

Regional Document

AMERICAS



5th WORLD WATER FORUM
ISTANBUL 2009



BRIDGING
DIVIDES
FOR WATER



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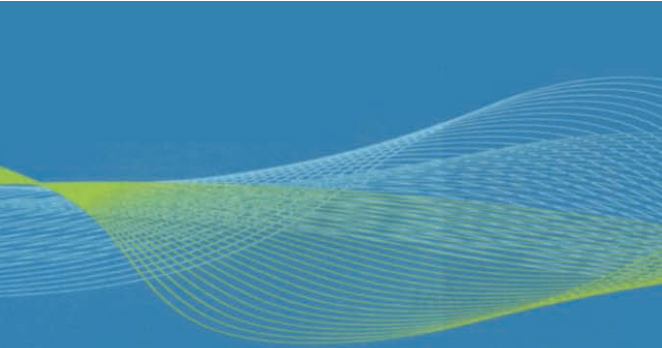
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REGIONAL DOCUMENT OF THE AMERICAS



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This document was written by the regional consultant, Víctor Pochat based on sub-regional documents prepared by César Herrera Toledo, Alexander López Ramírez, Vasantha M. Chase and Francisco Lobato. It was edited with the help of the organizations members of the Americas Regional Consortium (ARC). The Americas Regional Process received financial support from various institutions, including from the World Bank and the Inter-American Development Bank.

1

INTRODUCTION



The Regional Process is a key preparatory component of each World Water Forum, in which stakeholders from each region of the world present their perspectives and distinct positions regarding the management of water resources and water-use services.

The region of the Americas spans from the extreme northern points in Canada and the United States of America to the extreme southern points in Argentina and Chile, including the Caribbean island states. It is one of the most diverse regions of the world, as evidenced by both the abundance and scarcity of its water resources, as well as the range of wealth and poverty that characterize its social conditions.

The level of participation by the Americas in World Water Fora has increased progressively since the First World Water Forum held in Marrakesh, 1997, when only a few professionals from the region attended, mostly as individual experts. A report entitled “Water Vision and Framework for Action” covering South and Central America and the Caribbean was developed for the Second Forum (The Hague, 2000), based on national reports. For the Third Forum (Kyoto, 2003), participants from the Americas held a series of preparatory meetings, which resulted in the development of a regional document, encompassing perspectives from the entire region. Finally, at the 4th World Water Forum (Mexico, 2006) – regional participation was at its highest - due in part to the venue of the meeting – and strongest as reflected, by the quality of the Regional Document for the Americas prepared for the event, which benefitted from the experience gathered from previous events.



The Americas Regional Process for the 5th World Water Forum (Istanbul, 2009) began with the formation of the Americas Regional Consortium (ARC) and its respective Steering Group – comprised of the institutions listed in Annex I – which was charged with leading all activities related to the regional process. The ARC provided an environment for interaction among stakeholders such as representatives of national governments, parliaments and local authorities.

One of the responsibilities of the ARC was the development of the Americas Regional Document, which addresses “Global Changes” as a unifying theme for the region. This concept generated strong interest within the global political community, to the point that it was chosen as the principal focus of the Political Process for the 5th Forum, entitled “Water Management Adaptation Strategies for Global Changes, including Climate Change/Variability”.

It should be noted that the theme, “Global Changes,” is not limited to climate change and addresses other changes - such as globalization, population dynamics urbanization, and land use changes - that may, over the next 40 years, have a stronger impact on water resources than climate change. These changes affect both megacities and smaller communities living in rural areas, highlands, deserts and forests across the region.

Given the diversity of this vast region, the Americas have been divided into four sub-regions (South America, Central America,

Caribbean, and North America) so that each sub-region’s level of preparedness and adaptation capacity for “global changes” can be assessed. With this, policy options for the region as a whole may be analyzed and included in the global policy recommendations.

This document is an aggregation of the sub-regional documents drafted by four consultants, who based their respective reports on inputs received during several meetings organized throughout the year 2008 in each of the 4 sub-regions (Central America: San Salvador, El Salvador, June 19-20; Caribbean: Saint George, Grenada, June 25; South America: Montevideo, Uruguay, September 10-11; North America: Guadalajara, Mexico, November 3-4). The sub-regional documents and drafts of the four sub-regional chapters of the document were submitted for review to the participants of the Water Forum of the Americas (Foz do Iguaçu, Brazil, November 23-25, 2008). This final version incorporates the results of the discussions held and the comments received following that event.

In addition to this document, the Americas Regional Process produced the Message of Foz do Iguaçu. This message (Annex II) includes the recommendations drafted during interactive sessions which involved more than 250 stakeholders from different sectors of water management throughout the Americas gathered in Foz do Iguaçu.



2

CHALLENGES AND PERSPECTIVES IN SOUTH AMERICA



South America, which has an area of approximately 18,000,000 km² and around 385 million inhabitants, includes Argentina, Bolivia, Brazil, Chile, Colombia, Ecuador, Guyana, Paraguay, Peru, Suriname, Uruguay and Venezuela, and French Guyana.

The sub-region has climactic diversity with, for example, a humid and warm tropical climate in the northern and central areas; temperate at higher latitudes, and cold at the highest points of the Andean region and in Tierra del Fuego.

Precipitation patterns are diverse, with high rainfall in the upper Amazon, the southwest of Argentina and the south of Chile; dry coastal strips in Peru and the north of Chile, the South American Arid Diagonal, which comprises an important part of Argentina, Bolivia, Chile, Ecuador and Peru, and moderate rainfall in the pampas of Argentina, Uruguay and the south of Brazil, and even arid zones in Argentina as well.

The sub-region contains approximately 28% of the world's renewable water resources. However, 23% of the continent consists of arid or semiarid regions such as the northeastern semiarid region of Brazil, southern Ecuador, the entire coastal strip of Peru, northern Chile, parts of Bolivia and over 50% of Argentina.



- 1 Amazon
- 2 Plata/Prata
- 3 Orinoco
- 4 São Francisco
- 5 Madaglena

The main water basins within the sub-region include: the Amazon, Plata/Prata, Orinoco, São Francisco and Magdalena rivers.

The sub-region's population is heterogeneously distributed. Extensive areas of tropical jungle (Amazonia), the Atacama desert and glaciers of the Patagonia are all scarcely populated. Regions with high population density include the metropolitan regions of São Paulo, Rio de Janeiro and Buenos Aires, each of which contains more than 10 million inhabitants. In 10 countries of the sub-region, urbanization rates are higher than 60%.

For the countries of the sub-region, the Human Development Indices (HDI) range from over 0.800 to less than 0.700. The Gross Domestic Product (GDP) exceeds 7,000 US dollars per capita in six countries and ranges between 4,000 and slightly less than 3,000 US dollars in five countries. Numerous niches of poverty can be found on the periphery of all the major cities of the sub-region.

Water Challenges in the Sub-region Globalization

The international financial crisis may restrict the investments needed to meet the basic needs of the population, such as access to drinking water and sanitation.

South America stands out as a sub-region with natural conditions conducive to food production. However, due to increases in the world demand for and price of agriculture and livestock products, there has been an intensification of farming activities and an expansion of the agricultural frontier in several countries, which, in turn, has put pressure on the sub-region's water resources.

The growing demand for energy is also significantly influencing the sub-region, as countries make use of favorable conditions for bio-fuel production and of rivers for hydroelectric power production.

The rules and requirements of world markets can impact South America's natural resources reserves. Some parts of the sub-region are being affected by the increased demand for urban areas, agricultural livestock and timber products. This may, in some cases, result in the loss of natural forests, introduction of exotic species, and impacting soils, water runoff, and biodiversity.

If adequate controls are not applied for the installation of industries, there is a risk that throughout the sub-region, industries may not comply with the required environmental standards, which, in turn, could potentially result in water contamination problems.



Increases in the price of mining-sector products have promoted the development of many new projects in countries with high mining potential. Some of these projects could affect water sources, such as glaciers. In many instances, water needs for the exploration and processing of minerals require coordination with other water uses, particularly in cases regarding irrigation of agricultural zones. This, in turn, has raised the possibility of water being sold from one country to another.

