is not an option. In fact, food production will need to double by 2050 in order to feed the entire world's population. Hence the need to tackle the issue of agricultural water, which represents 70% of the total global water consumption. Another issue to be thought out is the low priority of investments in infrastructure for food production, at a time when these are essential in guaranteeing food safety and external market competitiveness; this subject is associated with the generation of sustainable projects⁷⁷.

77. The development of the agricultural frontier for irrigation is particularly important in Central America. See: Regional Process of the Americas. Subregion: Central America. Thematic Sub-regional document. 2015.



The increase in global demand and price of agricultural and livestock products, has produced an enhancement of crops and an expansion of the agricultural frontier. All of this has put extra pressure on water resources and changes in land use, with a direct impact on the behavior of different basins. The increase in the use of fertilizers and pesticides in some countries has led to pollution problems⁷⁸.

It is expected that agriculture will suffer the worst consequences of climate change. In some regions, the change in rainfall patterns and the growing scarcity of water will reduce agricultural yields in one fourth or more by 2050. The greatest challenge faced by agriculture in the region will be to ensure a sustainable use of water resources⁷⁹.

Productivity of water in agriculture⁸⁰

Considering its impact on the water balance of each country and its specific basins, the productivity of water in agriculture must be increased so as to reduce pressure on water resources, take pressure off environmental degradation and increase food safety conditions. However, this is not a simple process and there is no magical solution to accomplish it. In order to increase

the productivity of water one must intervene in every step of the supply chain, from efficiency in the way plants use water to the way international trade impacts its use and productivity.

Innovations with potential to improve the use of water correspond to four areas of action: (i) plant water usage, (ii) improvement in the use of water for parcels or production blocks (iii) improvement in water works and water supplies (iv) innovations in watershed management.

Progress in scientific knowledge and participation of stakeholders in agriculture, especially the producers (big, medium, small) who are the final users of the resource and therefore hold a greater interest in their quality and conservation, are two determining factors in the implementation of these innovations.

The core message of the Global Water for Food Conference of 2014 was that the combination of new, complex, large scale, diverse forms of data – ranging from the internet to remote sensing – together with the improved capacities for data processing, opens the possibility for a better analysis and decision making with long term consequences for water and food safety.

Improvements in the efficiency of plant water usage

The productivity of water is ultimately determined by how efficiently plants use it, as a result of absorption, metabolism and evapotranspiration, all physiological manifestations of plants. There is evidence to suggest that if traditional pathways of genetic improvement are followed, progress will be too slow to heed the effects of climate change as well as the production demands.

Against this background many anticipate that future innovations will come from the “new bio-

78. Consorcio Regional de las Américas (CRA), 2009. Documento regional de las Américas. Quinto Foro Mundial del Agua, Estambul.

79. Proceso Regional de las Américas (PRA), 2012. Agenda del Agua de las Américas: Metas, soluciones y rutas para mejorar la gestión de los recursos hídricos. Sexto Foro Mundial del Agua, Marsella.

80. Texts within this section were adapted from: Thematic document: IICA. 2014). Water and Food Safety. Regional Process of the Americas. Sub region of South America.

logy”, where branches such as biotechnology and nanotechnology can significantly contribute to increase water’s productivity and once and for all, “free” water from agriculture that could be used for other purposes.

Experience gained confirms the need to continue strengthening biological and agronomic research to improve, recover and find vegetable species that may produce more, making a better use of water or even adapting to extreme climate conditions, including those with less availability of water or high salinity conditions.

Improvements in use of water

There are three main interventions that can be carried out in parcels or production blocks: (i) the application of technologies and techniques oriented to improve soil management (for example, no-till farming or zero tillage); (ii) improvement in the use of other inputs, particularly fertilizers and (iii) use of technologies that will allow a more precise supply of water according to plant needs, such as precision irrigation, micro-irrigation and subterranean irrigation. Other technologies have also proved beneficial in water use, such as hydroponic crops and protected agriculture.

The combination of these integrated interventions is known as “precision agriculture”. In the most advanced cases computer systems are used to identify the specific needs of water for plant’s lifecycle and with support from satellite measurement systems would allow the supply of precise quantities of water in opportune moments, as well as other inputs that an individual plant or group of plants need in a small portion of soil.

Both agricultural innovation systems and the private sector have put a greater emphasis on the development of these knowledge systems

and methodologies, to the extent that there are many alternatives available in the market to aid producers in increasing their performance as well as improving an integrative management of their parcels. However, most producers are still unfamiliar with these technologies or find them unaffordable. Thus, an urgent task is at hand: to close the gap between the availability of these innovations and their practical application in the field, especially in small-scale and family farming. This confirms the need for countries in LAC to build and strengthen knowledge transfer systems, as well as to modernize the agricultural extension systems.

Improvements in the conduction and supply of water

A third type of innovation revolves around the way water is supplied to producers, resulting in one of the most important cooperation interfaces between end consumers and entities responsible for the management of water resources and which offers opportunity for hard innovations (in infrastructure⁸¹) and soft innovations (in the way management of resources is organized). In brief, greatest efforts in water supply have focused on:

- a. Improving the operation of irrigation systems: the main objective of these interventions—which include not only improving canals and conduction systems but also organization of management—is to ensure that productive units can rely on all the water they require, both in quantity and quality, without delays and losses.
- b. Reducing evaporation of water: for which important efforts have been made towards redesigning canals, redefining distribution routes, avoiding water conduction in unproductive land, modifying crop types by eliminating species that are less efficient in their use of water and controlling weeds that compete with crops for water and nutrients.

81. Water infrastructure is largely forgotten in the Americas, despite being fundamental to the health of agriculture, economy and society. Hydraulic infrastructure provides resilience. The ability to store water in seasons of excess and to use it when there is not enough available translates into reliable crops and stable economies.

c. Decreasing filtration, runoff and leaching (displacement of soluble or dispensible substances such as clay, salts, iron and humus) caused by movement of water within the soil, especially strong in humid climates. This causes soil layers to lose their nutritional compounds and become more acid, while in some cases can also generate toxicity.

d. Minimizing water pollution and salinisation of the soil.

e. Promoting recycling and reuse of water. Two actions that have generated positive results in these interventions have been to involve consumers in all of these processes and facilitate a community management of the resource, especially in areas with deep cultural roots and community traditions.

Innovations in the management of basins

At the basin scale, both nationally and even in transboundary waters, great efforts have been made to improve management of the resource. To this end many countries are now using georeferencing and geomeasurement systems, as well as spatial technologies and computer modelling.

The goals pursued by these innovations at a basin scale are four (i) to know the full extent of the availability of the resource and its state so that management models can be constructed that will allow facing the challenges of current demand and those being inflicted by climate change and population growth, (ii) to support decision making related to the assignment of resources to different users, with an aim to support water usage in activities with higher return or of greater importance to human development, (iii) to conserve resources, in terms of quantity, quality and health; these interventions include innovations in business models that involve users and reward them for the ecosystem services they provide, and (iv) to establish early-warning systems for monitoring climate conditions, available volumes of water and pollution levels.

It is clear that improving the productivity of water and attaining an integrative management of water resources is a shared responsibility at all levels, which is why participation of researchers, producers, communities, nations and the international community is needed to guarantee the availability and integrity of this vital resource.

Without a doubt, individual actions taken by a producer, a community, a government or a researcher will be insufficient in ensuring the availability of water that agriculture will need in the near future.

5.2 ENSURING FOOD SAFETY

In order to expand the demand for cereals between 70 and 100% for the next 25 to 30 years, solutions must arise from the water resource sector as well as the agricultural sector. Beyond this, the use of new technologies and of negotiable processes where all interest groups participate, are focused on the control and decrease of overexploitation and excessive consuming. This comes as a consequence of the rise in input prices and their reflection in food costs. Debates will center around availability, access, quality, innovation and increases in investment in agriculture.

5.3 THE FUTURE WE WANT

Efforts to ensure food safety and the fight against hunger in the Americas will translate into the future we envision.

- Where countries have eradicated or are close to eradicate hunger among their citizens, on top of contributing efficiently to global food safety, by developing a competitive and economically viable agriculture that conserves land, water as well as plant and animal genetic resources.

- Where countries have increased water productivity as a result of programs focused on the boost of efficiencies in all phases of the production cycle, the application of technological and computer innovations and the strengthening of user organizations.

- Where the expansion of the agricultural frontier for irrigation, needed to cover population needs and other productive activities, relies strongly on the reuse of treated and low quality waters.

5.4 REGIONAL STRATEGIES

- To impact on water- saving in agricultural use by reducing losses along the production and consumption chain, including decrease in global food waste and adoption of diets requiring less water consumption.

- To drive the modernization of irrigation systems by medium and long term schemes that take into consideration the financial capacity of the producers and where relevant, with the participation of the private sector.

- To apply computer, agronomic and other technological tools that will allow the farmer to counter climate change threats

- The efficient and safe use of agrochemicals as well as the elimination of use of toxic chemical products.

- Assessment of agricultural biodiversity and recognition of its role in ensuring the stability, resilience and nutritional quality of production and its importance in the provision of environmental services.

- Support for research and applied development of techniques for sustainable agriculture, boost for the dissemination of sustainable technological and management innovations, adaptable and accessible to all segments of growers.

