

2030 WATER AGENDA



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2030 Water Agenda

National Water Commission of Mexico

March 2011
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Foreword

Twelve months have passed since we assumed the commitment during the 2010 World Water Day festivities to work together in formulating the 2030 Water Agenda, which will allow us to consolidate sustainable water policy and hand over to the next generation a country with clean water bodies, balanced supply and demand for water, universal access to water services and settlements safe from catastrophic floods.

In the months that have passed since then, we have developed rigorous technical-prospective studies, carried out hundreds of meetings throughout the country and collected and reviewed a large number of initiatives from all sectors of society. The broad scope of participation shows that water is in the hearts and minds of all Mexicans.

Water-related challenges are extensive and complex, but they can be overcome, if we act with determination and unity and if the effort is deployed in a consistent and continual manner. We have to unite our intentions, capacities and resources. We have to change our traditional means of relating to water; we cannot continue looking upon it as an infinite resource, but as a limited and costly good that we must manage responsibly for our benefit and for that of future generations.

For all of these considerations, we are pleased to present to the national community the product of a generous collective effort: the 2030 Water Agenda.

National Water Commission
Mexico City, March 22, 2011
World Water Day

Executive Summary

Balanced supply and demand for water

Mexico presents an imbalance between the supply and demand for water; in some catchments, only a small percentage of the total water available is used, whereas in others more than 100% is used.

Currently, 78.4 billion cubic meters are required every year, and to supply this quantity, 11.5 billion cubic meters are taken from non-sustainable sources; with business as usual, the current gap will be doubled within a period of 20 years.

The main challenges are faced in the Lerma and Grande river basins, where there are cells¹ in which the gap foreseen will not be bridged without recurring to inter-basin transfers or by reducing the withdrawal of water for irrigation.

Ensuring this demand is sustainably met will require investments of around 306 billion pesos (approximately 25.44 billion USD) up to 2030, which should be paid for by the different stakeholders involved in water management.

The initiatives that can support the objective of balanced supply and demand for water in the most relevant way are: **i)** Giving a more prominent role to the Technical Groundwater Committees (COTAS in Spanish) in aquifer management; **ii)** Strengthening the organization and functioning of the River Basin Councils and their auxiliary bodies; **iii)** Consolidating the governance functions and regional organization of the CONAGUA; **iv)** Involving civil society associations of irrigation users and Technical Groundwater Committees in driving for the saving of water and the technification of irrigation; **v)** Formulating regulations for the distribution of surface water by catchment and by aquifer, and **vi)** Reinforcing systems to measure and ensure compliance with the volumes allocated and authorized in an agricultural year.

¹ A cell is defined as the territory of a catchment or hydrological region that corresponds to a state. Defined in this way, there are 168 cells in Mexico.

Clean water bodies

At this point in time (2010), nationwide 89.9% of the wastewater generated is collected in sewer systems and 43.4% of the wastewater collected receives treatment; this figure is expected to rise to 60% by 2012.

In a business-as-usual scenario, the main problem related with water quality in Mexico will be the lack of infrastructure for wastewater treatment.

The catchments facing the greatest challenge in this respect are Lerma, Valley of Mexico and Balsas.

6.7 billion cubic meters of wastewater are currently generated every year, and it is expected that this volume will reach 9.2 billion cubic meters by 2030, when only 38% of this volume would be treated to the level required by law.

Redressing this situation requires investments of 114 billion pesos (9.48 billion USD) by 2030, as well as the implementation of the following initiatives: **i)** Reinforcing available institutional mechanisms to discourage polluting behavior by different users; **ii)** Developing a specific normativity for the assessment, monitoring and control of non-point source pollution, and **iii)** Promoting and reinforcing intensive reforestation programs associated with soil conservation in priority catchments.

Universal access to water services

Currently (according to data from XIII National Census of Population and Housing), 91.3% of the population has access to drinking water services and 89.9% has sanitation coverage.

Considering the current coverage and the population growth, the challenge as regards drinking water will be to extend access to drinking water services to a further 36.8 million inhabitants and sanitation coverage to a further 40.5 million.

The states facing the greatest challenges as regards access to drinking water and sanitation services are Baja

California, Chiapas, State of Mexico, Jalisco, Puebla and Veracruz.

Reaching universal access to water services by 2030 will require investments of 215 billion pesos (17.87 billion USD) and the implementation of the following initiatives: **i)** Giving a more relevant responsibility to state governments as regards drinking water and sanitation; **ii)** Promoting the systematic certification of management and technical staff of drinking water and sanitation utilities; **iii)** Promoting tariffs that obey technical criteria and are not used for political purposes, and **iv)** Strengthening the capacities and attributions of the National Water Commission and its state water commissions to promote, supervise and regulate drinking water and sanitation services.

Settlements safe from catastrophic floods

Historically, floods have mainly affected the hydrological-administrative regions Valley of Mexico and Southern Border, which explains why the investments have been concentrated in those regions. However, there are other regions in which it is necessary to increase the investments under this heading, as is the case for Central Gulf and the Yucatan Peninsula.

Different types of investments are contemplated in Mexico, which basically fall under one of two headings: construction of storm drains (47%) and flood control (45%).

Insufficient information is available to estimate the amount of investments that would be necessary under this heading by 2030, because this depends to a large degree on the nation's performance as regards land use planning and the evolution of the phenomenon of global climate change; however, the investments already considered amount to 107 billion pesos (8.89 billion USD).

The initiatives that must be carried out in order to reduce the vulnerability of human settlements to catastrophic floods are the following: **i)** Creating the Ministry of Land Use Planning, which would implement a long-term Land

Use Planning Strategy; **ii)** Gradually implementing a mandatory Ecological Land Management Program in all municipalities in Mexico, and extending its scope to urban areas of population centers; **iii)** Creating the National Observatory of Sustainable Land Use Planning; **iv)** Broadening the scope of the Ministry of National Defense's Emergency Plan DN-III-E, to preventively evacuate people in situations of imminent risk; **v)** Increasing the investments in generation of flood risk maps, outlining of rivers, federal zones and flood plains, construction of protection infrastructure, and maintenance and custody of existing water infrastructure; **vi)** Strengthening the capacities of the municipalities as regards civil defense; **vii)** Consolidate regional and national hydrological services; **viii)** Accelerating the modernization program of the National Meteorological Service, and **ix)** Increasing the fines to civil servants who allow the non-compliance of land-use plans in urban development.

General initiatives

The 2030 Water Agenda has identified sixteen initiatives, the effects of which would benefit several or even all of the thematic focuses, including the following:

Outside the "water box": **i)** Creating the National Development Planning Institute, which would ensure the due long-term harmonization between the different sectorial and territorial policies in Mexico.

Inside the "water box", nationally: **i)** Creating an authority to guarantee budgetary adequacy and its clear use for studies and projects, in such a way as to put together a robust and strategic portfolio; **ii)** Applying a results-oriented evaluation to all public programs that have an impact upon or that affect in some way the pursuit of water sustainability; **iii)** Assigning payments of duties for the use of the nation's water to the financing of water governance functions; **iv)** Establishing a clear and transparent system of bulk water prices and tariffs, which considers costs and externalities; **v)** Abolish the Law on the Contribution to the Improvement of Public Federal Water Infrastructure

Works, and assimilate the equivalent amount to a tariff for services, with the aim of recovering the investments; **vi)** Boosting the resources destined to the modernization and technification of hydro-agricultural infrastructure; **vii)** Creating a national fund for the maintenance and rehabilitation of dams and large water infrastructure; **viii)** Facilitating the increasingly effective contribution of the scientific and technical community to the formulation and deployment of sustainable water policy; **ix)** Creating an information system on investments in the water sector made by the three branches of government and by users; **x)** Providing incentives and strengthening long-term water culture processes, and **xi)** Creating the climate change adaptation contingency fund.

Within the “water box”, regionally: **i)** Strengthening the process of formulation, follow-up and evaluation of long-term water programs by hydrological region aimed at water sustainability; **ii)** Developing regional information systems in order to reinforce water management by catchment and aquifer.

Within the “water box” at the state level: **i)** Modifying state laws and their by-laws in order for them to regulate public-private investment in water infrastructure; **ii)** Creating revolving funds to support access to the commercial financial system for a greater number of water utilities and irrigation associations.

Final observations

Turning the vision of the 2030 Water Agenda into a reality requires average annual investments greater than 50 billion pesos (4.16 billion USD) to act mainly on measures to increase efficiencies in the use of water in agricul-

ture and in public urban supply. Not acting implies growing opportunity costs, which for unmet industrial demand alone would reach orders of magnitude of 1.5 trillion pesos (124.70 billion USD) per year up to 2030.

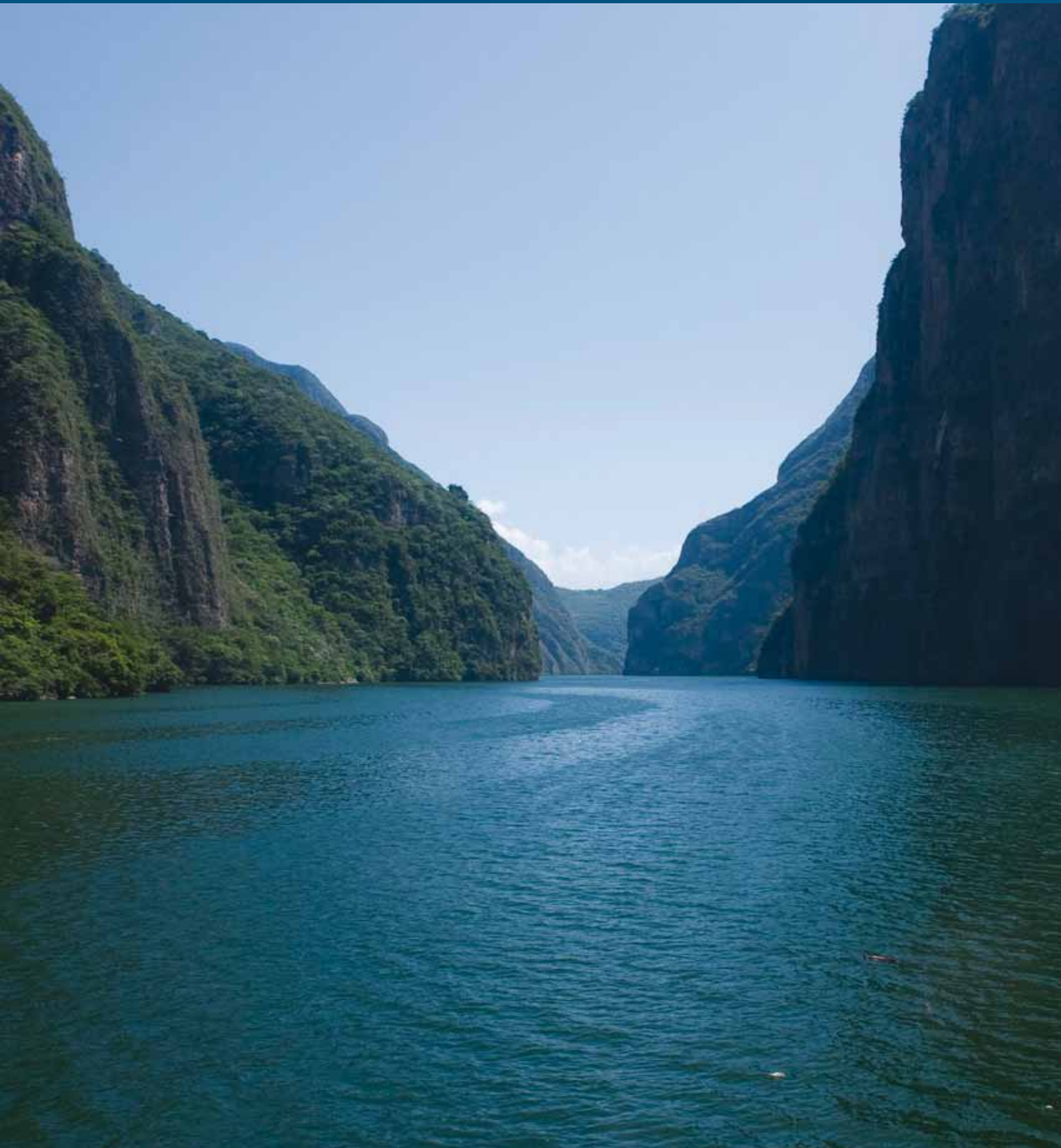
The business-as-usual scenario corrected by the impact of climate change would increase the gap to 36.3 billion cubic meters, or a further 13.3 billion cubic meters. This situation would necessarily bring about the intensification and extension of low-cost measures allied with high-cost infrastructural measures, which would mean a necessary expense of 246 billion pesos (20.45 billion USD) in additional investments by 2030. On this subject, the implementation of a contingency fund is recommended to ensure the availability and the opportunity to dispose of resources in such a great order of magnitude.

However, money is not the only obstacle to be overcome; nor is it the most complex. The majority of the initiatives that are part of the 2030 Water Agenda are related to the reassignment of legal functions, capacity development and the implementation of incentives to strengthen the national water management system at the national and regional scopes.

The progress in achieving the Water Agenda should be evaluated annually and presented in March every year, on the occasion of World Water Day; an assessment of results and impacts should occur every six years and should be the basis for a comprehensive update of this instrument.

The 2030 Water Agenda is an instrument for the appropriate implementation of sustainable water policy. The National Water Programs, Regional Water Programs, the federal government’s and state governments’ investment portfolios, the Federal Expenditure Budget for water and water culture programs should all be aligned with it.

I. Introduction



General aspects

a) Evolution of water policy

In the 20th century, Mexican water policy went through a clear evolution: from being guided by the increase in supply that dominated for more than half a century, through the focus on demand control that characterized the 1980s and 90s, to finally give rise to the emphasis on sustainability that is beginning to dominate at the start of this century.

The creation of the National Irrigation Commission in 1926 was the first milestone of a water policy aimed at increasing water supply for different uses through infrastructure construction. A major network of dams, aqueducts, wells, water treatment systems, water supply and sanitation systems, was established throughout the country. This network made access to tap water possible for more than 80% of households, as well as the development of an extensive surface area under agricultural irrigation –the sixth largest worldwide– and supported the nation’s industrial expansion.

In the 1980s, faced with clear signals that this model was being exhausted, it was progressively replaced by a new focus on developing a new institutionality to try to meet the nation’s water needs, no longer from the perspective of increasing supply, but through improved demand control. For this purpose, the National Water Law was passed, the National Water Commission was created, a regime of allocation of and charging for duties was established, the Public Registry of Water Duties was created, and functions were decentralized to municipalities and irrigation districts.

Although to a large degree, these policies provided an effective reply to Mexico’s water needs, unfortunately they also inherited serious problems, such as a growing over-drafting of aquifers, pollution of surface and groundwater bodies, poor quality in drinking water services and the great vulnerability to floods of different populations in Mexico.

This reality has led to Mexican water policy, at the dawn of the 21st century, adopting sustainability as its central facet. Incipient signs of this new orientation are the growth in investments in wastewater treatment plants, in the re-

placement of supply sources and in the technological modernization of agricultural irrigation systems, including the definition of optimal dam operation policies and the dimensioning of irrigation districts, as well as the development of standards on environmental flows and studies on the impact of climate change and the mitigation of its effects.

In this context, the 2030 Water Agenda aims to be a useful element to definitely consolidate the deployment of a sustainable water policy.

b) The starting point: thinking and acting for the future with the participation of society

On World Water Day in March 2010, Mexican President Felipe Calderón Hinojosa called upon the nation to work together on the preparation of a road map that would define all the elements necessary to be able to hand over to the next generation a country with sustainability in its water resources, meaning with clean water bodies, balanced supply and demand for water, universal access to water services and settlements safe from catastrophic floods.

On this occasion, the Head of State underlined the need for all relevant stakeholders from political, economic and social spheres to join their efforts to formulate the 2030 Water Agenda, above and beyond any difference, however legitimate it may be, in order to thus be able to generate a technically sound document that would enjoy sufficient social and political support to turn it into a factor of continuity, consistency and effectiveness of a sustainable water policy, irrespective of the changes in successive governmental administrations.

In this way, with the sights set on the future, thirteen rigorous technical studies were carried out, analyzing the alternatives for the sustainable use of water towards 2030, one for each of the hydrological-administrative regions into which the country has been divided. These studies were sub-divided by hydrological region and by state, in order to have sufficiently detailed results, which can be incorporated in more than one way.



c) Consultation and dialog to build the Agenda

Between March and November 2010, various consultation and dialog groups came together, the conclusions of which were presented in public forums. Specifically, 13 regional forums were held, 10 forums on crosscutting themes and a virtual forum, which was open for seven months and which made it possible for anyone to share his or her considerations and proposals; finally on November 17 and 18, 2010, a national forum was held in Mexico City, in which participants included governors, mayors, directors of water utilities, civil servants, leaders of agricultural irrigation associations, academics, industrialists, and representatives of environmental organizations, to discuss the results of the aforementioned forums.

As a result of these debates, more than 1,100 proposals and general and specific initiatives were captured on the various issues related to water management; these proposals were processed by a group of experts in December and January, resulting in successive drafts that were submitted for public consultation on the CONAGUA's website from December 31 onwards, obtaining various comments and counterproposals which enriched it remarkably.

What is the 2030 Water Agenda?

a) It is a methodology

The 2030 Water Agenda advances a long-term strategy, the progress on which should be evaluated annually and whose results and impacts should be assessed every six years as a basis for its corresponding update, in such a way as to permanently provide appropriate strategic long-term guidance for the national water management system.

b) It is an instrument for the consolidation of sustainable water policy

The 2030 Water Agenda defines the nature and magnitude of the challenges to be overcome and the solutions to be developed in order to be able to effectively hand over to the next generation a country with more strengths and opportunities than those that currently exist.



c) It is a prospective exercise with a great vision

The 2030 Water Agenda proposes first and foremost a vision: achieving a country in a period of twenty years with clean water bodies, balanced supply and demand for water, universal access to drinking water and sanitation services, and settlements safe from catastrophic floods. It defines the existing gap between that vision and the current reality and prioritizes the lines of action that should be deployed for that purpose. Finally, it identifies the changes that must be brought about in the institutional environment in order to make each of its components viable. Strategic changes in topics such as institutional organization, planning, legislation, regulation, financing, education, capacity development and others of a similar nature are tackled.

d) It is a series of initiatives that capitalize upon national and international experience

The 2030 Water Agenda considers the conceptual and methodological approaches which have come out of the international meetings over the last two decades, on sustainable development in general and on the sustainable use of water resources in particular. It gives special importance to the concepts of governance, integrated water resources management and catchment and aquifer management.

e) It is an instrument which encourages solidarity

The 2030 Water Agenda is an instrument that promotes solidarity between Mexicans from different regions and localities of the country at this point in time, and between this generation and future ones. It also encourages the concurrent action of all institutions - governmental and non-governmental- nationally, regionally and locally.

f) It is an initiative to generate culture

The 2030 Water Agenda should also be understood as a practice that generates a culture of water sustainability. An instrument to disseminate and bear testament to values such as unity, responsibility and solidarity, and an instrument that has a positive impact on the generalized beliefs as regards our capacity as a nation, as regions and as localities, to create the future that we crave for.

g) It is part of the national water planning system

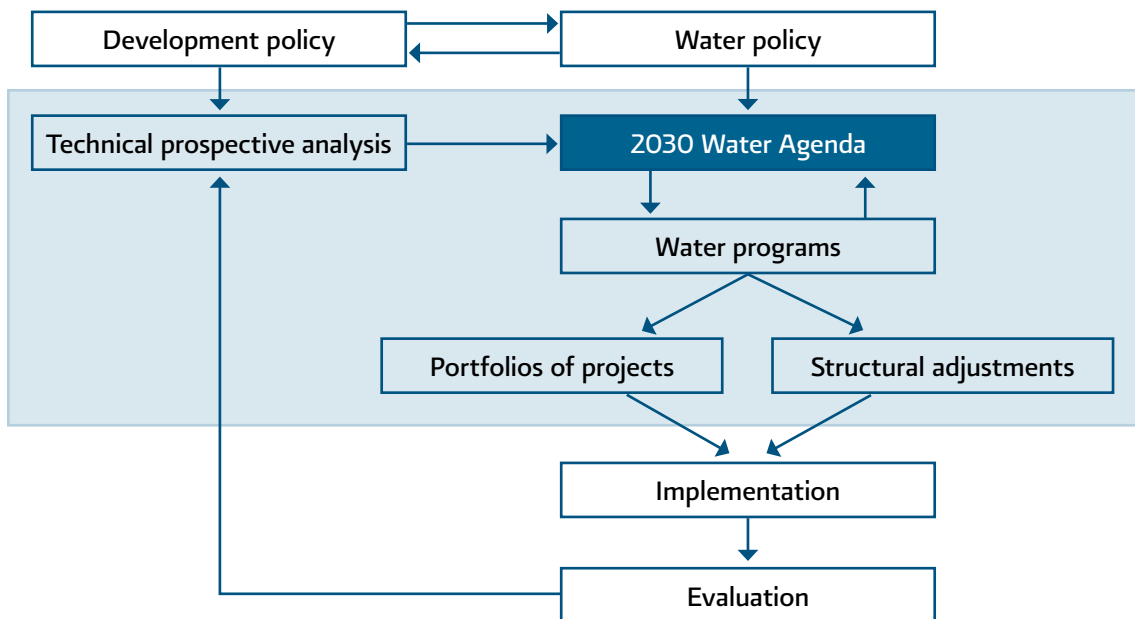
The 2030 Water Agenda does not exhaust national water planning, but is part of it; it takes its lead from the definitions of development policy, the definitions of water policy and the results of the technical analyses. The 2030 Wa-

ter Agenda is also fundamental input for structural adjustments to be carried out in the national water management system, and for the shaping of portfolios of national, regional and local water projects.