Also of concern are the implications of free trade agreements in which water is classified as a commodity, and therefore, subject to the norms that rule any economic commodity, without regard for its particular social and environmental value.

Population evolution, migrations and urbanization

South America has experienced a remarkable urban growth in recent decades, primarily due to rural-urban migratory movements, as well as migration from countries of the sub-region with social and economic problems to others offering better conditions.

These processes create serious problems related to water resources in urban areas, as the demand for drinking water and sanitation services, which is still unmet in most countries of the sub-region, increases. Minimal access to drinking water and sanitation also negatively impact public health. Similarly, several localized and scattered pollutant sources emerge as the result of the disposal of untreated solid wastes and industrial effluents.

Population growth aggravates problems related to urban floods, with costs impacting society as a whole due to property losses, the obstruction of traffic and the interruption of activities in general, among others.

Land use changes

Land use changes the expansion of the agricultural frontier in several countries of South America has resulted in land-use



changes, particularly in extensive zones where natural vegetation has been replaced by farming.

Such changes have directly impacted soils and the hydrological conditions in many basins throughout the sub-region. Increased erosion, and the associated loss of soils with high productive value, as well as changed runoff dynamics, with movement of sediments and increases in maximum discharge, may affect the quality of the surface and ground waters in some areas of the sub-region, create sedimentation problems in reservoirs and increase drainage needs in waterways.

Lack of policies to stimulate Integrated Water Resources Management (IWRM) and land-use planning in national basins weakens the sustainability of water and soil resources. This results primarily from the fragmented management of national basins and the insufficient development of mechanisms to enable the efficient participation of civil society at different stages of the management process.

The expansion of the agricultural frontier to low-rainfall areas has made necessary the use of irrigation water, which requires coordination with other water-users.



Climate change

Given the size and diverse geo-physical characteristics of the sub-region, as well as the influence that the Pacific and Atlantic oceans exert upon it, different situations may occur in relation to increases in temperature, and thus evaporation, and in the associated increase or decrease in precipitation and the corresponding river level flow.

The emerging trend with regard to reductions in river discharge and aquifer recharge is alarming, especially in light of the fact that such changes have already negatively impacted drinking water supply in several areas during dry years.

One issue of particular concern is the reduced supply of water to reservoirs. Forecasts indicate that such changes in supply will provoke a decrease in hydroelectric generation, reduce the availability of water for irrigation and other water uses, and affect water quality.

Another related impact of climate change which raises concern is that of rising sea levels. Forecasts indicate that levels will rise, which, in turn, will cause saline wedges to intrude upon aquifers close to the coast.

Special attention must be given to extreme flood and drought phenomena, both with regard to the magnitude, frequency, and duration of their impacts, as well as desertification processes.

Already temperature increases are strongly affecting glaciers and their role as sources of water and regulators of flows in fragile ecosystems.



Progress Achieved in the Sub-region

With regard to the processes that have taken place in the sub-region to confront water challenges, some important advances may be mentioned, among others:

Institutional strengthening

- Formulation of the National Federal Plan on Water Resources and strengthening of the Federal Water Council (COHIFE) (Argentina).
- Creation of the Ministry of Water, including structures for social participation and for the institutionalization of regulation (Bolivia).
- Establishment of basins committees and water-use fees (Brazil); changes to the Water Code (Chile).
- Establishment of redistribution taxes for localized contamination of water bodies (Colombia); creation of the National Secretariat of Water (Ecuador).
- Approval of the Plan for the Guyana Water Incorporated (GWI).
- Enactment of the Law on Water Resources of Paraguay.
- Creation of the National Water Resources System and the National Water Authority (Peru).
- Program to update the Master Plan of the Coastal Zone (Suriname).
- Constitutional reforms declaring water as a human right (Uruguay and Venezuela).
- International agreements for the strengthening of transboundary water management in large basins and aquifers (Basins of the Bermejo, Plata/Prata and Amazon rivers, and the Guaraní Aquifer).

Users and civil society participation

- Creation of the Social Technical Council, in which the Executive engages with representatives of the civil society.
- Establishment of a new regulatory organization for the use of water, in which irrigation organizations represent the majority of the stakeholders (Bolivia).
- Adoption of the National Water Resources Management System (SINGREH) made of a National Council, state councils, local basin committees and their respective basin agencies (Brazil).
- Participation of water users and civil society in water resources management through their membership in the "Advisory Commission on Water and Sanitation" (COASAS) (Uruguay).



Probable impacts of climate change

- Flood warning systems (Argentina).
- Implementation of actions for prevention, mitigation and response to extreme events (Bolivia).
- Integrated action to fight against deforestation in the Amazonia (Brazil).
- Collection of information to analyze the vulnerability of agriculture (Chile).
- Promotion of policies on renewable energies (Chile, Colombia, Peru and Uruguay).
- Pilot project for water harvesting (Colombia).
- Development of projects to determine the vulnerability of aquifers in coastal zones (Colombia and Uruguay).
- Pilot projects for the reuse of water at the small agricultural community level (Peru).
- Strengthening of the national emergency system (Uruguay).
- Study on the impacts of climate change on agriculture and recommendation of adaptation measures (Uruguay).
- Integration of the Andean region, sharing of information and experiences on glaciers and pilot projects on vulnerability and impact.

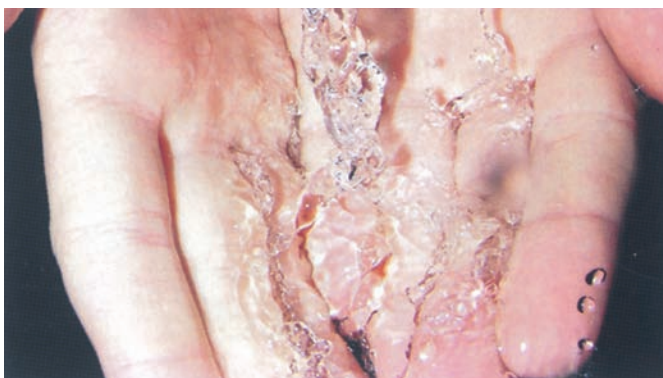
Political and Institutional Actions and Options

The following recommendations, among others, are presented as a result of the deliberations of the working groups at the South-American Water Forum and from subsequent comments:

Globalization

The main recommendations are as follows:

- Adopt adequate environmental regulations in order to mitigate the potential consequences of an expanded agricultural industry.
- Apply appropriate technologies to new hydroelectric projects to reduce their environmental and social impacts.



- Encourage collaboration and cooperation in transboundary water basins.
- Develop hydroelectric projects that will foster local development, especially in regions distant from large urban centers.
- Recommend actions that will reduce the environmental impact that mining activities may have on water, specifically improvement of control instruments.
- Promote coordination of actions in the South American region for the conservation and sustainable use of water resources.
- Acknowledge the emerging trend pointing to a greater use of aquifers as water reserves for the future and develop monitoring and research activities that allow for a better understanding of aquifer resources.

Population evolution, migrations and urbanization

The main recommendations are as follows:

- Foster the elaboration and implementation by all the South American countries of national plans for IWRM and land use.
- Ensure that all countries of the region have access to safe water – in terms of quantity, quality, continuity, reliability and cost.
- Foster capacity building focused on IWRM.
- Enhance transfer of technologies and horizontal cooperation among countries of the sub-region.

Land use changes

The main recommendations are as follows:

- Establish policies regarding land use planning to guarantee the sustainability of natural resources.
- Establish basin management plans at the national level in order to achieve forest and agriculture productivity and to conserve the functions of different ecosystems according to their capacities.

- Strengthen mechanisms and structures for meaningful and effective stakeholder participation in water-related decision-making processes.
- Establish economic instruments that promote forestation and reforestation, in accordance with national and international legislations.

