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Regional Policy
Dialog in Latin
America and the
Caribbean

Challenges and
Opportunities for
Water-Based
Adaptation to
Climate Change:
Elements for a
Regional Agenda



Disclaimer:

The organizations participating in the Regional Policy Dialog in Latin America and the Caribbean: Challenges and Opportunities for Water-Based Adaptation to Climate Change have contributed to coproduce this document. As such, the content included does not necessarily reflect the official position of these organizations.

Moreover, the views expressed through the content of this document represent an effort by the editors and authors to synthesize the most relevant aspects of the debate generated during the Regional Dialog process.

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Prólogo

This document represents a coordinated effort among several institutions and organizations in the Latin America and the Caribbean region to present the results of a joint reflection on the issue of water-based adaptation to climate change as part of a Regional Policy Dialog process. The main purpose of this Dialog is to communicate to politicians and decision makers – both within the water community and from other public policy areas relevant to the topic - and other actors involved, a series of key messages and recommendations that enable them to define, in an informed manner, public policies and corresponding actions on climate change adaptation.

This document has incorporating comments and suggestions obtained through presentation and discussion in three international events. The first event in this process was the dialog workshop “Challenges and Opportunities in Climate Change Adaptation in the Water Sector: Elements for a Regional Agenda”, held in Mexico City on 8-9 June 2010. The second event was the XI Conference of the Ibero-American Water Directors (CODIA) from 3-5 August 2010, from which inputs were gathered from this important body of water resource managers in the region. The document was presented at the third event, at the Panel of Experts and Ministers in Adaptation to Climate Change in Latin America and the Caribbean during the World Water Week in Stockholm, Sweden on September 7, 2010; and has been

further developed in this process of reflection and collaboration, through workshops and meetings that were held until December 2010.

The results of this dialog to date are reflected in this version of the document to be presented on December 3rd as part of the Dialogs for Water and Climate Change (D4WCC), an event associated with the COP16 to be held in Cancun, Mexico. This document is still under construction and is open to comments and modifications. It is planned, in particular, to provide examples related to the key messages through case studies, which could inspire the replication of successful actions throughout the LAC region.

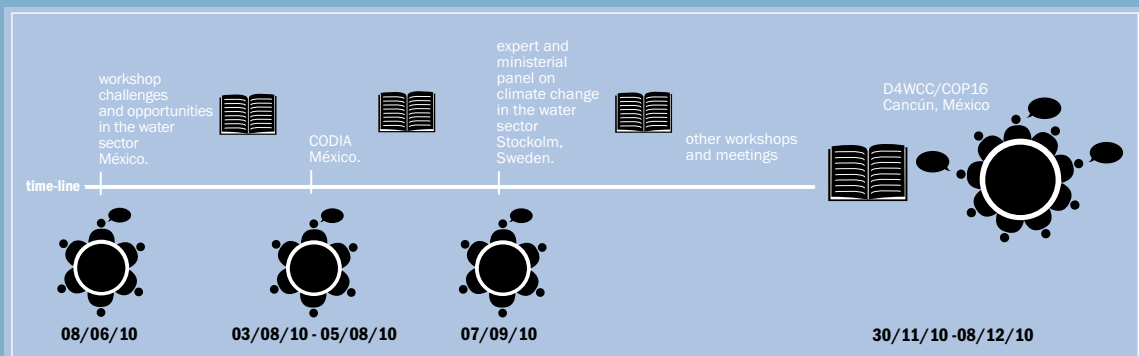
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We would like to thank all the institutions, organizations and individuals who participated in these events, whose input, presentations and results can be found on the website:

<http://www.conagua.gob.mx/aguayCambioClimaticoLAC/>.

Likewise, institutions and organizations interested in monitoring the efforts of this dialog can find news and updates through this page.



Introduction: Importance and Objectives

Since the beginning of the 21st century, climate change has become one of the greatest challenges facing humanity in regard to the sustainability of our civilization and our planet's environmental balance, clearly imposing the need of a process of adaptation to this phenomenon.

It is important to note that recently UN Water, as well as other newly created groups and coalitions, have stressed the importance of water-based adaptation to climate change. However, most of these reports and coalitions have not necessarily placed a special focus on how to go about adaptation in the context of developing countries. In the region of Latin America and the Caribbean (LAC), for example, there is an overriding need to understand the potential impacts of climate change on water resources management, in order to begin designing strategies for adaptation. This implies, to a large extent, reducing vulnerability to the impacts of current climate variability, and taking effective measures to prevent and respond to future impacts.

Therefore the process of adaptation to the effects of climate change is particularly important in water resources management, since water is the primary means through which climate change will impact upon the population and the environment. This adaptation process should include a coherent and effective management of water resources so as to achieve multiple objectives, such as management and preservation of water for the provision of water services and sanitation for all, efficient use of water for irrigation and food production, ecological use of water for the protection of ecosystems and biodiversity, improved use of water for hydropower generation, strengthening and close coordination between water planning, land use and urban planning in order to promote economic development and reduce risks to human settlements arising from extreme hydro-meteorological events.

A key component in this process of adaptation is

to reduce the initial gap between current scientific knowledge, and decision making processes and institutions in the water community in collaboration with civil society, and under the context of a new water governance. To close this gap, it is essential to enhance society's understanding of the implications of climate change, and the empowerment of a continuous dialog process among high-level experts, civil society organizations and decision makers in relevant institutions in the region, in order to move forward with a joint effort in capacity building and institutional development.

It is clear that climate change represents a new and complex challenge for integrated water resources management globally. As a result, it is increasingly important to generate greater awareness, understanding and ability to adapt to climate change in the water community. This document is the outcome of a Regional Dialog process on the subject and has the aim of communicating a set of 'key messages' on issues that have been highlighted during this process. Furthermore, the document seeks to be a synthetic compilation of some of the most important aspects on the subject, emphasized during this dialog, in order to be communicated effectively to different audiences, aiming to encourage reflection on priority matters to be addressed on water-based adaptation to climate change and at the same time, begin to facilitate inter-sectoral interactions with the variety of social actors involved. This document should still be considered a draft open to discussion during the follow up events that are part of this continuing Regional Policy Dialog.

Similarly, it should be noted that given the prevailing funding limitations, it will be essential to facilitate access of institutions in charge of water resources management to the financial resources that are necessary to implement adaptation actions on water issues.