6. WATER AND ENERGY

LAC countries have extensive resources of energy within their territory. These include oil (13% of global reserves), natural gas (5.4%), carbon (1.6%) biomass and other renewable resources, as well as a huge hydroelectric potential (22%). LAC's total energy production is 2,856 TWh: 55.9% hydroelectric, 40.1% thermoelectric, 3.1% nuclear and 0.9% from other sources⁸². Hydroelectric energy generation in the United States accounts for 10% of the total, but in many countries of Central and South America it represents more than 60% of total energy production. In Brazil, Paraguay and Uruguay it accounts for more than 90%.

A common feature in all Central and South American countries is the high rate hydroelectric plays in energy production. As a minimum, in countries with a high availability of natural gas like Argentina and Bolivia, accounts for 30% of the capacity. This rate is even higher in Brazil, but very lower in Mexico and the U.S.

Differences in the use of hydroelectricity partially reflect the challenges faced by each country as well as the form of organisation it has given its energy sector.

To a greater or lesser degree, these differences can be seen in the conformation of subregional free trade blocks (ie Mercosur and Pacific Alliance); this distinction, however, fails to explain the development of the sector if it is not taken into account with the strength of the institutions and of the water and energy markets, as well as capacity for social concertation.

While hydroelectric energy has played a significant role in many of the region's countries, on average, only 26% of Latin America's⁸³ full potential for hydroelectricity has been developed, a number su-

perior to Asia's (20%) of Africa's (7%) potential. In contrast, Canada, the US and Europe use more than 60% of their potential for hydroelectric energy. The use of this hydroelectric potential ranges from below the average value (23%) in Belize, Chile, Colombia, Cuba, Ecuador, El Salvador, Guatemala, Honduras, Mexico, Nicaragua, Peru and Surinam, to above 50% in Paraguay and Uruguay. Hydroelectric power stations generate on average more than 56% of electricity, with variations that range from 10% in Jamaica, Mexico, Nicaragua and the Dominican Republic, to over 70% in Brazil, Colombia, Costa Rica, Paraguay, Peru and Uruguay.

6.1 THE CHALLENGES

Towards the year 2030, the population in the Americas will surpass 1,120 million, with over a billion concentrated around urban centers⁸⁴. This translates into a considerable increase in the demands of goods and services. It is estimated that global energy requirements will double or triple by 2050, with great uncertainty on the impact of the evolving prices of oil, which is why it will be decisive to ensure enough supply of water and energy in order to support economic growth and reduce poverty. Within this context, another important challenge will be to ensure public access to electrical energy, by achieving a more inclusive development; in 2011 the percentage of population without access to electricity went from 0.7% in Brazil to 72.1% in Haiti⁸⁵.

Hydroelectricity

With a few exceptions, LAC countries will see an important generation of hydroelectric energy during the next decade. South America is one of the regions with the most potential for the development of this form of energy production. Inventories mention considerable numbers, ranging from 600 to 8,800 MW. While there

82. WWAP (United Nations World Water Assessment Programme). 2014. The United Nations World Water Development Report 2014: Water and Energy. Paris, UNESCO.

83. WWAP (United Nations World Water Assessment Programme). 2014. The United Nations World Water Development Report 2014: Water and Energy. Paris, UNESCO.

84. WWAP (United Nations World Water Assessment Programme). 2014. The United Nations World Water Development Report 2014: Water and Energy. Paris, UNESCO.

85. Ibid.

is reason to doubt the ability to exploit this potential, given the current restrictions, it is clear that there are still enormous opportunities for future development. According to CEPAL (2004), the estimated potential for regional electric generation comes from water sources: 18,271 MW (for example, Costa Rica holds a potential for 4,449 MW, followed by Honduras with 4,525 MW and Guatemala with 4,360 MW).

In order to address the growing threats posed by climate change, almost all countries in the region are contemplating a return to hydroelectric development. The current laws in Mexico, for example, envision that by 2035 40% of all electricity must come from renewable sources; similarly, government programs in all central american countries include goals that tend to increase the participation of hydroelectricity in the energy matrix.

Under an ideal scenario, beginning in the 2030s, small and medium sized generation could be an important part of renewable electricity, with social and environmental benefits surpassing any other type of energy generation. In this regard it is worth considering the example of Brazil: 48% of the renewable energy projects of its Clean Development Mechanism consist of small hydroelectric stations and 46% of wind farms. These projects contributed to a reduction of 21 million tCO₂e between 2005 and 2012. The large scale binational projects of the Parana river in Brazil and Argentina, supply 100% of Paraguay.

In Uruguay the Binational Salto Grande Project supplied the country for a long time, developing its total hydroelectric potential.

Environmental and social considerations make large volume water renewable generation difficult. While major dams have played an important part in the region's economic growth, they have



also been found to have a high environmental and social impact. Though authorities praise themselves for the great hydroelectric potential recently observed in Chile and Colombia⁸⁶, as well as in Mexico and Central American countries, errors committed in the past hinder public credibility, block and obscure the debate, leading to delays and even cancellation of promising developments.

It is clear that under current conditions only a portion of this potential can be developed. Existing inventories are generally obsolete, made when these environmental restrictions were not yet in place. In Colombia, for example, there is still talk of a 90 TW of potential when realistically, only a third of that could be developed. There is still much to learn about the way governments need

86. In some cases, approved and funded projects have had to be suspended, such as the Porce IV Project in Colombia and the HidroAysén project in the Chilean Patagonia. In other cases, projects have experienced delays and cost overruns of up to 30% because of compliance with environmental and social obligations which were not considered during approval.



to cater to the basic needs of areas where energy is produced, so that the projects themselves do not become hostages and see their development thwarted.

Conflicts on usage of water for energy production

The conflict on usage of water for energy production is implicit in hydroelectricity, when its use does not coincide in time and scope with other needs like human use, flood control, irrigation or minimum ecological downstream flow. This occurs when reservoirs are operated or interbasin transfers are made to better exploit hydroelectric potential. This is not a major problem in the majority of hydroelectric developments, be it because the seasonal needs coincide or because the lack of long term storing makes flow regulation less feasible. In other cases, the priority in the use for drinking water or flood control restricts the optimum operation of the electric system.

In general, problems involving the optimal allocation of water between uses are conditioned by priority assignments without a clear establishment of dilemmas. This can create assignment inefficiencies that in turn make it difficult to reach consensus with interest groups. Regulation is often very inflexible and public debate usually heated. Such is the case of the Sogamoso hydroelectric project in Colombia, where the environmental license established an ecological flow of 80 square meters per second. During normal operations this doesn't present a problem, but the strict requirement of this goal during the initial filling of the reservoir delayed the project, increasing the risk of deficit in the electric sector.

The idiosyncrasies of every system make it extremely difficult to incorporate the integrative operation of multipurpose projects within the optimization models of the energy sector.

However, the most important restriction towards the development of the hydroelectric potential is constituted by the environmental and social considerations for the development of the areas, the sizing of reservoirs and stations, as well as the location of transmission lines.

Alternative sources

Even though hydropower is a source of affordable and environmentally efficient energy, there is a strong trend for countries to develop additional sources, in particular those related with biofuels and wind power.

In some regions, both wind and biomass present a "seasonal complementarity" to hydropower, considering that the driest periods correspond to those of crop harvesting – for example, sugar cane as well as periods of high winds. These regions will have to develop synergy mechanisms between generation of hydroelectric, wind and biomass⁸⁷.

87. Proceso Regional de las Américas (PRA), 2012. Agenda del Agua de las Américas: Metas, soluciones y rutas para mejorar la gestión de los recursos hídricos. Sexto Foro Mundial del Agua, Marsella.

Given that production of energy generates important environmental impacts, the use of biosolids and biogas can help prevent greenhouse gas emissions while at the same time increasing the environmental performance of a wastewater treatment plant (PTAR, for its acronym in Spanish). For example, results from studies such as the Life-Cycle assessment of PTAR in California have attracted attention towards the need to recover energy in the handling of products derived from treatment of wastewaters.

An additional case is that of the PTAR Atotonilco in Mexico, the biggest in its kind constructed in one phase, third biggest plant in the world in terms of treatment capacity and an example of policies adopted by a country as a mitigating climate change action. This PTAR will benefit 700,000 people in the Mezquital Valley, while treating 60% of the wastewaters produced by the Valley of Mexico. It was designed to produce 1,041 Hm³ of irrigation water annually and will generate biogas for the production of electrical and thermal energy. The estimated electricity is 197 million KWh/year⁸⁸.

Energy needs of water usage

Energy use can be an important item in the production and distribution costs of drinking water and wastewater treatment in some areas, especially when pumping is used or desalination and water reuse processes are employed. The amount of energy needed in the water and in wastewater treatment processes is highly variable and depends on factors such as location and quality of water sources, the nature of pollution and the types of treatment used in installation.

However, available information indicates that consumption of electricity by the water sector amounts to a very small fraction of the total electricity use in a particular country; in Colombia, for example, it was estimated between 1% to 1.5%⁸⁹. This percentage depends on the structure of electricity consumption of each country as well as the characteristics of the water system, and may change in the future, but would rarely be radically different from that quoted.

The need for an efficient use of energy is derived from the opportunity to reduce production costs, even when it slightly relieves the growth needs of future energy supply. Energy costs may represent a heavy burden for water operators, making efficient use of energy a sustainable alternative. In Mexico, the consumption of electrical energy used to provide water and sanitation services at 5,000 GWh/year, 95% associated to pumping systems, implying a cost of around US\$600 million, or between 15% and 40% of the revenue of operators. It is estimated that in Latin America the cost of electricity for the provision of water and sanitation services accounts for 30–40% of the costs of water supply⁹⁰.