Climate change

The main recommendations are as follows:

- Improve water resources management in order to face the impacts of climate change.
- Quantify economically the consequences of extreme events (floods and droughts).
- Integrate national emergency systems with technologies designed to monitor climate change and water resources.
- Encourage sustainability.
- Implement measures for the restoration of degraded areas.
- Promote legal and institutional strengthening activities in water and climate change, according to the provisions of the United Nations Framework Convention on Climate Change.
- Strengthen and implement studies on vulnerability.
- Promote the exchange of experiences and the mobilization of resources to facilitate the design and implementation of climate change adaptation measures to reduce foreseen impacts upon the region's water resources.
- Integrate - at the national level - climate change as a component of water resources management.
- Coordinate efforts at the regional level to develop common strategies for adaptation to the impacts of climate change.
- Develop and share - at the national level - programs designed to raise awareness and educate the population on climate change and the impacts that such changes pose to water resources.



3

CHALLENGES AND PERSPECTIVES IN CENTRAL AMERICA



Central America, with an area of 523,780 km² and approximately 41.3 million inhabitants, is comprised of Belize, Costa Rica, El Salvador, Guatemala, Honduras, Nicaragua and Panama.

Rainfall patterns vary considerably, depending on the altitude and the location of the slope within the Central America isthmus. Thus, the Caribbean coast and eastern mountain slopes receive abundant precipitation throughout the year, while the Pacific coast and western mountain slopes have dry periods lasting five or more months. Annual average precipitation ranges from a minimum of 1,143 mm to a maximum of 5,007 mm. Although precipitation seems to be abundant, it falls unequally and is variable throughout the year.

There is also an asymmetry between the geographic distribution of water resources and population: 71% of the rainfall in the Central American isthmus drain into the Caribbean slopes and the other 27% into the Pacific slopes, while the population concentration shows a reverse distribution.

With an area of 167,772 km², the Usumacinta, San Juan and Coco river basins represent the largest transboundary basins in the sub-region, comprising 30.7% of the Central America territory.

The Human Development Index (HDI) published in 2005, indicates that two countries in the sub-region have an HDI over 0.800, four countries have an HDI equal or over 0.700, and only one country has an HDI under 0.700. The Gross Domestic Product (GDP) exceeds 8,000 US dollars per capita in three countries; two countries have a GDP over 4,000 US dollars per capita, and the other two have a GDP close to 3,000 US dollars per capita.



Water Challenges in the Sub-region

Globalization

The entry into force of the Free Trade Agreement (FTA) between the countries in the sub-region and the United States of America (USA), and the negotiation of an Association Agreement with the European Union, call for the consideration of measures like the ratification of the Stockholm Convention on Persistent Organic Pollutants (POPs) and the development of a Central America proposal. Thus, the establishment of environmental standards in accordance with access conditions to European and US markets will be required. An important effort will be required to ensure the development and enforcement of regulations related to pollution management among others. The Environmental Cooperation Agreement (ECA) between Central American countries and the USA may support this effort with financial resources and technical assistance.

Relations between water resources management and the FTA will depend upon the economic and commercial uses of water resources and the states' capability to regulate access to water resources.

Population evolution, migrations and urbanization

The population of Central America is growing at an average rate of 2.4%, and it is estimated that by 2015 it will reach 49.4 million. This fact creates a sustainable increase in demand for water resources and related services, such as hydroelectric power, drinking water for domestic use and tourism, and irrigation for food production, among others.

In most cases, such population increases are occurring in urban areas. It is estimated that by 2020 the sub-region will have an urban population five times larger than in the decade of 1970.

In general, the population of Central America is concentrated in the lowlands, on the Pacific slopes, resulting in water consumption shortages to a great number of inhabitants, especially during the dry season.

Most of the cities in the sub-region are located on a volcanic strip with high seismic activity, and in ecologically rich environments. The negative impact of urban expansion is very high, both in terms of risk generation, and damages to environmental resources and services.

In the case of Central America, water related migrations are induced by either shortages or over-abundances of water. Meteorological phenomena, such as Hurricane Mitch and El Niño-Southern Oscillation (ENSO) and their associated impact over the Central America Drought Corridor, are indicative of the wide range of potential weather patterns that can occur within the sub-region. Migratory events related to such phenomena cannot be ascribed only to the environmental variable – in this case water-related – but instead take root in a variety of factors.

Land use changes

The impact of deforestation on the hydrological flows is one of the major concerns in Central America. The sedimentation of dams, the water shortage during the dry season, the floods and the serious damages caused by Hurricane Mitch in 1998 have been attributed, at least in part, to deforestation. As a result of this, a strong political interest has emerged for addressing problems related to forest cover loss. Research indicates that the most promising effort for solving this problem lies in the development of environmental services payment systems, in which the owners of forested areas are directly compensated for the environmental services they generate.

Biodiesel production – as a renewable fuel derived from vegetal oils and animal fat – would imply changes in the use of soil throughout the sub-region. Among the projects of the Puebla Panama Plan, the proposal to install biodiesel plants in Guatemala and Honduras is particularly promising. Honduras, in particular, is pursuing an ambitious project for the production of biodiesel, with which it intends to reduce its dependence on oil by almost 25%, within 10 years, by planting 200,000 hectares of African palm tree between the years of 2007 and 2010, which will be used to extract the oil needed to produce 3.1 million biodiesel barrels per annum.



Climate change

Due to the fact that Central America is located on a narrow strip between the northern and southern hemispheres, it is vulnerable to the impacts of the climate change, and is likely to be affected by droughts along the Pacific coast and floods along the Caribbean coast, which will drastically impact the economies of the affected countries.

Available studies show rainfall within the sub-region to have very irregular variations. Data shows annually discordant trends at the ends of the isthmus, leaving Costa Rica as the transition zone. To the north, a gradual reduction of the rains is to be expected, while an increase would be experienced in the south. The projections in the north assume reduction levels between 1.1 and 11.5%, from 2010 to 2100; in the south, the increases would reach up to 2.4% from 2050 to 2100.

Among the future projections for climate change in this sub-region, changes may occur in marine current patterns, precipitation levels and patterns, tide patterns and river flows. Furthermore, in the Caribbean and the Pacific sea levels could significantly rise, and an increase in storms with strong tides could occur. Similarly, extreme increases in temperatures could increase the frequency of the heat stress during the growing season, and contribute to increased loss of fertility and cattle mortality, as well as soil salination due to the loss of water in the soil, and, finally, increased likelihood of fires and pests.

Forecasts also point to a higher frequency of flooding and drought, saline intrusion along the coastlines, reduction in aquifer recharge, in terms of the volume and quality, increased prevalence of water-borne diseases, decreased soil humidity and agriculture productivity, and increases in the frequency and magnitude of landslides and avalanches.

Likewise, reductions in river flows during the dry season, along with increases in temperature and greater levels of sedimentation, would negatively impact the generation and transmission of



electric power, while increasing levels of contamination. Similarly, changes in water quantity and quality could cause social conflicts, due to either scarcity or overabundance.

Progress Achieved in the Sub-region

With regard to the processes that have occurred in the sub-region to face the water challenges, the following significant advancements may be mentioned:

At the country level:

- Enactment of the National Water Policy (Costa Rica).
- Approval of the National Program of Integrated Management of Water Resources, the Canon of Use and the Pollution Canon (Costa Rica).
- Fully participative process for the discussion of the Water Law (Costa Rica).
- Development of the Water Initiative 2015 (El Salvador).
- Integrated Management Plan of Rio Paz (El Salvador).
- Establishment of the Water Office (Guatemala).
- Approval of the National Plan on Water and Sanitation, Sanitary and Environmental Education Plan (Guatemala).
- Processes for the discussion of the General Waters Law (Honduras).
- Approval of the Law on Water and Sanitation (Honduras).
- Formation and operation of local Water Committees (Honduras).
- Approval of a new Water Law (Nicaragua).
- Approval of a Law on Watersheds Management (Panama).
- Establishment of the Integrated Water Resources Management Regulatory Framework (Panama).

