



## Executive Summary



# Executive Summary

---

## The Global Challenge

**The world is facing a prolonged period of planetary surface warming that is unparalleled in human history.** The scientific consensus holds that this is largely a consequence of human-generated emissions of greenhouse gases (GHG). The 1990s were the warmest decade and 2005 the warmest year on record since 1800. The impacts of higher temperatures are already being felt and are visible in melting of some glaciers, rising sea levels, more frequent storms, and extreme weather events. At current trends, scientists predict that the Arctic could be free of ice within 100 years.

**Climate change has become central to the development and poverty-reduction agenda.** Progress toward attaining many development goals, such as eradicating poverty, combating communicable diseases, and ensuring environmental sustainability, could be made more challenging. The effects of global warming are likely very unfair. Industrialized countries are responsible for the vast bulk of past and current greenhouse gas emissions. However, the developing countries and the poorest people will suffer the most from climate change because of unfavorable geography, limited assets, and a greater dependence on climate-sensitive sources of income. Yet few developing

countries are well adapted to even current climate variations. Climate change is predicted to increase the variability and frequency of extreme events in ways that are outside the realm of experience. Some of the impacts are predicted to be in the form of new challenges (such as glacier melt and sea-level rise) and others as age-old threats made more severe by climate change (such as flooding or drought).

## Background and Approach

***South Asia: Shared Views on Development and Climate Change* builds upon the World Bank Group's *Strategic Framework for Development and Climate Change (Framework)*, which defines the pillars and priorities of the climate challenge.** Within the context of the global *Framework*, this document identifies the climate challenges in South Asia. It outlines the broad parameters of a response that is consistent with the development priorities of the region. The main aim is to help South Asian countries begin a process that would build climate-resilient economies that grow along a low-carbon trajectory. Adaptation to climate change lies at the heart of such a climate response, because it is critical in reducing climate-related threats to development. With rapid economic progress in recent decades, there also remain wide

opportunities for catalyzing low-carbon growth across the region in ways that contribute to the overall development objectives of South Asian countries. This document emphasizes the need for approaches that are aligned with country priorities and attempts to inform and support country programs by deepening knowledge of the climate-change challenge to development, expanding the policy toolkit to address climate challenges, and facilitating access to additional financial resources. The focus is on the consequences of climate change on economic growth, poverty reduction, and achieving the Millennium Development Goals (MDGs). The approach has been informed and developed through very extensive consultations in the region that took numerous forms: meetings, physical and virtual, workshops, conferences, and Web-based interactions. These interactions occurred over a seven-month period with governments, development partners, think-tanks, nongovernmental organizations, and individuals. There were several thousand downloads of the document from the Bank's website and a correspondingly high number of comments received from readers and experts in the region.

**Climate policies in South Asia will need to be tailored to risks and country circumstances.**

South Asia's climate is as diverse as its landscape. The region spans a variety of climate zones, including arid deserts, parched rangelands, freezing alpine mountains, and humid tropical islands. The projected impacts of climate change will be heterogeneous, suggesting that there can be no one-size-fits-all approach to building climate resilience across South Asia. Responses will need to be customized to specific risks and circumstances.

## Why is South Asia so Vulnerable to Climate Change?

**Geography coupled with high levels of poverty and population density has rendered South Asia especially vulnerable to the impacts of climate**

**change.** The region faces daunting climate-related development challenges. High population levels translate into increased resource demands on an already stressed and largely degraded natural resource base. With an estimated 600 million people subsisting on less than US\$1.25 per person a day, even small climate variations can cause irreversible losses and tip a large number of people into destitution.

**The region is highly susceptible to natural disasters.** Over 50 percent of South Asians—more than 750 million people—have been affected by at least one natural disaster in the past two decades. The human and economic toll has been high, with almost 230,000 deaths and about US\$45 billion in damages. The region shares common geological formations and river basins, so that natural hazards frequently transcend national boundaries. With climate change the frequency and incidence of such natural disasters is projected to increase.

