

**INTER-AMERICAN
DEVELOPMENT BANK**

Hilary Hoagland-Grey
December, 2015

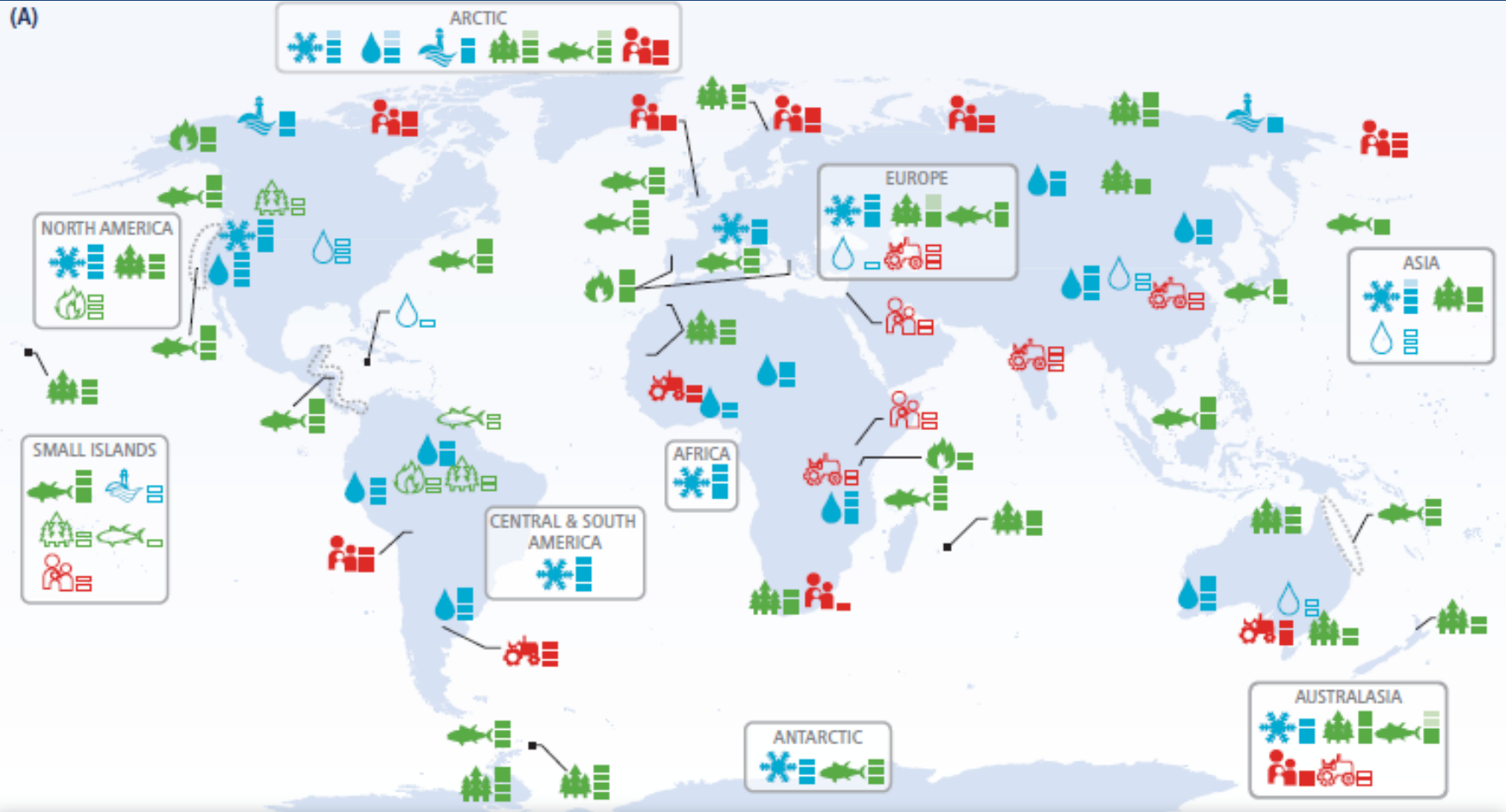
Sustainable Projects Through Climate Change Risk Management and Adaptation: Lessons Learned