Despite the interest of multilateral development banks and local governments in promoting actions and programs for energy use in water and sanitation⁹¹, their adoption has been modest. This may be due to lack of information on the activities developed by companies or to institutional and financial difficulties, on top of perverse incentives by companies to improve their financial situation via central government subsidies, that distort investment decisions.

88. The link between hydraulic and energy efficiency can bring considerable savings in money and greenhouse gas emissions. Mexico's savings potential is as high as 34% if changes were taken into account to improve hydraulic operation. Emissions of greenhouse gases could be reduced by approximately 704,000 tCO₂e / year. Barriers such as bureaucracy, lack of technical support, poor public policies and limited financing options must be overcome for this purpose.

89. Millán, Jaime. 2014. Thematic document: Water and Energy: challenges for South American countries. Regional Process of the Americas. Sub region of South America.

90. WWAP (United Nations World Water Assessment Programme). 2014. The United Nations World Water Development Report 2014: Water and Energy. Paris, UNESCO.

91. The IDB has financed five programs in Central America and the Caribbean, as well as technical cooperation for energy audits in other countries. The World Bank has financed technical cooperation and included components in water and sanitation projects in Mexico and Uruguay, and the Global Environmental Fund (GEF) funds some projects in Argentina.

Pumping for irrigation is an important energy use in arid areas of the U.S., Chile, Mexico and Peru, but gained momentum in other regions, such as Colombia. The existence of subsidized tariffs for this activity in some countries discourage investment in energy efficiency. The impact of technological change in the energy intensity of irrigation is difficult to predict: on one hand, the growing use of drip irrigation reduces the need for power consumption, but on the other, the use of pressurized driving to save water losses in canals can increase it strongly, as in the case in Spain.

As indicated within the documents of the World Bank's Thirsty Water program⁹², there is a significant progress in the technology for water desalination by reverse osmosis, which has reduced energy needs (15 to less than 5 kWh per m³) and therefore, these input costs are lower. In northern Chile, where energy is expensive, this has facilitated numerous investments and proposed regulatory measures to mandate water reuse and desalination in the mining sector, as made known by the press and in the ALADYR Trade Association forums. However investments are very large. This is a barrier even in Peru, where the price of energy is lower. In other countries, such as the development of coastal resorts in Mexico or other projects in the US, the needs are punctual.

Water-energy nexus

Energy production represents a significant fraction of total water use in a specific country (both consumptive and non-consumptive). The International Energy Agency (IEA) estimated

water withdrawals for energy production in 2010 amounted to 583 billion m³ (representing about 15% of global withdrawals, or about 75% of all industrial water extractions), of which 66 billion m³ were consumed. By 2035, according to the New Policies Scenarios of the IEA, water withdrawals will increase by 20%, while consumption will increase by 85%.

Between 15 and 18 billion m³ of fresh water are polluted by the production of fossil fuels every year, with important consequences for ecosystems and communities that depend on water for drinking or for their livelihood. Globally, climate change presented by the combustion of fossil fuels will have significant long-term impacts on the availability and water quality worldwide.

In recent years, there has been a growing interest in the complex connections between energy and water. There are important links between water and energy, and a long-term, sustainable use of these resources requires comprehensive management actions. The energy sector has a major impact on the availability and quality of water resources in the countries of the region. Meanwhile, all forms of energy production depend on the availability of water resources⁹³. Challenges in this field range from expanding information and research on the impacts on water resources, to accelerating improvements in the efficient use of water and energy efficiency, in order to meet growing demand, reducing or eliminating the need to develop capital-intensive infrastructure and provide environmental benefits⁹⁴.

92. <http://www.worldbank.org/en/news/feature/2014/01/16/infographic-thirsty-energy-energy-and-water-interdependence>

93. California's drought has affected efficiencies in hydropower generation.

94. Regional Process of the Americas (RPA), 2012. Water Agenda of the Americas: Goals, solutions and routes to improve management of water resources. Sixth World Water Forum, Marseille.



6.2 THE FUTURE WE WANT

Energy security is without a doubt a matter of great importance to the region of the Americas. Because of this efforts, will move towards building the future we want as follows:

- The region's countries advance substantially in the development of their hydroelectric potential, in harmony with other energy sources and a corresponding consideration of the affected communities and the environment.
- The introduction of new technologies and management systems allow for a more efficient use of water required for energy production and energy required to provide water services.

6.3 REGIONAL STRATEGIES

- Strategies for obtaining the hydroelectric potential of countries must be based on a dialogue between entrepreneurs, government, users and communities, in order to establish procedures to define public works programs with reasonable deadlines and without compromising the quality of the analysis.
- Running the necessary analyses to define location sites for power plants, by means of a joint effort of the energy, environmental and water resources sectors.

- Updating existing inventories of hydroelectric potential to make them compatible with the environmental and social standards of each country, as well as strengthening long-term indicative planning, including regional participation and identification of potential conflicts.
- To anticipate, along with affected communities, the potential environmental impacts of generation and transmission projects.
- To align energy regulation and water resources for multipurpose projects.
- To consider the benefits of incorporating the generation of electrical and heat energy using products that result from wastewater treatment.
- To anticipate a rational debate over the costs and benefits of unconventional hydrocarbons in the region, the potential effects of hydraulic fracturing (fracking) and of ways to mitigate them.
- To further promote programs to improve the energy efficiency of drinking water and sanitation, as well as of irrigation systems, especially those that rely on groundwater exploitation.

7. ADAPTING TO CHANGE: RISK MANAGEMENT

According to the World Meteorological Organization⁹⁵, between 1970–2012, South America experienced 696 disasters, which resulted in the loss of 54,995 lives and over \$ 71.8 billion in economic damage. Concerning impacts, floods caused the greatest number of victims (80%) and economic loss (63%). The most significant event was a flood and wet mass movement that occurred in Venezuela in late 1999, which caused 30,000 deaths.

In North America, Central America and the Caribbean, the 1970–2012 period recorded 1,631 disasters that caused the loss of 71,246 lives and economic damages of over US \$ 1'008,500 million. The majority of hydrometeorological and climatic disasters reported in this region were attributed to storms (55%) and flooding (30%). Storms were the leading cause of death (72%) and financial loss (79%). The most important events in terms of lives lost were Hurricane Mitch in 1998 (17,932 deaths), which affected both Honduras and Nicaragua, and Hurricane Fifi in 1974 (8,000 deaths), which affected Honduras. In terms of economic damage, Hurricane Katrina, which impacted the U.S. in 2005, was the costliest disaster in history, resulting in losses of US \$ 146.900 million.

7.1 THE CHALLENGES

Water is the primary medium through which societies and natural systems will feel the impacts of climate change. These impacts are manifested through increased spatial and temporal variability in precipitation and runoff, resulting in excess or lack of water, also leading to more intense and frequent extreme weather events. The emerging trend

of a reduction of river flows and aquifer recharge in the region is concerning. Meanwhile, temperature increases are already strongly affecting glaciers and their role as sources of water and runoff regulators in fragile ecosystems⁹⁶.

Climate change economy

Given that its economy depends heavily on natural resources, the region is considered particularly vulnerable to the impacts of climate change⁹⁷. Forecasts indicate that changes in the contribution to the reservoirs will cause a decrease in hydroelectric generation and reduce the availability of water for irrigation, domestic and industrial water supply and other uses of water resources, and affect water quality. Another concern are the effects of climate change over the rise of sea levels, with the consequent introduction of salt wedges in nearshore aquifers.

Vulnerability and risk

Disasters related to extreme natural phenomena have had a deadly and destructive impact on the region⁹⁸. Vulnerability to disasters related to extreme natural phenomena is accentuated by heavy urban concentrations. Special care should be given to floods and droughts, in terms of magnitude, frequency and duration of impacts, as well as to desertification processes; the impacts of droughts may last for years, contrary to floods, which occur in comparatively shorter terms. Floods and landslides occur in various metropolitan and suburban areas, while persistent droughts occur in arid and semiarid areas⁹⁹.

95. WMO. 2014. Atlas of mortality and economic losses from weather, climate and water extremes (1970–2012). WMO-No. 1123.

96. Regional Partnership of the Americas (CRA), 2009. Regional Document of the Americas. Fifth World Water Forum, Istanbul.

97. A noteworthy case is that of Central America, a region with great water wealth, but little capacity for institutional and social resilience to cope with the impacts of climate variability and climate change. This climate variability is manifested, first, in the inability to meet all demands and develop the existing potential and, on the other hand, in the way that pollution, degradation and impacts of these phenomena are magnified in the subregion. Vulnerability and risk conditions have been magnified with the appearance of historically recorded events, with significant variations in the increase or decrease in temperature, rainfall concentrated in time and space, floods, winds and droughts.

98. Regional document for the Americas. Fourth World Water Forum, Mexico.

Early warning systems and timely information are important tools in saving both lives and properties¹⁰⁰. In this regard, the concept of Integrated Risk Management proves essential. It includes the principles of efficiency and equity, integration, mainstreaming, corresponsibility and accountability¹⁰¹.

Institutional Coordination

It is essential to improve institutional coordination to promote a comprehensive treatment against the occurrence of droughts and floods. In Mexico, for example, an Inter-Ministerial Commission was established by presidential decree in order to coordinate the formulation and implementation of the National Program Against Drought (PRONACOSE)¹⁰² and the National Programme against Hydraulic Contingencies (PRONACCH)¹⁰³.

