



CHAPTER 14

The Urban Sector

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Cities have a twofold relationship with climate change. On the one hand, they are the magnets of consumption and production and their footprint accounts for the bulk of greenhouse gas emissions. On the other hand, with their high concentrations of economic activity and population, cities are also vulnerable to the impacts of climate change. Urbanization is increasing; cities around the world are projected to be home to 60 percent of the world's population by 2030, compared to 50 percent today (UNFPA 2007). This process of urbanization will inevitably be accompanied by higher incomes, innovation, and specialization and greater use of energy-intensive goods, such as cars and household appliances. The growing impact of cities will require particular consideration when planning measures to mitigate and adapt to the effects of climate change.

Greenhouse gas emissions in cities are generated primarily through transportation, energy use, and public services. Buildings use energy for lighting, heating, and cooling. Air conditioning in households is a major cause of emissions as rising temperatures result in increased energy use. This is exacerbated in cities, where temperatures are already higher than in the surrounding rural areas

due to the urban heat island effect. Public services, such as power supply, wastewater disposal, sanitation, drainage and landfills, are also major contributors to GHG emissions.

The concentration of people and assets in cities increases their vulnerability to climate change.

Cities are vulnerable to a range of climate-related impacts, such as flooding, storm surges, landslides, drought, saltwater intrusion, and cyclones, and also to earthquakes and other hazards, the effects of which are exacerbated by poor-quality and ill-maintained infrastructure, low-quality building stock, and the low resilience of much of the population. Coastal cities are especially endangered by rising sea levels and more intense weather phenomena, including storm surges. Other impacts include decreased water availability and adverse impact on human health due to the incidence of vector- and waterborne diseases. The poor, with their limited access to safe areas and scant livelihood opportunities, are especially vulnerable and bear the greatest burden of such impacts.

The cities are where a significant part of the battle against climate change will be won or lost.

Cities can adopt various widely adopted mitigation strategies, such as improving energy efficiency,

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building codes, public transport, and capturing GHGs from wastewater treatment and solid waste disposal facilities. Furthermore, adaptation measures need to be more localized and geared to particular circumstances.

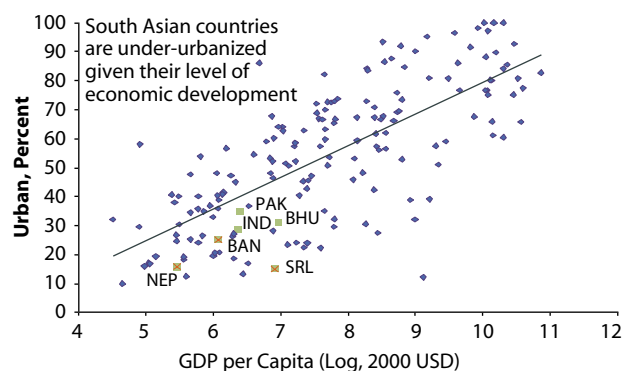
Urban Sector in South Asia

Vulnerability to Climate Change

Cities in South Asia are particularly vulnerable to climate-change impacts. This is due to a combination of nonclimatic and climatic risks. Factors such as high levels of poverty, underperformance in service delivery, infrastructure gaps, and lack of capacity increase the vulnerability of South Asian cities. Climatic risks include sea-level rise and changes in precipitation and temperature, which will affect water supply and energy availability and use, and increases in extreme events such as cyclones, floods, and droughts, impact of wind (dust, suspended particles), and so forth.

The threats are likely to grow as cities expand in a largely unplanned manner. Historically, the South Asia region has been the least urbanized region in the world (Figure 14.1). However, this trend is set to change. The annual urban growth rate is 2.53 percent, faster than that of Asia as whole (2.4 percent) and of the world (1.98 percent) (United Nations Population Division 2007). Close to 400 million people live in South Asian cities, more than the total populations of the Latin America and the Caribbean and Africa regions. The region has three of the 10 most populous countries in the world—Bangladesh, India, and Pakistan—and five of the world’s megacities: Karachi, Mumbai, Delhi, Dhaka, and Kolkata. It has more than 60 urban agglomerations having populations of more than 500,000. Among South Asian countries, Pakistan has the highest urbanization rate in the region, followed by India, Bangladesh, Sri Lanka, Nepal, and Bhutan. Table 14.1 shows changes in the percentage of

Figure 14.1 Urbanization and Economic Development: South Asian Countries in World Context



Source: World Bank Calculations 2009⁹⁸

the total population living in urban areas in South Asian countries between 1990 and 2006.