Some Facts and Figures



Climate Change Impacts Already Being Observed



Confidence in attribution to climate change



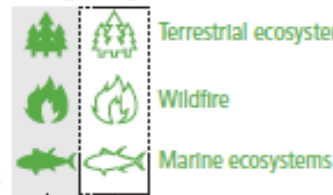
Indicates

Observed impacts attributed to climate change for

Physical systems



Biological systems

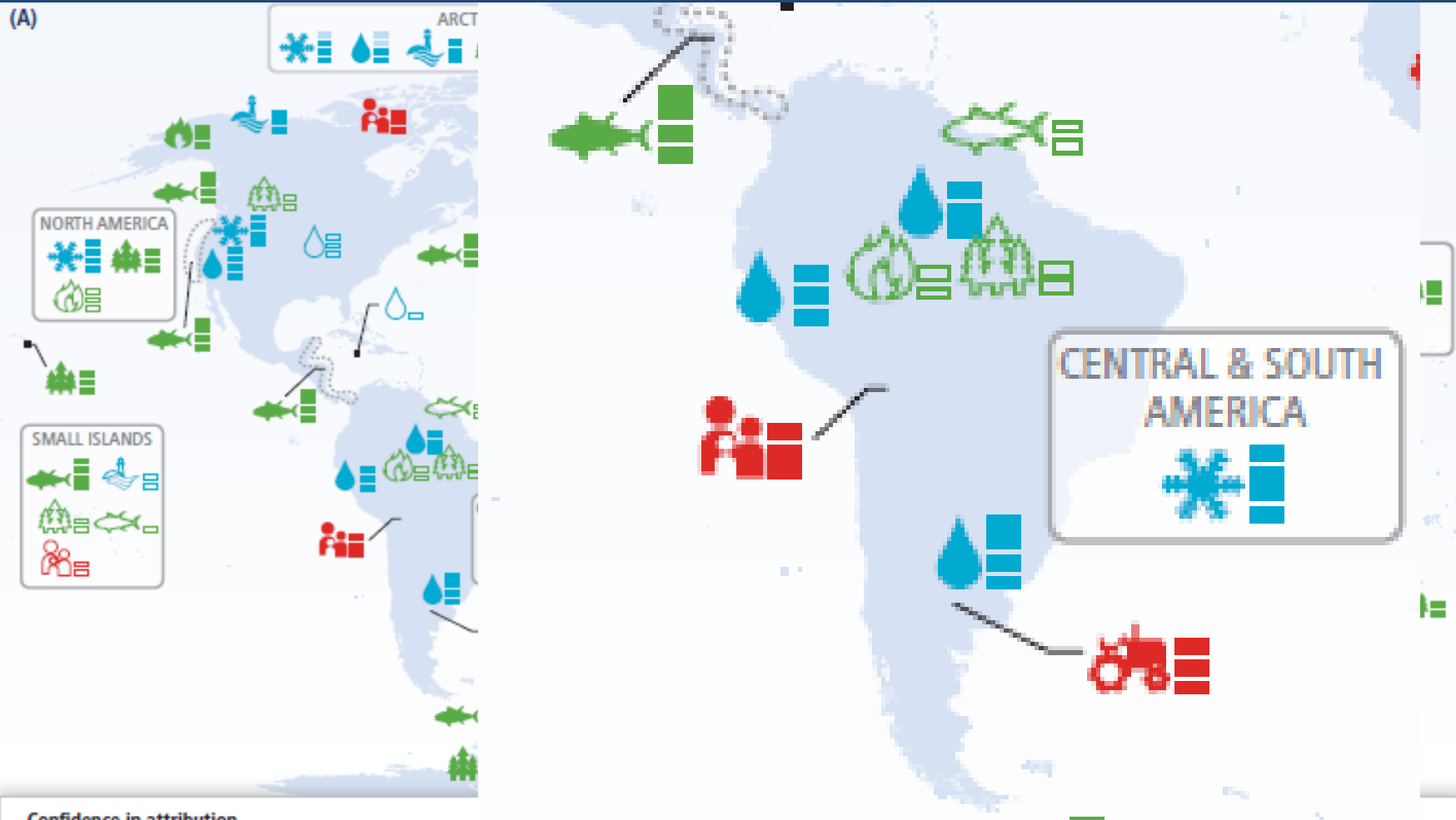