Generation of Knowledge

The development and effective implementation of climate information is an important challenge for the region's water sector. An effective response to this challenge must integrate the needs of users of climate services and the development of capacities of the current and next generation of scientists, professionals, administrators and policy makers.

The development and promotion of networks and communication channels are key elements to facilitate the transfer of knowledge and the active participation of the public. A suitable medium is the promotion of effective organisations involved in human resources, finances and knowledge, both locally and globally.



An improvement in capacities for research, education and local development through the co-production of applications, tools and decision-making processes. The development and implementation of “hardware” (infrastructure) and “software” (political and institutional support) is much needed, as is the creation of an environment where local actors are partners in the conception, co-production and implementation of climate services, contributing significantly at each stage.

99. <http://hidrosuperf.imta.mx/pronacch/Default.aspx>

100. For example, Mexico has implemented a well developed early warning system to deal with various phenomena through authorities and research institutions like the Mexican Institute of Water Technology. However, there is still a need to evaluate and improve.

101. In Mexico, this concept has been incorporated into the General Civil Protection Act 2012 and presents significant challenges for implementation as a public policy of civil protection.

102. <http://www.pronacose.gob.mx/>

103. <http://hidrosuperf.imta.mx/pronacch/Default.aspx>



7.2 THE FUTURE WE WANT

Efforts to address the new challenges associated with hydrologic variability and climate change will enable the region of the Americas to achieve the future we want in the following terms:

- Countries in the region have developed and implemented solid climate services and integrated its products in the decision making of socioeconomic sectors through an effective dialogue between providers and users.
- Countries have developed comprehensive risk management programs for watersheds and aquifers with a greater vulnerability to the occurrence of extreme weather phenomena, including both structural and non-structural actions.

7.3 REGIONAL STRATEGIES

- To stimulate activities of legal and institutional strengthening in the matter of adaptation of water resources to climate change.
- To integrate national emergency systems by means of technologies designed for monitoring climate change and water resources.
- To improving the capacities for assessing vulnerability and risk conditions.
- To develop technical assistance projects and identify investment opportunities for the development and implementation of IWRM practices and integrated risk management adapted to climate change.
- To aid in the design and implementation of actions of local adaptation along with institutional support to make these actions sustainable.

- To accelerate knowledge, experience and activity exchange throughout the region to provide better services to countries, facilitate the participation of all water-related sectors, integrating adaptation to climate change in their respective projects and increasing the number of interinstitutional public-private alliances.

7.4 INICIATIVES

In order to promote international cooperation and promote capacity building, Mexico proposes:

- That interested organisations (WWC, IHP, Iberoamerican Conference of Water Directors, etc.) form an inter-governmental panel to discuss the issue of water as an essential component in the COP during the XXI meeting in Paris this year.
- Creating a Category II Center for Water in Mexico to enable an increase in scientific cooperation at a regional level and improve understanding in water research, with emphasis on water security. This would focus on a risk-based approach, in order to overcome problems of water security along a wide range of socio-economic contexts.

Creation of HidroEx (Brazil). An International Centre for Education, Capacity Building and Applied Research in Water Resources than plans and executes programmes related to water resources management through the training of human resources and developing and applying technologies.

8. MANAGING ECOSYSTEMS FOR HUMANS AND NATURE

Latin America and the Caribbean present vast and diverse freshwater ecosystems, from the coastal estuaries and deltas of Mexico, the Central American lakes, the old meanders of the Amazon and the Pantanal in Brazil. However, there are significant challenges. Erosion and deforestation of the forests of basins have reached an enormous intensity on the eastern slope of the Andes, from Colombia to northern Argentina. Rural development (mostly for rice cultivation) affects wetlands throughout Latin America and the Caribbean. There is growing concern over pollution caused by mining and industry, as well as human settlements. Currently, major water resources in Latin America are chemically and biologically polluted to a considerable extent. This makes it necessary to ensure the continuity of environmental regeneration capacity through projects focused on IWRM.

8.1 THE CHALLENGES

Although the importance of ecosystems is sometimes recognized by managers and planners, very little is known about the relationship between the use of water resources and the ecosystems that supply them. The conservation of water resources for the future does not seem to be a key consideration in the planning and implementation of water usage projects. Due to the economic and financial uncertainties of less developed economies, environmental concerns and priorities often go into the background to prioritize economic gain¹⁰⁴.

Impact on ecosystems

The rules and requirements of global markets can often cause impacts over the region's nature reserves. The increasing demand for urban areas,

agricultural products, wood and wood products can result in the deforestation of natural forests, the introduction of alien species and the consequent impairment of soil, water runoff and biodiversity¹⁰⁵.

The improper use of water and poor land management are altering hydrological regimes and, therefore, availability, quality and timing of water in the basins. Meanwhile, construction of infrastructure to increase flow regulation faces different views, often conflicting, especially in places where there is strong competition for water use, where people's livelihoods are affected by the works and where there are environmental concerns¹⁰⁶.

Impacts of mining and industry

Increasing global demand for metals has led to a growing concern about the water required in the exploitation and processing of minerals. Some projects may affect sensitive sources such as glaciers, and pollute, as a result of production processes. Water needs for exploration and processing of minerals require coordination with other water uses, in particular with irrigation. If proper controls are not applied, there is a risk that industries will not meet the required environmental standards¹⁰⁷.

Environmental flows

Despite the fact that in recent years, the protection of ecosystems and their biodiversity has been assumed as a new form of usage of water, some countries have still authorized uses of water for a total equivalent to the availability of some courses, without considering the conservation of the ecosystems or the ecosystem services related to water. One source

104. García, L., Córdoba, R., Marchesini, K., Prifer, I., Ballester, M., Rodríguez, D. y L. Espinosa, 2003. Día de las Américas, 19 de Marzo del 2003, Resúmenes, Tercer Foro Mundial del Agua, Kyoto, Japón.

105. Consorcio Regional de las Américas (CRA), 2009. Documento regional de las Américas. Quinto Foro Mundial del Agua, Estambul.

106. Proceso Regional de las Américas (PRA), 2012. Agenda del Agua de las Américas: Metas, soluciones y rutas para mejorar la gestión de los recursos hídricos. Sexto Foro Mundial del Agua, Marsella.

107. Consorcio Regional de las Américas (CRA), 2009. Documento regional de las Américas. Quinto Foro Mundial del Agua, Estambul.

of conflict revolves around the ecological flow or water system provided by a river, wetlands or coastal areas, which allows other ecosystems to be maintained.

Based on regulations for environmental flow enacted in 2012, Mexico has launched a National Water Reserve Program¹⁰⁸. Water reservoir areas are specific areas of aquifers, basins, or hydrologic regions where limitations are established on farming, use of a portion or of all of the available water, with the aim of providing a public service, implementing a restoration program, conservation or preservation or when the State decides to exploit such waters for public use.

Ecosystem services

The management of ecosystems in relation to the environmental services associated is the basis of human security and grows in strength every day as an intrinsic element of the Integrated Water Resources Management (IWRM), where nature plays an important role in the storage, mobilization and damping of water flows. Recognizing the value of ecosystems has become a key factor in ensuring sustainable development of water resources.

Natural capital and ecosystem services are an area of investment needed for economic development within the water sector, functioning as a complement to infrastructure investment and not as a substitute. The results of these investments should be considered both in terms of economic returns as in terms of water, energy and food security, social equity, rural development and resilience to climate change¹⁰⁹.

Central America has seen significant advances in knowledge and actions towards the protection of forests and regulation of the hydrological cycle; the main challenges in reducing the vulnerability of these ecosystems and of the environmental services they provide in the face of climate change and climate variability, are expanding programs and regional strategies; promoting the implementation of innovative financial instruments for sustainable management; and implementing integrated water management where ecosystems participate in the allocation of water to benefit the environment.

8.2 THE FUTURE WE WANT

Safeguarding the enormous biodiversity of the Americas and enhancing ecosystem services is part of the future we want for the region, expressed as follows.

- Countries within the region recognize the crucial role ecosystems play in ensuring water security and the provision of essential environmental services to sustain life.
- The policies for allocation of water resources have incorporated mechanisms to ensure the necessary reserves that guarantee the ecological flow required for conservation of vital ecosystems and the provision of environmental services.

8.3 REGIONAL STRATEGIES

- To recognize the depreciation of natural resources within policies, programs and development projects, implementing a system of “green national accounts” and modifying deci-

108. <http://www.reservasdeagua.com/>

109. Proceso Regional de las Américas (PRA), 2012. Agenda del Agua de las Américas: Metas, soluciones y rutas para mejorar la gestión de los recursos hídricos. Sexto Foro Mundial del Agua, Marsella.

sion-making processes to consider environmental externalities.

- Considering “green infrastructure” as a component of infrastructure investment projects in the field of water resources.

- To establish legal protection and financial resources for ecosystem restoration as a national priority, carrying out studies that quantify the benefits of ecosystems in terms of their ability to generate services to various economic

sectors water users, as well as expanding the scope of the Water Funds, replicating them and disseminating the lessons learned .

- To consider ecosystem management as a fundamental pillar of IWRM, harmonizing and generating synergies with water user sectors in each of their respective agendas.

- To raise public awareness regarding the protection of ecosystems and the “water-biodiversity” relationship.