¹UN Water, Climate Change Adaptation: The Pivotal Role of Water, Geneva, Switzerland, 2010. http://www.unwater.org/downloads/unw_ccpol_web.pdf Water and Climate Coalition.
²Water and Climate Change Towards COP-16, Bonn, Germany, 2010. <http://www.stakeholderforum.org/fileadmin/files/wccstatement.pdf>





Key Messages:

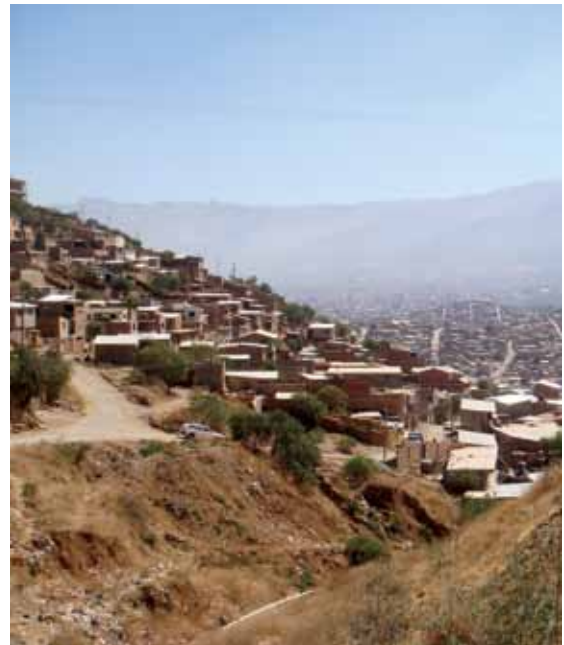
01_ It is important to recognize the imminence and importance of the impacts of climate change on water resources.

It is important to address the challenges of climate change on drinking water systems, sanitation and wastewater treatment.

The accumulated scientific evidence to date suggests that climate change implies changes in precipitation and runoff patterns in the LAC region, as well as an increase in the magnitude and frequency of extreme hydro-meteorological events such as droughts and floods. Thus, it is important to address the institutional, socio-political, cultural and funding challenges and opportunities that societies of the region face to adapt to this phenomenon.

The growing body of evidence suggests that climate change could have important consequences on the hydrological cycle and this on the operation of infrastructure associated with water storage, flow regulation and distribution, with impacts on the provision of safe water and sanitation, and supply for irrigation and industrial usage. For example, in densely populated cities, the occurrence of more frequent and intense rainfall can overload the capacity of stormwater drainage systems and wastewater treatment facilities. Also, increases in sea level in coastal areas could lead to the salinization of water sources provided by coastal aquifers. Similarly, increased flows and runoff endanger thousands of villages located in areas of high risk.

Changes in river flows may also have a direct impact on hydropower generation, which is a primary energy source in many countries of the region. Thus, the reduction of water for hydropower generation (or increased fluctuations in river flows)



of rural communities living off agriculture, and lead to sedimentation in reservoirs, affecting the operation of multipurpose facilities and the sustainability of watersheds. Furthermore, the extreme variability and/or reduction of water sources could increase rural migration to peri-urban areas and more generally, exceed the functional limits of the infrastructure and institutional capacities to manage water systems in all sectors and even beyond the borders of our countries.

Climate Change could increase the demand for irrigation due to the combination of decreased precipitation and increased evapotranspiration, putting additional pressure on irrigation systems which in many cases already have levels of availability of water that are lower than required.

could reduce the stability and reliability of power supply, with consequent effects on the economy. Soil erosion due to increased rainfall, deforestation and land use changes can affect the livelihoods

This situation, combined with increased competition among users and between nations over limited water resources could lead to hostility and mistrust between them, increasing the potential for conflicts. It is important to note that there are already some tools that can be used to respond to these situations, such as the 1997 UN Convention on the Law of Non-Navigational International Watercourses which promotes cooperation between coastal states to respond to environmental disasters such as droughts and floods and adapt their strategies for water resources management to climate change impacts. It also allows those states to implement transboundary adaptation measures

01_

The pressure on water supply and sanitation can have a wide range of adverse effects on public health. The reduced availability of irrigation water could threaten food security, rural development, and economies of countries that depend heavily on the agricultural sector.

through integrated and sustainable management of international watercourses.

It is worth noting that the extent to which the development and management of any water resources system will be affected by climate change will depend on its vulnerability and internal capacity - socio-political, institutional, economic, technological, cultural - to adapt. Potential impacts of climate change are real, and may extend far beyond what is known as the “water box”, i.e., the water community and its own management tools. For example, the vulnerability in some parts of the region increases as a result of the current trends of changes in land use and deforestation, which make it difficult to establish policies that promote sustainable productive activities in watersheds and ensure the availability of water resources with respect to both quantity and quality.

In most countries in the LAC region, water use has increased significantly in recent decades. It is expected that patterns of water use will continue to change in response to climate and management activities themselves. The latter includes not only the infrastructure and technology, but also the institutions that govern water use within sectors (e.g., water rates), between sectors (for example, water markets), and even across international borders (e.g., watershed boundary agreements and the recognition of virtual water), and more general governance systems, which must also evolve to address climate change.



Adaptation to climate change poses major institutional challenges in the field of consensus building and conflict resolution.

In the future, climate change could affect other sectors that use water, in the quantity and/or the desired quality (on the demand side) and/or the extent to which demands are met (on the supply side).

02_Adaptation to climate change should be incorporated as a key strategic element in Integrated Water Resources Management.

As water demand grows in the LAC region, driven by population growth, economic development and changing consumption habits of the population, depletion of water resources caused by overuse and pollution of sources will also increase, especially if necessary measures to counter the unsustainable use of water resources are not taken. This situation may be exacerbated by climate change, which is likely to increase the pressure on the use of water resources.

Furthermore, the lack of integration of climate change adaptation considerations to in the field of IWRM hampers efforts to increase the 'socio-political' adaptation capacity, through which there is a real risk of increasing vulnerability of societies to potentially devastating impacts. This ability to 'socio-politically' adapt must be built not only in regard to the governance of water supply and sanitation systems, but also for irrigation, industrial, aquaculture and hydroelectric power generation. Similarly, coordinated efforts of adaptation to climate change should be promoted in regard to the protection and conservation of natural areas such as forests, wetlands and mangroves, which play a basic role in supporting the hydrological cycle and protecting against extreme hydrometeorological phenomena. The issue of climate change adaptation, in general, requires a comprehensive strengthening of water governance systems in a crosscutting manner to other sectors of public policy.

Understanding and preparing for the impacts of climate change on the hydrological cycle is fundamental to achieving the Millennium Development Goals (MDGs) in areas like poverty alleviation, gender equity, health, nutrition, access to water and sanitation and power generation and industry, among others.



For the purposes of IWRM, adaptation measures are critical to achieving sustainable water use in the context of climate change and where there are multiple and growing demands for water. Since the trend is for climate change to aggravate existing pressures on water resources, IWRM provides effective management mechanisms that consider, in addition to ensuring the quality and quantity of drinking water, sustainable management of both surface and groundwater sources and their equitable distribution to all users and applications, linking and prioritizing key environmental and social needs with the quantities/qualities required for agriculture, power generation and industrial and domestic uses.