**Compounding these risks is the region's heavy reliance on the monsoon.** The monsoon is the most significant climate event in the region's economic calendar. It carries over 70 percent of South Asia's annual precipitation in a brief four-month period.<sup>2</sup> A buoyant monsoon heralds bountiful harvests and financial security, yet when the monsoons fail, or are excessive, suffering and economic loss are widespread. If climate projections are indicative of future trends, the risks associated with water-related climate variability are likely to worsen.

**The retreating of some glaciers in the Himalayas could present the most far-reaching challenge to the region.** The Himalayas are a vital life-sustaining resource for South Asia. The Himalayan ecosystem supports some 1.5 billion people who live directly in the floodplains of its many rivers (e.g., Indus, Ganges, Brahmaputra, and Meghna). The Himalayan system influences monsoon dynamics,

<sup>2</sup> Most of the region relies on the summer monsoon, which runs from June to September. In Sri Lanka and the Maldives, however, it is the winter northeast monsoon that delivers most of the precipitation, between November and January.

acts as a natural reservoir to sustain crops, provides groundwater recharge, and is home to a unique ecosystem with an abundance of endemic species. But with rising temperatures the ice mass of the Himalayas and Hindu Kush is retreating more rapidly than the global average. This poses an unprecedented threat to water supplies, lives, and the economies of the region. The retreating of some glaciers illustrate the interconnectedness of South Asia.<sup>3</sup> With melting glaciers, flood risks would increase in the near future. In the long term, there can be no replacement for the water provided by glaciers, which could result in water shortages at an unparalleled scale. Agriculture and the region's economic structure will need to undergo significant adjustment to cope with these changes.

**Sea-level rise is a further concern.** The region has long and densely populated coastlines with many low-lying islands. In the severe climate-change scenarios,<sup>4</sup> sea-level rise could pose an existential threat, potentially submerging much of the Maldives and inundating 18 percent of Bangladesh's total land, directly impacting 11 percent of the country's population. Saltwater intrusion from sea-level rise in low-lying agricultural plains could lead to food insecurity, further increase the prevalence of water-related diseases, and reduce freshwater supplies. Many of the region's primary cities (e.g., Chennai, Cochin, Karachi, Kolkata, and Mumbai)—the engines of regional growth—are located on the coast and threatened by sea-level rise. The immediate impact of sea-level rise is on coastal communities and ecosystems. Ripple effects could be felt beyond borders if there is large-scale displacement of populations in densely inhabited coastal areas and erosion of protective coastal ecosystems.

**Many of the most severe impacts of climate change are likely to be regional and will call**

<sup>3</sup> Evidence also suggests that climate change in China is influencing glaciers across the entire Himalayan range.

<sup>4</sup> Reference here is to the Intergovernmental Panel on Climate Change (IPCC) A2 scenario.

**for coordinated regional responses.** Bangladesh shares 54 rivers with India. Changes in upstream runoff and demand due to climate change could significantly impact future water availability across all these rivers. Likewise, sea-level rise could displace much of the population along the coastal zone and induce cross-border migration. Climate-sensitive diseases could spread rapidly across borders in a globalized world. The past decade saw dengue fever, cholera, and Rift Valley fever spread across and between continents. Adaptation to climate change might therefore require not just local action but also cross-boundary cooperative arrangements. Partnerships and coordinated approaches provide a cost-effective way of adapting to the impending regional climate related risks.

**The cascading effects of more variable rainfall and higher temperatures could impact most aspects of life and the economy.** Weather extremes and greater fluctuations in rainfall have the capacity to refashion the region's comparative advantage. Food security, health, livelihoods, and access to basic services of water, sanitation, energy, and shelter could all be compromised. Expected impacts of climate change include the following:

- ◆ Reduction of yields of major crops by as much as 20 percent and an even sharper decline in



Michael Foley/World Bank

agricultural incomes in the worst-case climate scenarios.

