"Working Together to Respond to Climate Change"
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Mexico

Country Case Study on Domestic Policy Frameworks for Adaptation in the Water Sector

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1.- **Overview of Water Resources and their main use**

Mexico has a surface area of approximately two million km^2 with about 105 million inhabitants as of the end of 2005. This compares to a population of about 25 million in 1950, an increase of 4 times in 55 years. Population growth has occurred in every part of the country, but has been greatest in the northwest, northeast and central regions, precisely the areas with the most severe water scarcity problems. During this period, the gross domestic product has increased more than 10 times. Both population and the economy are projected to continue to grow at annual rates of about 1.5% and 3.0 %, respectively.

Mexico has a mean annual rainfall of 780 mm, about 27% of which becomes runoff of about 410 billion m^3 per year. Renewable groundwater is estimated at 63 billion m^3 per year, 48 billion from natural recharge and another 15 billion from deep percolation associated with irrigation projects. Additionally, there are an estimated 110 billion m^3 of non-renewable groundwater that could be available for one-time use. Climatic zones vary greatly from tropical rainforests with over 3000 mm of annual rainfall in the south, to arid deserts with less than 100 mm in the north. Runoff variation is even more extreme, from over 2 million m^3 per km^2 per year in the wettest areas to essentially zero in the driest.

In the dryer parts of the country, precipitation and runoff are highly erratic with large variations from year to year and extreme seasonal differences. In these areas, rainfall occurs during a two- to four-month period and is related to thunderstorm and hurricane activity which can be very intense and cause flash flooding. Runoff is directly associated with the precipitation and most streams, and even rivers, dry up during periods of no rainfall.

The location of population and economic activity is inversely related to the availability of water. Less than a third of total runoff occurs within the 75% of the territory where most of the country's largest cities, industrial facilities and irrigated land are located. Consequently, surface runoff and groundwater are increasingly insufficient to support the high growth rates and economic activity, resulting in disputes over surface water usage and the overpumping of aquifers; additionally, water pollution has reduced the potential beneficial use of certain rivers and water bodies. Conflicts among competing and intersectoral users have heightened important political and social side effects.

In the Mexico basin, a conflict for water between Mexico City and the State of Mexico occurred. Only 2% of water for Mexico City comes from local aquifers, while the remaining 98% comes from various sources in the State of Mexico (the Lerma-Chapala-Cutzamala watershed). The dispute for water resulted in a legal conflict for the rights of water at the Supreme Court of Justice, demanding the payment for the overpumping of water to the Mexico City government. The conflict lasted for several years until the new authorities of the State of Mexico decided to remove the demand at the Supreme Court of Justice and look for a joint solution.

Similar conflicts for the right of water exist between neighboring states, either in relation to aquifers or dams. Most of these conflicts have not been solved and they may be aggravated as water resources diminishes due to increased demands or due to climate change.

An international conflict on transboundary water resources took place by the end of the 20th century. Under an international treaty from 1944, both Mexico and the US commit to exchange transboundary water resources in the Colorado River and the Rio Grande (Rio Bravo). Mexican authorities were unable to deliver water in the Rio Grande due to a severe drought that lasted for several years. The 5 years term to deliver a certain amount of water was exceeded and the drought continued forcing Mexican authorities to distribute the limited amounts of water among Mexican agriculturists. The treaty does not consider severe drought explicitly. Through a series of negotiations the Mexican government committed to pay the total amount of water in the coming years. The problem was solved but if more severe droughts occur under climate change, the problem could repeat and worsen.

Because of its geographic location, Mexico is subject to a variety of meteorological phenomena including thunderstorms and tropical cyclones which result in intense rainfall that frequently leads to severe flooding. These occurrences can cause major economic, social and environmental damage and loss of life, and therefore state-of-the-art meteorological and hydrological forecasting services, excellent coordinated flood warning systems and considerable floodplain planning of both structural and non-structural management measures are required to mitigate their effect. In Mexico, only an Early Warning System to alert on the approach of tropical cyclones exists. Under this system, the population is informed on the characteristics of the risk and a number of actions by federal, state and municipal authorities are put in place. The system has worked well and the number of casualties due to hurricanes have diminished considerably (from hundreds to less than five). However, flash floods, cold waves or drought still constitute a major threat to the Mexican population and socioeconomic sectors, and there are no early warning or prevention systems to reduce their negative impacts. A significant enhancement in the capacities of the Mexican Weather Service is necessary in order to establish this type of systems in an operational manner.