Conceived in this way, the 2030 Water Agenda contains the following elements:

- I. The vision on the long-term water reality to be built.
- II. The dimensioning of the problems to be overcome to make this vision a reality.
- III. The principles and strategic lines necessary to reach the objectives.
- IV. The identification of the changes necessary in the institutional layout to make all the components of the vision viable.

The 2030 Water Agenda for water management in Mexico



Questions to be answered

In Mexico, as in many parts of the world, there is a growing concern for water. Of concern are problems to ensure regular supply and distribution with the necessary quality, faced in various cities, towns and rural areas, to more complex questions such as poverty and migration, which often occur in association with the lack of basic services and droughts. Other causes of concern include major trends such as climate change and its repercussions for food production, ecosystems and the safety of coastal populations. Of particular preoccupation is the depression and degradation of surface and groundwater bodies as a consequence of the chronic overdrafting which they are submitted to. A possible growth in social conflict as a result of the decreasing availability of water is also a topic of some apprehension.

The business-as-usual scenario on the whole presents a highly complex panorama that it is essential to modify through institutional changes in areas such as the definition of responsibilities, capacity development, the establishment of incentives and the increase and enhanced focus of investments; on the other hand, not following this path could lead to catastrophic situations.

The necessary transformations require the committed cooperation of all stakeholders in the management and use of water resources: the three branches of government, national and local Congresses, large water users, companies that provide water and drainage services, civil society organizations, the national educational system and the media.

The main challenges identified in the national, regional and special forums carried out to build the 2030 Water Agenda are:

- I. How to cover the basic needs of water consumption for different uses without causing a deterioration in the natural sources of water and the integrity of ecosystems?
- II. How to make use of finite water resources with efficiency, equity and justice, when they are highly sensitive to pollution and unevenly distributed in time and space?
- III. How to manage the risks associated with the impact of extreme hydro-meteorological phenomena, such as droughts, hurricanes and rainfall and torrential floods, which may be aggravated by global climate change?
- IV. How to stop the overdrafting and pollution of aquifers and of surface water bodies?
- V. What should be the value of water and of its associated services in order to ensure at the same time its self-financing and to discourage wastage?
- VI. How can the financial resources required for the construction, rehabilitation, maintenance and improvement of the necessary water infrastructure be obtained?
- VII. How can the proliferation and escalation of conflicts over access to water be avoided?
- VIII. What characteristics and what means of functioning should the institutions required to guarantee good water governance portray?
- IX. What role should be played by federal, state and municipal governments, the private sector, large direct users of the nation's water and citizens in management processes of water resources and in the administration of associated services?
- X. How can water sustainability be effectively incorporated into the nation's culture?

II. A prospective vision of water in 2030



The uneven distribution of water around the country, the population dynamics, the development of economic activities, unordered urban settlements, the degradation of catchments, the overdrafting of aquifers and the effects of droughts and floods, constitute the main problems in the water sector in Mexico, whose future trends jeopardize the sustainability of water resources. In the following list, some relevant data is listed, which allows the current situation to be understood:

- The mean natural per capita availability of water has reduced drastically in recent years, going from 18,000 cubic meters per inhabitant per year in 1950 to only 4,422 cubic meters per inhabitant per year in 2010, due to the population growth. This figure is considered as low availability.
- The normal precipitation per year in Mexico is 760 millimeters; however, this national value hides a great regional variation, since states such as Baja California receive precipitation of just 176 millimeters per year, whereas Tabasco receives more than 2,100 millimeters, which generates problems related to the lack of water in some regions and excess and floods in others.
- The majority of the rainfall occurs between the months of June and September, very often torrentially, with large volumes in very short periods, making it difficult to make use of.
- The country shows an imbalance between the supply and demand for water. 77% of the population is concentrated in regions where only 31% of the mean natural availability of water can be found.
- We have a problem of rainfall variation in space and time, which also results in variation of the water that can be used sustainably for different purposes.
- There are 653 aquifers, of which 101 present conditions of overdrafting.
- Another of the major challenges faced by our country consists of recovering the water quality of rivers and

lakes, since a significant proportion of surface water presents some degree of pollution.

- 91.3% and 89.9% of the population has access to drinking water and sanitation services respectively.
- We have an agricultural irrigation surface of 6.5 million hectares.
- Year after year, our country suffers a battering from cyclones that cause significant damage.

In this context, it is necessary to focus all efforts towards a water management that guarantees its sustainability in the long term.

Long-term challenges

With the aim of defining the strategic guidelines to attain the sustainability of water resources, which is the vision of the 2030 Water Agenda, an intense effort has been made to carry out rigorous prospective scenarios in each of Mexico's 13 hydrological-administrative regions.

For this purpose, during 2010 the "Analysis of alternatives for the sustainable use of water in the medium and long terms" was carried out, which allowed i) the gap that would be generated between the sustainable supply and demand of water in the next 20 years to be determined, ii) alternative solutions to be identified, and iii) the costs to be estimated, to guide investment decisions in the sector, both regionally and nationally.

For the analysis of alternatives, an integrated tool was developed, that considered a wide range of information sources from federal and state agencies, and water user associations. With this tool, the challenges facing the sector were identified for each of the four thematic focuses of the Water Agenda.

In the following paragraphs, the results obtained for each thematic focus are described: Balanced Supply and Demand for Water, Clean Water Bodies, Universal Access to Water Services and Settlements Safe from Catastrophic Floods.

Balanced supply and demand for water

The demand for water nationwide is approximately 78.4 billion cubic meters. In order to meet that demand, a sustainable volume of 66.9 billion cubic meters is withdrawn from surface and groundwater sources. Additionally, this demand is satisfied with a non-sustainable volume of 11.5 billion cubic meters, of which 6.5 billion cubic meters comes from overdrafted aquifers. It is worth mentioning that the greatest percentage of the demand is concentrated in the agricultural sector.

It is estimated that by 2030, the demand will rise to 91.2 billion cubic meters, mainly due to the increase in productive activities and the population growth.

If we consider that the infrastructure projects registered in the Portfolio of Projects of the Ministry of the Exchequer and Public Credit will be built, the offer will be increased by 1.3 billion cubic meters, to reach a total of 68.2 billion cu-

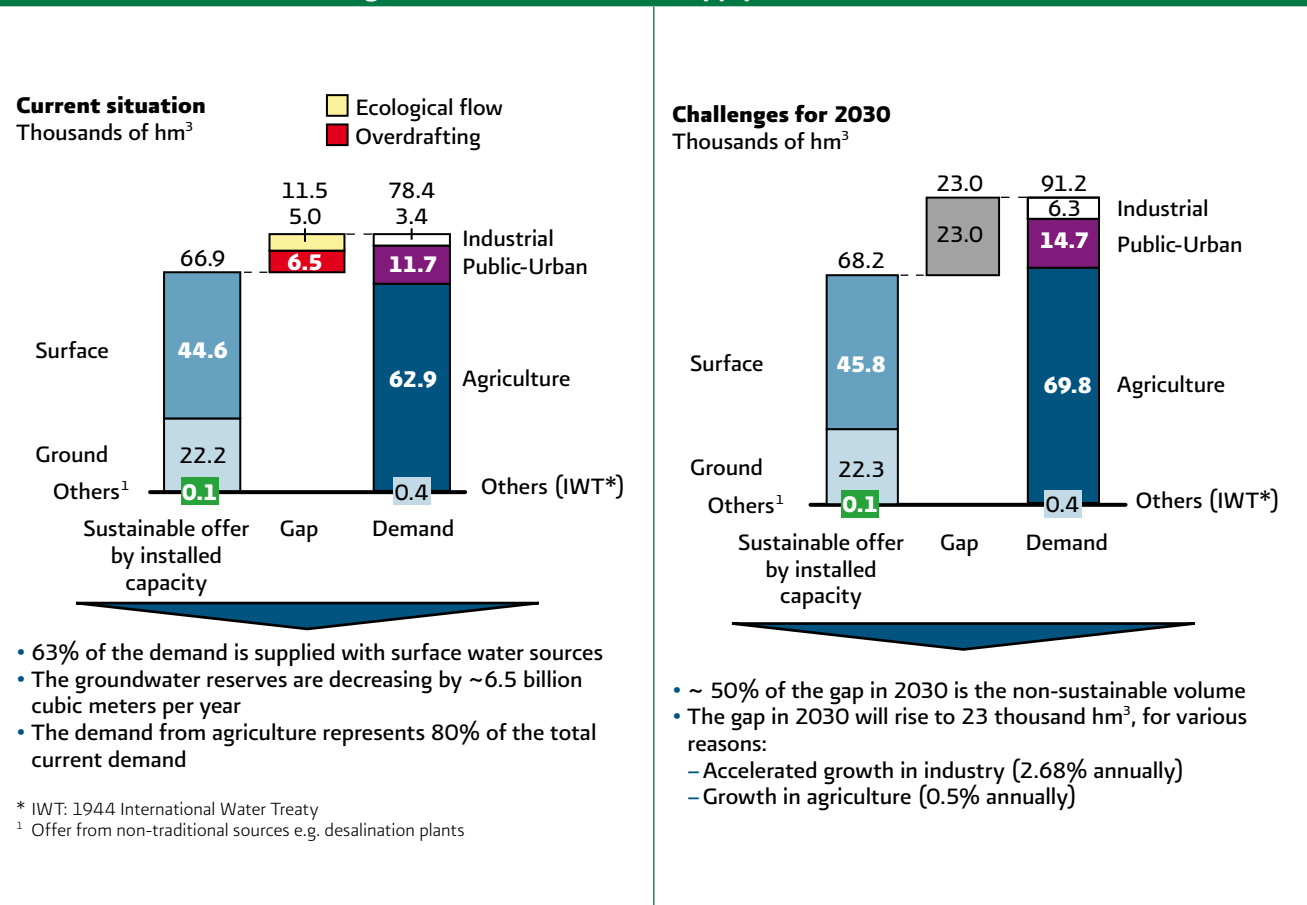
bic meters, which means that the estimated gap between supply and demand in 2030 would be 23 billion cubic meters, as shown in the following figure.

The gap in 2030 includes both the volume of water that will be used to cover the growth in demand for agricultural, public-urban and industrial uses, as well as the non-sustainable volume that will no longer be withdrawn due to the zero overdrafting of aquifers and the ecological flows in rivers.

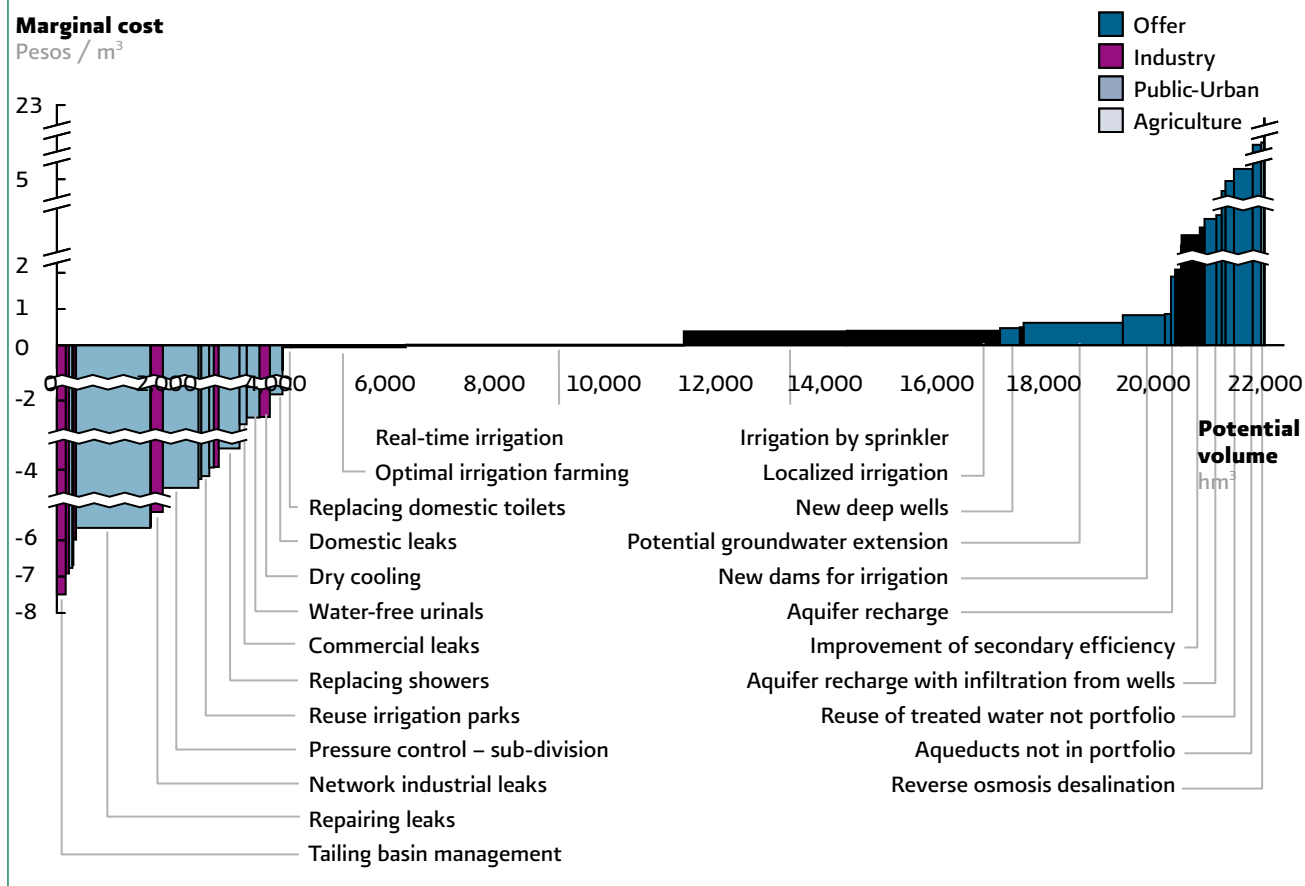
The main challenges can be found in the Lerma, Grande, Fuerte, Mocerito, Presidio-San Pedro, Tula, Balsas and the Valley of Mexico catchments.

In order to bridge the water gap by 2030, multiple solutions were analyzed. The solution shown in the following figure considers the measures that are technically feasible and with the highest cost-benefit ratio, such as improving efficiencies in all uses of water and the construction of new water infrastructure.

Current situation and challenge for 2030 for balanced supply and demand for water



Measures that integrate technical solutions, nationwide



The vertical axis shows the marginal cost per cubic meter of the measures identified and the horizontal axis shows the potential volume of water that would be saved and/or supplied by each measure, to bridge the gap.

The measures on the left-hand side of the figure have a negative marginal cost, which means that they would generate monetary benefits greater than the investments required for their implementation.

In the middle part of the figure are those measures associated with the improvement of efficiencies in irrigation by sprinklers and high pressure equipment, whose marginal cost of implementation is significantly lower than that of new water supply infrastructure related with the construction of aqueducts, the reuse of treated water and aquifer recharge, located in the right-hand side of the figure, with a positive marginal cost.

Along these lines, considering the marginal cost of implementation, the measures that should be implemented first of all are those with a negative marginal cost, such as repairing domestic, commercial, industrial and municipal leaks, as well as replacing showers.


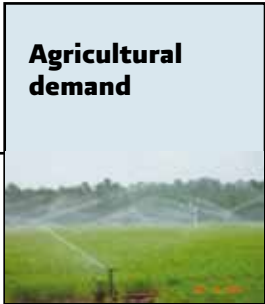






In summary, in order to ensure the implementation of the technical solutions and achieve balanced supply and demand for water, it will be necessary to concentrate on four lines of action: increasing the modernization (relining primary and secondary channels) and the technification of irrigation districts and units, even at the level of plots; continuing with the construction of infrastructure to supply areas of growth; boosting the efficiency of drinking water and sanitation systems through sub-division and leak repair programs, and increasing the use of efficient technologies in homes, businesses and industry.

The aforementioned actions require investments of approximately 348 billion pesos (28.93 billion USD), of which 306 billion pesos (25.44 billion USD) correspond to actions to cover the gap and the rest to the infrastructure currently under operation.

This investment could rise to 170 billion pesos (14.13 billion USD) if measures that are more socially and politically feasible for the country were to be implemented.