9. LESSONS LEARNED WITHIN THE REGION

- The geographic, political, technological, economic, social and cultural diversity of the Americas gives way to a rich mosaic of experiences of various kinds, which have been outlined in documents¹¹⁰ for the regional process, documented by the various subregions: Intergovernmental Panel on Water. As part of the 69th General Assembly of the United Nations (UN) convened by the Secretary General of the United Nations, President Enrique Peña Nieto called for the creation of an Intergovernmental Panel on Water as space to develop new measures to readapt and be better prepared of the impacts of increasingly intense weather events. This initiative coincides with the developed preparation work to Post-Agenda 2015 around the Sustainable Development Goals (SDGs) where also, for the first time, consider setting a goal solely to the issue of water.

- National Water Reserves Programme Established and administered by the National Water Commission of Mexico. As a climate change adaptation measure, a water reserves system is of great importance as it can ensure the functionality of the hydrological cycle as a water source and sustenance of ecological processes. Establishing this system will provide better resilience conditions in basin regions and the country at large and represents a significant measure of global climate change adaptation, both for humans and ecosystems.

- National Programme Against Drought (PRONACOSE). Implemented by the National Water Commission as an interinstitutional and participatory mechanism through which each of the 26 Basin Councils in the country will develop and implement their own Programme for Prevention and Mitigation of Drought Effects (PMPMS).

- Creation of a golden triangle for water and growth. Collaborative (public-private-civil society) effort for the conservation of water in the Rio Grande/Bravo.

- Establishment of partnerships through science, trust and common objectives. Establishment of Water Funds to examine how and why local aquifers have been overexploited in Mexico.

- Solving water problems with local and global public-private partnerships: the Jordanian experience.

- Honduras. Set up and strengthening of the Binational Management Group of the Goascorán River Basin.

- Nicaragua. Community Management of Water and Sanitation from the approach of Gender and the Human Right to Water.

- Costa Rica. Parismina River Basin Project.

- Guatemala. Sustainable and equitable promotion of the right to water, sanitation, food security and community and municipal organizational strengthening in the department of San Marcos (TANMA Program).

- El Salvador. "Micro-watershed management" project and its contribution in reducing the effects of heatwaves.

- Panama. Restoration and Integrated Management of the Zaratí River subbasin.

South America (nine countries)

- Departmental action plans for drinking water and sanitation in Colombia.

110. The subregional documents are available at the water platform of the Americas website.

- Water Funds Ecuador.
- Establishment of community water and sanitation organizations with corporate governance, social responsibility and project sustainability: EPSA Machaco, Bolivia.
- Successful programs in Uruguay: towards universal services.
- Subsidy scheme in Chile.
- EPM Social Responsibility: providing access to clean water in peri-urban areas of Medellin, Colombia.
- Improving associativity: Water Board Itauguá, Paraguay
- Project for the environmental protection and sustainable development of the Guarani Aquifer System (SAG).
- Water Funds: green infrastructure.
- Social and environmental responsibility of an electrical company in Colombia.
- Andean Páramo Project: an example of the application of the ecosystem approach at a regional landscape level.
- Cultivating Good Water Program (Itaipu).
- Water management in the province of Mendoza, Argentina.
- Brazil Water Program.
- Sustainability of hydropower projects.
- Assessment of Impacts and Vulnerability of Climate Change in the state of Sao Paulo. Options and adaptation strategies.
- Conception of institutional and operational order for an integrated disaster management in the state of Rio de Janeiro.
- Hydrological monitoring.
- Semi-arid Communities Program.
- Framework Programme for the Sustainable Management of Water Resources in Cuenca del Plata.
- One Million Cisterns Program (PIMC)

10. CONCLUSIONS AND LESSONS LEARNED

The situation of water resources in the Americas reached significant advance from the statements raised in the 4th World Water Forum in Mexico 2006, and in the three years following the 6th World Water Forum in Marseille, France, 2012. On the latter occasion eleven targets were established to meet between 2012 and 2020; these targets were associated with six thematic areas that are closely linked to the six thematic areas covered by the regional process towards the 7th World Water Forum to be held in Korea.

Progress has been made in the development of policies, including the definition of a set of rules for an efficient and equitable distribution of water. However, the task of acquiring the financial resources needed to manage water resources is still complex. Huge strides have been taken within international commercial treaties between the North and South of the region, and yet public interest on these treaties is not yet fully understood.

Efforts towards the development of capacities have continued, but there is still much to do to accomplish an effective decentralization, appropriate governance of water, and an efficient management and regulation of water services. Breakthroughs regarding local involvement in risk management have occurred, but the region continues to be devastated by natural disasters. Some countries in Latin America and the Caribbean made an important and yet unsuccessful effort to negotiate the elimination of agricultural subsidies in first world countries.

Water-related problems do not vary significantly throughout the region, although priorities differ, particularly between the countries in North America and those of Latin America and the Caribbean. For the latter, growth and development objectives still dominate the agenda, mainly in the aspects related to economic growth, fight against hunger and poverty.

While great developments have been made on the understanding of water and its relationship to the economy, society and environment, not

all countries in LAC have defined the role of water in the achievement of their own goals. The intuitive relationship between management of water and socioeconomic development is frequently confused due to a lack of appropriate indicators. The absence of these complicates the identification of a cause and effect connection, which would enable an isolation of the role water plays in growth and development, and of other economic, social and environmental effects.

Though emphasis has changed from an increased supply to a management of demand, there is still a debate on how to obtain a more equitable and sustainable balance between these approaches.

Where governments had traditionally established priorities concerning water, this has changed, as a consequence of the use of market-based approaches. Introduced in order to increase the advantages of the limited available resources for growth and combat of poverty, said objectives have not been clearly stated and society is frequently interested in other goals.

The competition between the demands of different sectors of society and the economy continues to stimulate the debate over what are the most appropriate mechanisms for the management of water.

While the region has accepted the premise of sustainable development, it continues to debate the priority it should give to economic, social and environmental goals in a national context. Proposals for maximising economic growth subject to social and environmental restrictions have clashed with proposals for maximising equity or environment subject to restrictions imposed by the other two angles of the triangle of sustainability. Struggles that were once irreconcilable between those who considered water an economic asset and those who considered it a human right have given rise to a number of proposals, showing that both points of view may be both beneficial and compatible. The unresolved challenge consists

in developing the appropriate mechanisms to maximise the contribution of water to the social and environmental objectives pursued at a national and regional level.

In the above context and based on the presented, some conclusions can be made regarding the complexity associated with an integrated management of water resources as well as the interrelation between water, food and energy safety.

Water safety

Water safety is one of the key issues to be dealt with in order to ensure water supply, in quantity and quality, for each use. To tackle it countries will have to act both on supply as on demand of water resources, contemplating climate change. Regarding supply, it is vital to ensure the protection of ecosystems and the experience of the Water Funds and other initiatives is encouraging in this respect. Protection of water sources is also very important, the control of pollution from domestic and urban activities (untreated effluents and bad disposal of solid residues), as well as productive activities (inadequate industrial processes, misuse of fertilizers and pesticides in agriculture, etc). To this end use of different technologies must be employed.

In terms of infrastructure, both dams and reservoirs constitute an important option for storage of water for multiple purposes, though they must be conscious of the environmental and social impact they cause and must be handled with measures of compensation and mitigation.

Regarding demand, the key is to attain an increased efficiency in all activities. As the largest consumptive use, special attention should be paid to irrigated agriculture, which usually has a low efficiency in the conduct and implementation of water. Studies involving how plants use water, maintenance of infrastructure and introduction of new irrigation technologies,

among other measures, can help improve the efficiency. Similarly, improved water and energy must be sought in the delivery of water and sanitation services, considering the link between them.

Governance

In relation to water resources, governance includes cultural, legal and institutional elements, besides those that determine its contribution to the economy and its ability to generate financial resources for water management. Latin American culture is marked by Spanish colonialism, which provides some common features, such as language and many traditions, thus facilitating dialogue and mutual understanding, essential in sharing management experiences.

Although the different concepts of economic and social policy have influenced some of the aspects of water management, particularly in relation to water rights and the provision of related services, this has not been an obstacle for developing countries seeking management methods that enable them to address the complexity that characterizes water management, which involves a diversity of actors and sectors with particular characteristics, but also with common goals.

The institutional framework for water management in the region is continually evolving and there is no model that could be described as regional. The region is extremely heterogeneous and each country has maintained either a traditional institutional framework since the 1940-1980 decades, or new models based on international experience but tailored to national characteristics. The challenge faced by the region is to determine the value of the investment in new approaches related to changes in national, regional and global contexts or in preserving historic institutional frameworks and, in that case, to specify the conditions necessary to ensure their adequacy for the implementation of new legislations.



Decentralization has had different types of success. The level of delegation of functions varies from country to country in the region and depends on a Central or Federal structure. Most countries consider water as a strategic resource and therefore, central governments retain responsibility for their management and conservation. What has been widely delegated to local governments or municipalities is the responsibility of providing basic services, such as water supply and sanitation. Some countries have delegated these responsibilities since the 1940s, while others have done it more recently.

Some local governments have carried out this responsibility very successfully, but not others. The general rule is to recognize the need to ensure that such measures are supported by the development of local administrative and financial capacity, with some functions, such as technical assistance or in some cases, regulation, preserved by the central government.

The consolidation of governance structures to ensure effective mechanisms for participation and granting of powers to civil society is another key factor; in this respect the progress that has been made in LAC is significant, even in countries where water management has been traditionally hierarchic. However, participation in decision-making remains a challenge, particularly as it relates to traditionally excluded groups such as women and indigenous populations. Although there are exceptions, these efforts have been more successful in decentralizing the “voice” than the “vote” on issues associated with the management of water resources.