In several places of the country, these intense rainfall events are the main source of water to fill the storage reservoirs. In addition, good water resources management requires balancing the often conflicting objectives of capturing and storing as much water as possible for future release during dry periods while maintaining a certain storage capacity empty in order to provide for flood protection. Mexico is also subject to droughts, particularly in the northern part of the country. Droughts may last from one to four years and during these periods rainfall and runoff may be reduced by as much as 40%. Because in many areas, water utilization nearly equals and even exceeds availability during normal years, droughts require major managed reductions in use and good contingency planning.

The actual water extraction is about 85 billion m^3 of which agriculture accounts for over 80% leaving the rest for domestic and industrial uses. The non-consumptive use of hydro-power generation uses 60% of the total surface water withdrawn. Although agriculture accounts for 66% of the total groundwater use, it is groundwater that supports 70% of domestic and industrial water needs. Water use in Mexico is, therefore, essentially centered around irrigation.

2.- Institutional Arrangements

Mexican water resources policy, as presented in the National Water Plan 2001-2006, is oriented toward ensuring the availability of water to satisfy the needs of the population and promote the development of economic activities in a manner that is environmentally compatible and sustainable in each region of the country. In accordance with this policy, avenues must be found for sustainable development which require establishing control and conditionalities on water usage such that economic development is compatible with environmental protection. The importance of sustainable use of water resources is manifest in the decision to relocate the National Water Commission (CNA) from the old Agriculture and Water Resources Ministry to the Environment, Natural Resources and Fisheries Ministry (SEMARNAP[1]). In accordance with the National Water Plan and the Law for National Waters (LAN[2]), the CNA has set an agenda to modernize and decentralize the management of the nation's water resources considering all uses and the preservation of the environment.

CNA was created to unite all aspects of water management. CNA has a central office located in Mexico City and has recently decided to reorganize CNA's regional dependencies into 13 regional offices with their boundaries being located along river basin boundaries. CNA had functioned in a centralized way, but has recently adopted and is currently implementing a policy whereby: (a) the Central Office functions will include oversight of water management activities and establishment of overall policy, criteria and uniform guidelines and procedures; and (b) the Regional Offices will have principle responsibility for water management, including: (i) the development of hydrographic regional plans; (ii) the promotion and strengthening of basin councils; (iii) the coordination of water resources planning and management activities both by public and private sector participants; (iv) water quantity and quality monitoring activities; (v) reservoir operation; (vi) the registry of water users into the National Public Water Rights Register; and (vii) dam safety.

In accordance with the LAN, CNA is the national water authority with complete responsibility for water rights administration, the management of the nation’s water resources and dam safety. Other public and private entities, including the Federal Electricity Commission (CFE[3]), that operate reservoirs must do so with CNA authorization and oversight. CFE operates 64 dams with hydroelectric plants. The Director General of CNA presides over a Technical Committee for the Operation of Hydraulic Works. In addition to CNA authorities and technical personnel, a CFE representative participates on the committee. The committee makes overall decisions relative to the operation of the nation's reservoirs including considerations related to floods, droughts, multiple uses (irrigation, municipal and industrial, hydropower, navigation, recreation, etc.) and environmental protection.

Irrigation sector reform took the form of massive transfer of public irrigation systems to user groups. The transfer program there began in 1988 following a set of sweeping economic reforms which were introduced beginning in 1986. The National Water Commission (CNA), was created in 1989 and a new water law enacted in 1992. By the end of 1996, 87 %of the area under medium and large scale irrigation districts in the country had been transferred to 386 Water User

[1] Secretaría de Medio Ambiente, Recursos Naturales y Pesca
[2] Ley de Aguas Nacionales
[3] Comisión Federal de Electricidad

Associations (WUA) to manage (about 2.9 million hectares) and 46% of the total area under all irrigation. The CNA had lead responsibility in carrying out the transfers of management responsibility. They held extensive preliminary meetings with both *ejidatarios* and small landowners touting better and more responsive service and greater efficiency before the user associations were formed. They also promised government assistance with system rehabilitation and equipment purchases, promises which were only partially kept.

