Climate Changes Risks to Infrastructure

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Climate-related drivers of impacts

Key risk

Adaptation issues & prospects

Climatic drivers

Timeframe

Risk & potential for adaptation

Increase in global mean temperature of 2°C and 4°C above pre-industrial levels. This level of warming is estimated to have significant impacts on various aspects of society and the environment.

Increased frequency and intensity of extreme weather events, such as heatwaves, droughts, and heavy rainfall, leading to increased risk of flooding and loss of life.

Sea level rise due to melting of polar ice caps and thermal expansion of the ocean, threatening coastal communities and infrastructure.

Increase in ocean acidification, which can negatively impact marine ecosystems and the fishing industry.

Flooding

Climatic trends

Risks to adaptation

Current and future climate change impacts require adaptation measures to be put in place to reduce their negative effects. These measures can be categorized into adaptation actions and mitigation actions. Adaptation actions focus on reducing the impacts of climate change, while mitigation actions aim to reduce greenhouse gas emissions to slow down or reverse climate change.

Adaptation actions can be categorized into two main types: preparedness and resilience. Preparedness actions aim to reduce the vulnerability of individuals and communities to climate change impacts, while resilience actions aim to increase the ability of individuals and communities to adapt to climate change impacts. Both types of actions can be implemented at various scales, from individual household level to national level.

Table 8-3 (continued)

Urban areas: Current and indicative future climate risks. Key risks are identified based on an assessment of the literature and expert judgments by Chapter 8 authors, with the realization of evidence and agreement supported by, and an active role in, supporting chapter sections. Each key risk is characterized as very low to very high, for the near-term (up to 2024) and long-term (up to 2050) time horizons.

Climate change will have profound impacts on urban infrastructure and services, the built environment, and ecosystem services, and affect urban socio-economic and demographic populations. This could exacerbate existing social, economic, and environmental drivers of risk, especially for vulnerable groups who lack essential services. An appropriate urban governance framework and coordinated urban adaptation focus on the built environment, improved infrastructure, and services and risk reduction have significant potential for reducing key climate risks in the medium term and even more so in the long-term.

Coastal zones are highly vulnerable to climate change due to increased exposure to coastal flooding, erosion, and storm surges. High-rise buildings and infrastructure are also more prone to damage, as well as the risk of increased coastal erosion.

Ecosystem services will be impacted by altered ecosystem functions such as temperature and precipitation patterns, leading to changes in ecosystem productivity and services, which will have implications for human health and well-being.

Adaptation response requires changes to network infrastructure as well as demand side management, to ensure sufficient water supplies, increased capacities to manage reduced freshwater availability, flood risk reduction, and water quality.

Managing waste water flows improves supply and ecosystem services. Reducing vulnerability of infrastructure may be easier in new areas, newly funded local bodies, or as part of scheduled interventions.

Green infrastructure not utilized sufficiently in most cities. Climate change impacts can bring about the dual benefits of green infrastructure for climate change mitigation and improved water management.

Energy systems (medium confidence)

Most urban centers are energy intensive, with energy-related climate policies focused on mitigation measures. A few cities have adaptation initiatives, especially for critical energy systems. There is a high potential for non-adapted, centralized energy systems to become more fragile and cascade impacts to national or transboundary consequences from localized extreme events.

Increasing energy demand due to urbanization and economic development, exacerbating greenhouse gas emissions and climate change impacts.

Poverty and access to basic services (high confidence)

Reduction in basic service delivery could reduce exposure, especially for the poor and vulnerable, and improve quality of informal settlements, improved housing conditions.

Water supply systems (high confidence)

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Table 8-3 (continued)

Climatic drivers

Timeframe

Risk & potential for adaptation

Urban food security is dependent on local, regional, and global food supply. Climatic drivers can exacerbate food insecurity, especially in the urban poor. Enhanced urban food security can support adaptation measures. Urban agriculture, local markets, and green roofs hold great prospects as adaptation measures, but are under-utilized in rapidly growing cities.

A difficult sector to adapt due to large existing stock, especially in developed countries, leading to potentially large economic and social impacts. National and regional planning and urbanization strategies must take into account climate change impacts. Emergency response includes a key element in reducing the potential of communicating systems for early warning and adaptation.

From quality, appropriately located housing is often most vulnerable to extreme events. Adaptation options include the potential to adapt housing and promote relocation, adaptation, and development of low-income households, rapid growth cities, and those rebuilding after a disaster, especially for those in coastal areas. Well-adapted, resilient strategies can significantly increase the resilience of urban areas. Well-adapted, resilient strategies can significantly increase the resilience of urban areas.

Increased energy demand due to urbanization and economic development, exacerbating greenhouse gas emissions and climate change impacts.

Low confidence

Table 8-3 (continued)

Climatic drivers

Timeframe

Risk & potential for adaptation

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