In this regard, it should be a priority for countries in the region to develop capabilities that make the implementation of IWRM both feasible and effective, according to the specificities and capacities of each country and each of their watersheds. It is important to note that the impacts of climate change on the water cycle do not follow national and geopolitical borders. Therefore, whether between states, departments or between neighboring countries, adaptation measures will increasingly require the creation (or updating) of transboundary agreements (intra-or supranational) to allow consideration of additional pressures and their potential impact on local, national, regional and ultimately global water security. Additionally, it is necessary to consider differences within the LAC region, as the required adaptation measures depend largely on local conditions (latitude, altitude, proximity to the coast, population density and other factors) that vary significantly over the region.

Similarly, in many cases, government institutions responsible for land management and land use planning and management of water resources are separate and often uncoordinated, so it is essential that land resources are articulated within plans for regional development and natural resources which are agreed to by the relevant institutions, to ensure

a more holistic and multidimensional approach to sustainability. For example, in many parts of the region, it is quite common to encounter current agricultural practices that cause a significant loss of rainfall water and the subsequent decrease in recharge capacity of aquifers.

In light of climate change, it is necessary to provide greater support to farmers and growers to improve irrigation technologies and lessen the tension on surface water and groundwater resources. Above all, we must recognize that, just like the energy sector, the agricultural sector is facing its own crisis. Efforts to resolve both crises need to be incorporated into updated IWRM approaches where adaptation to climate change is included.



03_ It is important to strengthen the 'environmental dimension' in water resources management in the region as a climate change adaptation measure

Water is a natural resource that is essential to sustain life on the planet, it is part of all living matter and ecosystems, and at the same time is essential for the development of societies. It is important to recognize that indicators on water resource management in the region show, in general, that the current management of water resources is not sustainable.

Throughout the LAC region, there are significant deficiencies in wastewater treatment, which create very negative impacts on the environment and health of communities.

Should the current trend continue, the negative effects on nature, human health and socio economic development, will undoubtedly result in serious socio-environmental tensions, which will intensify under adverse conditions produced by climate change.

The transformation and destruction of aquatic and terrestrial ecosystems, overexploitation and pollution of surface and groundwater resources are major problems to overcome in order to ensure sustainable use of water resources in our region. It is important to preserve these resources, and to this end it is necessary to preserve the integrity of the hydrological cycle, recognizing it as a basic condition to implement efficient and effective climate change adaptation strategies.

The impacts caused by climate change on the natural dynamics of ecosystems and watersheds pose new challenges to be faced by the water community, which cannot be served if the environmental dimension of the problem and the care of critical ecosystems for the hydrological cycle are ignored. On the other hand, it is important to note that adequate risk management approaches under the conditions expected with climate change must be oriented to prevent disasters and to direct actions to promote water security throughout the region. This involves the preparation of development plans in accordance with the limits imposed by nature and emphasizes issues such as ecological-land management systems, the implementation of

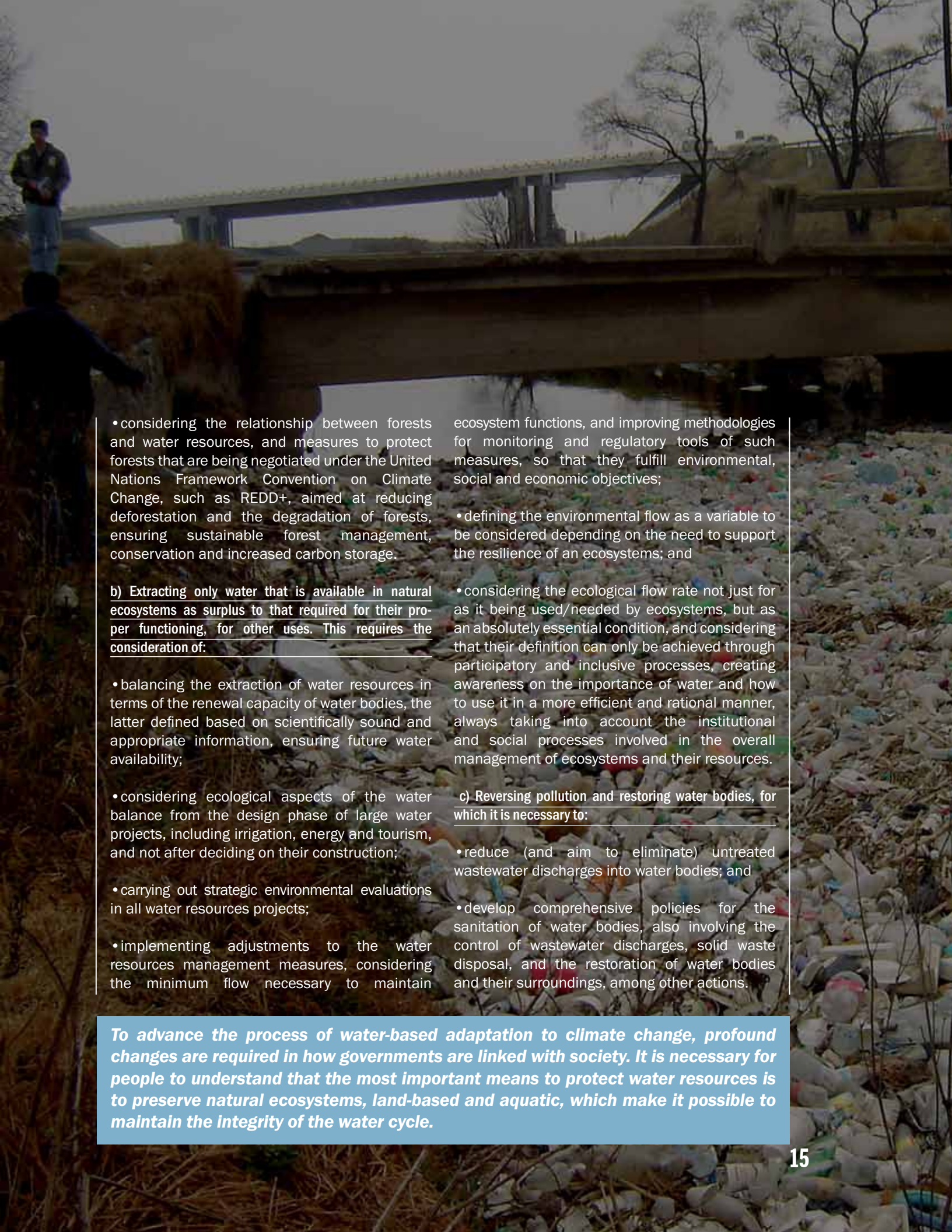
ecological flow rates, restoration of ecosystems and maintenance of their natural dynamics.

It is also possible to design and implement actions such as drought prevention and management, and water security planning, which consider balancing the extraction of water with the available supply in a sustainable manner. These plans could only be effective if designed and implemented with social participation and commitment of all relevant authorities, including water and other sectors of public policy.