According to the Federal Water Law of 1971, irrigation districts should be managed by the federal government. However, by the end of the 1980s, the government was subsidizing almost 75% of the costs of operation, maintenance and administration of the districts. This fact, contrasted with the total absence of support to the users of the smaller irrigation units, created a privileged group of producers in irrigation districts. Moreover, in spite of the large governmental subsidy, districts were not receiving adequate maintenance, causing deterioration of their infrastructure. Mainly for these reasons, starting from 1988 the federal government decided to transfer responsibility to operate, maintain, and manage the irrigation districts to organizations of users.

The Water Users Associations' main function is the operation, maintenance, and management of the irrigation infrastructure. They can be established as civil associations and granted certain fiscal privileges. The boards of directors of these associations are selected by the assembly comprised of water users of the irrigation modules in the irrigation districts or units. When the number of users is considerable, as with modules with many *ejidatarios*, the members of the assembly are delegates who are elected from each *ejido*.

In several irrigation districts that have been transferred, federations of WUA's are being established as societies of limited responsibility (SRL) which are given charge of the operation and maintenance of the major canal, drain, and road networks and serve all WUAs within their jurisdiction. In some relatively large districts, more than one SRL has been formed.

At a national level, a federation of WUAs called the National Association of Water Users (ANUR[4]) has been established and represents WUAs in negotiations with CNA, SEMARNAP, and Secretariat of Agriculture, Livestock, and Rural Development (SAGAR[5]). CNA is the supervising organization for the operation, maintenance, and management of the transferred infrastructure and equipment. CNA also provides WUAs with technical assistance in carrying out operational activities.

The Mexican Institute for Water Technology (IMTA[6]) is responsible for water related research, technology evaluation and transfer, and for training. It coordinates work being carried out at universities, research centers and other institutions in Mexico and internationally, and has cooperative relationships with various water related entities throughout the world.

3.- Legal Framework

Article 27 of the Mexican Constitution (adopted in 1917) recognizes the Nation as the owner of all water within the territory and authorizes the government to administer these

[4] Asociación Nacional de Usuarios de Riego
[5] Secretaría de Agricultura, Ganadería y Desarrollo Rural
[6] Instituto Mexicano de Tecnología del Agua

resources and to grant "concessions" for water use. The LAN and its regulations have established a legal and regulatory framework to tackle the management of scarce water resources. The stated objective of the law is "to regulate the extraction, use, distribution and control of the nation's waters as well as preserve their quantity and quality in order to achieve sustainable integral development". Implementation of the LAN and its relevant regulatory matters is a main CNA task. Important amendments were passed by congress in 2004.

The LAN recognizes the importance of water resources management and authorizes CNA to carry out this function with the objective of achieving sustainable development and use of water resources. Water management is to be carried out with the participation of water users to the maximum extent possible. The LAN specifically authorizes the establishment of river basin councils *(Consejos de Cuenca)* that would be responsible for coordinating activities and reaching consensus between CNA, other federal, state and municipal agencies and water user representatives on matters related to water management in the river basins. So far, there are no clear statements on the LAN in relation to climate change, even when the National Water Commission and the Federal Government recognize this may be a major problem in the coming years in terms of water availability.

When determined to be necessary by CNA, the LAN provides for the establishment by decree of special administrative and reserve zones in areas where problems of overuse, water quality or the environment necessitate this action. Zones can also be established during drought conditions or during other emergency situations. In these zones, water use can be restricted or curtailed completely as determined to be technically necessary to preserve the environment and the water resources.

4.- Impacts of climate change (or extreme weather events) on water resources (e.g. floods, droughts, storms, etc)

Climate over most of Mesoamerica (central-southern Mexico and Central America) is characterized by a relatively dry winter (November through April), and a well defined rainy season from May through October. The rainy season is, to a large extent, the result of air sea interactions over the Americas warm pools and the location and intensity of the Inter Tropical Convergence Zone (ITCZ) in the eastern Pacific. The existence of a mountain range along Central America imprints contrasting precipitation characteristics on the east and west of the Isthmus. Transients, such as easterly waves and tropical cyclones may contribute to a large percentage of the precipitation, particularly over northern Mexico. The Intra Americas Seas (IAS, i.e., the Gulf of Mexico and Caribbean Sea) and the north eastern tropical Pacific are among the most active regions for hurricanes in the world, that constitute a major threat in terms of extreme events. Depending on the proximity of tropical cyclones to the coast, seasonal precipitation may substantially vary from one year to another.