- ◆ Growing scarcity of water, with a need to balance more variable water supplies with the accelerating demand for water.
- ◆ Economic losses and damage to high-value infrastructure, particularly in the vulnerable coastal cities.
- ◆ Irreversible loss of ecosystems and ecological services, particularly in fragile and unique biomes covering terrestrial and marine ecosystems (such as the Himalayas, the Western Ghat biosphere encompassing India and Sri Lanka, and the fragmented coral reefs). In sum, high population densities, a large concentration of poverty, and the region's climate variability have all combined to make South Asia especially vulnerable to the consequences of climate change. Climate change has the potential to compound existing development problems and increase pressures on key resources needed to sustain future growth, urbanization, and industrialization.

## South Asia's Greenhouse Gas Contribution

**The region has recently emerged as a significant contributor to greenhouse gas emissions.** High economic growth has fueled a growing and insatiable thirst for energy in South Asia. Rising energy demand is driven by urbanization, industrialization, and prosperity, all of which are part of a broader process of development that is lifting millions of South Asians out of poverty. Increased energy consumption has been accompanied by rising greenhouse gas emissions. On average, emissions have risen at about 3.3 percent annually in the region since 1990—more rapidly than in any other region except the Middle East. Total emissions exceed 2.5 GtCO<sub>2</sub>eq (billion metric tons

of carbon dioxide equivalent). However, per capita emissions of the region are still extremely low by international standards—less than one-fifth of the developed countries.

**As the region strives to meet its development goals, the potential for further growth in emissions is enormous and driven by basic needs.** Over 500 million people in South Asia have no access to electricity. How the region meets the legitimate demands for energy and economic prosperity will have far-reaching consequences on global greenhouse gas emissions. Growth typically spurs emissions in rough proportion to the income it generates.<sup>5</sup> Hence, South Asia, like the rest of the world, faces an enormous challenge to sustain its growth while addressing global warming.

**Coal is the backbone of the energy sector and would likely remain the dominant fuel that will power much of South Asia.** India has the third-largest stock of proven coal reserves in the world, after the United States and China. Strategies to lower emissions by diversifying into cleaner sources of power are constrained by energy resources. India, the largest energy consumer in the region, is not well endowed with reserves of cleaner fuels such as oil, gas, and uranium.<sup>6</sup> Hydropower potential is significant and large in absolute terms (150,000 megawatts) but small compared to the country's future energy needs.<sup>7</sup> There are considerable and untapped possibilities for importing hydropower from Nepal and Bhutan and wind power from Sri Lanka, but there remain difficulties in establishing transboundary energy trade agreements. Because of the cost advantage of coal at the oil prices that have prevailed in recent decades, Bangladesh,

<sup>5</sup> Globally, a 1 percent increase in per capita income has induced, on average, a 1 percent increase in greenhouse gas emissions.

<sup>6</sup> In 2005–6 oil reserves were estimated at 786 metric tons and gas reserves are 1,101 million cubic meters (Government of India, Planning Commission 2006).

<sup>7</sup> According to the Government of India's Integrated Energy Policy (2006), with 8 percent growth, 150,000 megawatts of hydropower would supply about 5 percent of total energy needs in the best case scenarios by 2030.

Pakistan, and Sri Lanka will increasingly find coal emerging as the front-runner for incremental power generation. Cleaner coal technologies are likely to play a pivotal role in addressing the global climate challenge at least in the short term.

**There are large gains to be had from promoting energy efficiency and reducing power losses.**

Much of the industrial output in the region is from small- and medium-scale enterprises that utilize outdated and inefficient technologies and processes. Cost-effective energy-efficiency opportunities exist across the entire chain of energy production, distribution, and consumption in all South Asian countries. In addition there is scope for reducing emissions from existing thermal power plants. Many of the plants in the region are aged, inefficient, and highly polluting. Rehabilitation of these with cleaner technology can generate substantial emission reductions. Such measures would be in line with the countries' needs for more energy to sustain their growth as well as with global mitigation objectives.