Human and managed systems



Regional-scale impacts

Climate Change Impacts Already Being Observed



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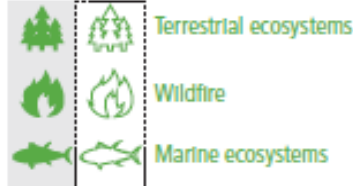


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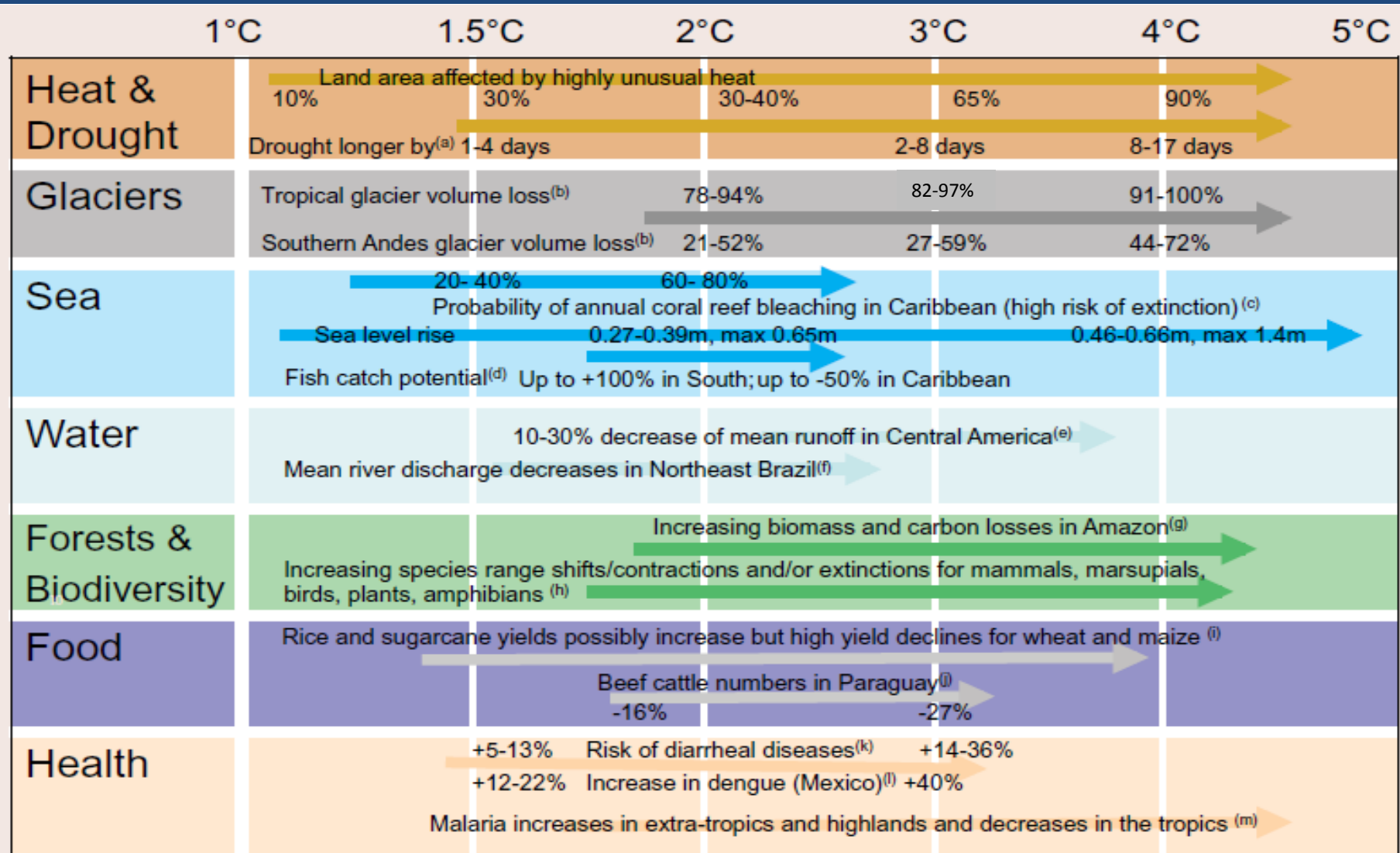
Human and managed systems