Most inter annual climate variability in the region is related to the El Niño/Southern Oscillation (ENSO), a phenomenon that influences the distribution, frequency and intensity of many of the regional atmospheric phenomena. The signal of El Niño over Mesoamerica is contrasting, not only in terms of the season but also in relation to the coast under analysis (Pacific or Caribbean). For instance, during El Niño boreal winters, precipitation over northwestern Mexico and parts of the Pacific coast of Central America increases. On the other hand, during summer, most of Mesoamerica experiences negative precipitation anomalies, except along the

Caribbean coast, where positive precipitation anomalies are observed even when tropical cyclone activity over the IAS diminishes.

Water resource availability is likely to be one of the more pressing problems resulting from the alterations in the hydrological cycle that are anticipated under climate change. The impact of this phenomenon on water resources is likely to be greater in the semi-arid and arid regions of the world, where climatic variability already has a determinant effect on water availability, and where competition over water allocation for the needs of growing populations is already acute.

In northern Mexico, a predominantly semi-arid region, periodic deficits in precipitation have resulted in hydrological droughts in recent years and even in bi-national problems related to transboundary water. The shift in the regional economy from an agriculture oriented society to a more service-oriented economy places new demands on urban water resources. Various sectors of the Mexican economy are highly vulnerable to drought. The precipitation deficit experimented during El Niño years (1982, 1997) have resulted direct losses of the order of $2 billion in the Mexican economy, mostly due to water deficit.

On the other hand, excess precipitation has had a negative impact on Mexican society. In most regions of Mexico, there appears to be a trend towards more severe storms (number and intensity) that frequently result in flooding and land slides. The negative socioeconomic impacts of these storms may well be observed in the northern semi-arid regions as well as in the southern tropical regions of the country.

The active North Atlantic Hurricane season of 2005 has prompted conjectures that increased intensity of North Atlantic storms is due to global warming. The severe impact of tropical cyclones over southern Mexico has been clear in various sectors, a scenario of how the future may look like under climate change, when more severe tropical cyclones are expected.

Over a large part of Mexico, annual mean temperatures have increased by about 1ºC during the 20th Century. The years 1994, 1995, 1997, 1998, 2000 and 2005 were among the warmest of the last century and the tendency for warming in the region continues, but at a slower rate than the global average. Modest increases in precipitation of a few per cent have been recorded over the region this century, with most of the increase occurring in the summer rainy season. It is not very likely that more precipitation results in more water availability. The joint effect of warmer temperatures and minor changes in precipitation will result in more evapotranspiration, less runoff and infiltration and consequently in less water availability. Therefore, even a small increase in precipitation, as that observed in recent decades for some parts of Mexico, would not balance the effect of the almost certain increases in temperature. A decrease in soil moisture and consequently, a negative impact in the water, agriculture and forest sectors, among others, is expected.

Some climate change scenarios suggest more severe weather events as storms and tropical cyclones. Mexico is particularly vulnerable to flooding due to its complex topography and the existence of urban settlements in risky areas. According to the Mexican government, almost 90% of disasters related to natural phenomena correspond to extreme hydrometeorological events, mostly droughts and flood. Unless vulnerability be reduced over most of the country, this situation will continue at a higher cost.

During the period 1980-1999, hydrometeorological extreme events resulted in more than 2700 deaths and economic losses of the order of $4.5 billion. An individual tropical cyclone, such as hurricane Wylma in 2005, or the flooding event during 1999 had an approximate cost of the order of $250 million. Consequently, the National Development Plan in the area of Civil Protection focus on the development of Early Warning Systems to protect life.

5 Preparedness to extreme weather events (and future climate change) national or regional or local measures that are in place, warning systems, information, emergency plans.

The number of the so called natural disasters in Mexico has increased in recent years, not only because of changes in the weather regimes, but mostly because of the increased vulnerability of society.

Recent changes in the Mexican legislation on Civil Protection have resulted in the allocation of resources to face natural disasters. The Mexican authorities have considered the establishment of a number of policies to meet the challenge of Disaster Preparedness including hydrometeorological risk. The National Fund for Natural Disasters, known as FONDEN[7], consists of a financial mechanism (a revolving fund of about $30 million) to assist entities, affected by disasters, to the extent of the possibilities of the Federal Government. FONDEN was designed to help during natural phenomenon that cause damage that cannot be faced by local authorities. The federal financial assistance covers disasters related to:

- Drought
- Tropical cyclones
- Severe storms
- Snow and hail
- Flooding
- Tornadoes
- Forest fires

The Civil Protection Agency interacts with scientific experts who work at the National Center of Disaster Prevention (CENAPRED[8]). There, a number of actions have been taken in order to diminish vulnerability to hurricanes and severe storms. An example is the establishment of a severe weather early warning system that alerts the authorities and the population of when to expect severe weather, particularly intense precipitation associated with hurricanes. The Early Warning System for Hurricanes has proven to be an efficient method to reduce the number of lives lost due to the effects of tropical cyclones. Since 2000, the number of deaths during the hurricane season has diminished from hundreds to only a few. However, severe storms and flooding are the major threat to life in rural and urban areas, where steep topography results in landslides.