On the other hand, with the aim of understanding the risks and the implications in the water sector, associated

Contribution to the gap by type of measure

		Sector	Type of measure and potential to contribute to the solution		
Reduction in the demand 	Agricultural demand 	Improvements in yields	0%	61%	
		Efficiency in the use of water	61%		
		Crop conservation	0%		
Reduction in the demand 	Public-urban demand 	Reduction in leaks	11%	17%	
		Efficient technologies	5%		
		Reuse of water	1%		
Reduction in the demand 	Industrial demand 	Reduction in leaks	1%	4%	
		Efficient technologies	2%		
		Reuse of water	1%		
Offer-related measures 	Infrastructure 	Surface	5%	18%	
		Ground	11%		
		Others	2%		

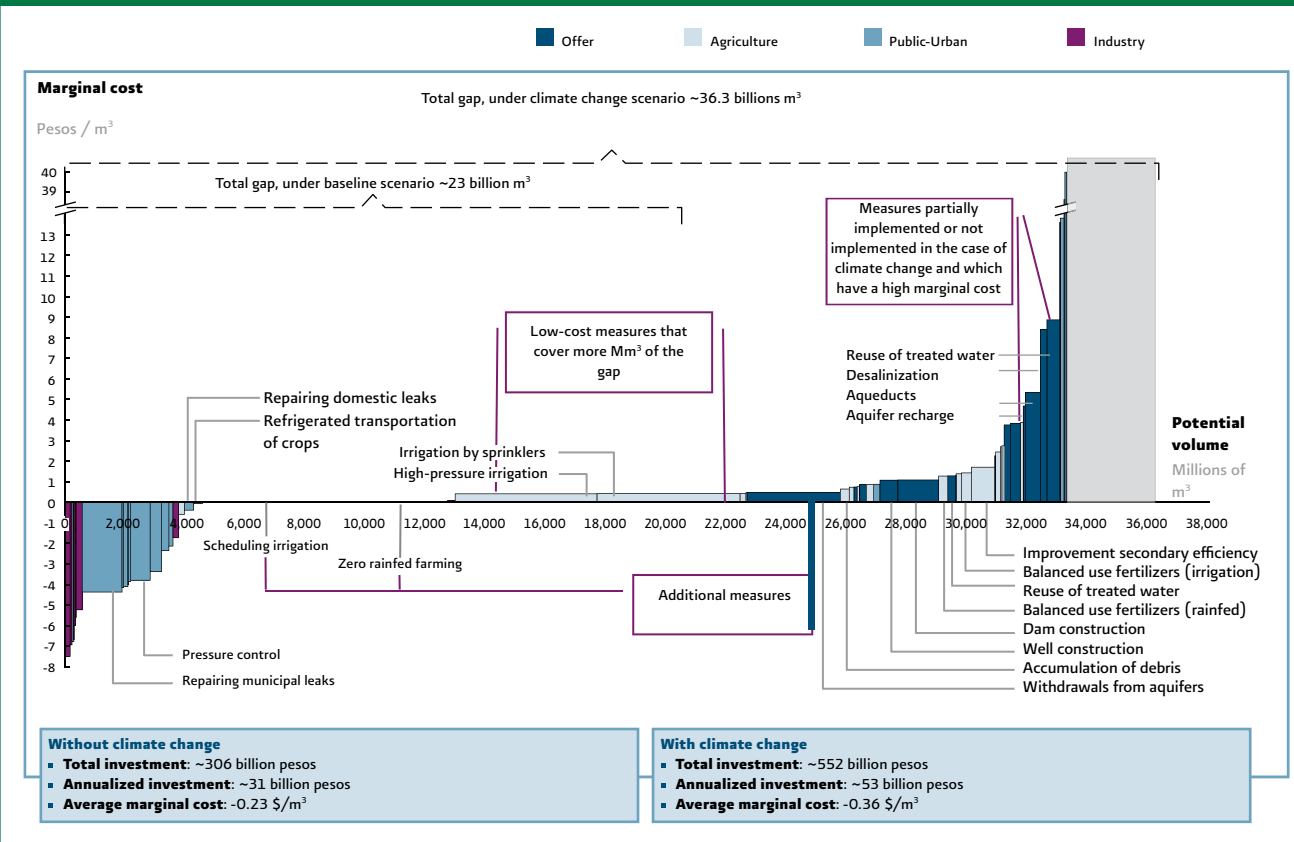
with the lack of water generated by the possible effects of climate change, a study was made to estimate i) the increased gap between supply and demand for water, ii) the value of the agricultural irrigation production that would no longer be obtained due to the lack of sufficient water for its growth, and iii) the adaptation measures necessary to bridge the gap under a climate change scenario towards 2030.



The results obtained show that the business-as-usual scenario corrected by the impact of climate change would increase the gap to 36 billion cubic meters, meaning 13.3 billion cubic meters more than the 23 billion cubic meters estimated in the business-as-usual scenario without climate change.

To bridge this gap, it would be necessary to intensify and extend low-cost measures and high-cost include infrastructural measures. The additional investment to implement this type of measures would rise to 246 billion pesos (20.45 billion USD). In catchments where the phenomenon of extended drought can be found, specific management plans should be implemented.

Increasing the use of current measures, as well as implementing additional measures, would close the gap by 91% by 2030

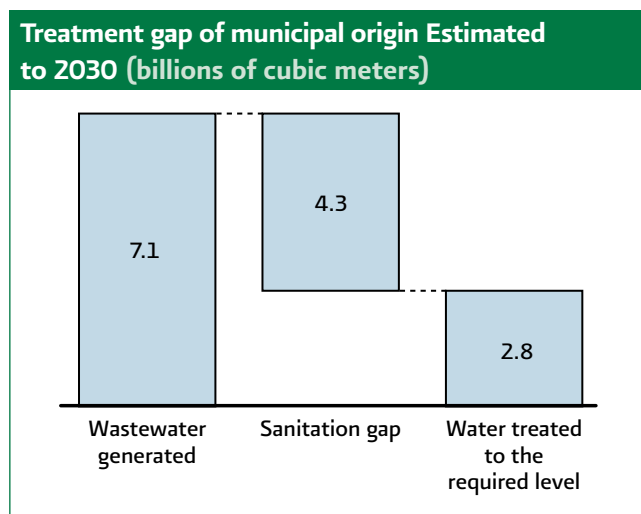


Clean water bodies

In order to have clean water bodies in all the national territory, it will be essential to guarantee that the wastewater discharged into these water bodies complies with the levels for non-point source pollution, for example the agricultural return, as well as maintaining rivers free from trash.

With the existing infrastructure in 2010, 2.86 billion cubic meters of municipal wastewater is treated every year, the equivalent of 43.4% of the wastewater collected, and it is estimated that by 2012, this coverage will be extended to 3.97 billion cubic meters, or 60% of the wastewater collected.

For 2030, infrastructure will be required to treat 7.16 billion cubic meters, which means covering a gap of 4.3 billion cubic meters.



This treatment gap will be made up mainly of the insufficient installed capacity for wastewater treatment, the non-operated installed capacity as a result of the lack of sewerage and wastewater treated insufficiently.

The catchments with the greatest challenges under this heading are Lerma, Valley of Mexico, Tula, Balsas, Bajo Palopan, Rio Grande and the Yucatán Peninsula.

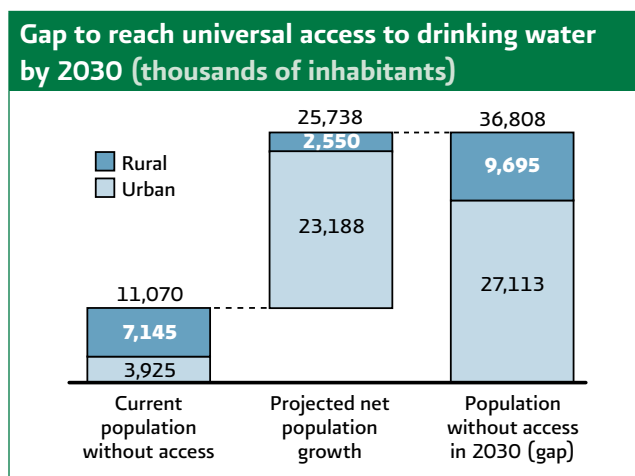
Similarly, by 2030 it is estimated that industrial activity will generate a volume of almost 2.1 billion cubic meters of wastewater. The treatment gap will be around 1.8 billion cubic meters.

To reach a level of treatment which meets standards and particular discharge conditions of all wastewater of municipal and industrial origin, approximately 114 billion pesos (9.48 billion USD) will be required in investments.

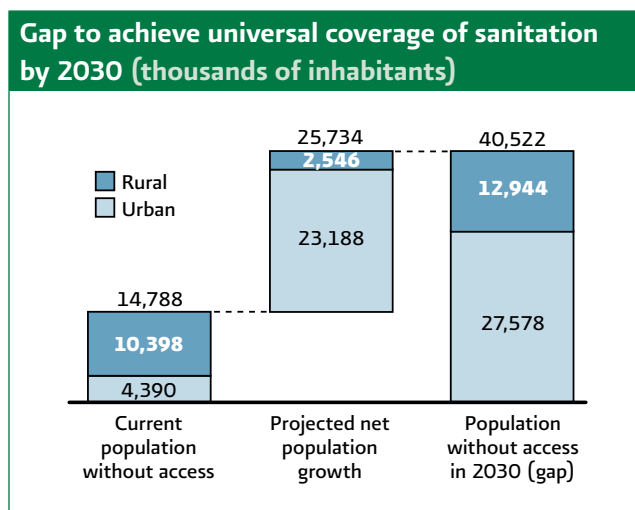
For the purpose of having clean water bodies, it will be necessary for existing and future treatment plants to operate efficiently in order to guarantee that their effluents comply with the respective standards, as well as connecting sewerage networks to plants, building new municipal and industrial infrastructure and fostering the reuse of treated wastewater.

Universal access to water services

In 2010, 91.3% and 89.9% of the population of Mexico had access to drinking water and sanitation services respectively. To achieve universal access to drinking water, it will be necessary to ensure this service for a further 36.8 million inhabitants by 2030.



The challenge to reach universal access to sanitation services is 40.5 million inhabitants.



The states facing the greatest challenges in the supply of drinking water and sanitation services are Baja California, Chiapas, State of Mexico, Guerrero, Jalisco, Nuevo León, Oaxaca, Puebla, Quintana Roo and Veracruz.

Investments of 215 billion pesos (17.87 billion USD) are required to reach universal access to drinking water and sanitation services, which should be directed towards the extension of networks in urban and rural areas, as well as the construction of wells, rainwater harvesting and the implementation of low-cost technologies for the collection and treatment of wastewater in rural areas.

Settlements safe from catastrophic floods

Due to its geographical location, Mexico is exposed on a daily basis to severe hydro-meteorological events, which, even if they do contribute positively to the increase in water storage in dams and lakes, also cause damage to the population, to infrastructure, to services and production systems.

Between 1980 and 2007, they affected more than 8 million people and caused more than 130 billion pesos (10.81 billion USD) of economic damage. In this period, cyclones Stan and Isidore were those that affected the largest number of people, whereas Emily, Stan and Gilbert caused the greatest economic damage.

The hurricanes that occurred in 2010, such as Alex, Karl and Mathew, affected 118 municipalities in Coahuila, Nuevo León, Tamaulipas and Oaxaca; 138 municipalities in the states of Campeche, Puebla and Veracruz; and 56 municipalities in the states of Chiapas and Oaxaca, respectively. The damage and economic losses that they caused amounted to 84.15 billion pesos (6.99 billion USD).

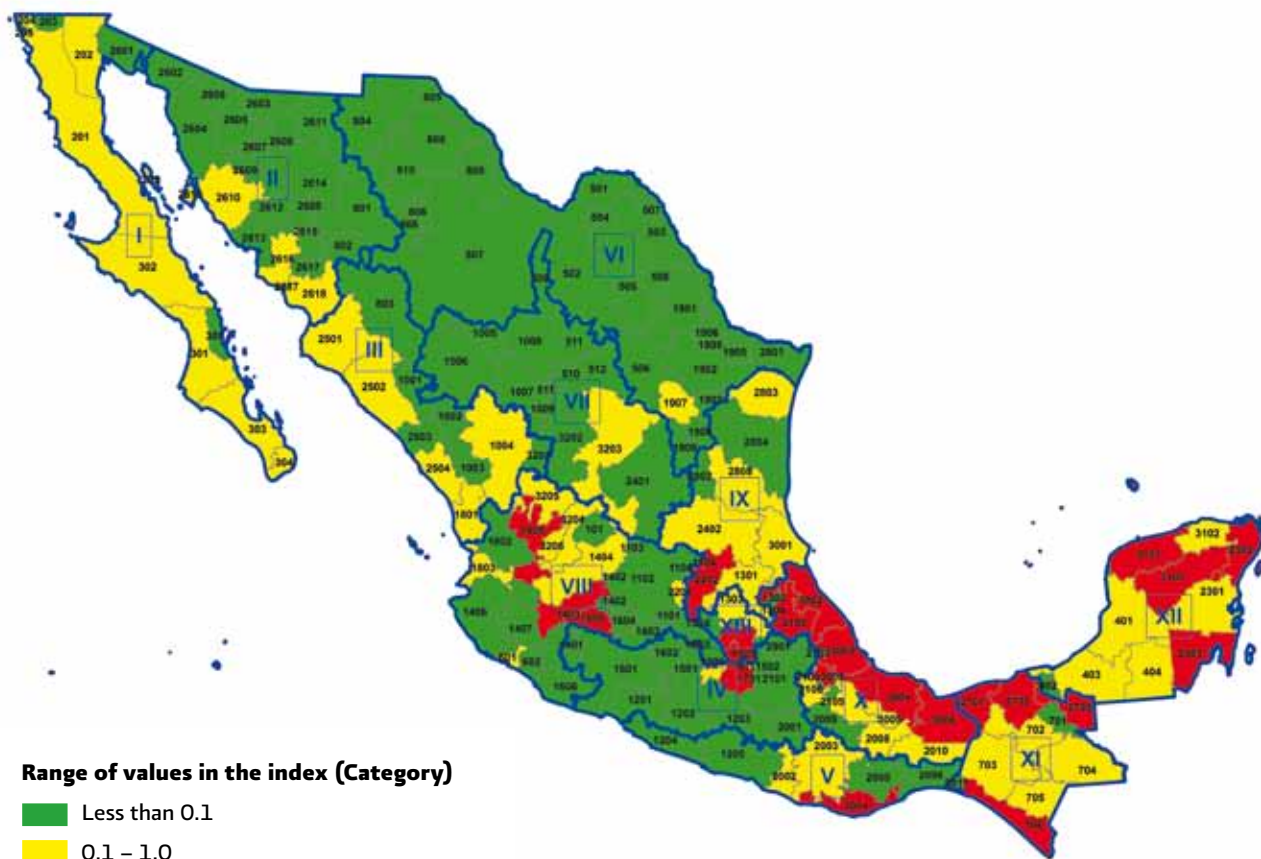
The greatest historical impact and the future trend for floods are concentrated in 17 states, which accumulate 62% of the population. Among them are the State of Mexico, Federal District, Veracruz, Tabasco and Chiapas, corresponding to the hydrological-administrative regions Valley of Mexico, Central Gulf and Southern Border.

Affectations of the main extreme hydro-meteorological phenomena in Mexico

Event	Date of impact	People affected (thousands)	Economic damage		Population density (inhabitants/km ²)	Surface area affected (thousands of km ²)
			(millions of pesos)	(millions of USD)		
Cyclone Emily	2005	347	27 287	2 268	210	166
Cyclone Stan	2005	1 370	22 229	1 848	121	223
Cyclone Gilbert	1988	119	18 631	1 549	98	369
Cyclone Isidore	2002	1 690	12 197	1 014	27	89
Cyclone Dean	2007	156	9 861	820	115	196
Cyclone Noel	2007	–	9 435	748	–	25
Floods in 2007	2007	939	8 532	709	95	47
Floods in 1999	1999	1 476	3 302	274	193	94
Floods in 1998	1998	34	3 032	252	43	67
Cyclone Juliette	2001	22	2 521	210	11	246
Cyclone Lane	2006	13	2 501	208	43	61
Floods in 2003	2003	49	2 204	183	132	146
Cyclone Kenna	2002	526	1 710	142	15	42
Cyclone Henriette	1995	35	1 202	100	22	379
Cyclone John	2006	10	1 133	94	7	74
Others	–	1 479	5 151	428	83	2 786
Total:		8 265	130 928	10 884	83	5 010

SOURCE: CENAPRED: Reports on the impacts of catastrophic events 1980-2007

Affectations of extreme hydro-meteorological phenomena nationwide (Flood Impact Index)



Range of values in the index (Category)

Less than 0.1

0.1 - 1.0

More than 1.0

Hydrological-Administrative Region

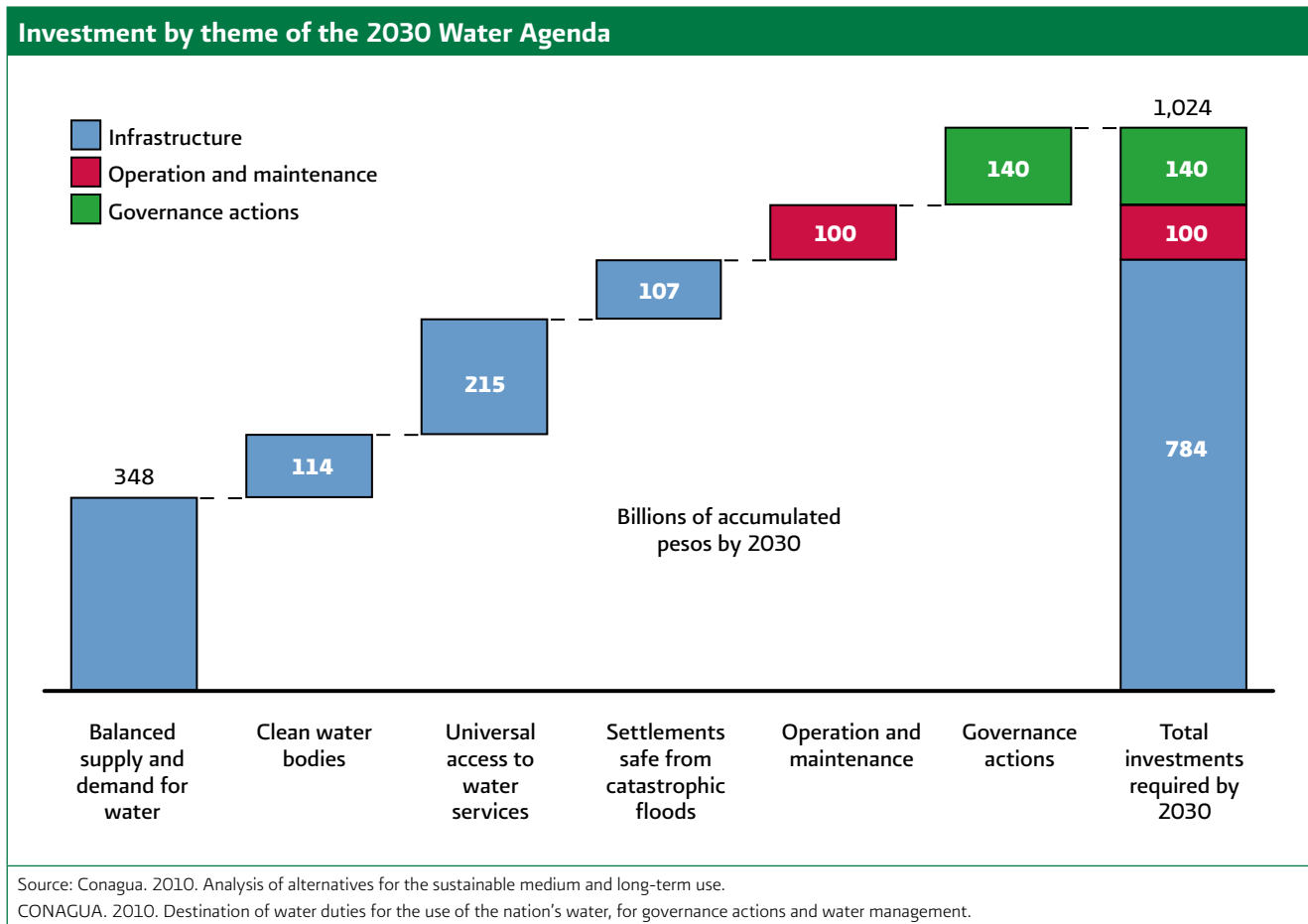


To minimize the risk of floods, 107 billion pesos (8.89 billion USD) worth of investment projects have been identified, focusing on the construction of storm drain and flood control works.