In designing adaptation strategies in water to address the conditions expected as a result of climate change, it is important to consider environmental criteria such as:

a) Conserving the key ecosystems for the water cycle, which implies:

- undertaking and strengthening measures to ensure that priority land-based and aquatic ecosystems, which are associated with the maintenance of the hydrological cycle, are no longer being altered and destroyed;
- increasing the land area under some form of protection, which that will guarantee the maintenance of hydrological and environmental services to reduce the vulnerability of populations;
- halting deforestation, harmonizing forest and agricultural development with environmental policies, and



- considering the relationship between forests and water resources, and measures to protect forests that are being negotiated under the United Nations Framework Convention on Climate Change, such as REDD+, aimed at reducing deforestation and the degradation of forests, ensuring sustainable forest management, conservation and increased carbon storage.

b) Extracting only water that is available in natural ecosystems as surplus to that required for their proper functioning, for other uses. This requires the consideration of:

- balancing the extraction of water resources in terms of the renewal capacity of water bodies, the latter defined based on scientifically sound and appropriate information, ensuring future water availability;
- considering ecological aspects of the water balance from the design phase of large water projects, including irrigation, energy and tourism, and not after deciding on their construction;
- carrying out strategic environmental evaluations in all water resources projects;
- implementing adjustments to the water resources management measures, considering the minimum flow necessary to maintain

ecosystem functions, and improving methodologies for monitoring and regulatory tools of such measures, so that they fulfill environmental, social and economic objectives;

- defining the environmental flow as a variable to be considered depending on the need to support the resilience of an ecosystems; and

- considering the ecological flow rate not just for as it being used/needed by ecosystems, but as an absolutely essential condition, and considering that their definition can only be achieved through participatory and inclusive processes, creating awareness on the importance of water and how to use it in a more efficient and rational manner, always taking into account the institutional and social processes involved in the overall management of ecosystems and their resources.

c) Reversing pollution and restoring water bodies, for which it is necessary to:

- reduce (and aim to eliminate) untreated wastewater discharges into water bodies; and
- develop comprehensive policies for the sanitation of water bodies, also involving the control of wastewater discharges, solid waste disposal, and the restoration of water bodies and their surroundings, among other actions.

To advance the process of water-based adaptation to climate change, profound changes are required in how governments are linked with society. It is necessary for people to understand that the most important means to protect water resources is to preserve natural ecosystems, land-based and aquatic, which make it possible to maintain the integrity of the water cycle.

04_ In the development of water-based climate change adaptation policies, it is important to explicitly consider equity and poverty alleviation measures.

It is important to link climate change adaptation actions with land use and urban planning to reduce the vulnerability of informal settlements, and in some cases, consolidated areas of cities, as water availability can reach limits beyond those considered safe. Urban water management under climate change presents new challenges that must be addressed.

The management and development of water resources is entrusted with achieving water security, i.e., the ideal condition of existence of reliable water resources in quantity and quality acceptable enough to sustain the development process, social livelihood systems, and public health, as well as acceptable levels of risk exposure to extreme and uncertain hydrometeorological phenomena. It is generally accepted that an effective and efficient management and the development of water resources play a crucial role in the economic development of countries in the region, and when certain specific redistributive measures and attention to poverty are introduced in the institutional context, they also directly assist in creating opportunities for all and more specifically for poverty alleviation.

In some parts of the region, this implies that there will be greater competition for water resources, perhaps raised to the level of social conflicts, and in other cases putting vulnerable populations under conditions of flood risk and natural disasters that are socially unacceptable. Water resources

Climate Change will negatively affect the achievement of water security, as it will impact both the supply and demand of water resources, through an increase in the severity and incidence of extreme weather phenomena such as droughts and floods, complicating further the processes of development and management of water resources.

management and development institutions throughout the LAC region need to be more aware of this increased risk and start developing the institutional capabilities that are required to achieve much sought-after water security, under conditions of variability and climate change.

It is now widely recognized that the impacts of climate change across the region generally fall disproportionately on those countries, regions and social groups that are less able to cope with them. In this sense, the vulnerability to extreme weather and climate phenomena is directly related to levels of development and more particularly to the conditions of poverty and marginalization. Similarly, it is important to emphasize that it is expected that climate change will continue to undermine development efforts throughout the region and further exacerbate poverty. Therefore, there is a pressing need for water resources managers to understand the differential burden that climate variability and change impose on the poorest and most marginalized populations of the region, and proceed to design and implement water-based adaptation measures to help reduce the vulnerability of these populations.

The management and development of water resources in the region will only meet the challenges of water security and development objectives through a comprehensive long-term adaptation strategy. This strategy clearly has to



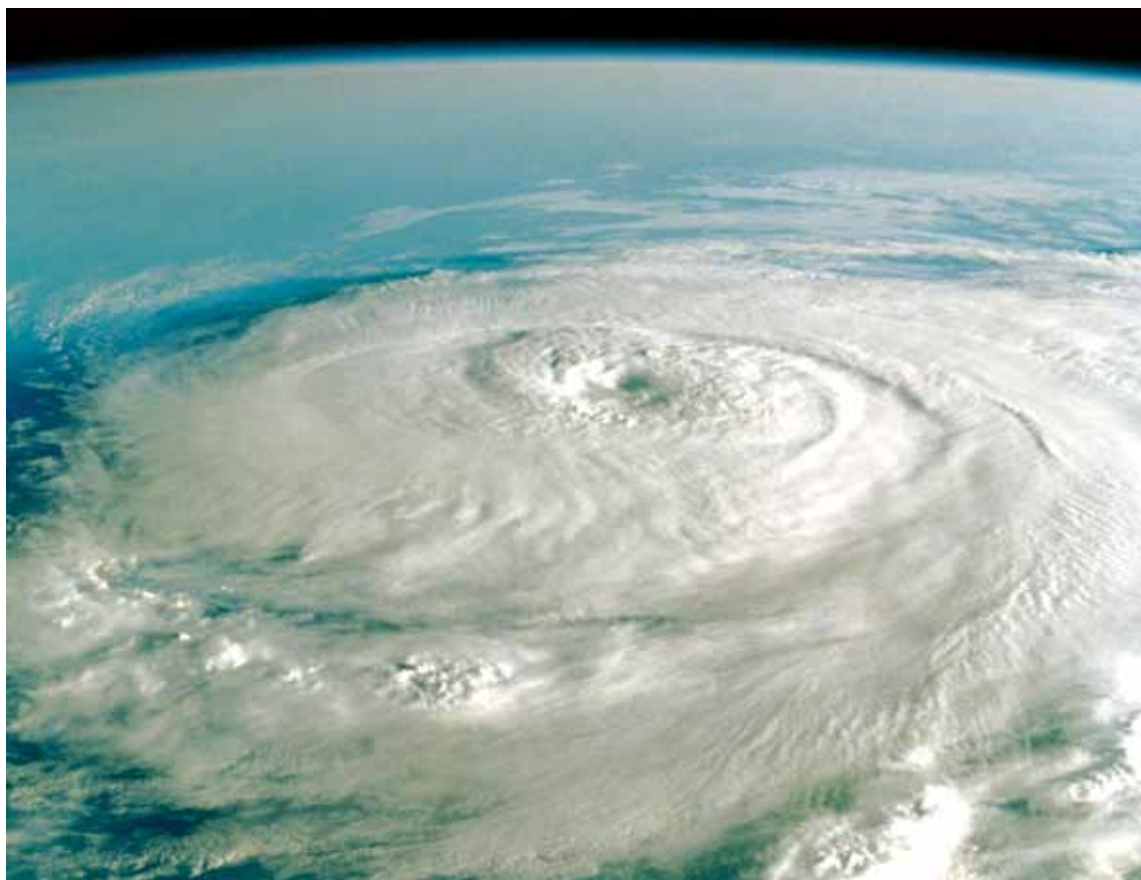
support the overall objectives of re-distribution and poverty alleviation in order to reduce vulnerability. This requires taking a number of relevant measures, such as:

- including explicit criteria of equity and poverty alleviation in the process of policy design and implementation;
- developing and implementing methodologies to properly assess and mitigate social impacts;
- developing risk and vulnerability maps using an inclusive and participatory approach;
- conducting climate change risk and vulnerability mapping in an inclusive and participatory fashion;
- relocating settlements that have established in risky areas;
- linking efforts on adaptation to other areas of social development policy, and
- generating the political will to address these priorities.



Peri-urban settlements in medium to intermediate size cities can be severely affected by changes in the availability of water resources as a result of climate change.

05_Hydro-climate information systems in the region must be strengthened so that they can be used to support timely and preventive climate change adaptation measures.



Currently, the planning and management of water resources in the LAC region incorporate climate information in a stationary fashion, i.e., not including the effects of changing climatic variables such as temperature and precipitation rates over time. This model of planning and management needs to evolve to meet the demands of water resources, in a context of variability and climate change.

The demand for water resources has grown in such a way that it is increasingly difficult to satisfy it equitably and sustainably, a situation that, added to the effects of climate change, would appear to be leading some regions to suffer from the presence of substantial droughts, increasing the competition and conflict between different uses of water. This problem has reached the point where, in some parts of the region, water resources are so scarce that sustainable planning and management have been considered

over the last few years as an element of national security. On the other hand, a relative increase has been observed in the frequency and magnitude of storms and floods, which frequently bring about significant human and material losses. To such a point that decades of development efforts may be adversely affected in a matter of hours. The frequency and magnitude of extreme climatic events in the region has increased, causing severe human and materials losses.

The authorities in charge of water resources throughout the region recognize that nowadays, to a greater or lesser extent, appropriate planning and management of water resources requires use of climate information, placing special emphasis on medium- and long-term climate projections. In this sense, it is not only a question of generating information on the quantity of water resources available to satisfy social and ecological demands and to protect the most vulnerable communities, but also of aspects of quality, which is affected by climate factors.

The majority of the region's information and climate prediction systems currently present some limitations when the intention is to use them effectively as a decision-support system in a context of uncertainty generated by climate change. Sustained effort is thus required in order to improve these information systems in such a way as to make them useful in the design and implementation of climate change adaptation measures. In this respect, the lack of capacity to produce and use seasonal climate forecasts or climate change scenarios stems largely from a limited number of specialists in the area and the lack of corresponding equipment. This situation should evolve so that priority objectives can be achieved, such as:

- establishing climate predictability at regional and national levels;

- producing relevant information for decision-making; and

- inducing in the information users a culture of climate knowledge to take preventive and adaptive measures, as in any risk management scheme.

It may be observed that throughout the region, descriptive climatology has generally been limited to the calculation of statistics reported in yearbooks or used to explain or justify disasters in the hydrology and civil defense sectors. There are only limited efforts to present explanations of why regional climate conditions vary from one year or decade to the next. However, it is now known that phenomena such as El Niño/Southern Oscillation are pivotal to understanding a dry or rainy, warm or cold season. Even with this understanding, progress in the region in terms of prevention based on climate predictions is limited, thus increasing our vulnerability to climate change.

Global climate change scenarios suggest that the conditions in the Pacific Ocean will tend towards El Niño characteristics, meaning that reducing the vulnerability to this climate condition constitutes an appropriate regional adaptation measure for various sectors. However, actions based on climate information also require an appropriate communication process in which government and society work hand in hand.

In this regard, public policies in the region need to be revised to:

- **facilitate the current generation, implementation and reporting of climate information;**
- **improve the technological capacity and financial and human resources for monitoring and climatological analyses, and**
- **support the transition of societies from a culture of attention / reaction to a culture of disaster preparedness and prevention.**

06_The LAC region should continue the ongoing process of institutional capacity development for water-based adaptation to climate change.

Managing water resources in a context of climate change raises new and complex challenges to existing institutional arrangements. It is therefore necessary to promote efforts to develop laws, rules, policies and institutions capable of facing these challenges. Some institutional design principles apply, such as the strengthening of interdisciplinarity and the crosscutting character of the public policy process, greater openness to social participation and multistakeholder dialog in the process of adaptation, improvements in cost analysis, more effective ways to achieve greater efficiency and equity in decision-making, long-term planning and the strengthening and implementation of IWRM.

These “adapted” water management institutions should be able to improve the understanding of climate development in their areas of intervention and to ensure that the tasks of meteorological observation and climate prediction are done with the scale and frequency needed.

A key strategy in the process of water-based adaptation to climate change is the definition of sound policies that, as well as responding to climate change impacts in water resources, also determine the rules of participation and allocation of roles and responsibilities in the process. These policies should also create



the right incentives and environment for their successful implementation, and should be designed to promote shared responsibility between society and government in designing and implementing water-based climate change adaptation measures.