The Early Warning System monitors and predicts the evolution of tropical cyclones and issues warnings, alerts, or emergency calls to take a preventive action (such as requesting people to be informed, to be prepared for the impact of a hurricane or to move to a shelter for

[7] Fondo Nacional de Desastres Naturales
[8] Centro Nacional de Prevencion de Desastres

protection). Previous to the implementation of the Hurricane Early Warning System, there were of the order of 300 people killed by a hurricane. After the implementation of the system, the number of deaths is no more than 10 per year. Flooding, as well as other extreme hydrometeorological events, are still a major threat. Only a few attempts to develop plans to reduce vulnerability to flooding have been implemented (as in Acapulco, Mexico, after Hurricane Pauline in 1997). However, there is still much to be done in terms of developing plans to reduce vulnerability, particularly when it is consider that the number of extreme precipitation events is increasing in most of Mexico, probably as a result of climate change. The National Prevention Fund for Natural Disasters (FOPREDEN[9]) is aimed at financing pilot project in the various state of the country to face, among other natural threats, flooding. Only a few projects exist.

There are no equivalent schemes to face individual severe storms or drought. In most cases, these phenomena are (incorrectly) described as unpredictable, to reflect the lack of confidence in prediction schemes currently available or the limitations of the government institutions to monitor and predict the evolution of these phenomena and to evaluate the risk they constitute for various sectors of the society. Under the 2000-2006 National Development Plan, the Civil Protection sector prepared a number of projects to remedy this situation, requesting academic institutions to develop strategies to face extreme weather events. However, these projects were not implements due to limited funds for this part of the development plan.

So far, only response plans under drought exist, both in the Civil Protection Agency or in the Agriculture Ministry. In both cases, a monetary compensation is given to those affected by drought. The use of seasonal climate predictions is limited, and no real plans to prepare for drought exist. Recently, the Secretary of Environment requested the academics in the field of climate to develop a National Project to produce climate information, including drought predictions. The Plan was produced but so far, there are no funds to finance this initiative.

Recently, the Mexican Government decided to create a new fund to move from response to the emergency to preparedness to major threats. The so called National Fund for Preparedness to Natural Disasters (FOPREDEN) is intended to move from a culture of reaction to a disaster to a “culture of reduction of vulnerability” to extreme events. FOPREDEN is at its early stages and there are no projects in the areas of major hydrometeorological disasters.

Through international cooperation projects, a number of initiatives to explore adaptation to climate change in various fields are in progress. Cases studies to define adaptation measures for the water, agriculture and forestry sectors have been conducted. For instance, with the support of the Environmental Protection Agency (EPA), a study was conducted to define adaptation measures in the urban water sector of Hermosillo, Sonora in northwestern Mexico.

Hermosillo has been facing a shortage in water in recent years due to increased demands from a growing population and because of a prolonged dry period. Considering this could be a more frequent condition under climate change and that the water issue is of major interest in most of the State of Sonora, a case study for adaptation was considered since most of the stakeholders would be receptive to discuss the issue of climate change and water. Local authorities have been considering a number of solutions like trading of rights of water, desalinization plants and a large number of treatment plants. Through a close interaction with stakeholders a couple of adaptation

[9] Fondo para la Prevención de Desastres Naturales

measures were proposed: 1) A culture of water program to reduce water consumption and demands, and 2) a enhanced infiltration of water after extreme precipitation events. In both cases, local, state and federal authorities would be involved. The culture of water program would include a home water saving kit (for the shower, toilet, sink, etc) which could be distributed among the homeowners and the costs distributed in a number of water bills. This program was partially implemented in a few homes, but due to the lack of resources it has been difficult to estimate the impact of this program in terms of water savings.