At the sub-regional level:

- Development of the Trinational Water Agenda for the Integrated Water Resources Management of the Upper Watershed of Lempa River (El Salvador, Guatemala and Honduras).
- Focusing on the development of a strategy for integrated water resources management (ECAGIRH). Formulation of which started with the identification of the institutional synergies of several entities involved in water resources management in the sub-region.
- Establishment of a baseline for the working agendas at the inter-agency level of the seven countries.
- Articulate on-going actions within a strategic vision for the development of the Central American water sector and its

contribution to the regional development over the next 10 years.

Political and Institutional Actions and Options

The central elements in terms of a public policy for the sub-region are: risk management, transboundary water management, value of water, water governance and water and sanitation.

Risk management

- Tackle the risks related to water, such as floods, droughts, tropical storms, erosion and the several forms of pollution through an integrated political and water resources management approach.
- Take into consideration the three components of risk management: knowledge of the risk; definition and implementation of structural and non-structural measures to reduce the risks; and “sharing” the risk, getting all sectors of the population involved.

Transboundary water management

- Design sub-regional public policies directed at facing the challenges posed by the existence of 23 transboundary watersheds within the sub-region. A crucial policy in this regard will focus on the effective management of highly fragmented political systems, which exist in the midst of a region that is deeply intertwined at an environmental level.
- Establish rules and institutions that incorporate notions of shared duty and responsibility, within frameworks of national sovereignty and territorial integrity that characterize the current management of transboundary basins, which, despite of being shared, continue to fall under the umbrella of numerous national agendas. In seeking to establish transnational coordination schemes, due consideration should be taken to account for the eventual conflicts that



interdependency will yield, as costs and benefits will have to be allocated among involved states.

Value of water

- Encourage the internalization of the cost of water as an input for the economy, as well as the social and environmental consequences resulting from its use.
- Study new creative partnerships between the public and private sectors, along with accounting and taxation systems which fully account for social and environmental factors.
- Promote a better knowledge of the economic value of water, reconsidering the concept that links its intrinsic value to the payment of fees for the provision of water services. This exclusively includes payment of fees related to operation and maintenance costs, and not those related to natural environmental services that regulate and maintain the water cycle, nor the costs involved with the adequate disposal of wastewater. This subject is hotly disputed, as many societies consider unacceptable to put a price tag to water. Despite the opposition, it is important to thoroughly examine the costs and benefits of such schemes, in order to devise an efficient mechanism to balance the costs of water provision and wastewater treatment with addressing the basic needs of the sub-region's poor and vulnerable populations.

Water governance

- Face the water governance challenges in the region.
- Make water a fundamental resource for development, introducing water as a key variable in the political decision making process for social, economic and environmental development.
- Concentrate efforts for assuring good water governance, particularly through the participation of each sector of society in decision making processes, taking into consideration cultural aspects as well as the particular idiosyncrasies of each country and the region as a whole.

Water and sanitation

- Tackle the problem of providing water supply to the poorest sectors of the society, which are affected most by the water crisis, as shortage is associated with hunger and disease.
- Limited access to water inflicts great difficulties upon affected populations and undermines development, particularly in terms of health, hygiene and food security. Consequently, these segments of the population should be the highest priority.



4

CHALLENGES AND PERSPECTIVE IN THE CARIBBEAN

The Caribbean archipelago is a chain of islands extending for almost 4,800 kilometers in an area located at 10° and 23° north latitude and 60° and 80° west longitude. It comprises, among others, the territories of the following independent nations and overseas Anglophone territories: Anguilla, Antigua and Barbuda, Bahamas, Barbados, Cuba, Dominica, Grenada, Haiti, Cayman Islands, Turks and Caicos, British Virgin Islands, Jamaica, Montserrat, Dominican Republic, Saint Kitts and Nevis, Saint Lucia, Saint Vincent and the Grenadines, and Trinidad and Tobago, with a total area of approximately 221,300 km² and a population of about 35.3 million inhabitants.

The region's climate is generally tropical marine, with more diurnal and local variations in temperature than seasonal ones. At sea level, there is little variation in the temperature, regardless of the time of the day or the season of the year; temperatures range between 24°C and 32°C. Cooler temperatures are experienced during the winter months between December and March.

There is a great seasonal variability in the rain distribution. Most islands have a dry season from December to May and a rainy season, from June to November. Total annual rainfall accumulation varies between the islands, with the smaller and lower elevated islands receiving comparatively less rainfall than the larger, more elevated ones. In the case of the Commonwealth of Dominica, the average annual rainfall distributed over the island approximates a relatively high 1,980 mm, while the average annual rainfall across Antigua and Barbuda is much lower at 1,016 mm.

The vulnerability of the region to severe or intense climate events is demonstrated by the impact of hurricanes on the region. The hurricane season runs from June to November, with peak activity between August and October.

Water is sourced primarily from surface sources (rivers, springs, ponds) and groundwater sources although there are variations from island to island in the proportions of groundwater versus surface water abstraction and utilization. Rain water harvesting is practiced in some of the smaller islands and in islands where topographic constraints limit access to the public distribution system in some locations. Desalination technologies are seeing increased application in the more water-stressed Caribbean countries where the demand for fresh water substantially surpasses the supply from natural sources.

For the countries of the sub-region, the Human Development Indices (HDI) - currently available and released in 2005 - range from over 0.800 to less than 0.600. The Gross Domestic Product (GDP) exceeds 35,000 US dollars per capita in two countries,

ranges between 15,000 and 20,000 in two, between 10,000 and 15,000 in four, between 5,000 and 10,000 in four and is less than 5,000 in four other countries.

Water Challenges in the Sub-region

Globalization

Caribbean Governments face considerable challenges in seeking to generate sustained economic growth rates that exceed the rate of unemployment and poverty. These challenges are being exacerbated by a series of external shocks, including energy price shocks, fluctuating commodity prices, the rising cost of external credit, the dismantling of preferential market arrangements for traditional agricultural commodities and the introduction of stringent market entry conditions including sanitary and phytosanitary (SPS) restrictions. The region's vulnerability to external price shocks is further exacerbated by the rising cost of imported food items and their respective costs of transportation.

The growing debt burden has caused a deepening of economic vulnerability within the region and an erosion of the impressive social development gains that were achieved from the 1970s through to the mid 1990s.

Over the past decade, several Caribbean countries have sought to transform their economies away from agriculture and manufacturing to tourism and financial services. The contribution of tourism to gross domestic product is expected to rise. However, as the fall-out from the events of 9/11 has shown, tourism is no less vulnerable to external shocks. Heightening this vulnerability is the threat posed by climate change and associated sea level rise, which pose devastating potential consequences to infrastructure built along the coastal zone.

The primary demand for water in most of the countries in the Caribbean is linked to domestic use. The large contribution of the tourism and agricultural sectors to most economies of the Caribbean has resulted in significant competition for allocation of scarce water supplies.



Countries with well developed tourism sectors demand proportionally high levels of water resources to sustain tourism-based activities. Golfing has emerged as a growing trend in many Caribbean destinations and heavy irrigation demands for maintenance of such facilities has placed added pressures on water resources in the region.

A number of Caribbean countries generate hydroelectricity. The growing cost of fossil fuel has led to the installation of new hydroelectric plants, thus illustrating the challenges associated with balancing the need for water resources with socio-economic development and environmental conservation.

Population evolution, migrations and urbanization

Caribbean countries will continue to face tremendous pressures due to population growth and development, which will result in increased competition for water resources and land, together with the contamination of surface and underground waters as a result of the industrial and domestic effluents with no adequate treatment. This threatens the quantity and quality of water resources available and poses serious threats to human health.

Land use changes

The economic growth prospects of the region are also constrained by a variety of natural factors, including adverse physiographic conditions in many countries. Many islands are characterized by steep slopes in the centre and flat lands in the relatively narrow coastal zone, which is particularly vulnerable to storm waves and the saline intrusion.

The availability of water is clearly a constraint to the agricultural productivity and economic development of most of the Caribbean. This is especially true for the agricultural sector, where limited water resources for irrigation are often the main factor constraining expansion.



Climate change

Based on climate modeling exercises it is predicted that the Caribbean region will experience changes in patterns of rainfall accumulation and distribution, with an overall trend toward less annual rainfall but accompanied by more extreme events in the form of intense hurricanes and serious droughts. Such changes will have serious implications for water security as a result of reduced aquifer recharge and surface water supply.

