

Climate Change Risk Management Options for the Urban Infrastructure Sector

Introduction

The Latin America and Caribbean (LAC) region has a long history of coping with natural hazards such as hurricanes, floods, and coastal storm surges. However, climate change is expected to exacerbate the threat of natural hazards and pose new ones. As a result of climate change, average temperatures and sea levels are known to be rising, precipitation patterns might change, and hurricanes could intensify. Many of these changes are already occurring, and are projected to become more severe in the future.

The Inter-American Development Bank (IDB) supports a wide-range of projects in the LAC region. Climate change-related risks could adversely affect the financial, economic, environmental, and social performance of current and future IDB investments in the region. This factsheet identifies climate change risks and risk management options that can be incorporated into IDB-investments for the urban infrastructure sector.

These climate change risk management measures range widely in scope, scale and time frame. It is anticipated that the user will consider the applicability of these measures and refine based on



the project or region of interest. In general, it is recommended that all projects should include disaster preparedness measures, such as measures to issue timely and effective early warnings, evacuation and safety plans, and business continuity plans. A review of the insurance scheme is also recommended as a means to minimize post disaster losses. For new projects, selecting risk management measures during the feasibility and design phase can help avoid costly retrofits and maximize resilience to climate change impacts throughout the project life.

Climate Change Risk Management Options for the Urban Infrastructure Sector

Climate Change Risk Management Options	How the Option Addresses Hazard	Relative Cost	Implementation Feasibility
Hazard and Impact to Sector Sea Level Rise Damage to private and public buildings			
Move facilities further inland	Prevents flooding	\$\$\$	Difficult to implement; could require social and political will, could result in adverse impacts
Install barriers to route floodwaters away from facilities	Reduces flooding	\$\$\$	Moderately easy to implement; could result in adverse impacts
Elevate key facilities using new land or by raising level using wood/metal piling or using floating docks	Prevents flooding	\$\$-\$\$\$	Moderately easy to difficult to implement, depending on site conditions
Update zoning and local codes to minimize development and or promote retreat from very high risk areas	Promotes growth and development in areas that are not highly vulnerable	\$\$-\$\$\$	Moderately difficult to difficult; requires social and political will and new legal authority for community level changes
Hazard and Impact to Sector Storm Surge Damage to buildings			
Construct new building entrances at higher elevation	Provides safer entrance	\$\$-\$\$\$	Moderately easy to implement
Add hardscape to protect lower story of building	Protects building	\$\$	Moderately easy to difficult to implement, requires capacity (maintenance)
Install back-up pump dewatering system for lower floors	Removes water before extensive damage done	\$\$	Easy to implement
Install tide gates to prevent combination of high tide and runoff	Reduces potential flooding	\$\$\$	Moderately easy to difficult to implement; requires technical expertise and could result in adverse impacts
Hazard and Impact to Sector Hurricane Winds Damage to buildings by wind			
Install stronger roof	Prevents roof collapse due to wind	\$\$	Easy to implement
Cover exposed components of infrastructure; other short term protective measures	Protects damage to buildings, and supports return to full use after event	\$	Easy to implement
Hazard and Impact to Sector Flooding Damage to buildings; water and sewage treatment facilities			
Install barriers to route floodwaters away from facilities	Reduces flooding	\$\$-\$\$\$	Moderately easy to implement; could result in adverse impacts
Elevate key facilities using new land or by raising level using wood/metal piling or using floating docks	Reduces flooding	\$\$-\$\$\$	Moderately easy to difficult to implement, depending on site conditions
Install green roof instead of routing water to street	Uses some water to reduce volume routed to street	\$\$-\$\$\$	Moderately easy to difficult to implement; requires technical expertise and capacity