**Cities are major contributors to greenhouse gas emissions.** Rapid urbanization has been accompanied by increased demands for transportation, energy, water supply, sanitation, and increased generation of wastewater and solid waste, all of which contribute to greenhouse gas emissions. Fortunately there remain large and untapped opportunities for South Asia to simultaneously improve services (waste treatment, public transport, etc.) and quality of life while reducing the greenhouse gas footprint of the urban landscape.

**Agriculture is also a major contributor to greenhouse gases.** Rice and livestock are the primary sources of agricultural emissions and account for more than 20 percent of emissions from South Asia. However, the per-hectare emissions from rice in South Asia are lower than the global average, reflecting the special features of the agricultural landscape: poor soils, low levels of chemical application, and planting regimes in the



*Michael Foley/World Bank*

region. In addition in some countries a significant proportion of underpriced electricity is used for groundwater extraction and lift irrigation. There appears to be limited potential to substantially lower agricultural emissions. Much of the livestock herd subsists on common pastures with little scope for altering diets in ways that can lower methane emissions. Likewise, with low per-acre emissions from paddies, opportunities for substantive reductions from rice emissions are also restricted.

## **Broad Principles of a Development Approach for Climate Change**

**Effective adaptation poses significant policy challenges.** Countries need to devise responses in the face of uncertainties on the timing, location, and severity of climate impacts. The scale of these impacts will be contingent upon global mitigation efforts undertaken in the next few decades. Delayed or limited emission stabilization will necessitate considerably greater investment in risk management and adaptation. These uncertainties need to be factored into the development of adaptation strategies and financing plans. The policies and institutions that enable South Asian countries to cope with these risks today will build

resilience in addressing future risks. Climate change is also predicted to bring new and unprecedented problems, such as those associated with sea-level rise and melting of some glaciers. This will call for building new policies to prepare for the potential adverse impacts. However, given the large uncertainties, a rational first response is to invest in greater knowledge to better understand the scale and magnitude of these threats and to build institutional capacity to adequately respond to the challenge of climate change. In many cases, institutions will be considerably challenged by the crisis of climate change, in particular where structures and responsibilities are fragmented and technical capacity is limited.

**To promote climate-resilient development and growth in South Asia, there is broad recognition that adaptation activities will need to be guided by five pillars:**

- ◆ **A “no-regrets” approach:** No-regrets approaches build resilience to climate risks and also generate co-benefits.<sup>8</sup> Faced with uncertainty about future climate outcomes, no-regrets policies provide a mechanism for hedging against future climate risks. Irrigation, health care, infrastructure, agriculture technology, disaster preparedness, habitat protection, and equitable and environmentally sensitive growth lend themselves to no-regrets interventions. These simultaneously deliver climate resilience and current development benefits.
- ◆ **A focus on the poor:** The most vulnerable are the poor in the developing countries. They have limited resources, and their assets and livelihoods are tied to climate-sensitive factors of production. Building the resilience of these groups to current climate risks would

<sup>8</sup> A no-regrets policy is one in which the benefits are not highly contingent upon a particular climate change outcome and would accrue across a broad range of climate scenarios (including the status quo).

generate immediate development dividends and reduce future climate vulnerability.