The situation will be critical in the low-lying limestone islands where the seasonality of rainfall is pronounced. Moreover, most rainfall is strongly associated with the generation and passage of easterly waves, tropical depressions, and storms. Thus, changes in the occurrence of these heavy rainfall events will certainly impact the water supply of many Caribbean islands.

Climate change can present additional management challenges. Such challenges may arise from a variety of factors, including increased risk of flooding, impeded drainage and the presence of elevated water tables, which may pose special engineering problems.

For many of the small island states that rely on groundwater, the prospect of saline intrusion is of great concern. In many islands where salination from overextraction of aquifers is already occurring, sea-level rise will further compound this risk.

In the Caribbean sub-region, there is a long and well-documented history of episodes involving hurricanes and other tropical weather systems. These weather events also cause damages to the sub-region's water distribution infrastructure. Earthquakes and volcanic eruptions, though not as frequent, also have the potential to disrupt water distribution systems and contaminate water sources.



Progress Achieved in the Sub-region

Institutional strengthening

- IWRM planning activities (Antigua and Barbuda, Barbados, Cuba, Dominica, Dominican Republic, Grenada, Saint Kitts and Nevis, Saint Lucia, and Saint Vincent and Grenadines) coordinated by the Global Environment Facility-funded Integrating Management of Watershed and Coastal Areas (GEF-IWCAM) Project, the Caribbean Environmental Health Institute (CEHI) and partners, such as the Global Water Partnership and the Caribbean WaterNet.
- Establishment of institutional policies and frameworks for water resources management (Barbados, Grenada and Trinidad and Tobago).
- Advancement in sectoral policies related to the environment and in the National Plan of Environmental Action, which includes water resources management (Haiti).
- Promotion of Integrated Water Resources Management (IWRM) with the enactment of the Watershed Act and the implementation of its National Water Policy and Strategy (Jamaica).
- Development of water management policies, taking into account the management of coastal areas and establishment of the Water Resources Management Unit (St. Lucia).
- Recognition by the Caribbean Community (CARICOM) of the efforts made towards the development or strengthening of the national water policies.
- IWRM plans and Water Use Efficiency plans in the various Member States and formation of a consortium of institutions to assist Member States coordinate consultations with national, regional and international partners.
- Capacity-building programs organized by the Caribbean WaterNet, the Caribbean Basin Water Management Programme and the Caribbean Water Initiative (CARIWIN).



Increased water supply

- Promotion of the use of desalinization and rainwater collection systems (Anguilla).
- Use of new technologies for exploration and development of groundwater sources through a public-private sector partnership contract that involves a “shared risk” between the client and contractor (Trinidad and Tobago).
- Development of a Rainwater Harvesting (RWH) national promotional program (Grenada) and RWH regional program (wider Caribbean).

Water and sanitation services

- Program to expand drinking water and sanitation services to rural communities through a participatory process and cost recovery mechanisms (Haiti).
- Pilot project for the development of Water Safety Planning approaches by water utility companies (Jamaica, Saint Lucia).
- Formulation of a Water and Wastewater Master Plan for the next 30 years (Trinidad and Tobago).

Stakeholders« participation

- Participation of the community in the process of water resources management to protect its health and social and economic well-being (Dominica).

Monitoring plans and information systems

- System of land-use planning for protecting the water resources through a zoning system based on the location of groundwater in the vicinity (Barbados).
- Development of a National Water Information System (Grenada).
- Implementation of a national program to monitor the bacteriological and chemical quality of the water on a monthly basis (many countries).
- Development of the Caribbean Drought and Precipitation Monitoring Network.



Political and Institutional Actions and Options

Meeting water challenges in the context of the limited resource-base of many Caribbean countries will require concerted government, private sector and civil society response. At the national level, it is clear that there is no single prescription for achieving efficient water management, as approaches will, of necessity, vary from country to country, and must be appropriate to local circumstances. However, there is an emerging consensus that there are certain critical policy elements that ought to be considered in the design of an effective IWRM strategy. The formulation of these policy elements is rooted in the special physiographic and socio-economic features that characterize Small Island Developing States (SIDS).

In this context, IWRM policy elements should be directed towards the following areas:

Enabling environment

- Commit governments to initiate or further develop the formulation of IWRM policies and plans.
- Implement national land use plans and policies that clearly articulate the nexus between good land use and water resource management.
- Support gender-balanced approaches and the promotion of the role of the youth seeking changes of attitudes in society towards improved water resources management.
- Strengthen water resources legislation, paying particular attention to effective enforcement.

- Promote appropriate approaches to provide information on water pricing and application of economic instruments, as these are sensitive issues for water users.

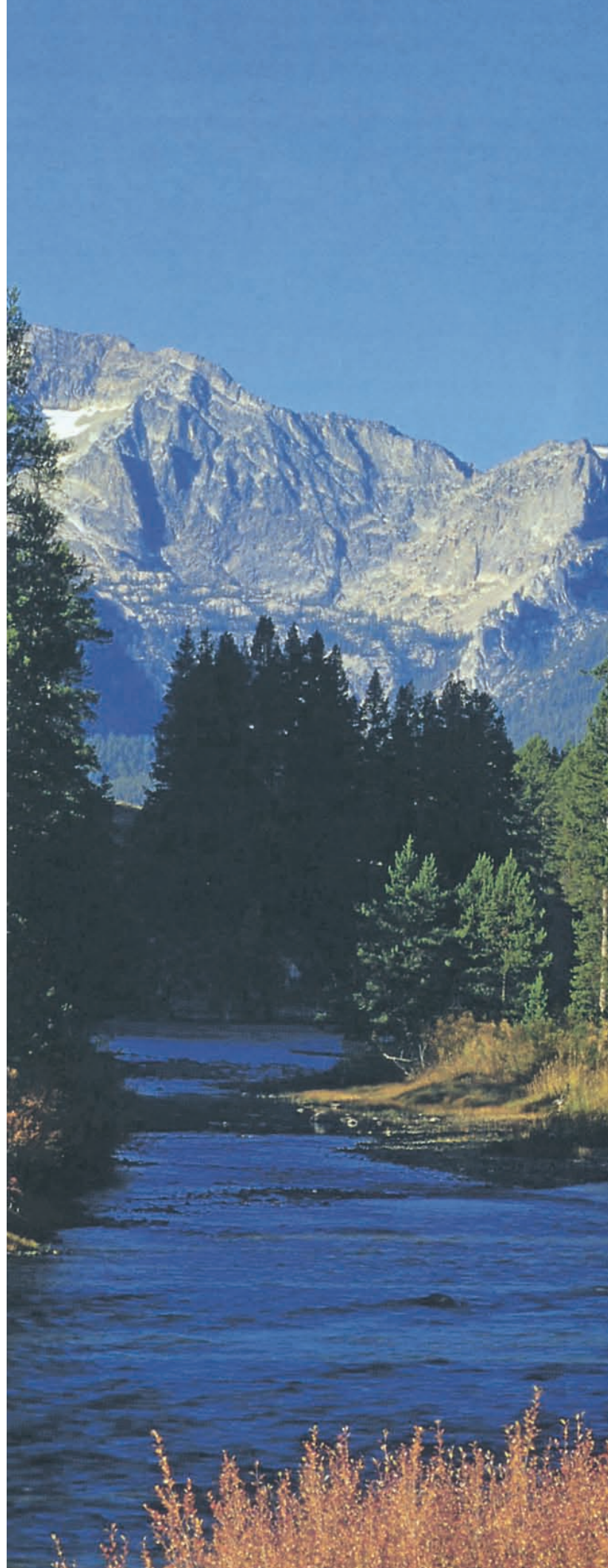
Institutional roles

- Establish politically independent, national bodies to formulate regulation policies.
- Strengthen institutional capacities.
- Build capacity in policy design and formulation; provide financial incentives; draft legislation and regulations.
- Improve the operational efficiency of water utilities.
- Invest in research and development with respect to augmentation and 'new' technologies, optimization of distribution systems, and reduction of operational costs.