Currently insufficient elements are available to estimate the total amount of investments that will be required under this heading by 2030, since it will depend on the performance of the country as regards land use planning and global climate change.

Global investments

In summary, more than one trillion pesos (83.13 billion USD) will be required to implement the actions and strategies of the 2030 Water Agenda, distributed as shown in the following figure.



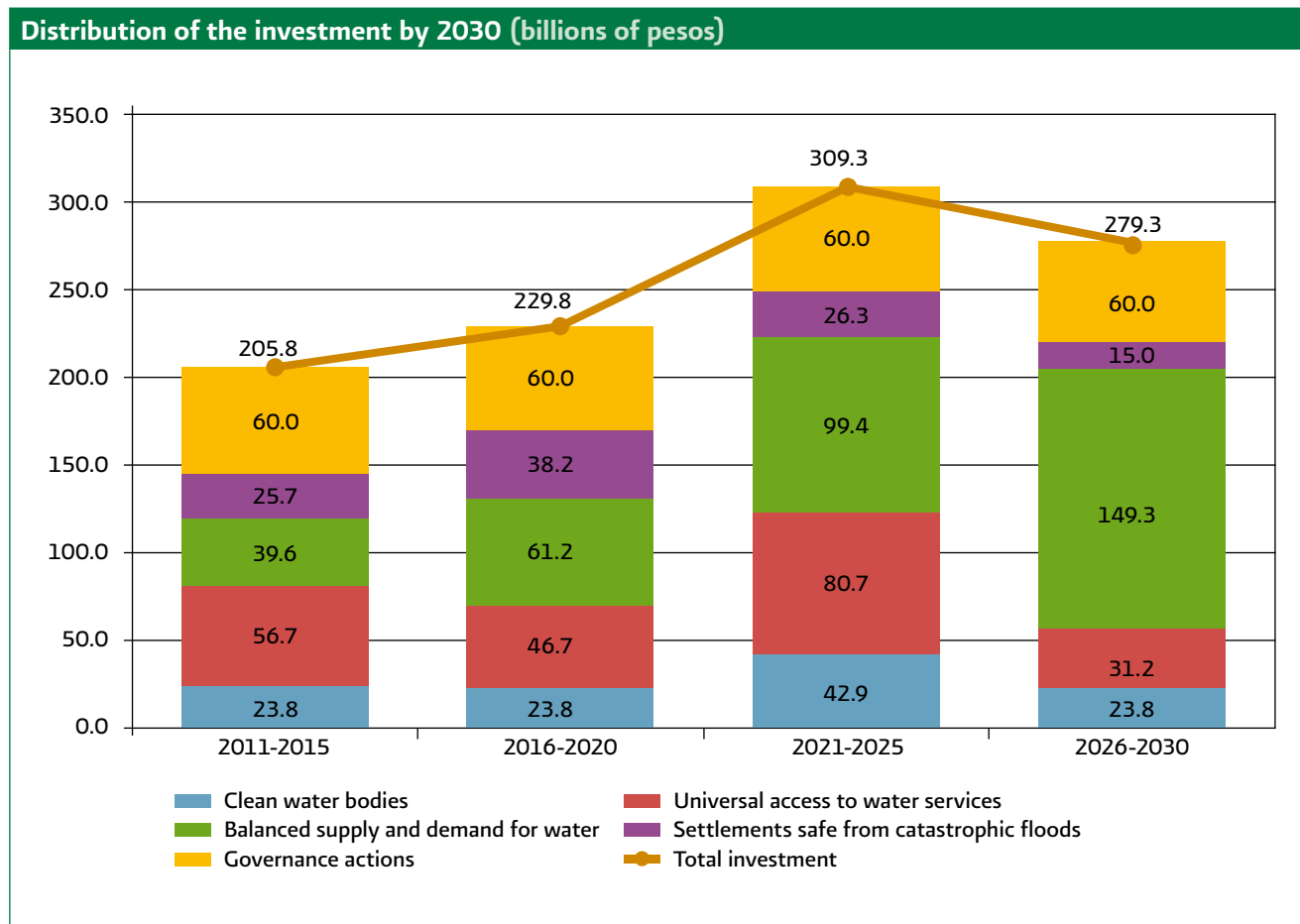
Investment and financing

A decisive factor to turn the vision of the Water Agenda into a reality, meaning clean water bodies, balanced supply and demand for water, universal access to water services, and settlements safe from catastrophic floods, as well as maintaining and operating the country's water infrastructure, and carrying out water governance actions, is ensuring over the coming years the continuity and the allocation of the required economic resources.

As mentioned previously, the investments that will allow the targets in the different regions of the country to be met amount to approximately 1 trillion pesos (83.13 billion USD), meaning that 51 billion pesos (4.24 billion USD) need to be invested annually over the coming twenty years.

Considering that the average amount of investments made in the water sector for the period 2007-2010 was 37 billion pesos (3.08 billion USD), we have a gap of 14 billion pesos (1.16 billion USD) per year, so it will be necessary to increase the allocation of resources and to modify investment policies in the sector to reach these targets.

The application of resources over the next twenty years is shown in the following figure, where it can be observed that over the next ten years, a similar quantity to that currently allocated to the sector is expected; it is considered a priority to increase access to drinking water and sanitation services, as well as improving the efficiencies in the use of water in agriculture, which would contribute to freeing up volumes of water for other uses.



In the final ten years of the period in question, the investment will increase significantly due to the programming of infrastructure works with a high cost, such as storage dams, aquifer recharge and aqueducts, as well as increasing the access to drinking water and sanitation services, among other activities.

The investment flow could be adjusted according to the priorities established in the future.

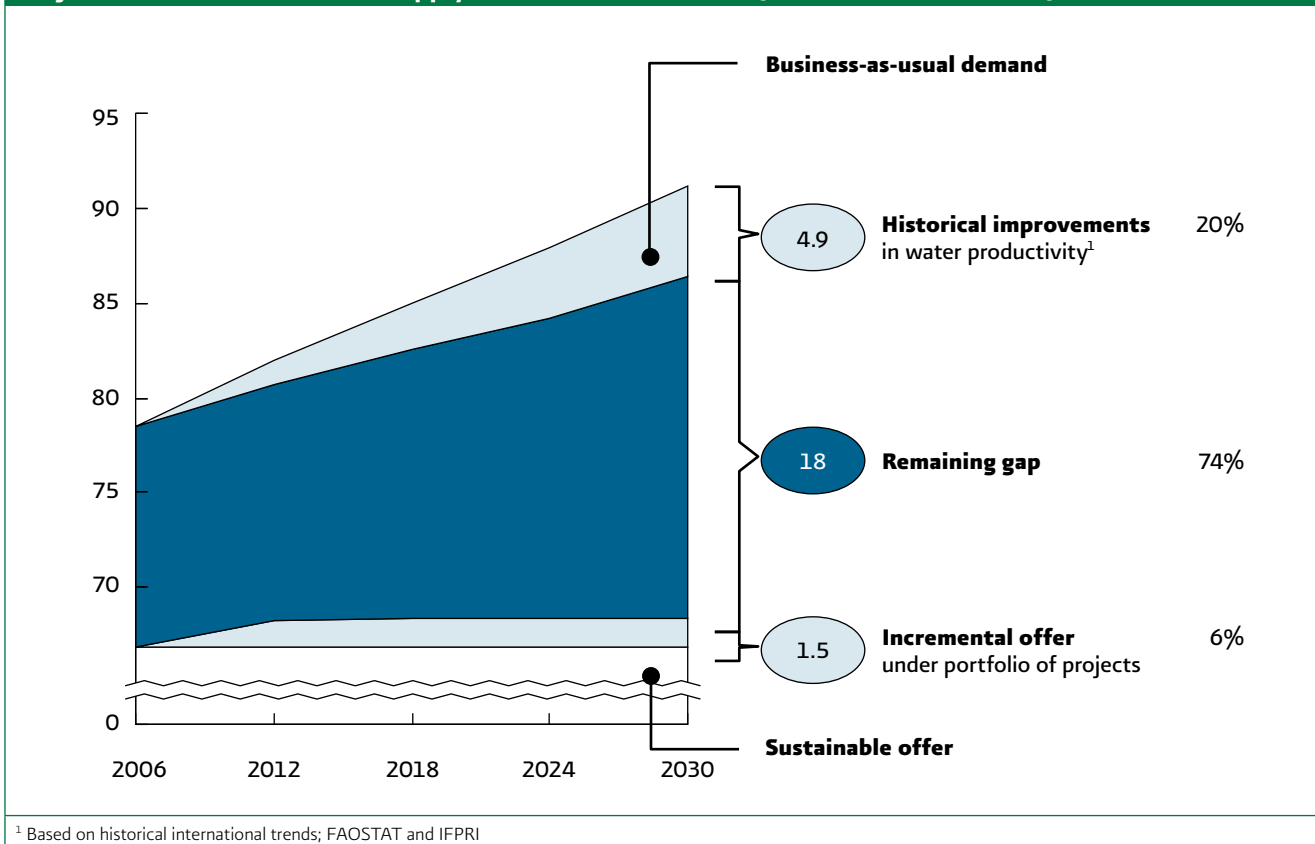
As can be appreciated, the investment required to face the challenges around water are considerable. Their financing will necessarily require a mixture of resources coming from water users (duties, concessions and services) and from taxpayers (budgetary allocations assigned directly or indirectly to water). At present, it seems obvious that this mixture is excessively and increasingly supported by federal resources, which is definitely not sustainable and needs to be reviewed to significantly increase the flow of financial resources from various schemes of user participation.

It should be underlined that the design and implementation of financing programs must contribute clearly and efficiently to the achievement of the strategic aims of the 2030 Water Agenda, as well as carrying out the sector's institutional strengthening through water governance actions, including those referring to the technical and administrative capacity, and to the use of technology.

The cost of not taking action

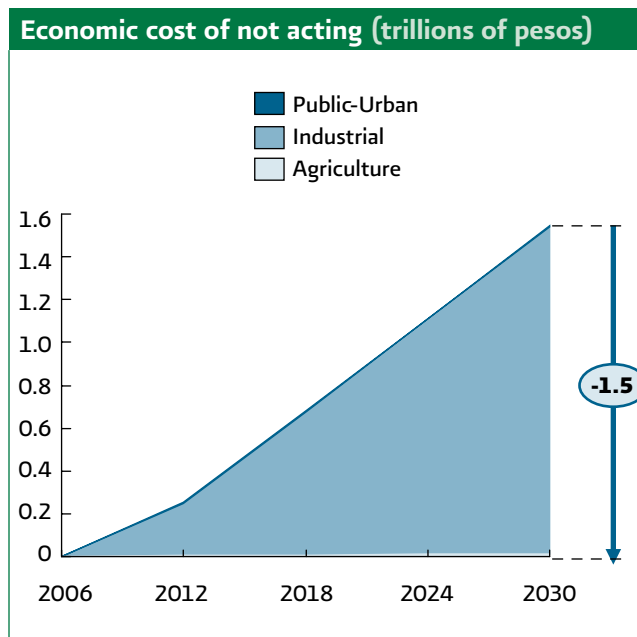
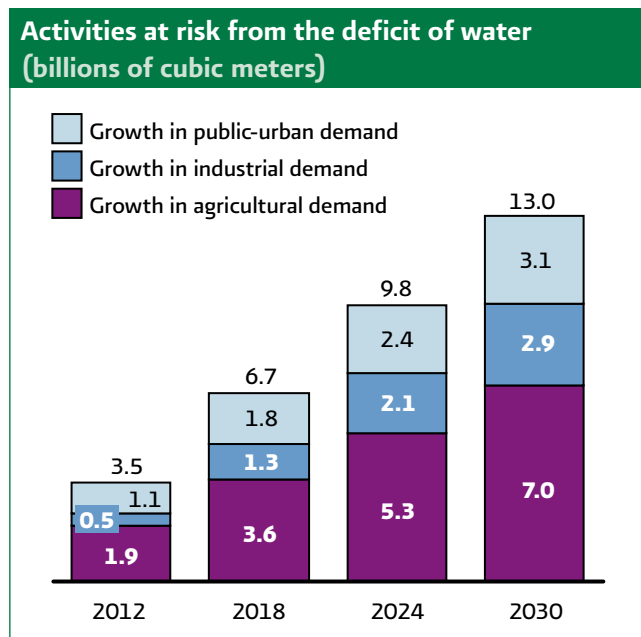
Not taking the actions encapsulated in the Water Agenda would imply that by 2030 there would be an approximate non-satisfied demand of 18 billion cubic meters. The existence of this future gap would imply productive activities that it would not be possible to carry out due to the lack of water.

Projected difference between supply and demand for water (billions of cubic meters)



This deficit of water will have to be covered by rationing available water resources between competing uses. Not meeting this demand implies an opportunity cost for each use of water, expressed as a non-achieved economic activity.

It should be mentioned that industrial growth restricted by the water deficit represents 99% of the cost of not acting in 2030, since it is the sector that adds the greatest value per cubic meter of water used.



Opportunity cost per type of use *

Type of use of water	Opportunity cost (pesos/m³)	(USD/m³)
Public-urban	2	0.17
Industrial	523	43.48
Agricultural	2	0.17

* Defined as the value of the activity not carried out per cubic meter of water not supplied:

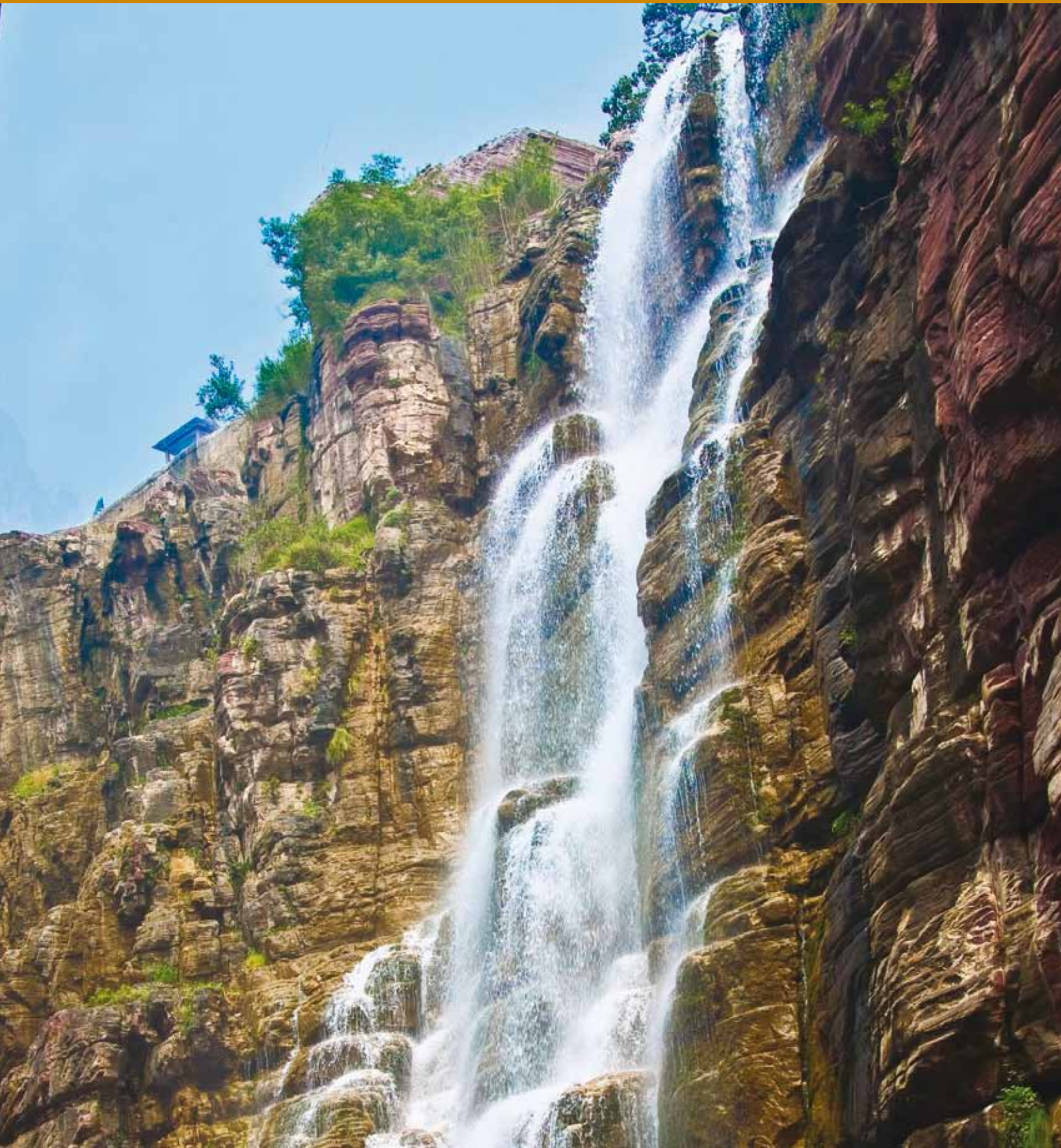
- Agricultural use. Value of the agricultural production, pondered by type of crop and intensity in water consumption.
- Industrial use. Calculated from the GDP of the manufacturing industry, pondered by the intensity of water consumption.
- Municipal use. Assumes that the population growth is also supplied at the cost of agricultural production.

In conclusion, making the required investment in water over the coming twenty years will have a high economic, social and environmental profitability.

Therefore, the economic cost of not acting increases over time, reaching 1.5 trillion pesos (124.70 billion USD) per year by 2030. Deferring the implementation of the 2030 Water Agenda would have increasingly negative economic impacts for the country.



III. Principles and long-term strategic lines



The general strategy put forward by the 2030 Water Agenda includes a series of principles and guidelines, which define the path selected to have each and every one of the activities in the National Water Management System completed under criteria of sustainability.

Principles

a) Sustainability should guide and inspire water policy, and should be the guiding principle of its management strategy and in the definition of medium- and long-term objectives and priorities

Sustainability prescribes finding means of meeting society's current needs without compromising the possibilities of future generations. It is certainly an expression of inter-generational solidarity, of responsibility and of good sense. Without doubt, it is an essential attribute of true development.

The principle of sustainability has at least three necessary and interconnected dimensions; the environmental, the economic and the social. In its environmental dimension, water sustainability requires that aquifers are not overdrafted, environmental flows of surface water bodies are respected and water pollution is controlled. In its economic dimension, it implies the establishment of efficient financial systems with the capacity to generate autonomy and sustenance over time, and the existence of incentives that induce the rational use of water resources. Finally, in its social dimension it demands the institutionalized involvement of water users in the management of the resource, the development of a culture that promotes the fair valuation of water and renders it unacceptable to waste or pollute it and, of course, implies guaranteeing the supply of clean water in sufficient quality and quantity so that all the country's inhabitants can maintain good health and meet their basic needs.

b) Integral long-term vision

It is essential to maintain an integral long-term vision in all the policies, programs and projects that have or that could have an impact upon the availability and the quality of water resources.

