I. Project Context

Country Context

1. The Mexican economy is recovering from a deep economic contraction precipitated by the 2008 global economic and financial crisis. As a relatively open economy, Mexico was hard hit by the collapse of international trade during the last quarter of 2008 and the first quarter of 2009. Real GDP growth in 2008 was a meager 1.3 percent, and in 2009 GDP actually fell by 6.5 percent. Responding positively to the Government of Mexico’s (GoM’s) countercyclical fiscal and monetary policies, and aided by the global recovery in production and trade, the Mexican economy picked up in the second half of 2009. By the second quarter of 2010, GDP was still slightly below its precrisis level. There was a similar scenario for private consumption and investment, whereas the level of exports has returned to its precrisis level and public expenditure never dropped. Real GDP growth is forecast at 4.3 percent for 2011. Presidential elections are scheduled for July 2012, with the new President to be inaugurated in December 2012.

2. Global climate change is posing increasing risks to sustainable development in Mexico, and this has been of great concern to the current Administration. Beginning in 2007, Mexico has been progressively strengthening its strategic and policy focus on climate change adaptation and mitigation. Key milestones include the publication in 2007 of the report of the Intergovernmental Panel on Climate Change; the National Development Plan (PND), which has environmental sustainability as one of four pillars; the National Water Program 2007–12 (PNH); and the National Climate Change Strategy (Estrategia Nacional de Cambio Climático, ENACC); followed in 2009 by the launch of the Special Climate Change Program (Programa Especial de Cambio Climático, PECC-2009/12), which established targets for climate change adaptation and mitigation in agriculture, energy, housing, transport, water, and other sectors. With this strong record of credible domestic action, Mexico has gained a role as an important global leader on climate change issues, a role which is continuing after its chairmanship of the 16th Conference of the Parties (COP-16) of the United Nations Framework Convention on Climate Change (UNFCCC).

3. Mexico has a high level of exposure to natural hazards. Both coasts of the country are in the path of hurricanes and tropical storms originating in the Caribbean Sea and the Atlantic and Pacific Oceans. The country also lies within one of the world’s most active seismic regions, is prone to volcanic activity, and is subject to recurrent droughts in its northern cone and central areas. This wide geographic exposure renders more than two-thirds of the country’s population and GDP at hazard risk. The bulk of natural hazards (turning into disasters) that affect Mexico are hydrometeorological. More worrisome, the occurrence of disaster events in Mexico over the last five decades has shown an increasing trend. According to the National Center for Disaster Prevention (CENAPRED), only during the year 2009, hydrometeorological phenomena affected over 554,000 people (injured, evacuees, and homeless), wiped out about 420,000 hectares of crops and caused losses of more than US$1 billion.

4. Mexico faces an acute water crisis due to accelerated population growth and suboptimal management of its water resources. Severe regional disparity in water availability persists within the country, despite steady improvements in access to water in recent years resulting from the Government’s effort to achieve a sustainable and more equitable water resources management. The overexploitation is especially dramatic in groundwater resources, with 102 overexploited aquifers of the 256 aquifers that supply more than 90 percent of total groundwater demands. Furthermore, water quality is deteriorating because less than 40 percent of wastewater is treated. Surface and groundwater in the country suffer heavily from overexploitation and contamination, due to the inefficient use of scarce water resources. Groundwater is the main and strategic freshwater source for the future, particularly under the threat of climate change.

5. Water is the medium through which impacts of weather variability, exacerbated by climate change, are felt. The combination of shifts in water availability and timing and intensification of the hydrological cycle, with more frequent and severe extreme events, is making water less manageable and predictable. A key adaptation strategy to cope with these phenomena, which climate change is likely to exacerbate, is to increase the institutional capacity of the National Meteorological Service (Servicio Meteorológico Nacional, SMN) to generate the climatic and weather knowledge and information required to maintain environmental integrity and to smooth the variability in water supply and delivery to meet human needs. Accurate observation and prediction of future climatic and hydrological conditions—floods as well as droughts—are also essential to develop operational rules and laws that are suited to the changing dynamics of Mexico’s water sector so as to manage its scarce water resources effectively and prevent water-induced damage. Likewise, the improvement of weather information and forecast will benefit important sectors like agriculture, transport, energy, public health, fisheries, among others.
II. Sectoral and Institutional Context

6. The water sector is central to Mexico's sustainable and socially inclusive development. Given Mexico's geography—the country lies between two oceans, and two-thirds of its territory is arid or semiarid, and the remainder, the southeast, is humid—the expected impacts of climate variability and global climate change include an increase in average and extreme temperatures, and a greater variability in rainfall extremes and geographic distribution, and thus changes in runoff patterns. As Mexico’s population grows, human settlements expand into floodplains, low-lying coastal areas, and denuded hillsides, leaving a larger share of the population exposed to flash floods and mudslides and increasing the threats to both lives and assets.

7. Rising prosperity and a growing population will increase the vulnerability of human settlements to extreme weather phenomena, thus spotlighting the need for a better disaster risk management, especially in the water sector. In addition, the severity of thunderstorms has increased; they form more quickly, affect a greater expanse of territory, and are more intense, further increasing risks to life and property. According to data from CENAPRED, since 1999, severe hydrometeorological events have been responsible for over 97 percent of damage caused by natural disasters. These weather-related disasters cost Mexico more than US$10 billion between 1980 and 2005. Over 80 percent of those economic losses occurred in the agricultural sector, increasing the vulnerability for rural households, affecting income generation, and resulting in negative social impacts. Inaction in the face of these challenges will generate economic and social costs that climate change will worsen. Better capacity to monitor and forecast hydrometeorological events and climate variability is therefore essential to confronting these challenges.

