Climate Change Risk Management Options for the **Water and Sanitation Sector**

IDB Inter-American Development Bank

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 water and sanitation 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.

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Climate Change Risk Management Options	How the Option Addresses Hazard	Relative Cost	Implementation Feasibility
Hazard and Impact to Sector **Sea Level Rise** Saltwater intrusion to surface water and aquifers			
Create a subsurface barrier using fresh or recycled water; this is not a structural barrier, but one created by lower salinity water injection	Decreases area affected by saltwater intrusion	$$$	Moderately difficult; opportunities are site-specific and could result in adverse impacts
In freshwater intakes upstream of estuarine zones, sea level rise can raise salinity beyond acceptable levels, and intakes may have to be moved further upstream	Move pump intakes to freshwater zones with lower salinity	$$	Moderately difficult; opportunities are site-specific and could result in adverse impacts
Manage fresh water flows to minimize salinization of lower elevation river reached and deltas	Ensures that a minimum quantity of freshwater is flowing through rivers to repel salinity from ocean water	$$$	Difficult to implement; requires flow control structure, such as a dam or reservoir to manage river flows, could result in adverse impacts
Hazard and Impact to Sector **Storm Surge** Floods intakes and water supply facilities, Introduce stormwater with sediments and possibly saltwater to freshwater intakes; overload for wastewater treatment plants; combined sewer overflows			
Install tide gates on major rivers	Prevents upstream movement of seawater	$$$	Moderately easy to difficult to implement; requires technical expertise and could result in adverse impacts
Move water intake and treatment facilities upstream; harden facilities for impacts of larger flows and storm surges	Prevents flooding of water infrastructure	$$$	Moderately difficult; opportunities are site-specific and could result in adverse impacts
Install barriers to route floodwaters away from facilities	Minimizes flood impacts to infrastructure	$$$	Moderately easy to implement; could result in adverse impacts
Update facility master plans to retreat from areas at risk of sea level rise and storm surge	Reduces exposure	$	Moderately easy to implement; requires capacity
Hazard and Impact to Sector **Hurricane Winds** Damage to facilities by wind; power failures			
Require enhanced building codes to handle higher wind speeds	Prevents structural damage	$	Ranges from easy to difficult to implement depending on scale; could require political will and new legal authority for community level changes
Install back-up generators to maintain pumping system	Prevents loss of pumping ability to route water	$	Easy to implement

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Hazard and Impact to Sector **Flooding**	Flood intakes and water supply facilities, overflow of sewage pump stations; overload for wastewater treatment plants; combined sewer overflows		
Install barriers or retaining walls to route floodwaters away from facilities	Routes water away from infrastructure to prevent flooding	$	Moderately easy to implement; could result in adverse impacts
Move pumps and critical electrical infrastructure to higher ground	Keeps facilities on dry land	$$	Moderately easy to difficult to implement; depends on site conditions
Use flood waters to enhance recharge and supplement water supply	Uses excess flow for storage and, over the long term, enhances water supply	$$	Moderately easy to implement; could have adverse impacts
Hazard and Impact to Sector **Drought**	Reservoir and groundwater levels drop, decreasing water supply, increasing sedimentation		
Implement water conservation programs	Reduces water consumption rates	$	Moderately easy to difficult to implement; requires political and social will
Install deeper wells	Taps into deeper water supply	$$	Moderately easy to implement
Install rain barrel collection devices and blue roof water collection system	Collects rain water for landscaping	$–$$	Easy to moderately easy to implement
Change pump intake locations in reservoirs or rivers	Moves pump intakes to deeper water	$$	Moderately easy to implement
Reduce leakage in water networks	Reduces water losses, increases amount of water resources for supply	$$$	Moderately easy to moderately difficult to implement; requires technical expertise and capacity
Use of treated wastewater	Increases freshwater availability	$$$	Moderately difficult to difficult to implement; could require political and social will, technical expertise
Increase water storage capacity	Balances seasonal water shortage	$$$	Moderately difficult to implement; requires new infrastructure, possibly upstream
Hazard and Impact to Sector **Extreme Temperatures**	Loss of water in surface waters due to increased evaporation; increased likelihood of microbial contamination		
Increase water withdrawals or supplement with other water sources	Replaces of lost supply	Variable but $$$	Moderately easy to difficult to implement; could have adverse impacts, require political will and new legal authority
Avoid standing water resources in warm environments through increased flow	Protects against microbial contamination	$$$	Moderately easy to difficult to implement; could have adverse impacts

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
- Urban Infrastructure Sector
- Transportation Sector

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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@iadb.org.