Much of this growth is fueled by rural–urban migration, and climatic stresses could induce sudden spikes in migration. Economic growth has resulted in a decrease in the proportion of households in the farm sector relative to the nonfarm sector, representing a shift in population and economic activity from rural areas to urbanized areas. For example, between 1984 and 1996, the percentage of households in the farm sector in Bangladesh decreased from 73 to 66 percent, while in the nonfarm sector it increased from 27 to 34 percent. During this period, the proportion of nonfarm households grew at a rate of about 4 percent per annum, almost triple the rate for farm households (Deshingkar and Farrington 2006). The United Nations Population Division projects that world population will grow by almost 500 million at an annual urban growth rate of 2.6 percent for the next 20 years (2007). Climatic changes in South Asia are likely to result in sudden spikes of rural–urban migration and may even cause urban unrest (Cruz et al. 2007).

⁹⁸ Data and calculations by the Urban Unit of the South Asia Region.

Table 14.1 Percentage of Total Population in Urban Areas

	1990	1995	2000	2005	2006
Afghanistan	18.3	19.7	21.3	22.9	23.3
Bangladesh	19.8	21.5	23.2	25.1	25.5
Bhutan	7.2	8.3	9.6	11.1	11.4
India	25.5	26.6	27.7	28.7	29.0
Maldives	25.8	25.6	27.5	29.6	30.1
Nepal	8.9	10.9	13.4	15.8	16.2
Pakistan	30.6	31.8	33.1	34.9	35.2
Sri Lanka	17.2	16.4	15.7	15.1	15.1

Source: UNESCAP 2007

Local governments in South Asia are struggling to cope with the rising demands and problems associated with urbanization and rapid economic growth. The region's cities lack adequate infrastructure to meet the demands of the current population and the growing influx of migrants from rural areas. The burgeoning population rapidly outpaces the provision of basic municipal services such as water, sanitation, electricity, and solid waste management. Improving living standards lead to higher demand for cars, bigger apartments, and more energy-intensive electrical goods such as televisions, refrigerators, and air conditioners. Environmental quality is rapidly deteriorating in the cities with air pollution, poor solid waste management, and polluted water resources. Some of these problems, for example air pollution and improper management of landfills, directly contribute to climate change. Other problems, such as pollution of water resources, could be minimized by adopting various climate-change adaptation strategies. Co-benefits of this nature should be further explored and adopted in combating urban-related climate-change issues.

Climate change will exacerbate the problems arising from urban poverty. Particular attention needs to be paid to climate-change impacts on the urban poor. It is well recognized that climate change will affect the poorest populations, who are usually located in high-risk urban environments

and are least able to cope with changes in climate. Urban poverty in South Asian cities is significant; poor residents make up more than 50 percent of the megacities' populations. This high level of urban poverty is a major issue that needs to be addressed in urban-related climate-change agendas.

Risks Associated with Climate Change

South Asian cities will face a number of risks emanating from climate change. Three principal sources of risk—sea-level rise, changes in precipitation and temperature, and extreme events—are explored further in the ensuing paragraphs.



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Sea-level rise: Rising sea levels are predicted to negatively affect coastal infrastructure and coastal cities such as Mumbai, Kolkata, Karachi, and Chittagong. Table 14.2 shows the total urban population in South Asia and the urban population residing in the low-elevation coastal zone, less than 10 meters above sea level, in 2000. Among the South Asian countries, Bangladesh and Maldives would be the most impacted by sea-level rise in terms of percentage of land area affected by any projection of sea-level rise. More than 80 percent of the landmass of Maldives will be inundated by a one meter sea-level rise, while about a million people will be directly affected in Bangladesh by 2050. In addition, coastal areas are susceptible to increasing salinity of ground and surface water due to sea-level rise.

Changes in precipitation and temperature: Climate change is predicted to increase the variability of precipitation and raise temperatures across South Asia. This will have a range of outcomes with potential negative impacts on urban areas, including heat waves and the accompanying threat to water supplies; flooding, compounded by inadequate wastewater treatment systems and stormwater drainage facilities; and health-related issues, such as outbreaks of cholera and contamination of drinking water. Climate change

will also likely bring higher frequency and intensity storms and cyclones. Particularly vulnerable are the urban poor who live in temporary shelters in typically vulnerable locations.

Climate Change and the City Governance Challenge

Facing the Institutional Challenge

Current urban management responses will be insufficient to address climate-change threats. Despite recent improvements in urban physical infrastructure, there remains a huge gap in attaining a full coverage of services. Investments have focused more on building infrastructure than on service provision. Ineffective planning has resulted in inadequate, and in some cases a total lack of, provision of services, including wastewater treatment, stormwater drainage, and collection and disposal of solid waste. Pervasive weak city and utility finances hamper further development and limit the ability of cities to solve their own problems. Investment therefore becomes heavily dependent on programs sponsored by higher levels of government.