It is not possible to aspire to having, over the long term, clean water bodies, balanced supply and demand for water, universal access and settlements safe from catastrophic floods, without acting in the short and medium term so that land use regulations, trash disposal, sanitation and urban growth, are in line with these ambitious objectives; if the institutions of the three branches of government do not agree to carry out their attributions and coordinate better in their respective areas of competence in order to achieve this, and even less so if successive governmental administrations define their programs without considering the continuity essential to reach higher objectives.

c) Catchment vision

Water flows and natural storage are always determined by the configuration of surface and groundwater catchments, establishing a systematic dynamic that it is necessary to have a deep understanding of in order to be able to manage it effectively. A catchment vision is also relevant for the sustainable management of other resources, such as soil, vegetation cover and ecosystems. Aspects such as organization, regulation, information, models, water balance, availabilities, as well as programs and projects, among others, should reflect a vision of catchments and aquifers.

d) Local control

The effectiveness of policies is intrinsically related with the control of human actions, which alter the state of water resources and make them unsustainable over the long term, whereas the enormous diversity of environmental, social, economic and political conditions that characterize the nation's water outlook (added to the uncertainty which is part and parcel of climatic phenomena), makes it mandatory for solutions to be decided upon, implemented and evaluated first of all in the closest scale possible to the origin of the problems and in a framework of shared responsibilities. Examples of problems that demand local control are: 1) trash disposal in areas close to rivers, streams

and other water bodies, or in areas of aquifer recharge; **ii)** domestic and industrial discharges into gullies and rivers; **iii)** disposal of dangerous waste in places not apt for that purpose; **iv)** industrial discharge connections without pre-treatment in public networks; **v)** the occupation of rivers and federal zones; **vi)** leaks and wastage in water supply networks; **vii)** the inefficient use of water in cities and in fields; **viii)** the overdrafting of aquifers; **ix)** the shortage of volumetric meters and chlorination devices; **x)** the shortage of monitoring and measurement systems; **xi)** the lack of protection plans for populations and productive areas in flood plains; **xii)** the lack of incentives for the development of education programs and water culture.

e) Subsidiarity

Within the framework of their legal attributions, the authorities of the three branches of government should permanently evaluate the regulation and the capacity of self-control of users and organizations in charge of service management or supply, foster sustainable behavior and the development of management capacities, and even temporarily intervene in those cases when the body in charge lacks the capacities to meet its responsibility in the management of water resources and in service provision to end users.



Strategic lines

In order to overcome the challenge of passing on clean water bodies, balanced supply and demand for water, universal access and settlements safe from catastrophic floods, the 2030 Water Agenda proposes a general strategy that is expressed in the following guidelines:

a) Ensuring that all the country's catchments have a sound governance structure, with sufficient capacity to manage water resources with joint responsibility and in a sustainable manner; this means:

- I. Consolidated River Basin Organizations in each of the country's major catchments.
- II. Operational River Basin Councils with the capacity to establish and implement agreements and memoranda.
- III. Technical Groundwater Committees (COTAS) operating in aquifers that are already or are in the process of becoming overdrafted, duly empowered to affect the recovery of their geohydrological balance.
- IV. Irrigation user associations in all existing districts and units in the country, strengthened in their capacities to technify and modernize their productive units.
- V. Water utilities and water and sanitation companies functioning with high levels of physical and commercial efficiency.

b) Ensuring a better and more balanced distribution of competences to foster, regulate and provide water and sanitation services, with responsibilities on the

three branches of government, to achieve a more balanced National Water Management System, capable of responding to the present and future water-related challenges. This means:

- I. Reinforcing the competences and capacities of state water and sanitation commissions and of companies and municipal water utilities, to provide efficient services and to be financially and operationally self-sufficient.
- II. Creating sufficient and appropriate regulatory frameworks so that each of the competent authorities and organizations meet their respective missions.
- III. Formulating and promoting joint programs and projects to attend to common and strategic matters for water sustainability, such as the occupation by settlements in channels and in federal zones of rivers, streams, gullies and in recharge areas, flood plains and others of similar importance.
- IV. Guaranteeing sufficient financial resources for the construction, improvement and rehabilitation of water and sanitation services, through the definition of tariffs and the establishment of subsidies and guarantees.
- V. Creating and developing vigorous local, regional and national financial systems for water, which satisfy the sector's requirements and minimize the distortions through considerations external to the management of water resources and to the provision of water services.
- VI. Establishing incentives for the different water stakeholders and users to adjust their behavior to the demands of sustainability.
- VII. Opportunely and rigorously carrying out the control and monitoring that correspond to their area of competence.
- VIII. Fostering the development of technical and management capacities of each of the key stakeholders.
- IX. Temporarily replacing those players that cannot comply with the minimum efficiency required.

IV. The initiatives and actions of the 2030 Water Agenda



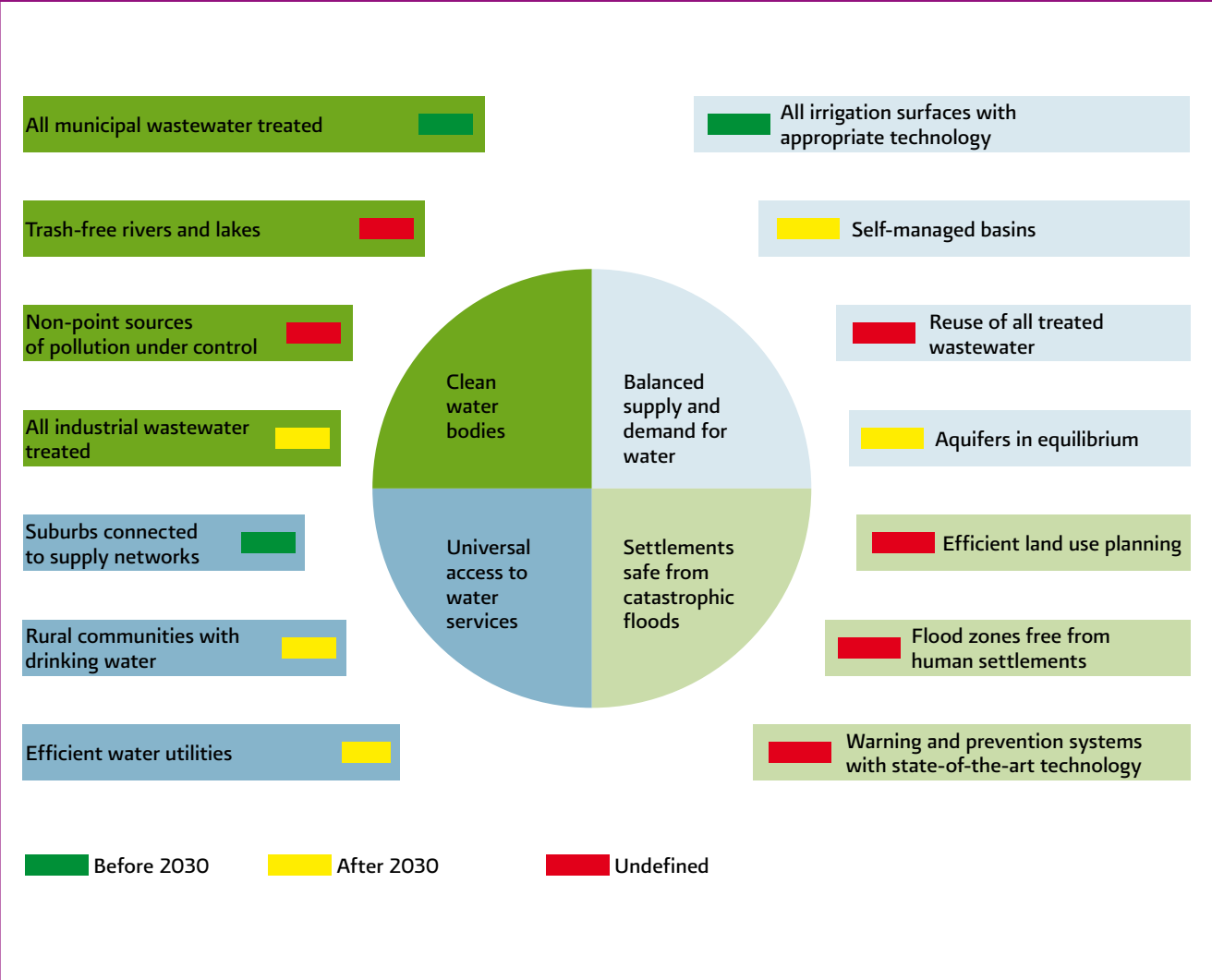
Consistent with the principles and strategic guidelines referred to in the previous chapter, the following pages present the initiatives and actions that are considered priorities to be developed in the shortest period of time possible.

The correct achievement of the vision described will only be possible if different changes are implemented in the institutional makeup of our country. In the current state of affairs, only three of the fourteen basic components of the 2030 Water Agenda have an appropriate and sufficient momentum to reasonably consider that they may be reached before 2030; another five components are going in the right direction, but are advancing uncertainly and slowly, as a result of which three or more decades would be needed for them to come to fruition; the remaining six components are practically at a standstill.

The numerous working groups that operated between July and November 2010 focused their deliberations precisely on the identification of the changes necessary to make all of the components of the 2030 Water Agenda feasible; each group with a particular territorial or thematic perspective.

The 38 initiatives shown in the following pages are the result of that process; all of them propose necessary changes. The majority of them naturally refer to aspects that are within the scope of water policy, but some of them touch upon aspects that go beyond the scope of the National Water Management System, which affect it in such a relevant way as to make them mandatory.

Basic components of the 2030 Water Agenda



Initiatives and actions linked to the challenge: Balanced supply and demand for water

Initiative 1.

Giving a more relevant role to Technical Groundwater Committees (COTAS in Spanish) in aquifer management

a) Legally reinforce their intervention in aquifer monitoring activities

The organizational and promotional work of the Technical Groundwater Committees (COTAS) has shown their potential to undertake tasks of greater magnitude such as intervening in the measurement and monitoring of flows withdrawn from aquifers, and in the planning, management and regulation of the use of aquifers; to achieve this, their intervention needs to be legally reinforced for this and other important support tasks for the institutional administration of the nation's water, modifying the legal rules that facilitate their intervention.

b) Develop the capacity of their representatives to intervene in the management and planning of aquifer use

It is essential to strengthen and develop the capacities necessary for the COTAS to increasingly intervene in management and aquifer planning processes, with special emphasis on the measurement and monitoring of withdrawals, the preparation of management plans, the drawing up of regulations, the implementation of processes of public consultation, in the processes of evaluating results, in the deployment of educational and water culture actions, and in the dissemination of water policy that leads to an individual and collective participation which is more committed with its immediate environment.

c) Develop information systems on the dynamics of the aquifer and the knowledge of withdrawals and recharge

It is essential that the COTAS have access to complete and reliable information that allows them to comprehend the behavior of their aquifers, which is why information systems must be developed that are accessible to users, where they can consult the data on the allocation of water concessions, the volumes authorized and those that are effectively withdrawn, the latter requiring measurements. Direct and indirect measurements of users should be complemented with the data from the measurement of natural aquifer recharge, which requires that the dynamics of these water bodies are known, in order to deduce the infiltrated volumes (recharges) from precipitation in recharge zones and the speed of infiltration through the characteristics of the soil. As can be observed, without information, the process of organization and participation of users loses sense and can generate negative results such as a lack of trust and/or belief from the stakeholders towards the authority, which would subsequently make the ordered management of water resources more difficult.

d) Ensuring their financial operation through some legally binding procedure linked to withdrawals and to users

The formation of a fund for the operation of the COTAS could be constituted from the application of a figure of around five to ten percent of the income from water duties and procedures carried out by the CONAGUA and that are paid by the users of each aquifer. The fund will grow as the users measure the withdrawals and pay the corresponding duties. Greater percentages could be conditioned to them being destined to water-saving infrastructure, artificial recharge and catchment management to facilitate infiltration. A process of this nature will allow sustainable long-term financing of the operation of COTAS and will encourage investment in efficient water use.

Initiative 2.

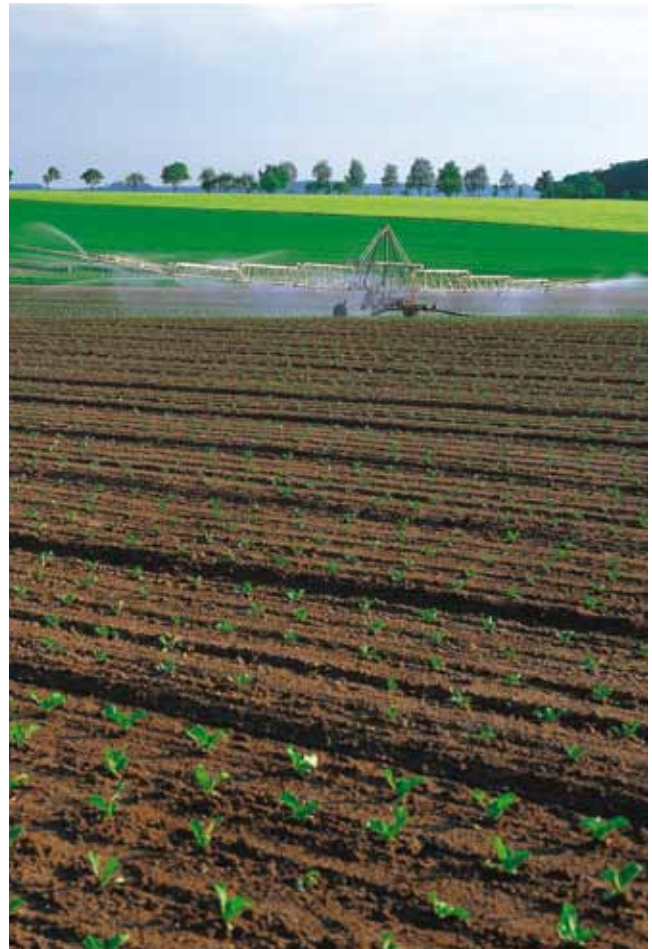
Strengthening the organization and functioning of the River Basin Councils and their auxiliary bodies

The River Basin Councils and their auxiliary bodies constitute the main institutional mechanism set up with a legal backing to coordinate and consult on actions that favor water sustainability in all of Mexico. However, and despite the efforts made, these organizations are still currently being consolidated as the most appropriate mechanism to facilitate the involvement of society-at-large in the management of water resources. For that reason, it should be a priority to reinforce their structure and functioning so that, in a spirit of shared responsibilities and joint actions, the three branches of government, the representatives of users and of different social groups agree upon the actions necessary to improve the management of water resources and of associated services in each catchment and aquifer. Under this initiative, the following actions are contemplated:

- a) Reinforcing the normative framework for a better organization and functioning.
- b) Revitalizing the Assemblies of Water Users in each of the country's catchments and aquifers so that, in conformity with the National Water Law, users can get to know and deliberate on the issues and problems faced in each catchment and aquifer and so that the representatives of the users in the River Basin Council are designated or renewed, being committed to provide information on and account for their actions and performance on that body.
- c) Reviewing the election process of the user members and of civil society representatives to give them greater representativity and legitimacy.
- d) Proposing and intervening in the drawing up of regulations for the distribution of surface water and other specific instruments for each catchment, such as regulations in Irrigation Districts and Units, among others.
- e) In collaboration with all members of the River Basin Councils and the governments or groups they represent, developing public consultation schemes to capture the opinion of broad segments of citizens and of

the users themselves on water problems and possible solutions in each catchment and aquifer.

- f) Developing continuous training processes that foster better skills and capacities among the members of the River Basin Councils, in order to promote, coordinate, and consult on joint actions with shared responsibilities, as well as to intervene in the diagnosis, formulation of plans and programs, evaluation of water management and in data and information management on water and catchments, as well as in their dissemination.
- g) Applying evaluation schemes to verify that the plans, programs and actions developed at the catchment scale are achieving their targets and are heading in the direction shown by the long-term goals contained in the 2030 Water Agenda.
- h) Establishing coordination and consultation agreements and memoranda to collaboratively develop and implement specific projects that aim to meet the demands and needs of each catchment or aquifer.



Initiative 3.

Consolidating the governance functions and regional organization of the CONAGUA

The structure of the water authority is facing a process of loss of human capital, mainly due to the reduction in staff that has been evident over the last few years, a situation that is out of synch with the importance of its faculties and functions, as well as with the size and complexity of water challenges in Mexico. To strengthen the main water institution, the following is required: making comprehensive use of and strengthen the staff roster, redesigning it according to the tasks that should be implemented and recognizing that their complexity varies in each region; operating and maintaining the monitoring networks on water quantity and quality; promoting and consulting with users on water management plans and regulations for the use and distribution in the country's catchments and aquifers; installing volumetric meters; standardizing and regulating withdrawals from surface and groundwater sources by the hundreds of thousands of users; making inventories of river channels and federal zones, flood plains and recharge areas to efficiently manage these national assets; drawing up risk maps; developing and implementing emergency programs, supervising the compliance with the National Water Law and dozens of tasks of similar importance. All of these responsibilities require that specialized field and cabinet work be performed –often non-transferrable to outsourcing schemes because they imply that faculties of authority be exercised and have legal implications-, for which insufficient qualified human resources and investment resources are available.

On the other hand, the basic current organizational structure of the CONAGUA was put together more than two decades ago, superimposing the regionalization formulated by the 1975 National Water Plan on the state and municipal division, to configure the hydrological-administrative regionalization of thirteen major regions in which Regional Departments operated, which have now become River Basin Organizations, maintaining Local Offices in 20 states in which, up to 2005, State Departments used to operate. In recent decades the demographic configuration of the country has continued to evolve, as have the system of cities, the transportation network and as a result the re-

gional demand for water resources and water management services. As a result, new operative needs have emerged in some areas of the country, and in others, a large degree of saturation of the regional and state offices can be observed. These reasons justify a review of the CONAGUA's current institutional structure in order to adapt it to a new regional reality that allows the global efficiency of the National Water Management System to be increased; improving the use of its human capital and strengthening the presence of the water authority in the different regions through consolidated River Basin Organizations.

Initiative 4.

Involving civil society associations of irrigation users (ACUs) and Technical Groundwater Committees (COTAS) in driving for the saving of water and the technification of irrigation

Irrigation Districts and Units play a fundamental role in the nation's and in regional economies: they produce a substantial part of the food and raw materials required for internal and external markets; they contribute to the trade balance and significantly occupy manual labor, among other contributions.

As a result of the characteristics of agricultural processes, the original conception of the country's irrigation infrastructure design and some agricultural practices, this group of users is also the one that has the greatest concession and makes the biggest use of the majority of the available surface and groundwater, which means that they have an enormous water-saving potential. This is essential, both to favor the balance in aquifers and watersheds, and to satisfy new demands in the primary sector and in other sectors that use water, seeking as much as possible to increase productivity through practices such as the modernization of infrastructure and the technification of irrigation at the plot level.

In the past, significant efforts have been made, both by the federal government and the farmers themselves, to make investments in improving and extending water infrastructure and technical assistance, but, in the context of the dimension of the challenges set out by the 2030 Water Agenda, even more incentives must be provided for

the active participation of ACUs and COTAS to extend the scope of existing programs, and save water which would significantly contribute to the sustainability of catchments and the balance of aquifers. As a result, the following will be promoted:

- a) Substantially increasing the budgets allocated to the modernization and technification of irrigation infrastructure and assigning them in priority through cooperation agreements to users with whom commitments are established to save water and to free up allocated volumes.
- b) Increasing the technical quantity and quality of staff to appropriately manage investments and operate the modernized infrastructure.
- c) Developing the mechanisms for water that is saved to be reduced from assignment deeds, by duty recovery projects, infrastructure modernization and irrigation technification, and increasing productivity, with the aim of reducing overconcessioning and overdrafting.
- d) Offering training for irrigation users to view water as a strategic resource and as such to foster its use under schemes of sustainability and self-control.
- e) Promoting the development of research aimed at irrigation technification.

Initiative 5.

