USAID
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PAKISTAN

CLIMATE VULNERABILITY PROFILE

US Foreign Assistance: [1] (thousands USD)	Requested FY 2012	Requested FY 2013
Estimated total:	2,101,908	2,227,596
Water:	0	12,000
Priority Adaptation Country in 2011:	NO	
Key Climate Stressors:	Heat, Drought, Flooding	

INTRODUCTION

Pakistan is located in South Asia and is bordered by India, Afghanistan, Iran, and China. It borders the Arabian Sea to the south, and stretches north to the Hindu Kush and Karakoram mountain ranges. Pakistan's 170 million people are economically and culturally diverse, and live in very different climate zones, topographies, and ecosystems. Most live along the banks of the Indus River, which is prone to severe flooding in July and August. Approximately 33 percent of the population lives below the poverty line. Pakistan has rich natural resources, including productive land, water, and mineral deposits, but still grapples with the challenge of balancing economic development with environmental protection. Pakistan is considered a semi-industrialized country and has generally shown slow growth. Its economy increasingly revolves around services, although a large part of the population still lives in rural areas and works in the agricultural sector. Agriculture contributes 22 percent of the national Gross Domestic Product (GDP) and employs 43 percent of the labor force.

PROJECTED WEATHER AND CLIMATE CHANGES

Pakistan has 11 climate zones due to its range of topographies and ecosystems, and each of these climate zones experiences different weather and climate patterns. Generally, the coastal areas of the country are dry and hot and the northern uplands get progressively cooler. The winter months (December-February) are cool and dry. The country experiences monsoons from June through September, with a lesser degree of monsoon activity in October and November as well.

TEMPERATURE: Widespread changes in extreme temperatures have been observed in Pakistan over the last 50 years. Cold days, nights, and frost have become less frequent whereas hot days, nights, and heat waves have become more frequent. According to Pakistan's Task Force on Climate Change, temperature is projected to increase from the 1960-1999 baseline by 1.3°C by 2020, 2.5°C by 2050, and 4.4°C by 2080 under the A2 scenario[2]. Under the A1B scenario[2], temperatures in Pakistan are projected to rise by 1.45°C, 2.75°C and 3.87°C in 2020, 2050, and 2080, respectively.

PRECIPITATION: Average rainfall in the arid and coastal plains of Pakistan has decreased by between 10 and 15 percent since 1960, while increasing during the same time period over northern Pakistan. Heavy rainfall events have increased, with the nine heaviest rains recorded in 24 hours all being registered in 2010.

SEA LEVEL RISE: The low-lying plains along the coast of Pakistan are exposed to the impacts of sea level rise, with conservative scenarios projecting an increase of 40 cm by 2100.

EXTREME EVENTS: Pakistan has experienced about 18 extreme weather events since 1990, including the historic 2010 floods, as well as droughts, cyclones, and landslides. Due to the heavy monsoon rains during the summer months, Pakistan often experiences severe flooding in the Indus River basin, where much of the population lives on low-lying lands. Rain- or otherwise- triggered landslides are common in the northern regions of Pakistan, particularly those connected to Azad Jammu Kashmir province. Lowland plains, especially those surrounding the urban areas of Karachi and Hyderabad, are vulnerable to the impacts of cyclones and storm surge. Finally, sparse and erratic rainfall patterns can alter water tables, leading to drought conditions in the southern and central regions of Pakistan.

KEY CLIMATE IMPACTS AND VULNERABILITIES

Much of the Pakistani population depends on agricultural activities for food and income. Under future climate scenarios, rising temperatures and erratic rainfall could limit the country's ability to sustain its current levels of agricultural and livestock production. Agriculture uses 92 percent of the country's extracted water, which makes it highly vulnerable to changes in hydrologic balance. Pakistan is ranked fourth in the world in terms of the extent of irrigated farmland; about 90 percent of agricultural output comes from irrigated land. The irrigation network receives 50 to 80 percent of its water directly from glaciers and snow melt in the Karakuram Hindu Kush series. Any change in the glacier mass balance will thus directly affect irrigated agriculture. Increasing temperatures could also increase demand for irrigation by triggering evapotranspiration. Further, erratic rainfall could increase the vulnerability of energy production, as 33 percent of Pakistan's energy supply is hydropower-driven. Availability of freshwater for key requirements such as drinking water and industrial uses will be diminished since most of this water comes from groundwater aquifers. Coastal communities and infrastructure are likely to be impacted by severe cyclones, storm surge, saltwater intrusion, and flooding during wet years.

KEY USAID PROGRAM VULNERABILITIES

ENERGY: USAID/Pakistan is partnering with the Government of Pakistan, the private sector, and other donors to strengthen the country's energy sector. The program focuses on increasing Pakistan's energy supplies, improving energy efficiency, and improving governance in the energy sector. USAID/Pakistan's energy program may be vulnerable to climate changes in a number of ways. First, hydropower, on which the country is heavily dependent, is highly vulnerable to projected climate changes as Pakistan may experience increased drought in the long-term when glacial melt is no longer consistent. Furthermore, the effectiveness of different types of renewable energy projects such as solar or wind may be diminished (or

[1] US foreign assistance includes both USAID and Department of State program funding, but in most cases the bulk of this funding is implemented through USAID. In order to have comparable figures in these categories, all country profiles use figures from the Congressional Budget Justification (CBJ) (see http://transition.usaid.gov/performance/cbj/185016.pdf and http://transition.usaid.gov/performance/cbj/158269.pdf). Between the time of the budget request and the 653(a) report to Congress, these figures can change significantly.