The strategies identified through this regional policy dialog process complement “top-down” approaches with “bottom-up” ones, from the following lines of action:

- identify public policies, legal frameworks and legislative instruments to mainstream adaptation to climate change, in the context of local water resources governance systems;
- consider actions to reduce vulnerability, decrease risk and generate water adaptation strategies in national, regional, state and municipal development plans;
- establish transparency and accountability in the use of financial resources by these institutions.
- create regional and sub-regional bodies, to strengthen partners for integrated hydro-climatic risk management.
- clearly define the role of local governments/municipalities in the process of adaptation to climate change in order to help them to strengthen capacities, establish the rules and channel greater local investments;
- create institutions specializing in risk management, of a cross-sectorial nature, professional staff, a long-term vision and a high ranking in the public sector hierarchy of each country in the region;
- implement integrated strategies that deliberately correct the various sources of risk, rather than measures that cause problems of fragmentation and thus avoid the economic, environmental and social management that some water systems have caused;
- increase the participation of the environmental

sector in hydro-meteorological risk management and in the different levels of government;

- the vulnerability of systems is determined by local conditions and the degree of exposure to climate risks, so it is essential to strengthen land management actions, both rural and urban, to prevent the poorest being located in the most vulnerable marginal areas, which are the least protected against droughts and floods;
- strengthening institutions in the implementation of legal systems that have sufficient strength and authority;
- strengthen management tools and environmental regulation to ensure the implementation of the strategies articulated for achieving water security;
- establishing transparency and accountability in the use of financial resources by the institutions involved in prevention, mitigation and emergency response;
- promote the cadastre of water users in the region as well as tools for monitoring and enforcement of these users;
- build and strengthen the interface between scientific knowledge and public policy;
- establishing multisectoral collaboration work between water authorities and responsible communities, and considering the community management of water as a key element in the care of watersheds and aquifers, as well as for handling and distribution;
- create synergies between water policies on climate change on water and other environmental sector policies, the social and economic sectors;
- integrate adaptation to climate change options into other current policies; and
- adapt, strengthen and implement the legal framework to promote integrated water resources management within it and to consider adaptation to climate change, taking into account international experience.

It is important to strengthen water resources management institutions for increased social participation in the process of adaptation to Climate Change.

07_ Water resources infrastructure needs to be developed and adapted to respond to climate change impacts and to the sources of financing available for this purpose.

A priority for the region is a diagnosis of the capabilities of existing and planned water resources infrastructure to respond to the needs posed by climate change, and to channel the necessary resources so that this infrastructure can meet the objectives of water security, with special attention to the most vulnerable populations and ecosystems. This situation requires an increased focus on investment, so it will be necessary to procure additional sources of funding.

Watersheds provide important services such as the catchment and drainage of water, nutrients and sediments, and secure the livelihoods of life on the planet. This natural functioning depends on a healthy physical state of the environment or natural infrastructure, which represents major operational benefits for IWRM, such as water supply, assimilation of pollutants, protection against extreme events, livelihoods of vulnerable communities (water and food), good management practices, land conservation and use and the support needed to maintain and increase vegetation cover, a measure of great importance in climate change mitigation and adaptation strategies.

level and temperature rise as a result of climate change. The negative effects that could be generated include a decrease in the quantity and quality of drinking water sources, loss of agricultural productivity, harmful disruptions to biodiversity and an increase in the frequency of extreme hydrometeorological events, among others, all with potentially significant implications for the natural ecosystems and economies of those areas. Faced with these implications, it is vital that there be adequate infrastructure protection and early warning systems in these areas.

Given the magnitude of the impacts of climate change in the region and the required financial resources for adaptation, it is necessary to optimize the use of these resources. In order to promote social and economic development in the region, it is not sufficient to only consider the efficient use of financial resources for adaptation projects, but also to incorporate the prioritization criteria of social cost-benefit analysis. However, it is necessary for there to be an enabling social, economic and environmental scheme, which aims to eliminate perverse subsidies (which induce the waste of water and energy), and to promote payment for

Strengthen the capacity of drinking water and sanitation utilities in the region is a fundamental task in the process of adaptation to climate change.

The challenge of developing infrastructure for water-based climate change adaptation is to focus its conception, design and construction to complement these environmental services, thereby enhancing the resilience of water systems and the preservation of the hydrological cycle. Another challenge related to new water infrastructure is the need to design it in such a way that it is “resistant” to climate change in that it continues to meet its objectives under the influence of climate change and variability of water.

For instance, coastal areas in the LAC region, and Small Island Developing States (SIDS) in particular, are especially vulnerable to the anticipated sea



environmental services and compensation for negative environmental externalities to mitigation.

In the LAC region, there is a growing effort to adapt sources of international funding to the needs of vulnerable countries and regions. However, a continuing challenge is to channel resources for climate change adaptation to rural and remote populations. Funds from the international development community, national governments and the private sector for climate change adaptation have a strong focus on infrastructure investment, under federalized or centralized schemes. The participation of local governments is key in terms of water-based adaptation measures to climate change, but they rarely have

the financial resources and capacities needed. It is therefore necessary to develop measures and actions to make it possible for the governments – both central and local – of developing countries to get access to adaptation funds and other resources, available under the UNFCCC. This should include the possibility of structuring national and regional proposals for voluntary market mechanisms in the field of climate, thus attracting the incorporation of the private sector to climate change projects. In the same way, ongoing efforts should be continued to directly fund initiatives from organized civil society and platforms/coalition that work on the issue and have a direct impact at the local level in reducing vulnerability and community development.



In medium and large urban settlements, it is of particular relevance to accurately assess the capacity of stormwater drainage systems to cope with extreme events, and possible local reuse.

08_ The process of water-based adaptation to climate change offers important challenges in terms of social organization, implying the need for sustained efforts to be made to establish effective coordination, collaboration and social participation mechanisms.

Climate change is a complex problem that represents a new challenge for the management and development of water resources. It implies a real necessity for close coordination, not only between the different levels of government, but also between the wide range of relevant stakeholders, such as grassroots communities, civil society organizations, research and development centers, international agencies and development banks, among others.

Thus, it is clear that an effective and sustained process of water-based adaptation to climate change cannot be considered the sole responsibility of the governments of the region, but also requires an organized involvement of a broad and genuine social spectrum of participation throughout the design and implementation processes of relevant policies.

This necessity for coordination, collaboration and participation required to face up to climate change has led to new and preferable forms or practices in governance and social organization, such as 'multi-level governance' and 'cooperative governance', being used in various public policy sectors relevant to the issue – including the water resources sector – to face climate change. These forms of governance aim to:

- support the coordination and collaboration between relevant stakeholders in the climate change adaptation process;
- seek coherence in the definition of goals and synergies in sectorial and inter-sectorial policy actions regarding adaptation to climate change;
- ensure that social participation is not only for informational purposes, but to cause and articulate collective action;

- have each agency perform its task in a coordinated fashion with the various levels of government;

- facilitate 'vertical' integration' between the different tiers of government (federal, regional and local), implying close coordination between them, accompanied by an appropriate and clear distribution of differentiated responsibilities and the development of commensurable capacities to meet these responsibilities; and

- facilitate 'horizontal integration' with various social stakeholders, through the creation and organization of different institutional arrangements and social participation mechanisms, such as public-private partnerships, cooperative regimes and public policy and technical cooperation networks/coalitions, among others.

It is thus highly relevant to build the institutional and social enabling environment in order to foster effective coordination, collaboration and vertical and horizontal integration processes, in the heart of our political communities responsible for the management and development of water resources, with the purpose of tackling climate change in an organized manner.