Formulating regulations for the distribution of surface water by catchment and groundwater by aquifer

The pursuit of sustainability in catchments and aquifers may be achieved by maintaining or restoring the balance between availabilities and uses of water in the medium and long terms, both open currents and water stored in dams, lakes, lagoons, reservoirs and aquifers. In both cases, interests should be reconciled between uses of water and the users involved, and long-term agreements should be established to avoid conflicts and to provide stability in water management.

The set of standards and regulations to establish volumes of withdrawal, use and discharges that might be authorized, the modalities or limits on the duties of the permit holders and assignees, as well as the other regulations that are required for public interest, can and should be expressed in rules, duly analyzed and consulted within the River Basin Councils and their auxiliary bodies, to be proposed to the authority and, once decreed, they become rules that must legally be observed, as foreseen in the National Water Law, and serve to standardize the behavior of all users.

The establishment of regulated zones is one of the main tools available to achieve a balance in catchments and aquifers, and has special importance in regions suffering from water stress for climatic reasons, as well as aridity on its territory, or in which there is a high concentration in the demand for water for demographic or economic reasons, as is the case in the center and north of the country.

The regulations for the use and withdrawal of water and declarations that establish quality targets in rivers that





translate into particular conditions applied to wastewater discharges, can be confined to large or medium-sized catchments, to sub-catchments, micro-basins or to part of them. In the case of aquifers, it is equally important to regulate withdrawals in order to reconcile them with recharges and make it possible for them to maintain the hydrological balance without affecting the ecosystems and the capacity to sustain regional economic development. Artificial aquifer recharge constitutes a key action for the purpose of redressing their overdrafting and reaching this balance.

Initiative 6.

Reinforcing systems to measure and ensure the compliance with the volumes allocated

Given that surface water and groundwater are, in conformity with the Political Constitution, assets that are the property of the Nation, it is the responsibility of the Executive Branch, through the National Water Commission, to administer its uses through the allocation of permits and concessions, expressed in duties that are registered in the Public Registry of Water Duties. Each duty expresses the annual volume of withdrawal authorized, reserving the Law to the authority (CONAGUA), as well as the prerogative to make inspections on the wells and intakes authorized to verify that the volumes that are being withdrawn correspond to those authorized; if this is not the case, a sanction is applied and the installation can even be closed. This legal and operative system, in order to be carried out effectively and efficiently,

requires at least two conditions: **i)** that the wells, infrastructure and withdrawal equipment have devices to measure the flows withdrawn, and, **ii)** that the institution responsible for verifying this has the economic and human resources to perform this task, independently from the number and location of the installations to be verified. It is clear that neither of the two conditions are met, sufficient reason alone to justify additional efforts, taking into account that this is a substantive part of the water management process. This initiative includes four complementary actions:

- a)** Reinforcing the measurement and monitoring of volumes allocated, giving more strength and means to formal inspections by the authority.
- b)** Installing volumetric meters in all wells and/or in tanks that receive water withdrawn from one or several wells by the CONAGUA directly or by processes of subrogation to third parties.
- c)** Incorporating remote and indirect measurement systems for the volumes withdrawn by the users, which facilitate parallel formal inspections.
- d)** Establishing cooperation agreements between the CONAGUA's central offices, or through its River Basin Organizations and State Offices, with the COTAS and with the State Water Commissions, so that they can implement decentralized measurement, monitoring and regulation systems for the withdrawals mainly in the agricultural and public-urban sectors, the authority reserving the right to perform random inspection visits with zero tolerance.

Initiatives and actions linked to the challenge: Clean water bodies

Getting all of the nation's streams, rivers and water bodies to recover the health of their ecosystems and natural biodiversity, bring their flows to meet the needs of the population and economic growth and continue to improve the appearance of the landscape, contributing to the population's quality of life, requires them to be kept trash-free, without urban, industrial or agricultural wastewater discharges to pollute them and affect them beyond their natural capacity of assimilation and dilution, and that their channels and federal zones are free from human settlements and from constructions that alter the flows of water and increase the risks for people and their assets in times of torrential rainfall.

The investment effort to be made in order to treat the wastewater and control the majority of anthropic pollutants (those products by human beings) has already been measured in the prospective exercises carried out in support of the 2030 Water Agenda, which highlighted their importance, but also showed the need to build a viable and self-sustaining financial system, to facilitate the construction, operation and maintenance of the treatment plants that are required. In these terms, achieving and maintaining clean water bodies is perhaps one of the economic and environmental challenges of the greatest importance that will have to be faced over the coming decades.

Due to the characteristics of the hydrological system, initiatives and actions must be put into practice in different strategic areas, both to build the protection and safety infrastructure for the channels, and for the wastewater treatment that is discharged into the rivers, as well as controlling the point and non-point source pollution that use streams and rivers as discharge zones, with the consequent affection on the quality of their flows and those of their surrounding ecosystems.

In the fight to clean and preserve gullies, channels and water flows, special attention should also be paid to the pollution coming from agriculture, industry and urban services. For each case, efficient policies and programs are required that are well-guided towards those who generate pollution and who should be made responsible for avoiding it or correcting it through treatment or necessary changes in their productive systems.



Additionally, a broad inter-institutional coordination effort will be needed with bodies from the three branches of government, as well as consultation with all civil society organizations interested and with the capacity to contribute to the cleaning up of the country's streams and rivers, in order to monitor and protect the channels and federal zones by pooling together resources and efforts, with the aim of maintaining them free from trash, non-controlled discharges and settlements. The task is immense, taking into account that the network of Mexico's rivers and streams is over 630,000 km in length, and that practically all of them have some degree of pollution and meander near to or through urban areas.

During the consultation period carried out for the 2030 Water Agenda, multiple and various initiatives and actions were expressed in order to maintain CLEAN WATER BODIES. In the following pages the initiatives that, in the opinion of the participants in the various forums could contribute to achieving the desired result are presented and discussed:

Initiative 7. Reinforcing available institutional mechanisms to discourage polluting behavior by different users

In general, in order to prevent and where possible sanction those responsible for water pollution, the authority has three types of regulatory tools: direct controls, economic incentives and disincentives, and social information and monitoring. In the majority of catchments, a combination of these tools is required. The direct tools are based on administrative regulations that describe the procedures to be followed in order to attain authorizations and the

criteria to grant them, and have the advantage of being flexible and not requiring long periods of time for their legal approval. Economic tools offer the advantage of inducing changes in behavior which help the user to fund the investments necessary to control pollution. In this case, care will be taken to review and harmonize the water pricing policies, tariffs and subsidies, concessions and permits, water markets and taxes to contribute to the cleaning of rivers. Organization and social participation mechanisms contribute to inhibit dishonest behavior by users who transgress the regulations that others comply with in order to attain some benefit; this is the case for example for users who withdraw more water than the amount authorized when others are making efforts to save with the aim of avoiding overdrafting.

In the case of industrial discharges, a mixture of basic tariffs for discharges and successive billing for the pollution produced will be established, in order to induce and provide incentives for the conservation, recycling and reuse of water in industries, as well as the change in polluting productive processes to others that are more environmentally-friendly. For the latter, taxes will be considered as a tool to stimulate anti-polluting investment and thus to act as a disincentive for pollution.

For the prevention and control of pollution from industrial and urban discharges, the 2030 Water Agenda considers the following actions relevant:

- a) Raising the amount of duties for wastewater discharge and including a greater number of polluting parameters in the particular discharge conditions, according to the activity of the generator, and establish incentives for its treatment and reuse.
- b) Zero tolerance for serious pollution problems, which means not allowing reoffending polluters to perform cleaning actions when they are going to be sanctioned.
- c) Modifying the Federal Duties Law to increase the economic incentives for non-polluting industries, through lower water prices (duties), subsidies via partial or total recognition of taxes for the replacement of polluting processes.
- d) Strengthening the CONAGUA's capacity to expedite the processing of the imposition of sanctions.

- e) Increasing the vigilance and legal and economic sanctions from the competent authority to municipalities or states that do not treat their wastewater.

Additionally, the charging of taxes for products that damage the environment, such as agrochemicals and pesticides, can be a useful alternative for non-point pollution problems where the options for direct control of the discharges or prior treatment are not possible and therefore, the decrease in pollution is achieved by reducing the amount of agrochemicals applied in agricultural production processes. Given that measures like these may have an appreciable impact on the productivity, competitiveness and the price of agricultural products in a context of global competition, the competent authority must review and promote practices that have been proven internationally, that avoid non-point pollution by herbicides and agrochemicals, without damaging productivity.

As regards the orientation of subsidies for projects and urban works, care should be taken that its specific destination should be the construction and rehabilitation of complete sanitary drainage systems, to avoid the construction of sewer networks without treatment plants and vice versa, which constitute incomplete projects and laborious investments. In the same sense, federal investments will give priority to municipalities that have the interest and the capacity to carry out sanitation works.

With these premises the following is contemplated:

- f) Charging a tax for fertilizers according to their non-point polluting effect and using these resources to attenuate the effects of this pollution.
- g) Creating awareness and developing capacity among industry executives in "housekeeping", Production Plus Cleaning, to optimize water management in industrial production processes, instead of creating more expensive end-of-pipe treatment solutions.
- h) Guiding federal subsidies for the construction of complete water supply, distribution, sewer, sanitation and reuse systems.
- i) Increasing the economic incentives for municipalities and states that have the interest and capacity or at least the potential to carry out sanitation works.

Initiative 8.

Developing a specific normativity for the assessment, monitoring and control of non-point source pollution

The control of non-point source pollution in addition to the use of economic instruments that contribute to containing the excessive use of agrochemicals in agriculture by means of taxes and greater prices for the raw materials incorporated in them, requires a broader knowledge of the size, characteristics and location of the problems of this type of pollution that affects water and soils and therefore its subsequent uses. For this purpose, it is necessary to establish a monitoring network that offers certain data for the diagnosis and evaluation that allow patterns of non-point solution in the different agricultural regions of the country to be pinpointed, and serve to maintain the definition of a specific program that incorporates in its policy definitions existing national and international best practices in this field. This initiative includes:

- a) Creating the National Program for Non-Point Source Pollution of Soil and Water, which would foster best practices in the management of fertilizers, pesticides and soil.
- b) Establishing a monitoring and evaluation system of non-point source pollution of water in each catchment, giving priority to areas close to rivers or water storage in which the presence of pollution typically caused by fertilizers or pesticides can be observed.
- c) With the intervention of the National Institute of Ecology, the Ministry of Agriculture, Livestock, Rural Development, Fishing and Food (SAGARPA) and the corresponding government entities, developing specific normativity and the promotion measures for the regulation and control of non-point source pollution.



Initiative 9.

Promoting and reinforcing intensive reforestation programs associated with soil conservation in priority catchments

Traditional soil, forest and water management schemes and processes carried out at the catchment level are showing their limitations in terms of ensuring the sustainability of natural resources, ecosystems and biodiversity and contributing to economic and social development, especially because they have to support the pressure from urbanization of cities that compete for scarce resources, and degrade natural systems as a result of their rapid growth. Faced with the evidence and trends caused by economic and urban growth, consisting of erosion, soil degradation and waterproofing, indiscriminate deforestation, and over-drafting of sources and water pollution, significant changes are required in the traditional way of looking upon and managing catchments. It will be important to recognize them as complex natural systems that need to be managed in an integrated manner in order to preserve them and approach sustainable management models; this demands that limits, rules and the interventions of the different stakeholders in the use of their resources be harmonized and established.

A well-managed catchment facilitates the preservation of terrestrial and water-based ecosystems. By maintaining surface water flows, a variety of economic benefits are produced, including forestry production and medicinal and native plants that provide protection to soil layers, wetlands preservation, the replacement of groundwater, coastal stabilization and storm protection, water purification by natural filtration, the creation of biodiversity reservoirs and providing habitats for wildlife. Catchment preservation also has a cultural, recreational and touristic value, and serves to mitigate climate change and facilitate adaptation to it.

The conservation of upstream wooded parts of catchments favors runoff and infiltration of water which can subsequently be used in the middle and downstream parts of the catchment. In this way, their conservation acquires special value for cities that manage to preserve the upstream and middle capture areas, in exchange for

the payment for environmental services they receive, but especially rainwater catchment to filter into and recharge aquifers, which constitute the main source of supply for urban consumption.

In this context, the initiative proposes the need to go from traditional extensive reforestation schemes, to the introduction of intensive reforestation processes associated with putting into practice soil and water conservation programs in priority catchments nationwide, through the establishment of payment schemes for environmental services.

The initiative seeks to consolidate the promising actions undertaken by the National Forestry Commission (CONAFOR) in recent years to reorient traditional extensive reforestation actions and to concentrate governmental, private and civil society efforts on selected priority catchments, configuring multi-annual projects that include soil conservation works, maintenance, protection and payment for the opportunity cost of the ground; social reforestation actions based on agreements with companies, NGOs and civil society groups through agreements for the production and purchase of plants of standardized quality by region in an open market of providers and certification of nurseries by third parties.



Initiatives linked to the challenge: Universal access to water services

Universal access in water supply, sanitation and treatment services is a desirable and feasible objective for the medium and long term. To achieve this, however, it will be necessary to carry out profound reforms to the current institutional arrangements, since as well as investing a significant volume of financial resources and applying them efficiently; systems need to be appropriately managed; all stakeholders need to be mobilized; sufficient capacity in water utilities and companies must be developed; the legal framework that currently covers and regulates service provision must be improved; state governments must be placed at the center stage and both municipalities and the federal water institution responsible for water management should be reinforced, so that, in a framework of shared responsibilities, they can collaborate to resolve the current deficits.

In the reform of current systems, it should be taken into account that the water and sanitation sector is facing a serious crisis of financial and operative sustainability. Indeed, apart from a few localities, generally the seats of government of some municipalities, which have managed to develop their corresponding water utilities with relatively efficient operative and economic models that have allowed them to increase the coverage of services as the population has grown, the rest of the localities have disarticulated water utilities, without autonomy of technical or financial operation and with strong pressure from the population they are obliged to serve. Their income is barely sufficient to cover basic operating costs, carry out a few corrective maintenance actions and minor works, and they

often struggle to pay the electricity bills. Added to that, the aquifers are frequently overdrafted or polluted due to the inefficient use of water, the inappropriate disposal of trash and waste, and the discharge of their wastewater without the necessary treatment.

Two of the major obstacles, insurmountable for the moment, for municipalities to be in a position to comply with the dispositions laid out in the Constitution and other legal tools, are the reduced governance period of municipalities and the fact that the tariffs are presented for approval by state congresses, where they are influenced by external political factors other than the costs of services and infrastructure.

In these circumstances, the 2030 Water Agenda proposes the need to have a legal and financial framework that allows both the development of the necessary water infrastructure and its correct operation, to ensure efficient drinking water and drainage services, and the treatment and disposal of its wastewater; meaning with the quality of drinking water; the continuity of the service throughout the day and with the necessary pressure, the aptitude in the provision per day and per inhabitant according to the various regions; and the treatment required according to the standard or the particular discharge conditions established in the corresponding permits. All of this sets out to guarantee the health and raise the level of wellbeing of the population.

According to these terms, it will be a priority to implement incentives and sanctions in the coming years to change behavior and attitudes towards development; stimulating innovation in systems and technologies for wastewater treatment in medium-sized and rural localities, and making the use of public resources destined to these issues more transparent. In the following sections, the initiatives and actions that are considered priority are described:



Initiative 10.

Giving a more relevant responsibility to state governments as regards drinking water and sanitation

To achieve universal access to services, it is essential:

- a) That municipal governments, with the support of state governments and the federal government, guarantee the quality of drinking water and sanitation services, implying water quality, continuity in supply, adequacy in service provision and the required treatment.

In our country, the issue of water quantity has always been given priority above and beyond that of water quality; partly as a result of the social demand to first have access to the resource. That criterion has permeated into the intentions of the municipal authorities and governs their actions in the mission to meet domestic needs. However, it can be affirmed that the standard of living of the population is resolutely affected by the quality of the water it consumes.

The concept of water quality only acquires practical meaning when it might potentially be measured and when the water is associated with a particular use, and on that basis, parameters and values are established that should be met. In the case of public supply services to the population, water quality should meet the requirement of being apt for human consumption. Legally, this is qualified as drinking water and is regulated by the standard NOM-127-SSA1-1994, which establishes in its regulations the maximum permissible concentrations for 46 parameters.

Based on this, and in strict compliance with the regulations of the Constitution, all Mexicans should have access to and receive water with drinking quality from municipal authorities. There is no information on the permanent compliance with this obligation; generally speaking, in most cases only one parameter is measured, the residual chlorine content, and on less frequent occasions, the density of fecal coliforms existing in the water that is supplied to meet basic needs, including direct human consumption.

As regards the quantity, fundamental requirements should be met, such as: adequacy in services per day and per inhabitant according to regional considerations, which should fully cover the needs of the population; the continuity in the service in such a way that water will be available

in each and every domestic intake 24 hours a day, without rationing, and with the necessary pressure.

Wastewater should receive the treatment required before its final disposal in the national receiving body, in compliance with the regulations in the standard NOM-001-SEMARNAT-1996 or in the particular discharge conditions established in the corresponding permits. The latter is mandatory and allows on the one hand the availability of the resource to be increased by fostering its reuse, either in industrial activities or in the irrigation of green areas, and on the other hand, contributes to controlling the pollution of the nation's water.

- b) That State Congresses guarantee the financial adequacy of water utilities by defining the composition they consider most appropriate between tariffs and subsidies.

Authorization requests for sufficient tariffs are applied in consideration for the services supplied by water utilities, and are presented by municipalities to State Congress for their analysis, discussion and approval; municipalities must present the necessary information and criteria for decisions to be made in full knowledge of the reality, to cover the costs, and to allow the adequate operation and development of water utilities. To maintain the sense of social justice that is usually applied to tariffs for public services, Local Congresses must define both the amount of the tariffs and the subsidies to be applied, in such a way that they allow the investment needs and costs to be covered.

An alternative option to the current procedure consists of modifying Article 115 of the Constitution so that the authorization of tariffs, which is currently a faculty of the state congresses, can be delegated to the State Water Commissions which depend upon the state governments, or could be entrusted to the governing bodies of the water utilities themselves. A clear national regulatory framework would need to be established to allow natural monopolies to be controlled and facilitate the achievement of efficiency and economic sustainability goals that are necessary to obtain universal access and to provide good quality services.

- c) In this case, the attribution of water and sanitation services could be assigned to state governments in all those municipalities that are not in a position to do so, that do not have the necessary capacities or cannot develop them in the medium term.

The relevance is proposed of carrying out modifications to Article 115 of the Constitution so that states are authorized to contribute with city councils to the provision of water supply services with the quality, quantity and opportunity that the population demands. Similarly, in the removal and treatment of wastewater in compliance with related normativity; this should only be in cases when the municipalities do not have the possibility of doing so, whether it be because they do not have the necessary capacities or because they cannot develop them in the medium term. With this change, the intention is to give state governments a more active role without withdrawing municipal autonomy, but to lighten the load that for the moment it has not been possible for them to bear and to guarantee good quality services to the population.

The aforementioned change is necessary since Article 115 of the Constitution currently negates the involvement of the states in providing drinking water and sanitation services, unless it is requested by the city council and even then only temporarily, or if the services are provided or exercised in a coordinated manner by the state and the municipality itself, subject to an agreement between the parties, the general standards on which are defined in the local legislation. In this case, the aim is to change the discretionary and optional character of the regulation to give it a sense of obligation. The proposed reform should include the notice that it is the responsibility of the federation, in coordination with the states, to promote and regulate the services and the establishment of a national regulatory framework.