[2] These scenarios are two of the scenarios developed by the Intergovernmental Panel on Climate Change (IPCC) to examine potential future developments in the global environment with special attention to the production of greenhouse gas emissions. For more information on these scenarios, visit www.ipcc.ch.

conversely expanded) by changing temperatures, winds, and/or storm patterns. Finally, investments in energy infrastructure may be in jeopardy as flooding, high winds, and rising temperatures may cause physical damage to energy production facilities and transport and distribution systems (e.g., power lines).

ECONOMIC GROWTH: USAID supports a variety of economic growth projects in Pakistan, including promoting competitiveness of agricultural value chains, increasing technological innovation, and increasing irrigated acreage as well as water use efficiency. Agriculture in Pakistan, predominantly an arid to semi-arid country, almost entirely depends upon irrigation water to support agricultural production. USAID interventions like the Gomal Zam Irrigation Project and the Satpara Development Project expanded the irrigated area by 180,000 acres. These projects are vulnerable to climate change impacts in two ways: 1) floods could seriously damage the newly built irrigation canal infrastructure; and 2) droughts could diminish river inflows, which would reduce water available for irrigation. Thus, both agriculture and water are key areas of vulnerability in Pakistan. Water availability and use are expected to change over time and across locations in Pakistan due to receding glaciers, decreased water reservoir capacity, and severe floods and droughts. With projected changes in climate, Pakistan's agricultural system is also expected to experience changes in crop and livestock productivity, pests, and water availability and use, as well as impacts from heat stress and shifts in spatial patterns of crops.

HEALTH: Objectives of USAID/Pakistan's health program include increasing access to family planning services, improving maternal and child health care, behavior change communication, health systems strengthening, and improving access to water. Child and maternal health projects may be threatened by changes in nutrient availability as climate changes impact agricultural production. Additionally, climate changes are expected to stress water resources, making it difficult to consistently supply potable water. Flooding caused by excessive rainfall led to a range of health issues during the summer of 2010 and is an ongoing potential threat.

PEACE AND SECURITY: Much of USAID/Pakistan's portfolio is focused on promoting stabilization within the country. To this end, USAID is supporting infrastructure development, service provision (energy, water, health, etc.), and livelihood development. Many of these projects could be vulnerable to the impacts of extreme events such as floods, droughts, and cyclones that may become more frequent or more severe under climate change. For example, USAID-rebuilt infrastructure such as the head-works on the Swat River, as well as bridges, roads, schools, and hotels that were badly damaged by the 2010 floods and by conflicts, is highly vulnerable to climate changes, including increased frequency and severity of flooding.

HUMANITARIAN ASSISTANCE: USAID supports a variety of emergency response and cash compensation programs in Pakistan that support vulnerable families in affected areas. As extreme events may become more frequent, USAID's assistance, through the Office of U.S. Foreign Disaster Assistance and Food for Peace, may be in higher demand.

ACTIONS UNDERWAY[3]

To date, Pakistan has received modest attention on adaptation compared to other South Asian countries. Most of these programs do not target Pakistan alone, but rather include a number of other countries in the region and across the world. In Pakistan, adaptation projects have mainly focused on water but also address disaster risk reduction, policy formulation, agriculture, and energy. In its disaster response program, USAID/Pakistan is already supporting the National Disaster Management Agency in coordinating information sharing and dissemination; however, the program does not specifically consider climate change.

CHALLENGES TO ADAPTATION

Pakistan faces several challenges in adapting to the impacts of climate change. Some of these are related to data and information gaps, including inadequate coverage of weather stations in some areas of the country (including on the Hunza river basin), lack of monitoring of the Karakoram glaciers, and poor demarcation of flood-prone zones. Institutionally, the country needs expanded capacity to respond in disaster situations, better capacity and training in managing flood waters, and institutions that can help mainstream climate considerations into all aspects of development, while also learning how best to engage people in affected communities. Further, there is a need to investigate changing rainfall patterns, especially the monsoon pattern, and their associated impacts, and develop sea level rise and storm surge models to evaluate impacts on low-lying areas around Karachi. The biggest of all these challenges will be developing an integrated political, social, and technical approach to transform climate change vulnerabilities into opportunities by developing appropriate strategies in all sectors. In the agricultural sector, for example, this could involve actions such as building more water reservoirs, increasing the efficiency of irrigation practices, increasing access to crop insurance, and promoting high value agriculture to increase economic growth.

RESOURCES

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[3] Actions underway include those from direct adaptation funds and indirectly attributed funds. More information on U.S. climate finance can be found at http://www.state.gov/e/oes/climate/faststart/index.htm.