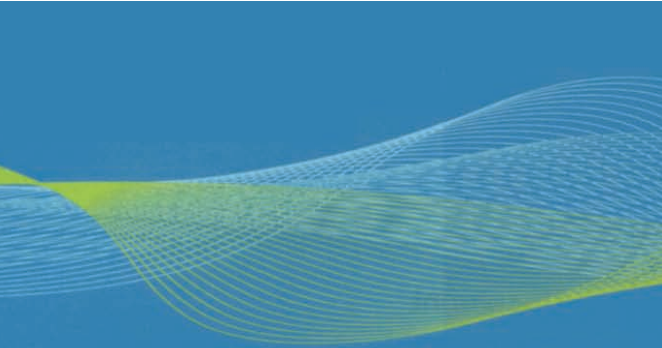
Management instruments

- Promote demand-side management, including incentives for water conservation, water use-efficiency and optimization, and waste water treatment.
- Strengthen capacities for comprehensive assessments of existing and future demands, to support decision making.
- Enhance capacities for forecasting the occurrence and risk assessment of extreme events and the formulation of appropriate mitigation measures.
- Invest in equipment for data collection and monitoring.
- Resolve water allocation issues, such as trade-offs, user rights and user-conflicts.
- Establish self-sustaining and effective mechanisms in support of assessment, repair and replacement of water infrastructure.
- Strengthen monitoring activities for the assurance and control of water quality in the provision of water.
- Strengthen the application of IWRM principles, using the watershed and/or groundwater aquifer recharge zones as basic units of planning and administration.
- Foster the creation of water-users groups to improve water governance at the local level.
- Enhance public awareness about the value of water.

A collective regional approach must be sought, through which all the Caribbean countries can benefit. The creation of a regional-level node that can disseminate basic concepts, promote research and development, support implementation practices and provide training in several aspects of IWRM (e.g., resource exploration, characterization, development, protection and valuation) should be supported.








5

CHALLENGES AND PERSPECTIVES IN NORTH AMERICA



North America has a total extension of approximately 21,600,000 km² and a population of around 438 million inhabitants. It comprises the territories of the nations of Canada, the United States of America (USA) and Mexico.

The climate of the sub-region is humid tropical in the southeast of Mexico; arid and semiarid mainly in the north and northwest of Mexico, the western part of the Rocky Mountains in the USA, as well as in a small part in southern Canada and finally subarctic and tundra in most of the Canadian territory.

The average annual rainfall in the sub-region is 637 mm, however great variations exist between the different latitudes and longitudes, which comprise the arid and semiarid zones mentioned above, with an average rainfall below 300 mm per year and the tropical forests in the most southern part, where rainfall reaches levels as high as 2,000 mm per year.

The surface runoffs and the recharge of the aquifers derived from rainfall produce 6,411 km³/year of renewable water. In addition to existing renewable water resources, large reserves of water, located principally in the Great Lakes, the largest in the world, provide a large water supply estimated at 22,500 km³.

Eighty per cent of the population of the sub-region is urban. Approximately 84 million people live in the urban and suburban areas of New York, Mexico City, Los Angeles, Chicago and Toronto. Over the last 30 years, the population growth rates have been less than 1% in the USA and Canada. In Mexico, this rate decreased drastically from 3.4% in the '60s to 1.02% between 2000 and 2005.

The sub-region contains three of the largest world economies. The USA leads as the first global power in terms of its Gross Domestic Product (GDP), while Canada holds the tenth position and Mexico ranks fifteenth. The GDPs per capita are respectively equal to 38,382, 45,490 and 8,442 US dollars and the Human Development Indexes (HDI) – published in 2005 – are equal to 0.961, 0.951 and 0.829 respectively. These figures illustrate the tremendous economic and social differences between Mexico, considered a developing country, and the two industrialized countries of the northern hemisphere.

Water Challenges in the Sub-region

Globalization

North America is, along with the European Union, one of the regions in the world that, over the last twenty years, has gone



through major structural and operational economic changes. These changes are indicative of new approaches used to penetrate global markets. These changes are best exemplified through the region's embrace of commercial agreements. In 1989, the United States and Canada signed an agreement to launch binational trade, and in 1994, both countries signed with Mexico the North American Free Trade Agreement (NAFTA). A key factor in this effort has been the standardization of numerous rules and regulations on areas that go beyond trade, such as environmental cooperation and settlement of disputes.

NAFTA partners are committed to protecting the environment in the process of reintegration of the whole region, particularly through the use of environmentally friendly technologies as well as market-based solutions to environmental problems. The NAFTA partners have promoted, before the Commission for Environmental Cooperation (CEC), the enforcement of policies and actions which generate mutual environmental benefits.

The impact of rising energy prices and the associated impact on transportation costs have made production more competitive in the NAFTA sub-region, in comparison with the import of goods from Asian countries. By dedicating larger agricultural areas to the production of ethanol, the effects of high transport costs will be offset.

Population evolution, migrations and urbanization

It is estimated that by 2030, the population of the sub-region will increase to approximately 20%. An important aspect of this growth will be due to immigration, mainly in Canada, where natural growth is close to zero. In the case of Mexico, the migratory flows, mainly to the United States, will reduce as the current working-aged segment of the population starts to decline in number.

On the other hand, migration from rural areas to cities will continue. Migrants will initially settle on the outskirts and peri-urban areas, known as shantytowns.

An estimated 30% of all sub-region's growth will occur in the Western US states, as well as north and northwest Mexico, where there is less water availability. The total population of these states will grow at an estimated rate of 40% between the years 2000 and 2030.

Migratory movements can also be traced from the 'snow belt' to the 'sun belt' areas, especially in the USA as well as in the state of Quintana Roo, Mexico, which is located close to the development center of Cancun, along the Caribbean coast. The total growth of the population living in the coastal states of California, Florida, Texas, Georgia, North and South Carolina, Alabama and Mississippi, in the United States and Baja California Sul and Quintana Roo, along the coast of Mexico, is estimated to increase by almost 50% between 2000 and 2030, thus putting pressure on coastal resources.

Climate change

Some of the greatest social and environmental impacts of climate change forecasted for the sub-region will be manifested in surface and ground waters. In Mexico, in addition to forecasts for decreased water availability, water quality is likely to be impacted as well, due to the reduction of the runoff and the increase on temperature, which reduces the capacity of the bodies to retain oxygen, causing greater eutrophication.

Changes in temperature, as well as the quantity and type of precipitation patterns will yield reduced snowfalls and an early snow melt of the mountains in the Western area of the sub-region until the middle of the 21st century.

In Canada, a 20% increase in the annual average value of precipitation is forecast, and in the winter months, the annual average value may increase as much as 30%. In British Columbia, projected impacts include precipitation increases, more severe spring floods, especially on the coast and in the inlands, and increased risk of summer droughts along the south coast and in the inlands up to southeast.

In the Great Lakes, the impacts associated with lower precipitation levels include changes in quality of water, navigation, recreation, hydroelectric generation and water transfers, which may also influence binational relations.



Significant decreases in annual average rainfall are forecast for the southwest of the USA, more than in any other zone of that country and Canada.

It is probable that Mexico's climate will be warmer in 2020, 2050 and 2080, especially in the north of the country. There will be reductions in precipitation, as well as changes in its temporal distribution. The number of serious storms and the intensity of drought periods are projected to increase as well. The water balance suggests that the increase in temperature will cause evapo-transpiration rates to increase and will induce a loss of soil humidity throughout the country. Evaluations of the Intergovernmental Panel on Climate Change (IPCC) indicate that Mexico may experience a 10 to 20% reduction in runoff at national level, and reductions of more than 40% in the Gulf's coastal swamps.

The surface temperature of the Caribbean Sea, Gulf of Mexico and Mexican Pacific could rise between 1 and 2°C. Based on the physical considerations, increases in sea temperature increase the strength of tropical cyclones, raising the probabilities that such storms will reach greater categories.