- d) In all states a Social Audit should be implemented, so that the population can verify that the institutions in charge of providing drinking water, sewage



and sanitation services are operating in an appropriate manner and are continually improving their performance based on the benchmarking of all the country's water utilities, coordinating for that purpose with the CONAGUA, the Mexican Water Technology Institute (IMTA) and the State Water Commissions.

Initiative 11.

Promoting the systematic certification of management and technical staff of Drinking Water and Sanitation Utilities

With a few exceptions, water utilities do not have permanent training programs for technical, administrative and management staff. Some courses may be taught, and staff are moderately trained, but are subsequently fired from the utilities where they work as a result of the alternating municipal authorities. This situation gives rise to an excessive rotation in management and technical staff, making it difficult to professionalize the services of the water utilities.

Through the Management Committee of Competences in the Water Sector, made up of authorities from the National System of Competences and created on October 8, 2010, the development of the necessary training services, evaluation and certification infrastructure should be promoted, in order to obey and enforce the regulations in the National Water Law which allow the human resources in the Water and Sanitation Sector to be trained, prepared, evaluated and, if possible, certified in their diverse aspects, be they technical or operative.

By promoting certified staff being entrusted with functions and responsibilities in the operation of utilities, and within the framework of the National Civil Service Career System in the Water Sector, the staff with capacity and experience will be encouraged to stay, and drinking water and sanitation water utilities will be made more efficient and effective. Furthermore, the possibility will be opened to transfer technical resources from limited and small systems to modern and self-sufficient ones.

Initiative 12.

Promoting the definition of water tariffs that obey technical criteria, dissociated from political aspects

The intention, as various local laws already consider it, is to make service provision self-sufficient through real tariffs. However, consensus does not exist between sectors, political parties, government and society, on accepting the real cost of the services, on updating them periodically and reflecting their increases in tariffs, and separating both (costs and tariffs) from political fluctuations and temporary interests. This situation has led to drinking water and sanitation services for the majority of the country's municipalities being an economic and political burden. Furthermore, nationwide, it has been established almost as a general rule that the tariffs are determined by state congresses, in which partisan interests and political criteria dominate more than technical or economic reasons.

Additionally, it is essential that tariffs are realistic and include costs for the payment of duties for the use of the nation's water and for drinking water treatment; duties for the maintenance of the drinking water and sanitation networks; the cost of pumping; the payment for the debt services for the purpose of financing; the administrative cost; and the wastewater treatment or the payment of duties for the use of receiving bodies, according to the particular case. It would be desirable to also take into account the possibility of creating a savings fund that would allow the continual extension and improvement of services, as well as considering environmental externalities.



Initiative 13.

Strengthening the capacities and attributions of the CONAGUA and its State Water Commissions in order to promote, supervise and regulate drinking water and sanitation services

The conditions in which water, sewage and sanitation services are carried out at the level of the locality under the responsibility of Municipal Water Utilities requires that the attributions of promotion, supervision and regulation are duly assigned and distributed between the CONAGUA and the State Water and Sanitation Commissions (CEAS). Although a clearly defined border does not exist, in general, it is considered that that the former should be in charge of the overall regulation of services, and the latter should ensure the technical and operative supervision of systems, whereas the promotion is a task that should remain shared. In both cases, capacities must be reinforced to guarantee that the service provision is undertaken in the best possible conditions, seeking to maximize the benefits for the end consumers.

The tap water distribution and supply systems in networks, as well as the wastewater removal systems, do not allow the possibility of choosing between different providers, since it is not common to have competitive piping. In this way, a natural monopoly is presented, in which the provider, as the only supplier of the service, theoretically could establish higher tariffs than those that would be set in a competitive situation. The most frequent case that is found is service provision with insufficient quality, without the users having the option to change provider.

In this way, the need is created for regulators, whose function is to balance and protect the legitimate interests of users and service providers, whether the services are provided by public, private or public-private utilities.

The regulation should not be limited to verifying the quantity and quality of the service provided, but should also include the standardization of the concession or service provision contracts, as well as the commitments to maintenance, rehabilitation and reinvestment in the extension of systems, to avoid the case of companies and/or water utilities neglecting to meet the needs of the conglomerates in situations of poverty. The operating costs should be



verified through accounting systems and auditors' reports drawn up according to strict accounting practices. All the accounting and operative information should be public and transparent, which minimizes the risk of costs being hidden or disguised, and acts as an obstacle for corruption.

A large number of water utilities, both municipal and state, do not completely cover the federal duties for the withdrawal of the nation's water, either from surface water or groundwater sources, or for the discharge of untreated water in receiving bodies that are the property of the nation. For this reason, the financial system of water is even further debilitated, since the public agencies themselves foster in practice the culture of not paying. Furthermore, they are breaching the terms of Article 115 of the Political Constitution, the National Water Law, the General Health Law and various official Mexican standards. Furthermore, the water supplied does not comply with drinking water quality fit for human consumption, they have deficient systems with leaks of up to 50%, the financial system is inadequate and they do not foster self-sufficiency, tariffs are very low and are insufficient to finance the operating costs, they do not have wastewater treatment plants, or if they do, they frequently do not work and those that do work operate with very low efficiencies compared to standards

for the project. All of these actions violate legislation and are as a result punishable by law.

Because of these obvious facts, one of the most recurring complaints in forums of participation for the construction of the Agenda was that of the lack of presence of the National Water Commission as the authority in charge of obeying and enforcing the legislation and normativity as regards the nation's water. It is perceived as a weakness of the Mexican State, and as a contradictory attitude for its purpose of preserving this vital and strategic resource, a guarantor of development and of national security.

The capacities of the CONAGUA need to be increased in order to: attend to the complaints and denunciations about water problems that are presented to it; to perform the relevant surveillance and consequently carry out inspection visits to the offending installations; to expeditiously accomplish the legal-administrative procedures to qualify and if appropriate forcefully impose sanctions in order to, when necessary, act against a reoffending behavior.

Initiatives and actions linked to the challenge: Settlements safe from catastrophic floods

Hurricanes and torrential rainfall coming from the Atlantic and Pacific Oceans bring important benefits for the country, because they allow the recovery of the hydrological system. On the other hand, they produce floods and winds of such a magnitude that they generate damage to people and their material possessions, when they are not duly predicted, when preventive measures are not taken to mitigate their effects or when the land occupation pattern generates significant vulnerability. In this case, the following can be mainly identified: the lack of urban and ecological land-use plans; as well as the unordered and unauthorized occupation of channels, federal zones and flood plains.

The lack of effectiveness in land-use planning is perhaps the most relevant problem and the main cause of the vulnerability of a large part of the country to phenomena such as hurricanes and torrential rains; the loss of natural resources, improper land occupation or unplanned urbanization; and the generation of social conflicts and insalubrity observed in many cities and villages. However, the deficient management of land occupation is not the result of a single cause, but the consequence of an intricate set of political, economic and social factors, which complicate its appropriate understanding and efficient solution.

On the one hand, the lack of political interest in land management efforts is a contributory factor, as a result of the lack of human and material resources and technical capacity in local governments, and a deficient legislation and normativity, factors that combine to discourage the organization of land management. Similarly, the ignorance on the competencies and the limits of the areas of impact are decisive, as are the lack of access to sufficient and appropriate economic and technological resources, and the collusion and even the corruption of local regulatory agents, which bring about the proliferation of human settlements in high-risk areas. Finally, the politicization of decisions of a strictly technical nature at the local level, the lack of articulation and plain passivity of civil society, combined with the discretionary and opaque nature of local decisions, generate a high degree of impunity for transgressions in existing management.

From this brief summary, it can be inferred that in order to be efficient, related public policy needs to be made up of elements of a highly diverse nature, such as processes and incentives for inter-institutional cooperation, adjustments to the normative framework, the redistribution of competences, budgetary incentives, application of fines for citizens and even the institutional use of public force for extreme cases.

During the consultation events, several initiatives were put forward which aim to prevent the risk conditions faced by populations when extreme climatological phenomena occur. In the following sections, the most relevant initiatives in this field are presented:

Initiative 14. Creating the Ministry of Land-Use Planning, which would implement a long-term land-use planning strategy

Currently the attributions of land-use planning are spread out between the three branches of government and within the federal government itself. This results in a highly unsatisfactory situation, the consequences of which are serious; one of them is the great vulnerability to floods of numerous human settlements in Mexico, particularly in high-risk areas that are not duly marked out, especially under climate change scenarios.

The federal government's attributions are spread out between the Ministry of the Environment and Natural Resources (SEMARNAT), the Ministry of Social Development (SEDESOL), the Ministry of Agriculture, Livestock, Rural Development, Fishing and Food (SAGARPA), the Ministry of Agrarian Reform (SRA) and the Ministry of Tourism (SECTUR). SEMARNAT is in charge of general ecological land planning, ecological sea planning, authorizing land-use changes and taking part in the formulation and approval of programs of this type when they involve more than one state or when a protected area is included in the area to be planned. It is SEDESOL's responsibility to coordinate with the corresponding states and with the various federal agencies involved to project the distribution of population and land-use planning in population centers. SAGARPA is in charge of fishing and water-based planning; land-use

planning in agricultural circles is the SRA's task, as a means to provide legal certainty and to foster the development of the country's agricultural centers, and finally, SECTUR is in charge of formulating touristic land planning.

On the other hand, municipal governments have broad faculties to authorize the use of land through the issuing of licenses for the use, construction and development of divisions, the creation and management of land reserves for urban development, housing and ecological preservation, and taking part in the formulation of urban development plans or programs for population centers, and evaluating and watching over their compliance. Similarly, they have faculties for the formulation and issuing of local ecological land planning programs, which regulate ground uses outside of population centers.

Since there is not a single federal agency that is responsible for the country's land-use planning, the capacities are fragmented and weakened and the focuses often compete, causing the dispersion of institutional resources, which are scarce to start with, a lack of coordination between authorities, and in short, the inexistence or ineffectiveness of the related programs and public policies. Faced with this problem, the 2030 Water Agenda proposes the unification of federal attributions on land-use planning in a single agency, whose mandate would be the formulation and deployment of a long-term strategy, to which the legal and regulatory frameworks would be aligned, as would the programmatic and budgetary framework, and which would give a relevant place to social participation in the monitoring of the compliance of land-use planning.

Initiative 15. **Gradually implementing a mandatory Ecological Land Management Program in all municipalities in Mexico, and extending its scope to urban areas**

While the necessary legal changes are being made to implement land planning processes in priority municipalities, the conditions for progress to be made already exist, based on the National Strategy for Ecological Land-Use Planning in Seas and Coasts, for the planning of at least the coastal municipalities that flow into the Gulf of Mexico and Carib-

bean Sea and the Mexican Pacific, which are those that, along with Mexico City, are the most vulnerable and face the greatest risks of catastrophic flooding. However, this should be accompanied by a financing and capacity-building program at the municipal and state levels, which would strengthen local technical and management capacity for participatory planning processes.

This initiative also puts forward the need to develop robust ecological regulation criteria that can be included in urban development programs, as instructed by the General Law of Ecological Balance and Environmental Protection, but whose application up to the present has not been sufficiently strong. In this sense, it would help to include special clauses in the operating rules of federalized programs that contribute to the improved planning of urban centers, avoiding the contradiction by which the federal government supports local governments that breach their obligations as regards land-use planning, and even contribute with the facilities in urban developments established in federal zones or flood plains.

Initiative 16. **Creating the National Observatory of Sustainable Land-Use Planning**

An innovation in the design of the new public policy on land-use planning would be the creation of a National Observatory of Sustainable Land-Use Planning, as an autonomous management body, with legal status and its own assets, and whose mission could be to identify and denounce unsustainable uses of land throughout the country, in a timely fashion.

The Observatory would fulfill its functions through the implementation of a set of satellite monitoring procedures to detect areas in which housing or touristic developments have already or are in the process of being established in unauthorized or unduly authorized areas; visits would be made to these areas to verify the information, document the case, formulate the corresponding recommendation to the local government and, if necessary, carry out the denunciation with the state and federal agencies and local and national public opinion.

The monitoring function would include the verification and qualification of the land-use, ecological and urban



development plans, a task that would allow the municipalities that had breached that responsibility to be identified, to direct them to related institutional capacity development programs.

The social sanction that would be implied by the denunciations of the Observatory would restrict the negligence or plain governmental collusion in view of transgressions in uses of land and in the normativity as regards land-use and ecological planning.

Initiative 17. **Broadening the scope of the Ministry of National Defense's DN-III-E Emergency Plan, to evacuate people in situations of imminent risk**

The Assistance Plan for the Civilian Population in Cases of Disasters, known as the PLAN DN-III-E, is the military operational instrument that establishes the general guidelines for bodies of the Mexican Army and Air force to carry out assistance activities for the civilian population affected by any type of natural disaster, once the contingency has occurred. Due to its social scope, this plan and its implementers enjoy great prestige and widespread acceptance. The initiative puts forwards the need to review its structure and contents jointly with those in charge of its implementation

to include, if considered pertinent, changes that allow the preventative evacuation of the population when it is based in areas of national property or of high vulnerability and at risk from catastrophic flooding.

Initiative 18. **Increasing the investments in generation of flood risk maps; outlining of rivers, federal zones and flood plains; construction of protection infrastructure, and maintenance and custody of existing water infrastructure**

In the context of the challenge to ensure settlements are safe from catastrophic floods; due to the location of the country along hurricane, cyclone and tropical storm routes, the extension of its coasts along which a significant number of cities are to be found; and the presence of mountain ranges parallel to coast lines that form slopes causing the rapid and plentiful return of the rainfall brought by these tropical events, the protection of river-based populations acquires particular importance due to their vulnerability to serious floods, the evacuation from channels and federal zones currently occupied by human settlements and the prevention of their subsequent occupation, the investments in the demarcation of channels, federal zones and flood plains, the maintenance and custody of these goods and of the infrastructure built upon them, since they are, together with risk maps, the starting point for all contingency and disaster prevention plans.

Taking into account the complexity and implications of the processes described, the initiative proposes to concentrate attention on the following actions:

- a) Increasing investments in the integration of risk maps, in the periodic updating of the National Risk Atlas breaking down its contents by regions in order to clearly indicate flood plains, as well as in the necessary studies and projects to create the protection infrastructure for settlements vulnerable to catastrophic floods.



Initiative 19.

Strengthening the capacities of municipalities as regards civil defense

According to Article 115 of the Constitution, municipalities are entitled to authorize and define the use of land within their respective land jurisdiction; formulating, approving and managing the zoning and the municipal development plans; intervening in the regularization of urban land tenure, granting construction licenses and taking part in the elaboration of regional development plans, creating ecological reserves and applying land management plans. Despite the extent of their faculties, they generally do not have the capacities and the resources necessary to intervene promptly and efficiently to natural or man-made disasters, a reason that requires the strengthening of their civil defense capacities, especially those of a preventative nature, to provide them with information systems and the means of communication necessary to react and make decisions opportunely to avoid risks to their population. Furthermore, when disasters or emergency situations occur, it is necessary to reduce response times before the corresponding declarations are issued as well as the procedures to benefit from the corresponding funds.

- b) Reinforcing the capacities of the CONAGUA's central offices and its River Basin Organizations, through the assignation of specific budgets and qualified staff, in order to demarcate the channels and federal zones, in the areas and stretches of rivers mainly exposed to risks of flooding, as well as those areas that due to their river-based location passing by urban areas, are liable to be occupied, creating serious problems for land-use planning and land ownership.
- c) Carrying out the necessary investments in maintenance and custody of water's inherent goods and current infrastructure.
- d) Reinforcing the attributions of municipalities for the custody and surveillance of channels and federal zones, when they are located within their geographic scope, establishing within the River Basin Councils coordination agreements between municipalities and state governments and the federal authority, with the aim of maintaining them free from settlements and to avoid them being used as dumps.

Initiative 20.

Consolidating regional and national hydrological services

One significant area for efficient water management and for the prevention of extreme meteorological phenomena involves measuring the variables of the hydrological cycle and determining availabilities, water balances and surface water and groundwater quality, for which monitoring networks should be modernized and the data made available to interested parties.

Currently the coverage of the networks is significant, although not sufficient to cover all the country's needs. Even if there are a large variety of stations that mix modernity with traditional systems, the majority of monitoring stations has not received appropriate maintenance and in some cases they are simply abandoned as a result

of the lack of supervising staff. Among the most important current infrastructure, the following should be mentioned: 686 stream gages; 191 telemetric stations; a network of manual and automatic stations for piezometric monitoring; a water quality monitoring network with stations in 800 sites; a conventional climate network with 3,014 stations; a network of 60 automatized surface hydro-climate stations and 15 radio survey stations. All this infrastructure needs to be operated, maintained and periodically modernized, but above all extended to cover the whole nation, so that it complies with the aim of contributing data in due time and form for efficient water management.

As a result of its importance as a support for the whole water management system, it is necessary to guarantee a sustained investment to preserve regional hydrological services that are operating effectively, to maintain and extend the measurement networks, centralize information, update databases and make this information available to the public. It is also important to promote careers as civil servants for the tasks of measurement of the hydrological cycle, improving the staff that constitute technical officials to support hydrological services, both in the measurement sites and in the regional offices.



Initiative 21.

Accelerating the modernization program of the National Meteorological Service

The National Meteorological Service (SMN) is the authority in charge of officially providing meteorological information and on the prevailing weather and climate conditions in the country. In order to fulfill that mission, the SMN requires a structure and an organization, both centrally and in its regional meteorological units, which must be closely interlinked and inter-connected.

Recent studies show that the SMN's organizational and operative structure is ill equipped to generate products and services for specific sectors. Some of the methods used to draw up and produce meteorological information are manual and need to be automatized. The SMN has a noticeable staff shortage to carry out its tasks. Meteorological observation is scattered among different institutions and managed with different criteria, which demands a greater coordination effort to integrate the information and harmonize the products and services, and the coverage of the surface stations managed by the SMN is deficient.

All the inadequacies and shortcomings mentioned previously occur despite the SMN having started a modernization phase, a few years back, as well as it having a National Data Center and a National Weather Prevision Center; a network of 12 radars; a network of 8 ground-based stations which receive satellite images; a network of surface observatories composed of 89 synoptic and 133 automatic stations that are complemented by the surface water and groundwater quantity and quality networks.

In the current conditions and in the perspective of building a water management system that guarantees the sustainability of development, it is fundamental to continue and accelerate investments to modernize the SMN's structure, facilities and operation, as well as its measurement and observation networks, with the aim of creating the conditions to provide meteorological services that are needed for the nation's economy and to anticipate changes in climate behavior and as a result, to take the necessary previsions and avoid catastrophes related with extreme meteorological phenomena.



Initiative 22.

Increasing the fines to civil servants who allow the non-compliance of land-use plans in urban development

Disasters occur when a group of population suffers severe damage from the impact of an extreme phenomenon of natural origin, as is the case of a hurricane, an intense storm or an earthquake; or due to the presence of a devastating calamity, as occurs when there is an accident of great proportions, such as an explosion or the destruction of a dam, for example, causing the loss of human lives, infrastructure or drastic changes in the natural environment, in such a way that the social structure is loosened and the compliance of the population's essential activities is inhibited, affecting the functioning of systems and services of livelihood. In these circumstances, the risk of human losses and damage to property increases when laws and regulations related to land use, land occupation and urban planning are breached, whether it be by omission or by corruption, which is why this initiative proposes to promote changes to the legislation in force to sanction as a serious criminal offense, the authorization of constructions, buildings, infrastructure works, human settlements and the carrying out of any type of action within an area considered as high risk, such as channels, federal zones and flood plains, among others, or when they the urban planning plans in force are not respected.