The region has shown a marked interest in modernizing the existing legal frameworks, especially in Latin America, where most countries are involved in processes to develop, modify or modernize existing water legislation. All these actions have shown different results. Derived from this, different questions have arisen about the current situation, the composition of good

laws, the aim of the legal reforms, how they should be implemented and the conditions necessary for their successful implementation. One of the biggest challenges is to achieve legal frameworks and institutional arrangements of water that provide certainty to the social partners and facilitate funding for the water sector. The criteria needed to establish these arrangements must be designed to develop an institutional structure, and a regulatory and operational framework that builds trust in institutions (law, organizations, authorities) and allows consensual and transparent decision-making.

Financing

It should be noted that it takes a strong commitment to allocate the funding needed to close the gaps and meet the growing needs in infrastructure, in order to provide water for various uses, maintain existing infrastructure, collect and treat wastewater, and modernize irrigation systems, among other investments. Alongside, there is the challenge of designing and implementing real rates, simultaneously with the introduction of effective subsidy systems for those in need.

Human right to water

Several countries in the region have led the recognition and institutionalization of the human right to water and sanitation as a key element in order to achieve universalization. The challenge ahead is to achieve the necessary agreements that will allow governments to put the concept to practice.

Although the region has recorded significant progress in the development of plans, policies, programs and strategies to enforce the law, there is still a long way ahead. All countries need to move forward in addressing the elements of the concept of human right to water, such as quality, affordability, accountability, citizen participation, acceptability, as well as environmental and financial sustainability of the systems.

Water and sanitation for all

Despite a greater commitment in recent years to address the persistence of poverty, many countries continue to register high levels in both rural and urban areas. The increasing high levels of urbanization have not translated into improved living conditions for most inhabitants who have migrated to the fringes of cities, which often have extremely precarious living, health, and environmental conditions. Water resource issues, both in terms of water and sanitation, and urban flooding, are the first issues to resolve, even though the solution to these problems transcends, given their complexity, the field of water provision.

Resolving these problems will undoubtedly contribute to improving the quality of life of those who are currently in need. Water resource security is particularly related, to the population's satisfaction with access to water and sanitation services. Despite high investment, there are still many needs. Aggregated data conceal high levels of intra-regional and urban vs. rural differences, and between richest vs. poorest areas within a same country; additionally, there is a high variation in quality, sustainability, and efficiency in services. The most serious access problems to resolve are those faced by small and medium-sized urban, concentrated and dispersed rural, and marginalized populations. The central problem for populations from medium and small cities with low quality potable water and sanitation, is the lack of provider's economic capacity to deliver efficient services, which are not financially sustainable.

In rural areas, services are managed by community boards, with low sustainability and limited support from national authorities. Both situations require special attention to find solutions. The financial sustainability of service providers continues to be a challenge and substantial subsidies are common, although not always addressed by national budgets.

Additionally, significant challenges and doubts persist regarding the institution's capacity to cover the cost for universal services and its limitations. It is important to consider the need for better regulatory practices, through permanent technical monitoring by the state, in order to improve quality of life and access to basic services for those with lowest income. An autonomous regulatory body can reduce political interference in sector decisions.

Water and food

Irrigation has played an important role in improving social and economic conditions of the region through important investments in infrastructure. However, there has been insufficient effort to assure efficient water consumption. The topics currently under debate in the region are the efficiency of small and large-scale schemes, and those factors which affect project size and impact on poverty reduction and food security. Other topics, with a view to improve production and sustainability, include considering the limits of efficiency, productivity, and technical advancement which can satisfy the growing demand for food, as well as the conditions for temporal agricultural production. In addition to the above, evaluation of the impact of trade liberalization and new global trends are summarized in what has been considered as food crisis.

Water use for agriculture needs to be prioritized at all levels of the processes, from plant water absorption to international trade. There are technologies and techniques to improve productivity for all resources for producers, soil, supplies, and water. Crop intensification and live-stock expansion, as a result of increased global demand for food and biofuels is affecting water resources and changes in land use, with a direct impact on the hydrology of many watersheds and soils. The increased use of fertilizers and pesticides in some countries has led to contamination problems which has led to the need for special evaluation of environmental impact.



Water and energy

Country economy growth has increased the challenge of expanding energy demands. Energy security means having enough power to sustain economic growth and reduce poverty.

Hydroelectricity provides the opportunity to use natural resources of a region, which is one of the main goals established by several countries in the region. Hydroelectric projects which were originally not considered viable are being re-evaluated since they are the cleanest cost-effective renewable energy. Although large dams traditionally associated with hydroelectric projects have been important for economic growth in the region, they have also been recognized for their environmental and social costs. However, given that current estimates suggest that energy needs will double or triple by 2050, and there is no certainty regarding trends in oil prices, ensuring sufficient supply of water and energy is crucial to economic growth and poverty reduction.

Hydroelectric power does not usually coincide temporally and spatially with other purposes, such as flooding control, irrigation, and ecological stability, which must be considered for reservoir management.

There is a strong tendency in countries to develop complementary resources, particularly biofuels and wind power, not only to ensure supply, but also to reduce the use of non-renewable resources. Although they are important and complementary, these sources are still not considered viable substitutes for hydroelectric power and fossil fuel. Since there is significant potential for some countries to develop unconventional hydrocarbons, potential conflicts related to quantity and potential contamination of water should be anticipated.

Water and the environment

The American region is working to strengthen its social and environmental resilience as an important step to adapt to climate change. The role of “green infrastructure” is being high-

lighted and analyzed for all development projects. Natural resources and ecosystem services are areas in need of investment for the economic development of the water sector, since they complement but do not substitute infrastructure investment. The results of these investments should be considered in terms of economic returns such as water, energy, and food security, social equity, rural development, and resilience to climate change.

Adaptation to climate change

Natural disasters in countries of the American continent cause loss of life and have significant impacts on the regional economies. The region boasts some of the most advanced weather forecasting centers in the world and allocates large amounts of resources to protect populations and mitigate natural disasters as well as to establish and maintain costly disaster prevention systems and organizational capacity development. Despite the aforementioned, the development and effective implementation of climate information is an additional major challenge. An effective response must integrate the needs of users of climate services and capacity building of scientists, professionals, administrators, and policy makers.

Variability and climate change can affect both supply and demand. For example, on the supply side, the reduction in reservoirs will cause a decrease in hydroelectric production and the availability of water for irrigation, domestic, and industrial water supply, as well as for other uses of water resources, and affect the quality of water. On the demand side, higher temperatures promote increased water requirements for crops and domestic consumption of water and energy. The prevention and protection measures implemented in the region include structural and non-traditional structural actions, as well as risk transfer mechanisms through insurance and creation of emergency funds. Learning from natural disasters, both catastrophic and minor, will be necessary to implement at regional, national and local levels, actions to reduce vulnerability to natural hazards, for

implementing mitigation measures and responses in cases of emergencies.

Understanding risks can generate options to reduce potential impacts of natural disasters. Risk indicators, and in a wider context, information on risk that can be interpreted by people who are not experts on the subject, are inputs necessary for decision makers to efficiently manage the risks associated with natural disasters.

The variety of risks, combined with the different capacities for management among the countries of the Americas, make it necessary for risk indicators and responses to these events be developed considering the characteristics of each country. However, many risks are shared by several countries, which fosters collaboration and exchange of experiences.

The region has had a leading role in the efforts on climate change adaptation, especially in measures concerning water resources. Being aware of the increasing need to plan adaptation measures, the organisations engaged in water management in different countries of the region agreed to set up a consultation mechanism at the highest level to share experiences and develop collaborative schemes to jointly face this challenge.

Mexico is particularly vulnerable to global warming, which causes significant changes to its hydrological cycle as it is subject to recurrent droughts in some regions, or heavy seasonal rainfall caused by hurricanes and tropical storms in others.

Under this premise, the Government of Mexico, through President Enrique Peña Nieto, presented in the 69th UN General Assembly convened by the UN Secretary General, Mr. Ban Ki-Moon, in New York, the initiative to create the Inter-governmental Panel on Water as “a space to develop new adaptation works that enable our

countries to be better prepared for the impacts of increasingly intense weather events”.

This initiative coincides with the work carried out on the draw-up of the Post-2015 Agenda on the Sustainable Development Goals (SDGs), which also, for the first time, considers establishing an objective dedicated to water.

Final thoughts

The countries of the Americas have made progress in different measures towards the objectives set out. The correct achievement of these objectives is the shared vision that the countries of the Americas have contemplated for their economic development, social equity and environmental protection towards the future, taking a correct water management as a starting point.

The regional process of the Americas seeks to strengthen the effort to translate this shared vision and create the necessary synergies to contribute to the common learning how to use the lessons learned and overcome existing challenges.

In the coming decades, our ability to build a future with safe water depends on our ability to turn challenges into opportunities. By ensuring water supply, security in many other areas will also be ensured¹¹¹.

The Seventh World Water Forum is an opportunity to analyze the priorities and aspirations of countries that make up the region of the Americas and to present, from their own perspectives, the development paradigm that will govern the New Development Agenda Post 2015, with a focus on sustainable development, equality and structural change, and that will support the discussions within the region and the global community concerning the steps needed to achieve a new paradigm shift.