The transboundary watersheds located in the north of Mexico deserve special attention, as the waters of the Bravo and Colorado Rivers are allocated according to international treaties signed by Mexico and the USA. Changes in water availability in the United States territory of these basins may compromise delivery of water



to Mexico, since the signed instruments call for a reduced delivery in the case of drought.

The polar ice caps are the areas in which more immediate and deep climatic changes are expected. The greatest concern regarding the effect of climate change upon water resources regards the Arctic, as it contains a diversity of water resources, including many of the biggest rivers in the world, like the McKenzie and great lakes.

With regard the generation of hydroelectric power, a raise of 2 to 3 degrees centigrade will generate greater production of power at facilities located along the San Lorenzo River and a reduction at Colorado River in the United States.

Progress Achieved in the Sub-region

Some processes that have taken place in the sub-region have made substantial progress in meeting water challenges. Among these, the following may be mentioned:

Integrated water resources management

- Greater public awareness of the matters related to water management, derived from discussions to prohibit the massive withdrawal of water, especially from the Great Lakes (Canada).
- Strong investments to limit or eliminate point-sources of pollution through the installation of water treatment plants (USA).
- Consolidation of an integrated national water policy, concentrating the management role within a sole federal agency, based on a new Law of National Waters, enacted in 1992 and amended in 2004 (Mexico).
- Gradual decentralization and a more active role of the state governments during the last years (Mexico).

Water demand and availability and the droughts

- Measures regulating the efficient use and conservation of water resources and changes to design criteria resulting in the construction of smaller dams (USA).
- Attention to the problems pertaining to the overexploitation of aquifers, through the establishment of Technical Committees of the Groundwater (COTAS in Mexico).
- Attention to the overexploitation of the Ogallala Aquifer through the formation of an Advisory Committee (USA).



Impact of the tropical cyclones

- Support to populations affected, with rapid reestablishment of water services and, in particular water supply, through specialized equipment centers and personnel (USA and Mexico).

Access to water and sanitation

- Increased coverage of the water and sewage networks to include 26.4 and 27.3 million of people, respectively, between 1990 and 2005 (Mexico).
- Advances in the treatment of residual waters; from 33.7 to 79.3 m³/s between 1996 and 2007 (Mexico).

Transboundary water basins

- 31% to 80% increase in the treatment of residual waters in the border zone between the USA and Mexico, through the establishment of the Ecological Cooperation Commission (COCEF in Spanish) and the North American Development Bank (BDAN in Spanish).
- Investments in Irrigation Districts which are supplied with waters from transboundary basins to increase the efficiency



in the use of water and reach the water delivery volumes agreed upon in the Treaty on Limits and Waters, 1944.

Political and Institutional Actions and Options

Globalization

- Improve the coordination and cooperation among the different federal, state and municipal agencies involved in water resources management, with the overarching aim of achieving a more integrated approach.
- At the level of transboundary basins, extend the coordination and cooperation between involved countries.
- Given the similarity of Mexico – culturally, economically, socially, politically and environmentally – to other sub-regions and countries in the Americas, increase its role as a “facilitator” between the South-American and North-American sub-regions, seeking to reinforce scientific and technological cooperation and development of capacities to achieve continental water security.

Population evolution, migrations and urbanization

- Take measures to reduce the effects of urban and suburban sprawling.
- Reduce the horizontal growth of urban centers, especially those located in the west and south of the USA and those in central, north and northwest Mexico.
- Develop strict measures to reduce water demand in the USA and in Mexico, so as to face water shortages as a consequence of population growth and climate change.
- Design cities incorporating environmental criteria so as to face these situations.
- Ensure that all inhabitants in the sub-region have access to safe water and sanitation services.
- Renew the infrastructure of drinking water supply and



drainage in Canada and the USA.

- Promote a more rational use of water after domestic use; apply new quality standards for drinking water; eliminate some specific contaminants, such as lead; and reduce non-point pollution sources.
- In Mexico, control water losses due to leakages in the distribution network.
- Seek sustainable water use practices, paying particular attention to overexploited basins and aquifers, and the financial sustainability of operating entities and the water and sanitation supply systems.
- Protect coastal waters.
- Incorporate an “ecosystem approach” for water quality taking into account the interrelationships between air, soil and water.
- Promote research and technological development to increase water productivity in rural areas, and a more efficient use of water in cities.

Climate change

- Establish strategies and actions to handle the effects of intense rains, floods, ice melting and droughts.
- Especially in Canada, design strategies to handle problems associated with the melting of polar ice and permafrost.
- In the USA and in Mexico, develop measures to reduce flood risks in vulnerable areas, including the development of infrastructure for river regulation, and land-use planning – so as to prevent the settling of the population in vulnerable areas – and of forecasting and alert systems for the coordination of the different government agencies involved in the prevention and monitoring of hydro-meteorological risks.
- In the transboundary basins of USA and Mexico, incorporate in the Treaty of Limits and Water specific measures in the event of droughts.
- Increase research and analysis activities of the different components of the hydrological cycle, both at the national level and within transboundary basins, so as to better



assess water availability and water quality, as well as the effects of climate change.

- Develop alternative sources of energy which, while contributing to the reduction in the emission of greenhouse gases, may reduce the cost of supply and purification services.
- Strengthen cooperation and knowledge and information exchange between countries in the sub-region particularly on risk-mitigation and vulnerability reduction to extreme climate-induced hydrological events.

Governance and management

- Promote more and better mechanisms for the participation of users and civil society.
- Emphasize access to information, transparency and accountability as instruments to prevent corruption and patronage.
- Establish new and more effective conciliation mechanisms before situations of conflict emerge; train specialized staff and generate adequate language and information.
- Design and implement environmental education systems – formal and non-formal - aiming to develop a new water culture based on the rational use of water resources.





6

CROSS CHALLENGES TO THE SUB- REGIONS



The Regional Process of the Americas – characterized by a high level of participation of a variety of stakeholders from every country of the region – has provided a series of valuable results from which interesting conclusions may be extracted, including the identification of common issues and major differences in relation to water challenges affecting the region.

In general terms, issues related to water resources in the region are practically the same in all of the four sub-regions. Differences appear only when the specific characteristics of each sub region are analyzed and evaluated, based on the magnitude and geographic location of each sub-region and its respective countries.

One of the most prominent common issues is the financial difficulties being experienced by every country in the region. The long history of economic problems of developing countries is now being further complicated by the current international financial crisis, which is impacting especially more developed countries. There is great concern on the effects that this situation will have on the flow of investments needed to meet all water challenges and, particularly, the basic needs of access to drinking water and sanitation.

Furthermore, increasing energy demand is affecting the region which, however, has some comparative advantages, such as its potential for hydroelectric production – through large or small initiatives – and the possibility of bio-fuel production.

The region has a wealth of natural resources - such as metals and timber – in high demand by the world markets. Likewise, several countries have favorable conditions to contribute to satisfying the world's growing demand of food. It is thus necessary to take the precautions needed to benefit from such economic potential, minimizing possible negative effects on the ecosystems and, in particular, on the quantity, quality, and dynamics of water bodies.



Several free trade agreements have been signed in the region. Although it has been proven that their implementation may help standardize environmental norms and regulations, there is, on the other hand, the concern on the implications of these agreements and the qualification therein of water as a marketable commodity, with the application of norms that rule commodities in general, without consideration - besides its economic value - of the particular social and environmental value of water.

Almost all countries in the region are experiencing remarkable growth of their urban areas, due primarily to demographic growth, to the migration of the rural population to the cities, to the transfer of migratory groups between countries, and to an increase in tourism. This creates serious problems related to water resources, including requirements for new surface or groundwater sources, an increased demand for drinking water and sanitation services which remains limited for many countries in the region, the emergence of new focuses of contamination, and the aggravation of the problem of urban floods.

Given the extension and the physiographic diversity of the region and the influence of the oceans and seas surrounding it, many different situations may occur as a result of climate change. Zones will be found in which the rise in temperature and, consequently, in evaporation, will be greater or less than the increase or reduction in precipitation, affecting the rivers' flow and the recharge of aquifers, and reaching extreme conditions of floods or droughts. Similarly, behavior of glaciers, snow, and ice will be altered; and sea level rise and consequent saline intrusion will be affecting most countries, particularly small island states. Climate change is also expected to increase the magnitude and frequency of the hurricanes impacting the Caribbean, the south of North America and part of Central America.