- ◆ **Investment in knowledge:** Climate science is imperfect, and it is not possible to predict with certainty the path of future climate risks and the likely damages. Under uncertainty, knowledge has high value, and this will require vigorous investment in generating information and building awareness in the relevant policy agencies.
- ◆ **Regional cooperation:** The most severe climate threats (such as glacier retreat and sea-level rise) transcend national boundaries. Likewise, in an increasingly globalized world, climate-sensitive diseases spread rapidly beyond their origins. Finding effective solutions will require cooperation between countries to jointly address shared problems.
- ◆ **Maintaining the integrity of environmental services:** Recognizing that climate change is a consequence of damaged and diminished eco-services, the remedial measures need to be aimed at protecting and restoring ecosystem integrity. Indeed, maintaining ecosystem integrity can provide a cost-effective way of building climate resilience and a buffer against climate impacts.<sup>9</sup>

**With a large proportion of South Asia’s population living below the poverty line, any low-carbon growth initiative must be consistent with the development objectives of improving living standards and incomes.** This is the principle that guides the Bank’s programs. Fortunately, opportunities do exist to harness win-win outcomes by focusing on measures that generate significant co-benefits, such as improvements in

<sup>9</sup> Through much of South Asia the diversion of forest land in protected areas to other uses is typically not sanctioned. Bhutan remains the exemplar in terms of the stewardship of its habitat and as consequence the high productivity of its natural capital. Notable too has been the recent reaffirmation by the Minister of Environment and Forests that protected areas in India are not to be converted to other uses.

energy and economic efficiency, reduction in local pollutants, and improvements in natural resource management. The South Asia region has initiated a strong dialogue and a work program that includes knowledge sharing and investments to realize these multiple benefits.

**Recognizing the need for approaches to be informed and led by country development priorities, there are three key pillars that guide the low-carbon development and growth agenda:**

- ◆ **Win-win policies:** Such policies not only provide global benefits in reducing greenhouse gases but also pay for themselves in local benefits, such as reduced fuel expenditure, improved air quality, and natural resource management.
- ◆ **Support for low-carbon growth activities:** South Asian countries would need to be compensated for the additional costs of mitigation actions that go beyond their development objectives. This approach underlies the United Nations Framework Convention on Climate Change (UNFCCC) principle of “common but differentiated responsibilities.” This convention recognizes that current climate risks are the consequence of past actions by developed countries and that low carbon investments must not detract from current development imperatives.
- ◆ **Accelerated technology deployment:** Promoting research and the wider adoption of emerging clean technologies would result in a number of benefits.. Developing new technologies is expensive and risky, but with continued research and early adoption they can become more economical and accessible. Developing countries, however, do not have the resources necessary to undertake unproven, risky technological research. Development, deployment, and diffusion

of new technology are critical to enabling developing countries to meet the challenges of climate change. Technology transfer by the developed countries is necessary to achieve the goal of balancing growth and adoption of clean energy sources. The Bank can play a supportive and catalytic role in this process.

**Most South Asian countries already spend a significant proportion of their development budgets on disaster relief and programs that address climate-related risks to welfare and development:** Investments in disaster prevention and management plays a minor role in comparison to disaster relief, however. Climate change is likely to increase the frequency of adverse climate events in ways that are outside the realm of current experience and could compromise the effectiveness of development efforts in climate-sensitive sectors of the economy.

## World Bank’s Role

**The main objective of the World Bank is to support the development priorities of countries in South Asia by addressing climate-change-related risks and harnessing development opportunities that promote low-carbon growth.** Agreements on global climate strategies to stabilize emissions lie in the jurisdiction of the parties to the UNFCCC, at which the World Bank is a neutral observer and does not participate. However, the Bank recognizes that climate change has become a significant development challenge that threatens growth prospects. Much of the Bank’s current portfolio of activities in South Asia is already structured to promote growth under climate constraints. The adaptation dimension is closely linked to the Bank’s core development mission and includes a well-targeted package of interventions aimed at reducing exposure to climate risks, promoting integrated coastal zone management, and building climate-resilient rural economies. There is also a growing engagement in



Michael Foley/World Bank

understanding and addressing the risks in the large coastal cities of South Asia, which generate much of the region's investment and growth but where climate vulnerabilities are high. The Bank's energy portfolio in the region has been moving toward promoting energy efficiency, renewable energy, and institutional reforms aimed at improving energy service and efficiency. The approach envisions that the Bank will continue to play a key role in facilitating South Asia's transition to a low-carbon-growth trajectory and promoting climate-resilient development.