111. Benedito Braga, President, World Water Council.

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Table 1. General Indicators

COUNTRY	Human Development Index	Surface Thousand Km²	Population 2013			Population Growth		Population Density 2010	GDP 2012 Millions of USD\$	GDP Per Capita 2012 USD\$/persona	GDP Growth 2012	GDP Growth 2013	
			Thousands of people		% Urban	%	%						
			Urban	Rural									Total
			Total										
Bermuda	0.911	0.1	65	0	65	100.0%	--	1,300.0	5,474	83,622	-4.9	--	
Canada		9,984.7	29,006	6,519	35,525	81.6%	2.57%	4.0	1,826,769	51,422	1.7	2.0	
Greenland	--	410.5	49 v		57	86.0%	--	0.0	1,268	22,182	--	--	
Mexico	0.775	1,964.4	97,766	26,034	123,799	79.0%	1.25%	60.2	1,181,633	9,545	4.0	1.1	
United States	0.937	9,831.5	262,734	59,849	322,583	81.4%	0.87%	35.0	16,768,200	51,981	2.3	2.2	
NORTH AMERICA	--	22,191.2	389,620	92,401	482,030	80.8%	1.04%	21.4	19,783,344	41,042	--	--	
Belize	0.702	23.0	150	190	340	44.1%	3.07%	13.4	1,573	4,629	3.8	1.5	
Costa Rica	0.773	51.1	3,749	1,189	4,938	75.9%	1.74%	91.4	45,107	9,135	5.1	3.5	
El Salvador	0.680	21.0	4,230	2,154	6,384	66.3%	0.37%	295.5	23,864	3,738	1.9	1.7	
Guatemala	0.581	108.9	8,107	7,753	15,860	51.1%	2.47%	131.7	50,236	3,168	3.0	3.7	
Honduras	0.632	112.5	4,472	3,789	8,261	54.1%	2.04%	68.0	18,564	2,247	3.9	2.6	
Nicaragua	0.599	130.4	3,607	2,563	6,169	58.5%	1.37%	44.8	10,508	1,703	5.0	4.6	
Panama	0.780	75.4	2,603	1,323	3,926	66.3%	1.75%	48.7	35,938	9,154	10.2	8.4	
CENTRAL AMERICA	--	522.3	26,916	18,961	45,877	58.7%	1.78%	86.3	185,790	4,050	--	--	
Antigua and Barbuda	0.760	0.4	22	69	91	24.2%	--	197.4	1,194	13,135	4.0	-0.1	
Aruba	--	0.2	43	60	103	41.8%	--	564.4	2,584	24,983	--	--	
Bahamas	0.794	13.9	317	66	383	82.8%	2.19%	26.0	8,149	21,301	--	--	
Barbados	0.825	0.4	90	196	286	31.6%	--	652.1	4,225	14,769	0.0	--	
Cayman Islands	--	0.3	59	0	59	100.0%	--	210.3	1,012	17,087	--	--	
Cuba	0.780	109.9	8,666	2,593	11,259	77.0%	0.14%	101.8	71,017	6,308	--	--	
Curacao	--	0.4	145	17	162	89.4%	5.19%	332.3	--	--	--	--	
Dominica	0.745	0.8	50	22	72	69.3%	0.00%	94.8	496	6,856	-1.4	-0.9	
Dominican Republic	0.702	48.7	8,219	2,310	10,529	78.1%	1.36%	206.5	58,898	5,594	2.7	4.6	
Grenada	0.770	0.3	38	68	106	35.6%	--	304.3	802	7,540	-1.2	2.4	
Haiti	0.456	27.8	6,009	4,453	10,461	57.4%	--	356.6	7,843	750	2.9	4.3	

Jamaica	0.730	111.0	1,527	1,272	2,799	54.6%	0.29%	249.4	14,795	5,286	0.7	1.3
Puerto Rico	--	8.9	3,449	234	3,684	93.6%	-0.42%	418.0	103,135	27,998	-2.8	-0.6
Sint Maarten	--	0.0	46	0	46	100.0%	--	1,250.6	--	--	--	--
Saint Kitts and Nevis	0.745	0.3	18	37	55	32.0%	100.00%	200.6	732	13,359	-1.2	4.2
Saint Lucia	0.725	0.6	34	150	184	18.5%	0.00%	329.1	1,318	7,181	-1.6	-0.4
Sint Maarten	--	0.1	46	0	46	100.0%	--	575.0	--	--	--	--
Saint Vincent and the Grenadines	0.733	0.4	55	54	109	50.2%	--	280.0	--	--	1.2	1.7
Trinidad and Tobago	0.733	5.1	115	1,229	1,344	8.5%	--	258.9	23,225	17,277	1.5	1.6
Turks and Caicos Islands	--	1.0	31	3	34	91.8%	--	72.1	--	--	--	--
Virgin Islands (EE, UU.) (U.S.)	--	0.4	102	5	107	95.2%	--	306.6	1,996	18,691	--	--
CARIBBEAN	--	230.9	29,080	12,839	41,919	69.4%	0.54%	179.7	301,420	7,191	--	--
Argentina	0.811	2,780.4	38,293	3,510	41,803	91.6%	0.88%	14.5	477,028	11,411	0.9	2.9
Bolivia	0.675	1,098.6	7,388	3,460	10,848	68.1%	1.76%	9.2	27,035	2,492	5.2	6.8
Brazil	0.730	8,515.8	172,604	29,429	202,034	85.4%	1.06%	22.9	2,249,091	11,132	1.0	2.5
Chile	0.819	756.1	15,881	1,892	17,773	89.4%	0.97%	22.7	2,68,314	15,097	5.4	4.1
Colombia	0.719	1,141.7	37,265	11,665	48,930	76.2%	1.46%	40.8	370,509	7,572	4.0	4.7
Ecuador	0.724	256.4	10,152	5,831	15,983	63.5%	1.74%	52.9	87,495	5,474	5.2	4.6
Guyana	0.636	215.0	229	575	804	28.5%	1.02%	3.7	2,851	3,548	4.8	5.2
Paraguay	0.669	406.8	4,110	2,807	6,918	59.4%	1.76%	15.9	24,595	3,555	-1.2	14.2
Peru	0.741	1,285.2	24,088	6,681	30,769	78.3%	1.20%	22.8	203,977	6,629	6.0	5.8
Surinam	0.684	163.8	359	184	544	66.1%	0.00%	3.2	4,908	9,024	3.0	2.9
Uruguay	0.792	176.2	3,253	166	3,419	95.2%	0.23%	19.3	49,919	14,602	3.7	4.4
Venezuela, RB	0.748	912.1	27,439	3,412	30,851	88.9%	1.68%	31.8	381,286	12,359	5.6	1.3
SOUTH AMERICA	--	17,708.1	341,062	69,612	410,674	83.0%	1.18%	22.1	4,147,008	10,098	--	--
LATIN AMERICA AND THE CARIBBEAN	--	20,425.7	494,823	127,446	622,269	79.5%	1.20%	29.0	5,815,852	9,346	--	--
THE AMERICAS	--	40,652.5	786,678	193,813	980,499	80.2%	1.12%	23.8	24,417,553	24,903	--	--
WORLD	--	134,324.7	3,880,128	3,363,656	7,243,784	53.6%	1.18%	50.8	75,592,941	10,436	--	--
AMERICAS AS % OF THE WORLD	--	30.26%	20.27%	5.76%	13.54%		--	--	32.30%		--	--

Source: (a) World Bank: World Development Indicators; (b) UN Population Division: World Urbanization Prospects: The 2014 Revision

Table 2. Indicators on water resources

COUNTRY	AVERAGE ANNUAL PRECIPITATION		TOTAL RENEWABLE WATER RESOURCES		RATE DEPENDENCY ^{1/} %%	WATER STRESS
	mm/year	Km ³ /year	km ³	M ³ /Year/Person		
Bermuda	--	--	--	--	--	--
Canada	537	5,362	2,902	83,300	1.792	1.31
Greenland	--	--	--	--	--	--
Mexico	7581	,489	462	3,822	11.53	17.11
United States	715	7,030	3,069	9,666	8.179	15.62
NORTH AMERICA	644	13,881	6,433	13,349	--	9.39
Belice1	,705	39	22	67,068	29.79	0.67
Costa Rica	2,926	150	113	23,517	02	.38
El Salvador	1,784	38	26	4,172	40.5	5.05
Guatemala1	,996	217	128	8,480	14.63	1.80
Honduras	1,976	222	92	11,613	1.632	0.90
Nicaragua2	,280	297	165	27,4535	.0510	.66
Panama	2,928	221	139	36,639	1.941	0.56
CENTRAL AMERICA	2,270	1,184	685	14,928	--	1.28
Antigua and Barbuda	1,030	00	--	584	0-	-
Aruba	--	--	--	--	--	--
Bahamas1	,292	18	05	40	--	--
Barbados	1,422	10	--	283	0-	-
Cayman Islands	--	--	--	--	--	--
Cuba	1,335	147	38	3,382	0	21.53
Curazao	--	--	--	--	--	--
Dominica	2,083	2-	--	--	--	-
Dominican Republic	1,410	69	21	2,043	0	16.12
Grenada2	,3501	40	--	--	--	--
Haiti	1,440	39	14	1,379	7.237	7.04
Jamaica	2,0512	87	--	3,396	04	.35
Puerto Rico2	,0541	--	--	1,922	0-	-
Sint Maarten-	--	00	--	444	--	-
Saint Kitts and Nevis1	,427	1-	--	--	0-	-
Saint Lucia	2,301	--	--	--	--	-