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Use bioretention ponds to capture and infiltrate runoff	Allows more water to infiltrate and reduces runoff	\$--\$	Moderately easy to implement
Install sump pumps in basements	Removes water before damage to building occurs	\$	Easy to implement
Move critical operations to higher floors (e.g. electrical, heat and cooling systems, communication)	Avoids loss of key equipment and enhances resilience after event	\$--\$	Easy to implement during design/construction; moderately difficult after construction
Hazard and Impact to Sector Destructive Fast Onset Events Destruction of means of livelihood of the population/inhabitants; population could be stranded			
Have emergency shelters (designated zones or designated buildings) for the affected population	Reduces the impact on the population and enables quick disaster relief	\$--\$	Easy to implement
Have emergency response team available (equipment and trained staff) to do first repairs infrastructure	Decreases power outages and blocked roads	\$	Moderately easy to implement; requires capacity
Have back-up food and water supplies for blocked or damaged areas	Decreases severity of emergency	\$	Easy to implement
Have evacuation plan	Allows work force and community to be moved safely which accommodates elderly and disabled, and vulnerable populations	\$	Easy to implement
Hazard and Impact to Sector Drought Damage to landscaping; limited access to water			
Increase irrigation system efficiency to maintain landscaping	Reduces quantity of water used	\$--\$	Moderately easy to implement
Change plant mix to more drought tolerant plants	Reduces need for water	\$--\$	Depends on site setting
Implement water conservation program	Reduces water uses	\$	Moderately easy to difficult to implement; requires social and political will
Have back-up water supplies	Provides emergency water supply	\$--\$	Easy to difficult to implement; depends on source of water
Hazard and Impact to Sector Extreme Temperatures Increased demand for heating and cooling			
Plant trees for shade and to decrease heat island effect	Helps to decrease temperature	\$	Easy to implement
Install back-up generators to power heat/air conditioning systems	Allows heating and cooling systems to function after power failures	\$	Easy to implement
Set-up cooling centers for sensitive populations	Provides alternative respite place for people to shelter	\$	Easy to implement

Table Guide

The relative costs and implementation feasibility are indicated for each option based on the professional judgment of the authors, and only to be taken as an **approximate starting point** for additional analysis. The costs have been broadly categorized into four levels (identified as \$ to \$\$\$\$) with the following general meaning:

\$ = Relatively straightforward to implement, either simple changes on the ground or adoption of new regulations/guidelines etc.

\$\$ = Relatively small scale projects on the ground that can be implemented with modest design and planning requirements.

\$\$\$ = Intermediate scale efforts, more spatially extensive, and or requiring more engineering design, scientific development, and or planning/institutional changes than in the above two categories.

\$\$\$\$ = Major new infrastructure development with significant new design, planning and permitting requirements.

The relative degree of difficulty is indicated for each option using the following four broad categories (difficult, moderately difficult, moderately easy, and easy) with the following general meaning:

Easy = Relatively straightforward to implement, provides long-term benefits, has no adverse secondary impacts.

Moderately easy = Minimal demands on capacity (staffing, funding, and maintenance capabilities), option is not expected to result in significant social or environmental impacts.

Moderately difficult = Intermediate scale efforts required to implement; option could require further assessment of environmental and social impacts, additional regulatory requirements, or capacity and technical expertise.

Difficult = Major effort would be needed to implement; option could result in adverse environment/social impacts, or could require significant expenditures, capacity, technical expertise, political will, or legal authority.

Other fact sheets in this series include climate change risk management options for the:

- ▶ Agriculture Sector
- ▶ Energy Sector
- ▶ Tourism Sector
- ▶ Water and Sanitation Sector
- ▶ Transportation Sector



For more information

IDB Environmental Safeguards Unit has mandated a more in-depth document to accompany this factsheet. To obtain a copy, or for more information on IDB Environmental Safeguards Unit's climate change risk assessment process, contact Hilary Hoagland-Grey, Lead Environmental Protection Specialist, at hilaryhg@idb.org.

The opinions expressed in this publication are those of the authors and do not necessarily reflect the views of the Inter-American Development Bank, its Board of Directors, or the countries they represent.

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