

Latin America and Caribbean Region



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One of the most urgent development issues for Latin American and Caribbean countries is to better understand and prepare for the impacts of global climate change. Accounting for about 6 percent of global emissions, Latin America as a region is not a major contributor of greenhouse gas emissions, despite the presence of rapidly growing economies and industries such as in Brazil and Mexico; however, as a result of climate change, the region is expected to suffer irreversible impacts to key ecosystems and the services they provide.

Impacts of Climate Change

The most certain effect is sea level rise resulting from ice melting in the poles and thermal expansion of the oceans. The Intergovernmental Panel on Climate Change (IPCC) projects that by 2100, sea levels could rise by between 20 and 60 cm. This would have a dramatic direct impact in low-lying areas in deltaic regions and the Caribbean islands. Sea level rise is expected to exacerbate inunda-

tion, storm surge, and other coastal hazards, thus threatening the livelihoods of island communities. Sea level rise and warmer sea-surface temperatures are linked to coral bleaching, which has affected more than 80 percent of coral reefs in the Caribbean, according to a 2006 NOAA assessment. The result is a serious degradation of the role of coral reefs in protecting coastal areas against storm

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surges, functioning as marine nurseries critical to Caribbean biodiversity and fisheries, and attracting tourism. In addition, sea level rise may contribute to salinization of aquifers and hence affect the availability of drinking and irrigation water resources.

Changes in precipitation and the rapid melting of glaciers are projected to significantly affect water availability for human consumption, agriculture, and energy generation. For example, the reduction of glacier mass in the Andes during recent decades is well-documented and accelerating. Between 1970 and 2002, the area covered by glaciers in the tropical Andes (Bolivia through Venezuela) declined by about 15 percent. Glaciers at altitudes below 5,500 meters could disappear by 2015. Retreating glaciers will dramatically reduce flows in dry seasons and could produce flooding in wet seasons.

Increase in extreme weather events. There is evidence indicating that global warming is associated with increases in both weather variability and the incidence and severity of extreme weather events. Recent studies (Hoyos and others 2006; Webster and Curry 2006) show a trend toward intensification of hurricanes in the Caribbean, which will have significant impacts on regional ecosystems, populations, infrastructure, and economies. The occurrence of extreme weather events from 2000–05 was almost 2.5 times higher than during the 1970–99 period, including a number of unusual occurrences. For example, in 2004 Brazil was hit by the first hurricane ever observed in the South Atlantic. Similarly, in 2007 Buenos Aires saw snow for the first time in 89 years.

Risk of Amazon dieback. One of the most significant projected consequences of climate change is its impact on the ecosystem integrity of the Amazon basin. Temperature increases and associated changes—including decreases in soil water, disruption in precipitation cycles, and increased wildfires—are projected to lead to a gradual replacement

of tropical forest by savanna in eastern Amazonia. The Amazon rain forest plays a critical role in global climate, locking away vast quantities of carbon and serving as an “engine” of global climate circulation that affects rainfall in places as far away as Europe and Central Asia. Moisture injected by the Amazon ecosystem into the atmosphere also plays a critical role in the region’s precipitation patterns. In drier areas, climate change is expected to lead to salinization and desertification of agricultural land. Moreover, productivity of some important crops is projected to decrease and livestock productivity to decline, with adverse consequences for food security.

Additional losses from land conversion. Compounding the impacts of climate change on the Amazon there are additional losses from land conversion. While fossil fuels account for two-thirds of LAC’s emissions, a solid 20 percent is accounted for by land use change. Over the past 15 years, the Latin America region has lost about 45,000 square kilometers of forest per year—777,000 square kilometers since 1990. LAC accounts for slightly more than 50 percent of global annual deforestation. Most of the deforestation has taken place in Amazonia, with Brazil accounting for 60 percent of lost forest areas in the region since 1990.

Risk of significant biodiversity loss. There is a significant risk of species extinction in many areas of tropical Latin America. For example, an increase in sea-surface temperature due to climate change is projected to have adverse effects on Mesoamerican coral reefs, and cause shifts in the location of southeast Pacific fish stocks. Similarly, with higher temperatures, increased invasion by non-native species is expected to occur, particularly in middle- and high-latitude islands.

Impact on páramos. The effect of climate change on Andean páramos (unique mountain ecosystems of mixed grasslands, shrublands, bogs, and lakes) requires further

analysis. However, recent data (Ruiz and others 2007) suggest that significant changes in atmospheric stability, increases in sea-surface temperature, and changes in local vegetation cover have altered the circulation patterns responsible for producing and moving water vapor to the region and could fundamentally modify the ecology of the páramos. These changes have likely contributed to the disappearance of some high-altitude water bodies and increased the occurrence of natural and human-induced fires. These fragile ecosystems are not only home to globally unique biodiversity, but they also play an important role in the water supply of some major urban centers such as Bogotá and Quito.

Increased exposure to tropical diseases. Colombia has experienced a gradual increase in outbreaks of tropical disease, particularly malaria, that may be an indicator of future trends in parts of Latin America that are projected to have long-term increases in local temperature and precipitation. The strong correlation between precipitation and malaria and between temperature and dengue, documented in a 1997 study of 715 municipalities in Colombia (Blanco and Hernández 2007), suggests that these and other diseases may be more prevalent in the region as a result of climate change.