**Building country ownership, capacity, and awareness is the key to tackling the climate-change problem.** The global funds available for addressing climate change are limited. So expanding the many climate-friendly interventions in the Bank's portfolio will not be sufficient to tackle the climate challenge in South Asia. The solution to leveraging limited resources effectively lies in promoting country ownership of climate-change issues. This calls for selectivity with a focus on outcomes that build institutional capacity and deepen knowledge so that climate-change risks are incorporated in country development policies, plans, and programs. It also requires high-impact investments that could have catalytic effects.

## Toward a Sustainable Development Trajectory in a World with Increasing Climate Change

**The Bank is one of many players in the global arena of climate change.** The Bank's comparative advantage is to help countries address the highly likely impacts of climate change across its many development challenges—local, national, and regional. To this effect, the Bank could use an array of instruments that will lead to a shift in the services that it provides to its clients as they strive for development and poverty reduction while building climate resilient and low-carbon trajectories. Depending on the various clients' demands and priorities, the Bank could offer the following:

- ◆ **Climate-specific investments:** The new climate funds such as the Climate Investment Funds, Global Environment Facility climate funds, and carbon-finance programs provide the additional resources that are required for climate-specific activities for both adaptation and low carbon growth.
- ◆ **Integration of climate considerations in the portfolio:** With client countries spending large sums of money on investments, there is a need to ensure that they get the most sustainable long-term outcomes possible. This includes the consideration of likely climate-change impacts, e.g. on infrastructure, on ecosystems, and on services such as water supply or health care. The Bank will include climate-change considerations in its investments in order to help clients build climate resilience and low-carbon trajectories in the investments that would be undertaken anyway, and whose quality would be compromised if climate considerations were neglected.
- ◆ **Technical assistance for knowledge, research, and capacity building:** With uncertainty of likely climate impacts, there is a clear need to fill critical knowledge gaps in

ways to raise awareness that could improve decision making. The Bank has already played an important role with contributions on adaptation to climate change in climate-stressed areas and a low-carbon-growth study for India. But much more remains to be done to better understand highly likely critical climate risks and their economic impacts across the region, as well as to identify low carbon growth opportunities. Climate change will also challenge existing institutional structures and calls for greater integration of likely risks in development policy, as well as cross-sectoral coordination among various government agencies. Technical assistance would need to play a key role for building institutional capacities and defining the architecture for improved climate governance. With its presence across all countries in South Asia, the Bank can play an especially useful role in catalyzing a regional dialog on the common climate risks and opportunities.

- ◆ **Financing and harmonization:** In an environment of resource scarcity there, is a need to utilize existing resources effectively, which calls for, among other things, harmonization with other development partners. The Bank can play a key role in helping countries leverage existing global resources more effectively and coordinate

with development partners. The Bank is also a significant player in developing alternative financial modalities and instruments. Climate-specific multidonor trust funds, innovative instruments for risk financing (such as catastrophe (CAT) bonds and climate contingent insurance), and “green” bonds are among the many initiatives under various stages of development and application.

**This approach is based on the premise that flexibility is needed to update and adjust responses as knowledge regarding likely climate-change effects improves and as the economies of South Asia grow.** It is expected that instruments will evolve and be adjusted, in ways that allow the Bank to help countries cope with an evolving situation. The ultimate aim is to support the development objectives of South Asian countries in a world with increasing climate change.

Table E.1 provides a summary of the main climate risks that have been identified in the region, based on documents of the Intergovernmental Panel on Climate Change (IPCC), National Communications, National Adaptation Action Plans (where available), and other related peer-reviewed sources.<sup>10</sup> Table E.2 outlines the priority responses across the South Asia region. The risks and responses imply the need for a more climate-sensitive approach to development.