A number of adaptation initiatives were defined through close interaction with stakeholders to solve a present and future major threat: limited water availability and drought. Similarly, adaptation measures in the water, agriculture and forestry sector for the state of Tlaxcala, in the Mexican Plateau, are being analyzed along with stakeholders, following the methodology suggested in the Adaptation Policy Framework. Actual measures, such as the extended use of greenhouses in agriculture, have been developed to show that the benefits in terms of water saving and more productivity are reachable. In Sonora, as well as in Tlaxcala, the feasibility of the adaptation measures is being evaluated through cost-benefit analyses, efficiency, number of people benefiting, and additional benefits of the measure.

6 Possible new (short-term and long-term) measures that can be taken to improve adaptive capacity to climate change

In the short term, a number of initiatives are being considered to face the challenges of hydrometeorological extreme events. There appears to be consensus that the water infrastructure of Mexico should be substantially improved (better irrigation systems, climate information systems, information programs on how to better use water, etc.) in order to reduce our vulnerability to climate change. The use of new technologies on a large scale over the country has been limited. Although it is recognized that the water and forestry sectors are of national security, the approach of examining their vulnerability under climate change has just started in recent years.

The case study projects such as the Sonora and Tlaxcala studies on development of adaptive capacity and adaptation strategies are part of a major initiative to promote studies that result in actual measures and policies to adapt to climate change in the most vulnerable sectors of the country. Through a close interaction with stakeholders some specific adaptation measures have been proposed. For instance, some specific suggestions include:

In the urban water sector:

- A culture of water program, to reduce water consumption from 330 lt/person/day to 180 lt/person/day, through the use of new technologies for the bath and kitchen. This program considers technologies already available in the Mexican market.
- An enhanced water catchments program to increase the water levels in aquifer, taking advantage of a positive trend in the number of severe storms in the region
- New regulations in housing projects that consider more carefully the characteristic of climate in a semiarid region in order to reduce energy and water consumption in cooling systems. Until recently, there are no clear regulations on how to better use energy and water in semiarid regions. There is a subsidies program for energy use during summer to

face offset? the high costs of increased demands of energy for cooling. The population in northern Mexico is requesting the subsidies begin earlier in the year, since hot temperatures are experienced even in the latter part of winter.

- Water pricing is differentiated and only in a few states are the actual costs of water covered. This is apparently the case in Mexico City. Most regions in the country seldom pay for the actual cost of water. However, for those with no access to water, the costs of this element are extremely high since they have to obtain the resource through deliveries by cistern trucks.

In the agriculture sector

- The use of greenhouses to produce vegetables with less water in a reduced area, considering the severe problems in soil degradation and water availability in various regions of the Mexican Plateau
- The use of climate information to plan agricultural activities in a risk management framework
- The importance of the insurance industry in the agricultural sector to protect the rainfed sector to extreme weather and climate conditions

In the Civil Protection sector

- The development of early warning system to face more frequent severe weather
- The reduction of vulnerability through projects under the Preparedness Fund for Natural Disasters

The Mexican authorities are currently preparing the 3rd National Communication and a strong emphasis is being placed on adaptation initiatives. The case studies are serving to draft a National Program on Adaptation to Climate Change. This program will seriously consider the challenge of a reduction in water availability.

It should be clear that the previous examples were constructed considering some specific cases for some region. Therefore, it is necessary to consider the development of systematic actions aimed at reducing vulnerability of Mexico to climate change in sector under high risk, such as water, agriculture, forestry or health, but at the national level. At present, a National Climate Change Program is only being considered. The evaluation of the national capacity for adaptation to climate change should be part of such plan, and this will require a strategy to communicate the concept of climate change among stakeholders. The first draft of such National Plan to enhance adaptive capacity in Mexico is under preparation and should be ready by the end of the 2006. However, additional elements should be incorporated into the plan to make it a national program, e.g. costs, policies strategies, training, etc.

7 Recommendations (Development of administrative capacity (institutional an legal), mechanism (risk management, information, inter-agency cooperation, stakeholder process, etc)

A number of issues surrounding water: its availability, uses, rights distribution, etc., are still a matter of discussion. It is necessary to work on most of these problems in an integrated manner, by combining the expertise of specialists, authorities and stakeholders in general. This appear to be the tendency in Mexico, where the academia, NGOs and government agencies have organized a number of forums to discuss this subject. However, it is necessary to go from the pure discussions to legislation and actions in general, to improve what has been called a National Security issue for Mexico in these years.