Saint Martin	--	--	--	--	--	--	--	--	--
Saint Vincent and the Grenadines	1,583	1-	--	--	--	--	--	--	--
Trinidad and Tabago	2,200	11	42	,872	08				.03
Turks and Caicos Islands	--	--	--	--	--	--	--	--	--
Virgin Islands (EE. UU.)-	--	--	--	--	--	--	--	--	--
CARIBBEAN	1,431	3319	42	,287					15.45
Argentina	591	1,643	876	21,325	66.67				3.57
Bolivia 1	,146	1,259	574	54,688	47.13				0.22
Brazil 1	,761	14,995	8,647	43,528	34.53				0.72
Chile	1,522	1,151	923	52,854	4.123				1.36
Colombia	3,240	3,699	2,360	49,472	3.814				0.50
Ecuador	2,274	583	457	29,525	3.279				3.93
Guyana2	,387	513	271	340,881	11.07				0.68
Paraguay	1,130	460	388	57,993	69.83				0.15
Peru	1,738	2,234	1,894	63,159	13.39				1.05
Suriname2	,331	382	99	185,047	00				.55
Uruguay 1	,300	229	172	50,722	46.46				2.26
Venezuela2	,044	1,864	1,325	44,233	39.25				0.68
SOUTHAMERICA	1,636	29,012	17,987	43,798	--				0.96
LATIN AMERICA AND THE CARIBBEAN	1,556	32,016	19,227	30,898	--				1.74
THE AMERICAS	1,110	44,408	25,198	25,699	--				3.25
WORLD	806	107,924	43,7646	,042	--				8.69
AMERICAS AS % OF THE WORLD-	-	41.1%	57.6%	--	--				--

i/ External availability percentage of water

Source: (a) World Bank: World Development Indicators; (b) FAO. Aquastat; (c) UNEP. GEO América Latina y el Caribe: perspectivas del medio ambiente 2003

Table 3. Uses of Water

COUNTRY	TOTAL WATER WITHDRAWALS			WATER USE SECTORIAL (% OF TOTAL WITHDRAWALS)			ARABLE LAND (2011)	AREA UNDER IRRIGATION	% OF IRRIGATION
	Km ³	% of Availability	m3/person/year	Agriculture	Industry	Municipal	Thousand of in.	Thousand of in.	%
Bermuda	--	--	--	--	--	--	--	--	--
Canada	42.2	1.45%	1,188	12	69	20	42,968	869.9	2%
Greenland	--	--	--	--	--	--	--	--	--
Mexico	80.3	17.38%	649	77	5	17	25,491	6,460.0	25%
United States	478.4	15.59%	1,483	41	46	13	160,162	26,644.0	17%
NORTH AMERICA	600.9	9.34%	1,247	44	42	14	228,621	33,973.9	15%
Belize	0.1	0.46%	297	0	89	11	75	3.5	5%
Costa Rica	2.4	2.08%	476	53	17	29	250	101.5	41%
El Salvador	2.1	8.06%	332	59	16	25	665	45.2	7%
Guatemala	3.3	2.60%	210	80	13	6	1,500	337.5	23%
Honduras	1.6	1.74%	195	81	11	8	1,020	89.7	9%
Nicaragua	1.5	0.94%	250	83	3	14	1,900	199.1	10%
Panama	1.0	0.74%	264	28	5	66	540	32.1	6%
CENTRAL AMERICA	12.1	1.76%	263	64	14	22	5,950	808.7	14%
Antigua and Barbuda	0.0	--	92	--	--	--	4	--	--
Aruba	--	--	--	--	--	--	--	--	--
Bahamas	--	--	--	--	--	--	9	--	--
Barbados	0.1	126.25%	353	--	--	--	12	--	--
Cayman Islands	--	--	--	--	--	--	--	--	--
Cuba	4.4	0.33%	393	69	12	29	3,550	--	--
Curazao	--	--	--	--	--	--	--	--	--
Dominica	0.0	0.00%	229	--	--	--	6	--	--
Dominican Republic	5.5	0.39%	520	66	2	32	800	306.5	38%
Grenada	0.0	0.00%	94	--	--	--	3	--	--
Haiti	1.2	0.08%	115	94	1	5	1,000	97.0	10%
Jamaica	0.9	0.05%	332	49	17	34	120	--	--
Puerto Rico	1.0	0.05%	270	--	--	--	60	22.0	37%
Sint Maarten	--	--	--	--	--	--	--	--	--
Saint Kitts and Nevis	--	--	--	--	--	--	5	--	--
Saint Lucia	0.0	--	90	--	--	--	3	3.0	100%

Saint Martin	--	--	--	--	--	--	--	--	--	--	--	--
Saint Vincent and the Grenadines	0.0	--	91	--	--	--	--	--	5	--	--	--
Trinidad and Tabago	0.2	0.01%	172	6	27	67	25	--	--	--	--	--
Turks and Caicos Islands	--	--	--	--	--	--	--	--	--	--	--	--
Virgin Islands (EE. UU.)	--	--	--	--	--	--	--	--	--	--	--	--
CARIBBEAN	13.4	0.94%	320	64	9	27	5,602	428.5	8%			
Argentina	37.8	6.39%	904	74	9	16	38,048	2,357.0	6%			
Bolivia	2.1	0.18%	192	83	3	13	3,836	297.2	8%			
Brasil	74.8	4.25%	370	62	18	20	71,930	5,400.0	8%			
Chile	35.4	2.33%	1,993	64	25	11	1,317	1,109.0	84%			
Colombia	11.8	0.36%	241	45	3	50	2,098	1,087.0	52%			
Ecuador	9.9	0.44%	621	82	5	12	1,156	1,500.0	130%			
Guyana	1.4	0.06%	1,798	97	1	2	420	143.0	34%			
Paraguay	2.4	0.21%	349	72	9	19	3,900	136.2	3%			
Peru	13.7	0.79%	444	82	10	8	4,310	1,195.0	28%			
Suriname	0.6	0.03%	1,132	93	3	4	59	57.0	97%			
Uruguay	3.7	0.28%	1,071	97	1	2	1,807	238.0	13%			
Venezuela	22.6	1.11%	734	48	7	45	2,600	1,055.0	41%			
SOUTH AMERICA	216.2	13.22%	527	68	13	19	131,481	14,574.4	11%			
LATIN AMERICA AND THE CARIBBEAN	322.0	20.70%	518	50	35	15	168,524	22,271.7	13%			
THE AMERICAS	842.6	75.91%	859	--	--	--	371,654	49,785.6	13%			
WORLD	3,902.0	8.92%	539	--	--	--	277,800.0	18%				
AMERICAS AS % OF THE WORLD	22%				25	11						

SourceWorld Bank: World Development Indicators; (b) FAO. Aquastat; (c) UN Water: The United Nations World Water Development Report, 2014

Table 4 Access to safe water and improved sanitation

[illegible]

Dominica	2012	95.7	--	--	--	--	--	--
Dominican Republic	2012	82.5	77.2	80.9	85.5	73.8	82.0	--
Grenada	2012	99.0	95.3	96.8	97.5	98.3	98.0	--
Haiti	2012	74.6	47.5	62.4	31.0	16.3	24.4	--
Jamaica	2012	97.1	88.8	93.1	78.4	82.2	80.2	--
Puerto Rico	2012	--	--	--	99.3	99.3	99.3	--
Sint Maarten	--	--	--	--	--	--	--	--
San Kitts and Nevis	2012	98.3	98.3	98.3	--	--	--	--
Saint Lucia	2012	98.6	92.8	93.8	--	--	--	--
Saint Martin	--	--	--	--	--	--	--	--
Saint Kitts and Nevis	2012	95.1	95.1	95.1	--	--	--	--
Trinidad and Tobago	2012	97.4	--	--	92.1	92.1	92.1	--
Turks and Caicos Islands	2000	87.1	87.0	87.1	81.4	81.4	81.4	--
Virgin Islands (EE. UU.)	2012	100.0	100.0	100.0	96.4	96.4	96.4	--
CARIBBEAN	--	--	--	--	--	--	--	--
Argentina	2012	99.0	95.3	98.7	97.1	99.4	97.2	--
Bolivia (Plurinational State of)	2012	96.0	71.9	88.1	57.5	23.7	46.4	--
Brazil	2012	99.7	85.3	97.5	87.0	49.2	81.3	--
Chile	2012	99.6	91.3	98.8	100.0	89.3	98.9	--
Colombia	2012	96.9	73.6	91.2	84.9	65.7	80.2	--
Ecuador	2012	91.6	75.2	86.4	86.5	75.9	83.1	--
Guyana	2012	96.6	97.9	97.6	87.9	82.0	83.6	--
Paraguay	2012	100.0	83.4	93.8	96.1	52.5	79.7	--
Peru	2012	91.2	71.6	86.8	81.2	44.8	73.1	--
Suriname	2012	98.1	88.4	95.2	88.4	61.4	80.3	--
Uruguay	2012	99.9	94.9	99.5	96.5	95.8	96.4	--
Venezuela (Bolivarian Republic of)	2000	94.1	74.4	92.1	92.5	54.1	88.7	--
SOUTHAMERICA	--	--	--	--	--	--	--	--

Source: WHO-UNICEF. Progress on Drinking-Water and 2014 Sanitation. 2014 Update