The institutional dimension is critical when dealing with the climate-change agenda. Local

Table 14.2 Total Urban Population and Urban Population in the Low-elevation Coastal Zone in 2000

	Total Urban Population (millions)	Urban Population in Low-elevation Coastal Zone (millions)	Urban Population in Low-elevation Coastal Zone (%)
Afghanistan	4,320	0	0
Bangladesh	30,692	15,429	50
Bhutan	148	0	0
India	301,206	31,515	10
Maldives	6	6	100
Nepal	2,719	0	0
Pakistan	48,111	2,227	5
Sri Lanka	4,223	962	23

Source: SEDAC 2008

governments are often unable to work with poor communities—those most at risk. Moreover, most South Asian cities are characterized by inefficient urban planning, which has led to discriminatory land-use regulations and a limited supply of land for commercial, industrial, and residential development. Land in these cities tends to have a high price relative to household and business incomes as demand exceeds the finite supply. Many urban governments have weak capacity and are strongly influenced by central and state or provincial governments. Lack of fiscal decentralization limits the financial autonomy of cities, and their utilities are often operated by inefficient state companies, without adequate performance incentives or clear delegation of responsibilities at the city level.



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There is a large overlap between the climate needs and the development needs of cities.

In many cases, adaptation to climate change involves improvements in basic infrastructure, with positive outcomes for inhabitants who live in poor-quality housing; lack access to water, sanitation, and drainage facilities; and who are most likely to be affected by flooding, drought, sea-level rise, and other predicted consequences of climate change. The adaptation actions that are needed will vary by threat and location. Box 14.1 summarizes the more common elements of these.

There is also a considerable overlap between adaptation and mitigation measures in the

urban context. For example, improving the energy efficiency of buildings through improved insulation, reflective glass, and efficient air conditioning will mitigate climate change by reducing GHG emissions while also rendering the urban infrastructure more adaptable to warmer climatic conditions. Mitigation and adaptation potential in solid waste management can also be explored to avert further increase in emissions and the spread of waterborne diseases related to climate change. Likewise, improving efficiency in water supply and sanitation facilities would help to both curb GHG emissions and preserve water availability and quality.

Box 14.1 Potential Strategies for Adaptation to Climate Change

Strategies to improve adaptation of cities to climate change include:

- ◆ **Drainage system:** Flooding can be mitigated by installing stormwater systems; providing proper drainage from household water, rain, and waste disposal sites; and improving solid waste and water supply.
 - ◆ **Disaster risk management:** Contingency plans should be prepared to deal with natural disasters such as flooding. The building of larger water reservoirs and other facilities for sufficient storage of water in the case of drought is needed, in addition to dikes against surges of flooding and seawater.
 - ◆ **Strengthening the knowledge base:** Increased knowledge of the consequences of climate change and the development of related adaptation responses in South Asian countries will render governments better able to cope with and respond to climate risks.
 - ◆ **Improving energy efficiency of buildings and construction:** This measure will help reduce the heating and cooling demands of offices, dwellings, and other buildings.
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Urban water supply and sanitation services, already inadequate relative to urban demand, are likely to be further jeopardized by climate change. In the region, a relatively low 84 percent of the population has access to water supply. Reduction of water wastage and leakages in urban water infrastructure, and demand management, will be some of the key strategies required to address potential threat to urban water services. In the region, approximately 35 percent of the population has access to sanitation. Wastewater treatment is generally absent, with most treatment plants not functioning. Overall, despite significant recent investments in water supply and sanitation in South Asian countries, particularly India, it is expected that the region will not attain Millennium Development Goals on these basic services. The effects of climate change will only render that shortfall more likely.

Urban infrastructure and maintenance is poor throughout the region and is essential to addressing climate threats. Inefficient water-supply systems (physical losses of more than 50 percent of the water produced are common) exacerbate the water-availability risk posed by increased droughts, and aged and inefficient pumping systems increase the demand for electricity. Flooding and the lack of wastewater treatment systems, coupled with inadequate stormwater drainage facilities, may in emergency situations result in major public health threats such as outbreaks of cholera and contamination of drinking water. Improved operational planning and maintenance of basic infrastructure are needed to ensure that services function when required.