Although a general trend accepting the potential impacts of climate change in the region can be observed, there is still a perception which gives hierarchy to physical phenomena (hydro-meteorological) without adequately recognizing and accepting

responsibilities in relation to the socio-cultural and economic processes, including changes in land use, that increase vulnerability to natural events at the local, national and/or regional level, including those corresponding to regular climate variability. This conceptualization, within an inadequate legal and institutional framework, hampers tackling the problems of climate change in its proper dimension, making difficult the adoption of effective measures and policies that aim to forecast, hinder or solve the social, cultural, economic, institutional and/or legal issues that have greater incidence on the vulnerability of the region than climate change per se.





7

RECOMMENDATIONS AND PERSPECTIVES

The previous chapters reflect – for each one of the sub-regions – challenges and perspectives regarding water challenges, progress achieved in meeting said challenges, and recommendations regarding measures and political options for water resources management. From this set of recommendations, the following adaptive strategies to address “global changes”, within the context of water resources management, have been compiled for the Americas as an input to the Political Process of the 5th World Water Forum.

Globalization

- Promote processes for the regional harmonization of policies for the conservation and sustainable use of water resources.
- Promote incremental transfer of technology and horizontal cooperation activities between countries of the region.
- Foster the formulation of national policies on integrated water resources management and the revision of national water laws.
- Promote the construction of new hydroelectric facilities of distinct magnitudes, with the application of adequate technologies to reduce environmental and social impacts.
- Promote actions to reduce the environmental impacts of mining and intensive agriculture on water resources.

Population evolution, migrations and urbanization

- Foster the preparation and implementation of national plans for integrated water resources management (IWRM), in coordination with land-use plans.
- Take measures to reduce the effects of uncontrolled urban and suburban growth.
- Ensure in each country access to safe water (quantity, quality, continuity, reliability and accessible cost) and sanitation services.
- Promote the management of water demand, via incentives for conservation, efficiency of use and adequate waste management systems.
- Renew drinking water supply and drainage infrastructure systems, which, in several countries, are nearly outdated.
- Improve the operational efficiency of water supply and sanitation service providers, assuring their financial sustainability.
- Strengthen mechanisms and instances for meaningful stakeholder participation in decision making processes related to water.



Land use changes

- Establish policies for land-use planning (territorial ordainment) which will ensure the sustainability of natural resources.
- Implement national land-use plans that clearly account for the nexus between land use and water resources management.
- Establish economic instruments to promote forestation and reforestation, in conformity with national and international legislation.
- Apply measures for the recovery of degraded areas.

Climate change

- Approach risks related to water – such as floods, droughts, tropical storms, erosion and contamination – through an integrated approach to water resource policies and management.
- Incorporate climate change into water resources management policies.
- Consider, in risk management activities, three components: i) risk knowledge; ii) identification and implementation of structural and non-structural measures to reduce risks, and iii) “risk sharing”, involving all sectors of the population.
- Promote research activities to assess the different components of the hydrologic cycle, both at the national and transboundary levels.
- Strengthen and implement vulnerability studies and adaptation measures.
- Improve capacities for the forecasting and assessment of risks for extreme events and the formulation of mitigation measures.
- Integrate national emergency systems with those related to climate change and water resources management.
- Promote the reinforcement of legal and institutional frameworks on water and climate change, according to the provisions of the United Nations Framework Convention on Climate Change.
- Support coordinating mechanisms at the regional level for the development of common strategies for adaptation to climate change impacts.
- Develop and share awareness and education programs related to the problem of climate change and its associated impacts.

ANNE XI

INSTITUTIONS INTEGRATING THE AMERICAS REGIONAL CONSORTIUM

Americas Regional Consortium		
Institution	Acronym	Reach
UN World Water Assessment Programme	UN WWAP	Global
World Bank	WB	Global
UNESCO - IHE Institute of Water Education	UNESCO - IHE	Global
World Water Council	WWC	Global
Gender Water Alliance	GWA	Global
The Nature Conservancy	TNC	Global
UN - Habitat "Latin-American and Caribbean Program"	ONU - Habitat	Global - Regional
Global Water Partnership	GWP	Global - Regional
Organization of American States	OAS	Regional
International Hydrological Programme of UNESCO for Latin America and the Caribbean	UNESCO - IHP/LAC	Regional LAC
Caribbean Environmental Health Institute	CEHI	Caribbean
Inter-American Development Bank	IADB	Regional
United Nations Economic Commission for Latin America and the Caribbean	ECLAC	Regional
Inter-American Association of Sanitary and Environmental Engineering	AIDIS	Regional
Institute of the Americas	IA	Regional
Inter-American Water Resources Network	IWRN	Regional
Inter-American Institute for Cooperation on Agriculture	IICA	Regional
Yoga del Sol	YS	United States
Central American Integration System - Regional Committee on Hydraulics	CRRH-SICA	Regional - Central America
National Water Agency	ANA	Brazil
Brazilian Congress - Committees on the Environment	CMADS/House, CMA/Senate	Brazil
Brazilian Water Resources Association	ABRH	Brazil
Applied Research Institute on Economics and the Environment	Instituto Ipanema	Brazil
British Columbia Environment	BC Environment	Canada
Costa Rican National Assembly	CRNA	Costa Rica
Asociación Andina de Empresas de Servicio de Agua Potable y Alcantarillado	ANDESAPA	Ecuador-Andes region
National Association of Water and Sanitation Utilities	ANEAS	Mexico
National Water Commission	CONAGUA	Mexico
American Water Works Association	AWWA	United States
American Society of Civil Engineers - Environmental and Water Resources Institute	ASCE - EWRI	United States
U.S Army Corps of Engineers	USACE	United States
American Water Resources Association	AWRA	United States
World Wildlife Fund US Chapter	WWF - US	United States
International Union for Conservation of Nature	IUCN	Global
Water Resources Institute of Argentina	IARH	Argentina



ANNE X II

MESSAGE OF FOZ DO IGUA SSU

This message will be sent to the 5th World Water Forum from the participants in the Water Forum of the Americas in Iguassu Falls, Brazil. The Water Forum of the Americas was the culmination of the Americas Regional Process in preparation for the 5th Forum. The event included more than 250 people from different sectors of water management throughout the Americas. Participants included Ministers of State, Governors, Mayors, Parliamentarians, international organizations, academics, the private and public sectors, non-governmental organizations and river basin committees. Participants included the Ministers of Environment from Brazil and Turkey.

The following recommendations were produced during interactive sessions involving all the participants:

- Promote social inclusion and the eradication of poverty through universal access to water supply and sanitation as well as through the productive use of water, by means of the usage of hydroelectric power, irrigation for food production, transportation, tourism and recreation, within a sustainable development context.
- Institutional strengthening of management bodies and promotion of internal and external integration of water resources policies with other sectoral policies.
- Incorporate the principle of common but differentiated responsibilities in water resources management, and the need for technology transfer and additional financial resources, in particular in strategies to face climate change.
- Because of the transversality principle, water management must be at the core of public policy in all three phases: planning, implementation, and control.
- Within specificities of each region, one should consider the multiple use of water on an efficient and rational basis, incorporating environmental conservation, protection and reclamation as necessary actions toward the improvement of water availability.
- Water sustainability requires good regulation and economic incentives.
- Promote agreements on the management of transboundary aquifers and basins.
- Decentralized, participative and integrated management of water resources with local stakeholders and indigenous and traditional communities, taking into account a gender perspective.
- We need to promote cleaner production by making investments in applied research, technological development and capacity development.
- The challenge of water management in small islands (SIDS) and the wider Caribbean region must be recognized and receive special attention due to their vulnerability to global climate changes.
- Support capacity development to help cope with the impacts of climate change.
- Need to raise awareness about water with training and education for everybody at different socio-economic levels, connecting people with the basin where they interact.

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