<sup>10</sup> The summary is based on a subjective and qualitative assessment of the literature.

**Table E.1 Summary of Climate Risks by Country**

	Afghanistan	Bangladesh	Bhutan	India	Maldives	Nepal	Pakistan	Sri Lanka
Sea-level rise	–	√	–	√	√	–	√	√
Glacier retreat	√	√	√	√	–	√	√	–
Temperature increase	√	√	√	√	√	√	√	√
Floods more frequent	?	√	√	√	√	√	√	?
Drought more frequent	√	√ (some areas)	?	√	–	?	√	?

Likely: √ Not Present: – Unknown: ?

**Table E.2 Summary of Regional and Sector Impacts in the Context of Climate Change and Priority Responses**

Sectors	Risks	Priority Response
<b>Regional and Cross-sectoral</b>	<ul style="list-style-type: none"> <li>Information gaps</li> <li>Limited coordination between sectors and countries</li> <li>Funding gaps for both adaptation and low-carbon growth</li> </ul>	<ul style="list-style-type: none"> <li>Knowledge products</li> <li>Institutional coordination and strengthening</li> <li>Resource mobilization</li> </ul>
<b>Water</b>	<ul style="list-style-type: none"> <li>Melting of some glaciers in the Himalayas, including lake outburst</li> <li>Floods</li> <li>Droughts</li> <li>Saline intrusion in coastal aquifers (due to sea level rise)</li> </ul>	<ul style="list-style-type: none"> <li>Regional cooperation on international rivers and river basins</li> <li>Improved water resources management</li> <li>Climate-sensitive infrastructure packages to build climate resilience</li> <li>Knowledge investments, e.g. to assess risks in Himalayas and the region's large river basins</li> <li>Increased research on new water-efficient technologies and (drought-resistant) crop varieties.</li> </ul>
<b>Agriculture</b>	<ul style="list-style-type: none"> <li>Declining yields of major crops</li> <li>Agriculture unviable in marginal areas e.g. arid, semi-arid, and coastal (saline intrusion-affected zones due to sea level rise)</li> <li>Crop destruction by extreme events</li> </ul>	<ul style="list-style-type: none"> <li>Promotion of climate-resilient cropping patterns and techniques</li> <li>Agricultural research and extension for promoting climate resilient crop varieties</li> <li>Improvements in risk management (e.g., climate insurance, contingent credit schemes)</li> <li>Irrigation development and increased investment in in water harvesting</li> </ul>