Elements of an Urban Climate-change Approach for South Asia

An urban climate-change priority needs to be fully linked with and integrated into a larger development framework for cities and made fully coherent with the disaster-management program, with which it shares many overlapping elements. The Bank is well positioned to contribute in aspects such as policy dialogue, knowledge sharing, and capacity building. It can also contribute by initiating demonstration climate-resilient projects that can be replicated more widely. There are a number of opportunities to have ongoing and future urban projects make significant contributions to the mitigation and adaptation agendas (Box 14.2).

Concentrate on the Bank's comparative advantage. The Bank's current portfolio and near-future pipeline represent a small percentage of investment in urban infrastructure. The Bank is better positioned to contribute in aspects such as policy dialogue, knowledge sharing, and capacity building. In particular the Bank can assist cities in developing their own climate-change agendas. Also, as noted in a World Bank study on climate-change mitigation in cities (World Bank 2008b), there are a number of opportunities to make ongoing and future urban projects make significant contributions to the mitigation and adaptation agendas (Box 14.2).

Synergies between urban and climate-change priorities: The agendas for urban climate change

Box 14.2 Potential Mitigation Projects

Some mitigation projects that are in the implementation or prospective phases include the following:

- ◆ Increase of water-supply energy efficiency in Karnataka
 - ◆ Composting of organic waste in Gujarat
 - ◆ Urban street-lighting energy efficiency in several states in India and Pakistan
 - ◆ Landfill gas recovery (CH₄) and controlled wastewater treatment in the planning stages in Bangladesh, India, and Pakistan
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and city management largely coincide with and reinforce each other. For example, reducing leakage in water-supply pipes reduces wastage, which is an adaptation strategy, but also increases revenue, which is an effective city policy. In many cases, climate change does not create new infrastructure and service delivery challenges, but exacerbates current ones. Both agendas serve to reduce vulnerability by designing and building resilience to climate-related scenarios. Similarly, city development and climate-change mitigation agendas have many points in common, such as lowering pollution, increasing the efficiency of buildings, and building energy-efficient infrastructure. Given that climate-change mitigation and adaptation may not be top priorities for South Asian cities, as these cities face other pressing and more immediate challenges, the synergies between the two agendas should be highlighted.

Synergies between urban strategies and disaster risk management and reduction: Local climate-change impacts will progressively be felt through an increase in severity and frequency of disasters, such as cyclones, storms, and floods, as well as by changes in mean conditions that could alter the vulnerability of populations to hazards. Disaster risk management encompasses actions taken to reduce impacts of disasters before, during, and after they occur. Hence, one of the main entry points for engaging cities on climate change is through disaster risk management, specifically through policies and incentives that are in the pecuniary interest of cities. For example, with better land zoning and building codes as means of reducing climate change and disaster-related risks, city officials can increase value capture through increased property taxes. India is one of the few countries that have a central and various state agencies to address disaster risk management (Revi 2007).

Maximizing mitigation potential: Services such as solid-waste disposal and wastewater treatment are large generators of GHG emissions, particularly

in cities with inefficient management and improper techniques. Where possible, South Asian cities could adopt mitigation strategies and access the carbon-finance market. The World Bank can play a role in knowledge and capacity building in this respect.

Institutional development: Institutional development would include assisting cities to prepare for the likely impacts of climate change. Infrastructure projects, particularly in energy, transport, and telecommunications, generally have long life spans, and it is easier to plan them in such a way as to minimize damage and destruction from extreme events.

Capacity building: The capacity of South Asian cities to put in place and implement programs related to climate change is not a priority. Lack of effective decentralization makes management of climate change a particularly large challenge. Going forward, it is important to keep in mind the following:

- ◆ States in India and provinces in Pakistan are crucial interlocutors in any climate-change effort, even in large cities.
- ◆ Larger efforts would be needed to empower cities to better face the challenges of climate-change mitigation and adaptation.
- ◆ The response to climate change represents an opportunity for cities in South Asia to hasten the pace of the decentralization agenda, thereby reaping a number of co-benefits.

Continue to promote decentralization: While most urban programs in South Asia will be funded by state or provincial and central governments, such programs should be designed in a way that places the recipient cities in the driver's seat, taking key decisions during the planning and implementation phase. Higher levels of government should have a supportive role.

The Bank's urban priorities could include the following:

- ◆ Ensure that infrastructure design includes likely impacts of climate change at an early stage and is conceived and designed taking into account predicted impacts on hydrology. Look for opportunities to include climate-change-related analytical and advisory activities.
- ◆ Share knowledge of policies and practices that have worked in the past in similar situations and across countries, and become a repository of knowledge.
- ◆ Participate in carbon finance, cap-and-trade mechanisms, and global reporting initiatives.



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