8. Modernization of meteorological services is a key pillar of the large water sector reform which the GoM initiated in 1989 with the support of the World Bank. The PECC, PND, and PNH include objectives and activities related to water resources management and protection of the citizenry and infrastructure from climate change impacts, including disasters of hydrometeorological origin. The National Water Law puts the SMN, as an Administrative Unit of the National Water Commission of Mexico (Comisión Nacional de Agua, CONAGUA), at the center of these objectives and activities. It is responsible for generating, interpreting, and disseminating meteorological information, analysis, and forecasts of public interest and strategic importance for the water sector. The National Water Plan 2007-12 proposes the modernization of the SMN including the expansion of the coverage of hydrometeorological monitoring systems and the creation of regional forecast centers to improve services delivery and community outreach with hydrological and climatic information and warnings.

9. The SMN, created in 1937, has developed and operates a national meteorological network of 200 surface stations, 80 synoptic observatories, 16 upper-atmosphere observation stations, and 13 Doppler meteorological radars. It issues regularly warnings, medium term and seasonal forecasts and monitors hurricane and tropical storms. Its long experience and historical records have made the SMN a prominent member of the World Meteorological Organization (WMO) and an active partner of several regional weather and climate prediction and monitoring networks. However, the SMN has experienced a gradual degradation of its technical and institutional capacity and infrastructure over the last 10 years due to the lack of effective operation and maintenance policies and long-term plans for meeting the needs of qualified staff. The allocation of resources has not met the needs for enhancing the technology and infrastructure for delivering modern hydromet services. With the growing demand for meteorological information and services, upgrading SMN is a priority (climatologists, meteorologists, engineers, physicists, and radar experts need to be trained). The observation infrastructure needs to be automated, systems for the sustainable and efficient operation and maintenance of databases created, and applications for the analysis of information customized for decision making and operation. The existing modeling tools need to be upgraded in order to address longer-term climate forecasting needs.

10. Improving the meteorological and climatic forecasting capabilities so as to better respond to the challenges that major economic and social sectors face in a changing climate is essential. This will require substantial scientific knowledge, data and advanced numerical models for atmospheric phenomena. Following an assessment of the SMN conducted in 2009 by an international panel constituted by the WMO, the GoM asked the World Bank to prepare an action plan for the modernization of the SMN as one of the activities of the joint Strategic Engagement Program Supporting Adaptation of the Water Sector to Climate Change in Mexico.

11. In 2010, leveraging this technical assistance, the GoM launched the National Program for the Modernization of the SMN, the objective of which is to ensure that the meteorological services are improved for the greater benefit of the entire population, all economic sectors, and the environment. The GoM has increased the SMN budget from Mex$62 million to Mex$440 million between 2009 and 2012 to respond to the most urgent needs identified in the Action Plan. The most relevant achievements in this initial phase were: (a) implementation of a large five-year contract with a reputable international meteorological services provider who is producing weather forecasts with different resolutions and time horizons, (b) rehabilitation of instrumentation, (c) recruitment of 30 qualified meteorologists, and (d) the implementation of several institution-strengthening initiatives. The proposed operation will provide further support and additional financial and technical assistance to next phases of this ongoing Program to modernize the SMN.

12. The SMN currently has about 600 employees, of which 170 are professionals with a university degree and 430 are technicians. In comparison, AEMET, Spain, for example, has around 450 professional meteorologists compared with about only 20 for the SMN of Mexico. There can be many consequences of having an understaffed SMN, many of which involve significant negative impacts. The forecast and monitoring of extreme events associated to this complex topography requires a major effort from the SMN in terms of infrastructure and manpower dedicated to weather surveillance, analysis and preparation of warnings. Mexico is the 13th-largest world economy and the 10th-most populous country, but it has a very small staff dedicated to the provision of a significant demand for meteorology and climate services. This is one of the more relevant key issues of the Project, because the development, implementation and, above all, the sustainability of Modernization of SMN, will depend on strengthening the quantity and professional level of the staff.

III. Project Development Objectives

The Project Development Objective (PDO) is to strengthen the human resource, institutional, and infrastructural capacity of the Servicio Meteorológico Nacional to meet the increasing demand for timely and accurate weather and climate information for the purposes of water resources management and disaster risk management in the face of climate change and climate variability.

IV. Project Description

Component Name

Component I: Strengthening Institutional Capacity and Client Communications (US$ 23.8 million total cost with US$ 19.6 million from IBRD)

Component II: Modernizing Observation Infrastructure (US$ 81.5 million total cost with US$ 41.0 million from IBRD)
Component III: Improving Meteorological Forecasts (US$ 32.3 million total cost with US$ 16.2 million from IBRD)
Component IV: Develop Climate Regional Capacity (US$ 33.1 million total cost with US$ 28.2 million from IBRD)

V. Financing (in USD Million)

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VI. Implementation

VII. Safeguard Policies (including public consultation)

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VIII. Contact point

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