General initiatives

In the following pages the crosscutting initiatives are presented, meaning those that are related to the four areas of the 2030 Water Agenda. Some of the initiatives could be considered as going outside the “water box”, however, due to their effects and implications, they are essential for the achievement of the long-term objectives. Issues such as planning, water culture, information and governance, are touched upon in this section.

Initiative 23.

Creating an authority to guarantee budgetary adequacy and its clear use for studies and projects, in such a way as to put together a robust and strategic portfolio

The inadequacy of projects is an unsolved problem in water management that causes serious consequences, such as: the process of investment is distorted and becomes ineffective because it is interrupted or delayed for months or even years; it becomes difficult to carry out the exercising of governmental budgets within the same fiscal year; works become more expensive by being built based on inappropriate projects or with projects that are drawn up hurriedly, which in short has the opposite effect of leading to an orderly planning process. For these reasons, it is necessary to create a specific fund for water studies and projects which allows a broad portfolio

to be put together, to feed the continual process of investment in the water sector; which facilitates the choice of the best alternatives in large projects; which allows projects to go beyond one calendar year; which supports the executors of medium-sized and small works and, which reinforces the medium- and long-term planning process.

Initiative 24. **Creating the National Development Planning Institute, which would ensure the due long-term harmonization between the different sectorial and territorial development policies in Mexico**

The national development process observed in Mexico presents results that need to be harmonized to avoid distortions and negative impacts on sustainability. In particular, the general economic policy and sectorial and territorial public policies should be duly integrated with policies on water and catchments, and vice versa. Both of them need to be harmonized in order to overcome water-related challenges. Indeed, if food policies that encourage the population growth and agricultural productivity are not coherent in their means and their ends, or if the country's industrial development policies, or those that regulate land occupation and standardize urbanization and the growth of cities, do not take into account the current and future availabilities of water, it will be difficult to achieve a sustainable country. For that reason, the formulation of national, sectorial and territorial programs should be guided and coordinated with a long-term vision, not synchronized with changes in administration, and fully harmonized in their aims, contents and tools. Furthermore, medium-sized and large industrial projects must be evaluated according to the capacity of the national and regional water system to absorb them. The interactions between phenomena such as droughts, poverty and migration should be studied. The growth of human settlements and changes in the national distribution of population should also be studied as regards their relationship with water. It is proposed that all of these tasks should be the responsibility of a National Development Planning Institute which, in a similar way to the Na-

tional Institute for Statistics and Geography (INEGI), would function with great management autonomy and guide planning for all agencies of the Federal Public Administration, as well as states and municipalities.

Initiative 25. **Strengthening the process of formulation, follow-up and evaluation of long-term water programs by hydrological region aimed at water sustainability**

To make significant progress in the achievement of the challenges highlighted in the 2030 Water Agenda, a necessary condition is to guide the use of the nation's water down the path of sustainable development in each of the nation's regions, catchments and aquifers, through specific programs that are also proposed as long-term objectives and that are coherent with the national purposes. These programs should reflect the regional differences in climate, availability of natural resources, population, economy and culture and all the other particularities of the different catchments. Once these projects are formulated and implemented, their periodical evaluation is particularly relevant to guarantee that their actions lead towards results that have an impact in key variables of sustainability. It is equally important that they are duly agreed upon with users, local governments and other sectors of society, and harmonized with other sectorial programs, mainly with those that propose hydrological-forestry restoration and the correct management of catchments, and urban planning and ecological planning, with the aim of boosting their results.





Initiative 26.

Applying a results-oriented evaluation to all public programs that have an impact upon or that affect in some way the pursuit of water sustainability

A few years ago (2006/2007), the government of Mexico created a National Council for the Evaluation of Social Development Policies (CONEVAL) and adopted a logical framework methodology to evaluate various public programs, guide them towards results and boost their impacts in national and human development, especially in the social sectors and in agriculture, and more recently has initiated its application in some water programs. The accumulated experience up to now is sufficient to propose the gradual expansion of this system of evaluation to all programs linked with water management, through which the aim would be to give them complete coherence in their design; to guarantee the consistency of all of their components; to raise the efficiency in their implementation and to lead to a continual improvement, with the ultimate aim of all programs being more aligned with the achievement of the long-term objectives proposed in the 2030 Water Agenda.

Initiative 27.

Assigning payments of duties for the use of the nation's water to the financing of water governance functions

At the present moment in time, part of the duties for the use of water that are collected are destined to provide incentives for investment in drinking water supply and sanitation systems through schemes which return duties, which is considered a promising activity that should be continued. However, it is necessary to review the current system of collection of duties and to promote the concept with the treasury authorities that “what comes from water, goes back to water” and is invested particularly in reinforcing water governance systems.

This proposal means that the new systems of financing that are designed should take into account that it is not sufficient to finance infrastructure; if appropriate investments are not also made in the measurement of surface and groundwater quantity and quality; in their management, in the associated technical services; in the elaboration of plans and programs and in supporting the participation of users, since all of these actions have been weakened in recent years due to the misconception that they are operating expenditure and by that virtue can be minimized or even eliminated from the budget, without taking into account that the effectiveness of the physical investments depends upon them.

Initiative 28.

Creating revolving funds to support access to the commercial financing system for a greater number of water utilities and irrigation associations

The construction of infrastructure, in addition to public resources, requires private financing. However, this is not always available in the best conditions for water utilities and irrigation associations, due in the majority of cases to their lack of financial autonomy which means that they are not subject to credit.

In order for these utilities and associations to be able to obtain private financing for the construction of infrastructure and the improvement of efficiencies in the use of water in agriculture, the industrial sector, services and for human consumption, it is proposed to implement revolving state funds that can receive federal and state contributions and can directly provide guarantees and financing with preferential conditions.

This will allow the exercising of federal and state resources to be facilitated, as well as supporting water projects that go beyond one calendar year, by separating their implementation from annual budgets, as well as fostering access to commercial financing.

Initiative 29.

Establishing a clear and transparent system of bulk water prices and tariffs, which considers costs and externalities

When attempting to make the value of water more transparent, it is necessary to distinguish between the value of use and the intrinsic value. The former is determined in general by the value that water acquires or may acquire for its users in a given moment and region. On the other hand, the intrinsic value includes its appreciation (valuation) for the community as a natural resource that belongs to it and is part of its existential environment.

Additionally, in the determination of the tariffs for water services, it is relevant to refer to the total costs involved in water supply, be it in bulk or supplied to the point of use, in both cases the economic cost and environmental externalities associated with public health and ecosystem maintenance should be considered.

In general, the economic cost is made up of the costs of operation and maintenance of the infrastructure and the capital costs, which together represent the cost of the water supply, to which the opportunity costs must be added, determined by alternative uses to which the water can be destined, plus the so-called economic externalities that can be calculated by associating them with changes in economic activities in the sectors affected by a change in the use of water, for example, the costs represented by harvests in an irrigation field when the water that would



allow the production is channeled to another activity such as industry or urbanization.

Despite the complication in managing the values and costs of water, those in charge of setting tariffs for bulk water supply or water delivered to the point of use should make a significant effort to reach realistic and rationalized values to be in conditions to intelligently differentiate the discounts, with the aim of taking into account the tax paying capacity of the different segments of the population and benefit, according to the political criteria that guide the decisions, with subsidies for the poorest areas. These subsidies should be transparent, as should all components of the costs in order to ensure that the benefits effectively reach the target populations and to send the right signals to the consumers.

Initiative 30.

Abolishing the Law on the Contribution to the Improvement of Public Federal Water Infrastructure Works, and assimilate the equivalent amount to a tariff for services, with the aim of recovering the investments

The Law mentioned in this initiative dates from several decades ago and has not been applied. For this reason, the 2030 Water Agenda proposes its abolition and, if appropriate, the assimilation of the foreseen income concepts in the tariffs for services, with the aim of contributing to the recovery of investments.

Initiative 31.

Boosting the resources destined to the modernization and technification of hydro-agricultural infrastructure

The fact that it is established by law that the value of water for agricultural use is zero, suggests the convenience of modifying that law to give it an appropriate value, which would allow additional resources to be generated for the modernization and technification of irrigation infrastructure.

At the same time, it should be recognized that the lack of measurement, in particular among groundwater users, as well as the insufficient monitoring of withdrawals, foster abuse in this sense, to the detriment of the aquifer.

The increasing demand for the resources required for the modernization and technification is being worsened by the lack of a vision of water as a strategic and finite element for many users in the agricultural sector, and the fact that financial agents consider agricultural activities as high risk, with the consequent increase in the cost of agricultural credit. These conditions demand that innovative models are implemented, both by the authorities that spend public funds under this heading and by development banks, in order to develop and incorporate new credit subjects in the financing processes for the modernization and technification of irrigated agriculture.

The feasibility of issuing water bonds should also be discussed, exchanged against private resources invested in such a way as to make savings of this resource, so as to guarantee the sustainability and future availability for the purpose of urban and industrial use.

Initiative 32.

Modifying state laws and their by-laws in order for them to regulate public–private investment in water infrastructure

For the last two decades, some state laws have been modified to make public-private investments possible in water infrastructure, with limited results due to the issue of tariffs which do not cover the total costs of the investments.



However, the 2030 Water Agenda takes into account that for this type of investments to be successful, it is necessary to have effective regulatory frameworks that recognize the legitimate interests of stakeholders and concession systems that are harmonized with the development objectives.

Initiative 33.

Creating a national fund for the maintenance and rehabilitation of dams and major water infrastructure

The country has a water infrastructure that is composed among other works of 4,467 dams, which require supervision, maintenance, conservation and rehabilitation. With the aim of verifying their safety, ensuring the continuity of the multiple services they offer and protecting the populations situated downstream, the initiative proposes to build a national fund with federal and state contributions, as well as from duty returns, destined expressly and uniquely for this purpose, taking into account that the risks and damage associated with the destruction of just one of these dams is far superior to the preventive investment required.

Initiative 34.

Facilitating the increasingly effective contribution of the scientific and technical community to the formulation and deployment of sustainable water policy

The practically universal recognition that knowledge and innovation are currently two of the most valuable means of

generating wellbeing and development, has led to a growing concern to align these activities with national priorities in order to focus the human and economic resources involved in those research and development lines that are potentially most relevant and with the greatest impact on the sustainability of water.

Mexico has a scientific and technological community specialized in the different issues around water, which should be valued and boosted with the intention of reaching the vision of the 2030 Water Agenda. The interlinking and feedback mechanisms should be strengthened between the scientific and technological community and the national and regional problems of water management, in order to make better use of the capacities and strengths available, directing the resources necessary to the priorities established in the Agenda.

It is necessary for that community, jointly with water managers and with other productive sectors, to define and disseminate the areas of priority attention on which the nation's technological research and development efforts should concentrate. Institutional mechanisms should be designed to assign resources that provide incentives for efforts by academia and private initiative and to guide them towards the priority lines of research and development. Finally, evaluation systems should be implemented to ensure a continual process of institutional improvement regarding the impact of research and development in the performance of the National Water Management System and which make the profitability of the investments under this heading more obvious.

Initiative 35. **Developing regional information systems to reinforce water management by catchment and aquifer**

Without appropriate, reliable and easily accessible information, both the planning/evaluation and consultation, opinion-forming and decision-making processes are made more difficult, which could contribute to an integrated management of water resources in each of the country's catchments and aquifers. That is why it is important to create solid regional information systems and reinforce the existing ones, as well as duly harmonizing them with the nation-

al databases and information systems. As well as data and information on the quality, quantity, uses and conservation of water, it is necessary to include under approved statistical bases and in geographical systems at the regional level, the inventories of infrastructure and national assets, the configuration of catchments and their social, economic and environmental characterization, as well as the outline, location and names of rivers, streams, water bodies and aquifers. The location of the flood risk zones and the climate and hydrometrical information that contributes to planning their prevention. Equally important is the systematization and making accessible the information consultations of all those who are involved in water management, to facilitate the analysis and interpretations, as well as the elaboration of diagnosis and the generation of indispensable indicators for the very formulation of the planning process at the regional and national levels.

Initiative 36. **Creating an information system on investments in the water sector made by the three branches of government and by users**

In the construction, maintenance and operation of the water supply and sanitation infrastructure for populations, the following take part: the Federal Government, the State and Municipal Governments, Water Utilities and Municipal Companies. In the agricultural sector, the users also take part. In the industrial sector and in general in the private sector, companies carry out important investments in water, both to reform their productive processes and in setting up water-saving technologies, and to treat and reuse their wastewater. Furthermore, in medium-sized and large infrastructure, resources can flow from international organizations. Given that there are so many diverse investors, it is understandable that the total annual investments for water are unknown, but it is necessary to systematize and integrate this important financial information in order to facilitate future planning processes.



Initiative 37.

Providing incentives and strengthening long-term water culture processes

To ensure that the various stakeholders involved in water management and in general all citizens assume individual and collective commitments that contribute to the sustainability of water, it is necessary to recognize education and culture as fundamental and irreplaceable tools to change attitudes that foster the squandering of a resource that is increasingly scarce in large parts of the country, and which is highly sensitive to pollution. In this sense, water education and culture are recognized as continual processes that facilitate the transformation of values, beliefs, attitudes, and behavior in favor of the sustainable management of water and the environment.

In this context the following priority actions have been contemplated:

- a) Reinforcing the scope and promoting institutional education and water culture campaigns that highlight the importance of water in terms of guaranteeing the sustainability of the country's long-term economic and social development and its economic, environmental and social value.
- b) Ensuring the public is better informed about the problems and solutions around water in their locality and in the catchment in which they are based, through the formulation and development of dissemination and water culture programs, duly arranged with the educational and business sectors.
- c) Having the various water stakeholders recognize their role in the context of the 2030 Water Agenda, through the formulation and development of a special program of national, regional and local promotion and sharing of the contents of the Agenda.



Initiative 38.

Creating the climate change adaptation contingency fund

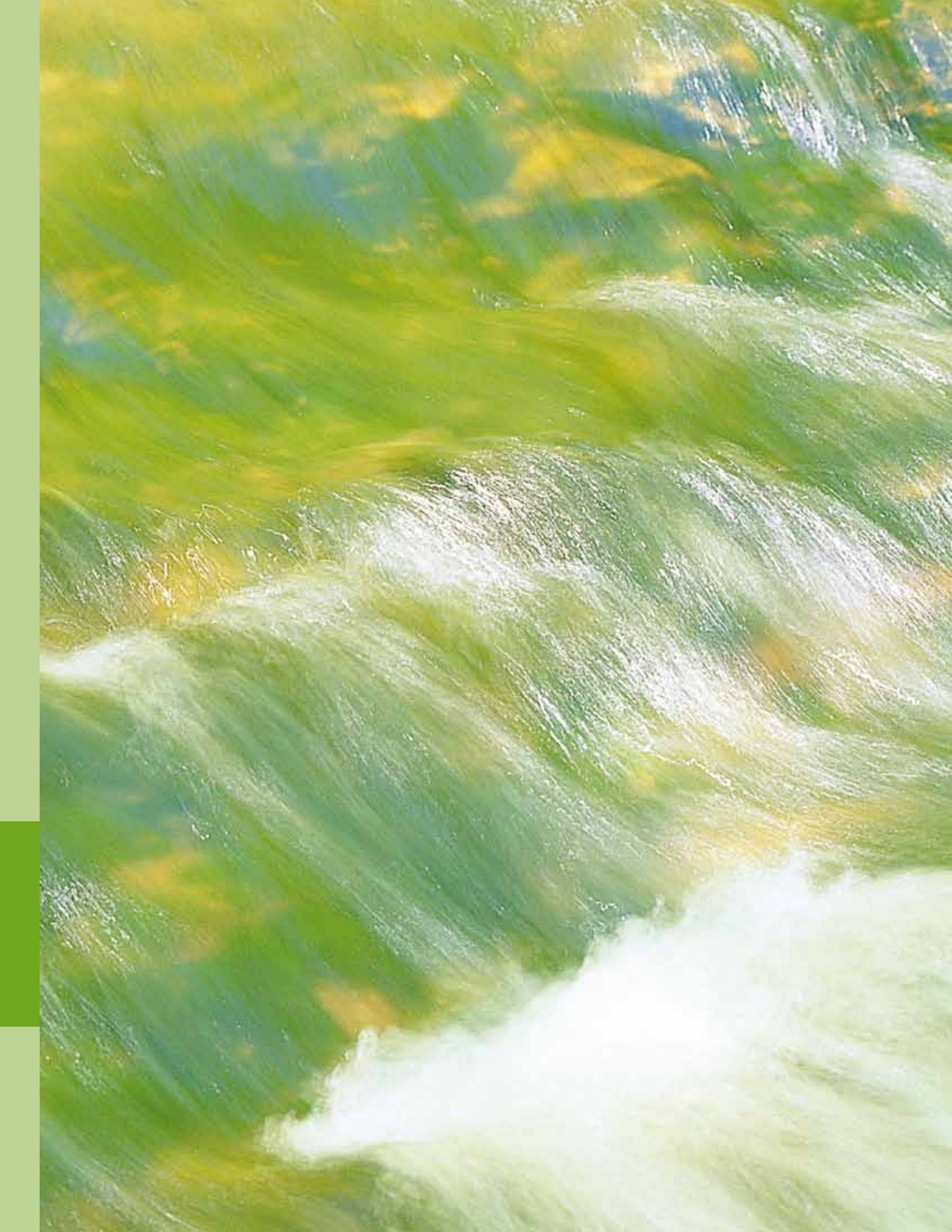
There is an increasingly generalized agreement in the scientific community on the existence of a process of climate change on our planet. The evidence of its increasingly destructive effects has driven significant diplomatic efforts to agree upon a worldwide climate change mitigation agenda, and also taking shape is the theory about the need to include adaptation measures to the effects of climate change.

Since it is not possible to predict precisely the degree to which climate change will affect us, nor the magnitude of its effects, in Mexico, the 2030 Water Agenda proposes the need to establish within a short time frame a contingency fund that would improve our capacity of response to effectively tackle replacements or great modifications to water supply or to flood protection systems, which the change in precipitation patterns and increase temperature could cause.

Obviously the 2030 Water Agenda, when considered wholly, is in itself a means of improving the adaptation capacity to the effects of climate change, but the Contingency Fund proposed within this initiative is a complementary measure that increases its effects.

V. Continuity and follow-up on the 2030 Water Agenda





With the presentation of this first version of the 2030 Water Agenda, a second stage of dialog and analysis is also starting, with the intention for it to be permanent. These tasks will seek to periodically update and evaluate both the future vision of water and the management processes that are carried out and the contents and scopes of national, regional and each catchment and aquifer's water policy, as well as the results and progress obtained in the development of the actions included in the Agenda itself.

For the implementation, follow-up and verification of progress that is being achieved in the Agenda, consultations will be held with the different stakeholders in each initiative, with whom a work plan will be drawn up, as well as a monitoring system, indicating specific actions, targets or results to be obtained, as well as the deadlines and indicators that facilitate the achievement of the purposes that gave rise to them.

The follow-up and evaluation should be an orderly and systematic process that allows us to ensure that we are still walking with our eyes set on the future and that we are making progress on the right path and at the required speed.

The first two months of each year will be used to review where we stand as regards the long-term trajectory highlighted in the Water Agenda and as regards its objectives and initiatives with the aim of presenting an annual evaluation in March of each year, in the framework of the World Water Day celebrations.

Every six years a global evaluation of results and impacts should be carried out along the lines of action and the initiatives contained in the 2030 Water Agenda to update it and reformulate it, in such a way as to guarantee that it remains a valuable tool at the service of sustainable development in Mexico. In the way, the following version of the 2036 Water Agenda should be presented on World Water Day in 2017.



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