Vulnerability of energy supply. Latin America relies heavily on clean hydroelectric power to generate electricity. The share of this source is about 60 percent of electricity production, more than three times higher than the next region. Given the region’s dependence on hydroelectric power, the extent to which climate change will affect hydrology and potentially reduce hydropower potential is of critical importance to the region’s economic growth. Because of the region’s high dependence on hydropower, it is critical to “climate proof” its energy production, for example, through design of hydropower installations taking into account more variable as well as changing average flows, and

through moving toward a greater mix of clean energy sources.

Highlights from LAC Portfolio

The LAC Region has a large adaptation portfolio, with seven active projects addressing some of the most critical impacts identified by the scientific community. Development of this portfolio has been guided by (a) seeking to address critical impacts caused by scientifically documented trends such as glacier retreat and coral reef bleaching and (b) using an approach based on the projected impacts of climate change on ecosystems and the services they provide.

The Bank's regional adaptation work, summarized below, has been strategically focused on responding to impacts on key ecosystems. The identification of these impacts is being supported by key observation networks, monitoring coral systems, sea level rise, sea-surface temperature, and glacier dynamics. These activities are being complemented through the application of Earth Simulator runs to model future climate in Latin America. In collaboration with the Bank, this modeling of future climate scenarios is being undertaken under a pioneering partnership with the Meteorological Research Institute of Japan, the Mexican National Institute of Ecology, the Colombian Institute of Environmental and Meteorological Studies, the Peruvian National Service of Meteorology and Hydrology, the Ecuadorian National Institute of Meteorology and Hydrology, and the Bolivian Institute of Hydraulics and Hydrology.

Caribbean—Mainstreaming Adaptation to Climate Change. Now in its third year, this project is helping internalize climate change considerations into decision making and sectoral planning among members of the Caribbean Community (CARICOM), as well as expanding the monitoring network

to document trends in climate impacts in the region. It has supported further capacity building by transferring project management to the regional Caribbean Community Climate Change Center, which is responsible for guiding and implementing CARICOM's climate change strategy and designing and proposing projects. This center has installed a coral reef early warning system to monitor conditions that might lead to coral reef bleaching.

Colombia—Integrated National Adaptation Program. This program is supporting Colombia's efforts to define and implement specific adaptation measures and policy options on a pilot basis to address anticipated impacts from climate change. These efforts are focused on high-mountain ecosystems and insular areas, as well as human health concerns related to malaria and dengue (almost half of Colombia's population lives in areas where an increase of 2° Celsius in mean temperature is likely to result in significantly greater exposure to these diseases). Impacts in the Caribbean and Pacific coastal areas are also a major concern; vulnerable infrastructure, cities, and ecosystems could be at risk from higher sea levels, increased sea-surface temperatures, and more intense and frequent extreme weather events. The project, currently in its second year, has begun

to implement specific adaptation measures in the health sector, mountain habitats, and coastal zones.

West Indies—Implementation of Adaptation Measures in Coastal Zones. This project supports efforts by Dominica, Saint Lucia, and St. Vincent and the Grenadines to implement integrated, pilot adaptation measures that address the impacts of climate change on the natural resource base, with a focus on biodiversity and land degradation along coastal and near-coastal areas. The project is being implemented by the Caribbean Community Climate Change Center, now widely recognized in the region as a source of expertise on climate issues in the Caribbean.

Andes—Adaptation to the Impact of Rapid Glacier Retreat in the Tropical Andes. This project, currently under preparation, will implement adaptation measures to address the anticipated consequences of catastrophic glacier retreat induced by climate change. This is expected to be achieved by (a) supporting the detailed design of selected adaptation measures, (b) implementing regional and strategic adaptation pilots to target key impacts from rapid glacier retreat on selected basins, and (c) supporting continued obser-



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vation and assessment of glacier retreat and its associated impacts on the region.

Mexico—Adaptation to Climate Impacts in the Gulf of Mexico Wetlands. Also under preparation, this project is expected to reduce vulnerability to the anticipated impacts of climate change on the country's water resources, with a primary focus on coastal wetlands and associated inland basins. The project aims to identify national policies to address these impacts at the national level, to assess current and anticipated effects of climate change on the integrity and stability of the Gulf of Mexico wetlands, and to implement pilot adaptation measures to protect environmental services from the impacts of climate change.

A Regional Approach to Climate Change

In light of the significant and potentially irreversible impacts from climate change, the Bank's Latin America and Caribbean Region has pioneered analytical work and pilot adaptation projects for several years. This year's groundbreaking regional flagship study looks at the relevance of climate change concerns in the LAC context and will contribute to the policy debate regarding the implementation of mitigation and adaptation interventions in specific country contexts. Other analytical work includes low-carbon studies for Brazil and Mexico and a landmark modeling study of the projected impacts of Amazon dieback.

LAC's approach is to strengthen the institutional capacity of regional agencies and national governments to (a) formulate climate change policies, standards, and guidelines, including the planning, management, and monitoring of these policies and (b) support the transfer of global best practices and strategies in vulnerability assessment, adaptation, and mitigation. The analytical work currently under way will determine the region's relative priorities—in some cases focusing on miti-

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gation, while in most cases helping countries adapt to the effects of climate change. Critical to this will be to help countries secure financing for their adaptation needs through a mix of financing instruments.

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