In regard to water resources management and development, these recommendations are not alien to us, since significant experience has been acquired on the discourse and the implementation of IWRM. Let us recall that IWRM is a paradigm that seeks to foster the effective, equitable and sustainable management of water resources, to federate between the multiple range of interests and conflicts for their use and between the different users, and the need to establish vertical coordination and horizontal collaboration mechanisms between the different stakeholders, while seeking to guarantee broad social participation and gender equity. IWRM systematically involves

the planning and implementation of “hard” actions, meaning the construction and improvement of infrastructure, and “soft” actions, referring to the strengthening of institutions and development of capacities. Both activities are necessary in the process of water-based adaptation to climate change.

There are already a number of applicable approaches which enable greater efforts to be made in order to mainstream IWRM in the region and to take measures to complement them with other methodologies – such as Strategic Environmental Analysis and ecological land planning – with the purpose of making IWRM more effective to face the challenges imposed by climate change.

It seems appropriate then to carefully review the strengths and limitations offered by IWRM in the case of our region to provide a conceptual and methodological platform for the integration of adaptation strategies to Climate Change.



It is necessary to encourage the participation and responsibility of different stakeholders in the processes of water-based adaptation to climate change.

09_The LAC region must increase its efforts to generate knowledge and train professionals on water-based adaptation to climate change.

Climate change in the LAC region poses the challenge of training the new generations of experts and decision makers so that they are capable of dealing with complex problems from the perspective of inter-disciplinarity, multi-disciplinarity and planning under contexts of uncertainty and risk. For this purpose, the following strategies and actions are proposed:

a) Formal mainstreaming of the issue of adaptation to climate change in the water community

In this Regional Policy Dialog, a vitally important challenge that has been raised is to formally mainstream water-based adaptation to climate change in academic curricula at various levels of education: elementary, high-school and higher education. At the same time, given the complex nature of water-based adaptation to climate change and the fact that it requires multi-disciplinary and inter-disciplinary processes, it is considered highly relevant to transform educational and professional training models in the water community (academic, training and continuing education), in order to favor the principle and the practice of multi-disciplinarity and inter-disciplinarity.

The challenge and the opportunity is to train individuals with capacities that allow them to communicate broadly and to face complex problems related not only with climate change and its related concepts, e.g. mitigation, adaptation and vulnerability, but within a sustainable development framework. Pilot programs should be implemented and study plans established at all educational levels in the region, with the aim of objectively putting together curricular activities and weighing up their impact in the educational market, as well as designing and carrying out massive training programs on climate change as a key element in educating a new breed of water professionals.

b) Support for research and knowledge generation on climate change

Similarly, support for research and knowledge generation on the effects and causes of climate change is important, complementing them with research and studies derived from the social processes of resilience and adaptation.

The knowledge on climate change has gradually been growing over the last two decades, becoming increasingly evident through the generation of convincing data and the impacts of climate change in practically all sectors. The knowledge generated has been gradually consolidated, thus increasingly underscoring for the benefit of the public-at-large and for decision makers the effects of the current variability as well as the future threat of climate change, which will tend to increase and to have ever greater impacts if relevant measures are not taken.

One of the main challenges when facing this global problem has been a difficulty in communication and the construction of a common language that facilitates the exchange between scientific, economic and social disciplines that play a role one way or another in this problem. Another difficulty is the lack of easily understandable and consensual concepts to explain climate change to the public-at-large, through different dissemination and promotion mechanisms, and the development of concepts that allow interested stakeholders and decision makers to understand the long-term implications of climate change.

c) Effective communication and dissemination applied to the context of climate change

The question of the consensus of concepts to achieve a better understanding between scientific communities, specialists with recognized practices, various stakeholders, decision makers and society-at-large is fundamental for any action related with the resilience and sustainability of ecological and social systems around the world.

Over the last few decades, the international

discourse has repeatedly stated that information, knowledge and social participation are vital elements to guarantee that the countries of the LAC region can find development alternatives, according to their social-environmental, economic and political context. In the region, it is necessary to recognize the broad divide that prevails between society and scientific knowledge and the social-environmental impacts of climate change. Communication processes are thus required that allow civil society to acquire objective knowledge of the climate situation, its causes and consequences.

d) Boost social participation to face climate change

In order to generate an increased awareness and social participation based on information and knowledge of water-based adaptation to climate change, shying away from scaremongering and catastrophic visions, a regional communication plan should be implemented that establishes the method of dissemination and promotion of specialized information, generally concentrated in the hands of climate change specialists, bearing in mind that water is only one of the issues directly affected by the processes of this global phenomenon.

Similarly, with the aim of strengthening local capacities and promoting mitigation actions brought about by the impacts of climate change, a social adaptation approach must be adopted, supported by efficient communication mechanisms.

Environmental scientists and water resources managers are increasingly aware that today's environmental problems require inter-disciplinary and multi-focused solutions: scientific knowledge is needed, but the cultural diversity of our peoples should also be recognized and their participation strengthened. In fact, the structuring of the information on climate change science in public discourse is coming under greater scrutiny from communication sciences and other social disciplines. Understanding how communication

is framed and its effect on social participation is a multi-disciplinary task that challenges some of the accepted concepts on the relationship between the scientific communicator and the public-at-large. These are priority aspects on the climate agenda of the water resources sector in the short term.

e) Document cases of successful adaptation to climate change

There are a number of successful adaptation practices to climate change at all scales in the LAC countries. These should be documented and shared to be used as lessons learned in other places where applicable.



To cope with climate change, human resource training is critical and urgent.

Concluding remarks

Throughout history, communities in all continents have faced diverse climatic and meteorological phenomena such as droughts, torrential rains and floods. These phenomena have had an impact on the lives and the livelihoods of these communities, who have turned to practices that we now refer to as adaptation to climate impacts; important lessons have thus been learned about how our societies perceive and act faced with changes in their environment.

A consideration of great relevance for the LAC region and emphasized throughout the Regional Policy Dialog documented in this position paper is the need to continue efforts to generate greater attention and support for a climate change adaptation agenda across the water community amongst regional decision makers. This should lead to more focused attention by the international development community on the seriousness of climate change impacts on water resources in Latin America and the Caribbean. This point is a key element in water-based adaptation to climate change and implies the need to address challenges posed by political and technical decision making under conditions of uncertainty and long-term cost-benefit analysis.

In this context, a fundamental aspect of adaptation to climate change is an appropriate public policy approach. This approach should combine generation of data and tools to determine vulnerability and future impacts of climate change, with clear and strong rules on participation /responsibility in the process, including how best to structure incentives so that they can support successful policy implementation. This will allow adaptation strategies and actions to be developed, which at the same time facilitate the greater participation of all stakeholders in water resources development and management to ensure the success of their implementation in combating

climate change. This involves adopting transparency and accountability schemes in the use of financial resources, which need to be optimized given the magnitude of the task at hand and the limited funds available.