Sectors	Risks	Priority Response
		<p>infrastructure at required scales that take account of climate risks</p> <ul style="list-style-type: none"> <li>• Development of incentives and innovative approaches for rural development to diversify income and buttress against climatic risks</li> </ul>
<b>Natural Disasters</b>	<ul style="list-style-type: none"> <li>• Higher probability of extreme climate events (cyclones, storms, floods, heat waves)</li> <li>• Higher probability of slow onset disasters (prolonged droughts, sea-level rise)</li> </ul>	<ul style="list-style-type: none"> <li>• Emergency preparedness and information (early warning systems)</li> <li>• Risk mitigation: structural and nonstructural measures</li> <li>• Catastrophe risk financing or transfers (where needed)</li> </ul>
<b>Health</b>	<ul style="list-style-type: none"> <li>• Increased incidence of water-related diseases (malaria)</li> <li>• Heatstroke</li> <li>• Direct health risks; e.g. injury and death caused by extreme events</li> </ul>	<ul style="list-style-type: none"> <li>• Awareness of the health implications of climate change</li> <li>• Monitoring and surveillance of disease and improved health sector response and training for new disease risk profiles</li> <li>• Improved water supply and sanitation</li> </ul>
<b>Social</b>	<ul style="list-style-type: none"> <li>• Increased poverty, vulnerability, and nutrition insecurity</li> <li>• Social conflict</li> <li>• Aggravation of social exclusion and inequity</li> <li>• Indebtedness in climate-vulnerable areas</li> <li>• Migration</li> <li>• Increased urban slum population</li> </ul>	<ul style="list-style-type: none"> <li>• Awareness raising, social mobilization and capacity building</li> <li>• Education and skill training for women, indigenous populations IPs and other vulnerable groups for reducing agricultural dependence</li> <li>• Promotion of self-help groups (SHGs); and enhancing of access to microfinance and banking services</li> <li>• Strengthening social capital of vulnerable groups, their access and decision making</li> <li>• Promotion of community-based asset building and sharing of natural resources</li> </ul>
<b>Ecosystems and Biodiversity</b>	<ul style="list-style-type: none"> <li>• Quantitative and qualitative damage upon freshwater, coastal, marine and terrestrial ecosystems with consequences for livelihoods</li> <li>• Loss of habitats, dependent species, and important ecological goods and services</li> <li>• Biodiversity loss in the Himalayas, glacier-fed ecosystems, forests, and coral reefs</li> <li>• Shifts in vegetation regimes in forests, grasslands, and semi-arid deserts resulting in altered community structures and climate feedbacks</li> </ul>	<ul style="list-style-type: none"> <li>• Expansion of protected area networks and promotion of ecosystem-based approach in biodiversity conservation</li> <li>• Mainstreaming of biodiversity and ecosystem management in development projects, climate mitigation, adaptation and risk management</li> <li>• Designing and building biodiversity-friendly and climate-resilient infrastructure</li> <li>• Generation of knowledge and capacity</li> </ul>

Sectors	Risks	Priority Response
<b>Energy</b>	<ul style="list-style-type: none"> <li>• Political economy (nonclimate) barriers to developing regional energy trade</li> <li>• Poor quality local coal</li> <li>• Aging and inefficient thermal power generation, high transmission, and distribution losses</li> <li>• Inefficient energy use</li> <li>• Poor energy pricing frameworks including underpriced electricity for lift irrigation, which can consume up to 20 percent of supplies in some countries</li> </ul>	<ul style="list-style-type: none"> <li>• Regional energy trade from power surplus countries (Bhutan, Nepal for hydro and Sri Lanka for wind) to energy-deficient economies (India and Pakistan)</li> <li>• Cleaner coal through rehabilitation and replacement of inefficient generation units</li> <li>• Harnessing of hydropower potential</li> <li>• Energy efficiency and reduction of system losses</li> <li>• Investment in (nonpolluting) renewable energy</li> </ul>
<b>Transport</b>	<ul style="list-style-type: none"> <li>• Increase in number of private vehicles and usage per vehicle</li> <li>• Increase in age and efficiency of vehicle fleet</li> <li>• Ongoing deterioration of public transport in cities</li> <li>• Expansion of low-density urban land development which is not friendly to public transport and nonmotorized transport</li> <li>• Rail freight competitiveness and efficiency</li> </ul>	<ul style="list-style-type: none"> <li>• Sustainable and energy-efficient public transport and aggressive transport demand management, particularly in megacities</li> <li>• Reorient urban growth patterns and practices to create networks of walkable neighborhoods, particularly in high-growth, medium-sized cities</li> <li>• Promoting the modal shift to rail transport</li> <li>• Fuel efficiency standards for road vehicles</li> </ul>
<b>Urban</b>	<ul style="list-style-type: none"> <li>• Climate-related damage upon urban settlements, lives, assets and basic water and sanitation services</li> <li>• Increase in urban vector- and water-borne diseases (associated with urban poverty mainly in slums)</li> <li>• Growth of greenhouse gas emissions of future urbanization</li> </ul>	<ul style="list-style-type: none"> <li>• Integration of climate adaptation and disaster risk management within the urban climate change strategy</li> <li>• Harnessing mitigation potential in industries such as solid waste, wastewater treatment, energy-efficient buildings and infrastructure</li> <li>• Improving energy-efficient buildings</li> </ul>