Similarly, it has been underscored that the availability of water resources is a prerequisite for the development of nations, and that even without considering the impacts of climate change, many countries in the region are already suffering from some degree of affectation in terms of the quantity or quality of water resources, a situation that is having a negative impact on their development, and as a result, their economies.

In addition to the continual decrease in the per capita availability of water, brought about by population growth, the overdrafting of water sources, their deterioration through environmental pollution, and changing lifestyles that result in a greater use of water resources, climate change with all of its impacts can now be added to the equation, generating an even greater stress on the availability of water around the world. Therefore, in order for local and national governments and multilateral institutions to be able to continue fostering economic, social and environmental development, within the scope of their respective jurisdictions, they should consider this variable and implement, within their possibilities, some of the measures recommended in this document. Whereas there are different positions in the global debate on the mitigation of future effects, adaptation is a fundamentally local aspect that may not require legal frameworks, legally binding international agreements or conventions.

Not acting in the face of uncertainty is not a serious option. The recommendations described in this document are part of a comprehensive reform of water resources

management to promote trans-sectoral “no regrets” strategies.

It is self-evident that, due to the complex nature of the issue at hand, there are no one-size-fits-all solutions for adaptation to climate change. Measures implemented in one region of the world with a certain degree of success may or may not have the same impact in different environmental, social and economic conditions. However, in Latin America and the Caribbean, there are existing regional cooperation schemes and common backgrounds that allow an exchange of relevant experiences to be fostered in order to enrich the common understanding of the problem. It is proposed that this exchange should be translated into a series of proposals for public policies, of national and/or local scope, which could be mainstreamed throughout the LAC region.

In order to reach that goal, the partners in this Regional Policy Dialog recognize that the steps taken up to now have mainly – but not exclusively – involved water technicians and experts, implying the need to reach those stakeholders who are “out of the water box”. The stakeholders that should be involved include representatives of central and local governments, legislators, experts from other related sectors, such as the environment, agriculture, forests and energy, to name but a few, the financial community, and society-at-large.

At the same time as climate change constitutes a challenge or a threat for our nations, it also provides us with a unique opportunity to strengthen our unity as neighboring countries. In the countries of the LAC region, there are numerous examples of cooperation and collaboration to overcome common challenges in different social, economic and environmental aspects. In the case of water, some clear examples include the regional efforts associated with water and sanitation service provision, as well as the cooperation related with transboundary water resources.

The challenge of adaptation to climate change constitutes a new call to unite our efforts, which might lead to the drafting of a Regional Adaptation Agenda to Climate Change in the Water Sector in which, based on existing capacities, the joint commitments and the individual roles and responsibilities of nations and multilateral organizations would be clearly defined. In this agenda, cooperation and mutual support mechanisms should be established in the water community to reach concrete results, in specific and realistic timeframes, in the fight against the threat of climate change. This Regional Policy Dialog that has been initiated constitutes a fundamental communication and action tool to tackle this new challenge that the region will be facing during the coming decades.

In a few words, it can be observed that

**WATER = SUSTAINABLE
DEVELOPMENT,**

but

**WATER + CLIMATE CHANGE =
UNCERTAINTY.**

Annexes and Glossary of Terms

List of acronyms and abbreviations

CARICOM:	Caribbean Community
CCCCC:	Caribbean Community Climate Change Centre
CODIA:	Conference of Ibero-American Water General Directors
COP:	Conference of the Parties on the UN Framework Convention on Climate Change
GHG:	Greenhouse gases
GPPN:	Global Public Policy Network
GWP:	Global Water Partnership
ICT:	Information and Communication Technologies
INE:	National Institute of Ecology (of Mexico)
IPCC:	Intergovernmental Panel on Climate Change
IWRM:	Integrated Water Resources Management
LAC:	Latin America and the Caribbean
MDGs:	Millennium Development Goals
SICA:	Central American Integration System
SIDS:	Small Island Developing States
UNFCCC:	United Nations Framework Convention on Climate Change
UNISDR:	United Nations International Strategy for Disaster Reduction
WOP:	Water Operators Partnerships

Adaptation to climate change: “Initiatives and measures to reduce the vulnerability of natural and human systems against actual or expected climate change effects”. (IPCC, 2007).

Current climate variability: Refers to the changes in the climate registered in recent years, especially as regards the increase in extreme events such as droughts and floods, beyond the uncertainty about whether the changes in the climate are of anthropogenic or natural origin.

Environmental flows: Refer to the regime of water supplied within a river, wetland or coastal zone to maintain ecosystems and the benefits they provide to populations.

Integrated Water Resources Management (IWRM): “IWRM is the coordinated development and management of water, land and related resources in order to maximise economic and social welfare without compromising the sustainability of ecosystems and the environment” (Global Water Partnership, 2000).

Local climate change scenarios: Refer to local projections of global climate change scenarios, drawn up by the IPCC, to establish the adaptation and mitigation measures necessary to reach long-term goals, beyond the certainties and uncertainties of the models in their global and local projections.

Mitigation: “Technological change and substitution that reduce resource inputs and emissions per unit of output. Although several social, economic and technological policies would

produce an emission reduction, with respect to climate change, mitigation means implementing policies to reduce greenhouse gas emissions and enhance sinks.” (IPCC, 2007)

“No regrets”: Actions that reduce the vulnerability to possible future extreme water phenomena, but which are justified even without the climate change scenario occurring.

Public policy: The attempt to determine and structure the rational basis for action or non-action faced with issues considered public. Dye (1992) stated that it is “whatever governments choose to do or not to do, for what reason and with what effect”. Lasswell (1950) referred to public policy as supposing the idea of the public as a dimension of human activity regulated by governmental action.

Resilience: “The ability of a social or ecological system to absorb disturbances while retaining the same basic structure and ways of functioning, the capacity for self-organisation, and the capacity to adapt to stress and change.” (IPCC, 2007).

Risk: A result of the expected impact, the probability of its occurrence and vulnerability.

Threat: The probability that an event will occur in a given time and space, with sufficient intensity to produce damage.

Vulnerability: “The inability to resist a hazard or to respond when a disaster has occurred.” (UNISDR).

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In addition to the presentations given during the workshop “Challenges and Opportunities in Climate Change Adaptation for the Water Sector: Elements for a Regional Agenda” from June 8 to 9, 2010, which are available on <ftp://ftp.conagua.gob.mx/RetosyOportunidades/>, and the presentations from the XI CODIA, from August 3 to 5, 2010, available on <ftp://ftp.conagua.gob.mx/CODIA>, the following publications were used as reference material for the production of this document:

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**Water
community**



**Development
community**



**Climate change
community**



Do we all live in different worlds?

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