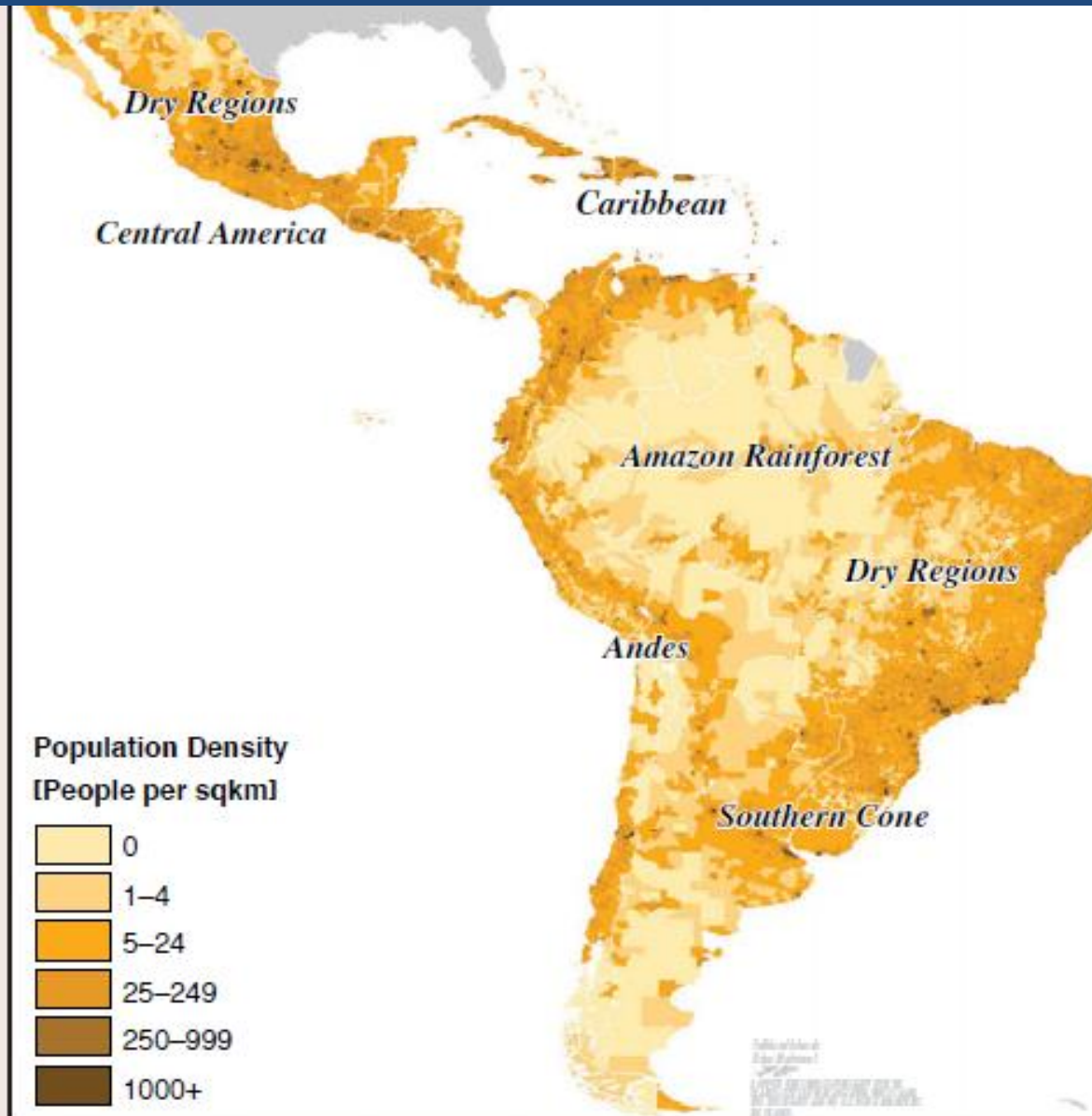
Regional-scale impacts

And the Future.....

Projected Future Climate Change Impacts of Key LAC Sectors



The LAC Region Future



Central America & the Caribbean

- Higher ENSO and tropical cyclone frequency, precipitation extremes, drought, heat waves.
- Reduced water availability, crop yields, food security, and coastal safety.
- Landslides, coastal erosion, negative impacts on coastal tourism income



Amazon Rain Forest

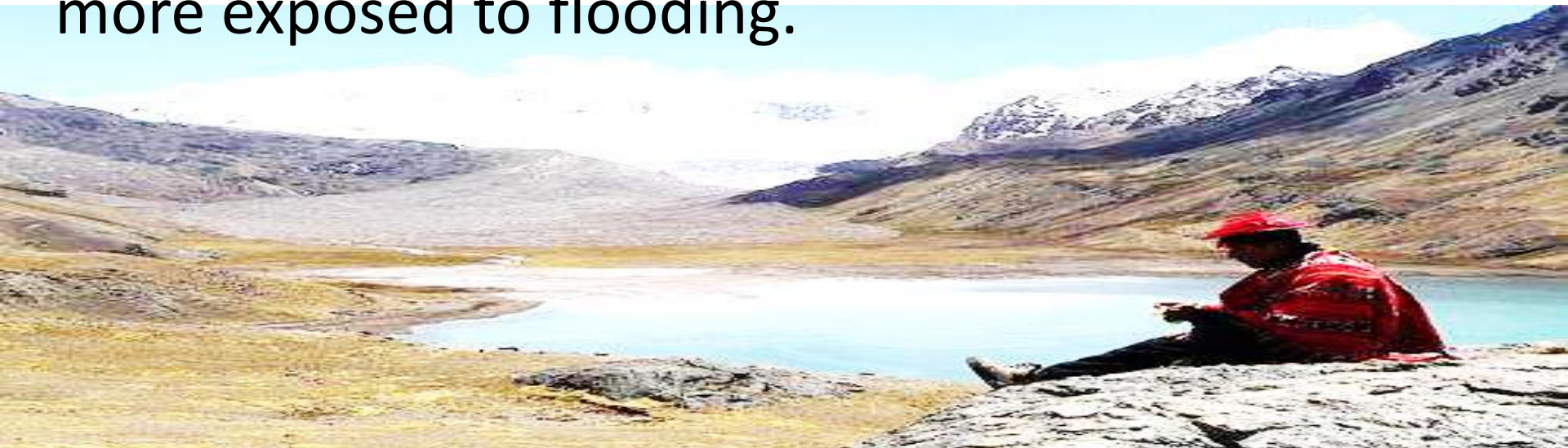
- Increase in extreme heat and aridity, risk of forest fires, degradation, and biodiversity loss.
- Risk of rainforest turning into carbon source.
- Shifting agricultural zones may lead to land conflicts
- Species extinction threatening traditional livelihoods and cultural losses.



Other Examples (included for reference)

Andes

- Glacial melt, snow pack changes, risks of flooding, and freshwater shortages.
- High altitude women, children, and indigenous people particularly vulnerable / agriculture at risk.
- In urban areas the poor living on steeper slopes more exposed to flooding.



Dry Regions

- Increasing drought and extreme heat leading to cattle death, crop yield declines, and challenges for freshwater resources.
- Risks of localized famines in remote indigenous communities, water-related health problems. Stress on resources may lead to conflict / urban migration.



Sothern Cone

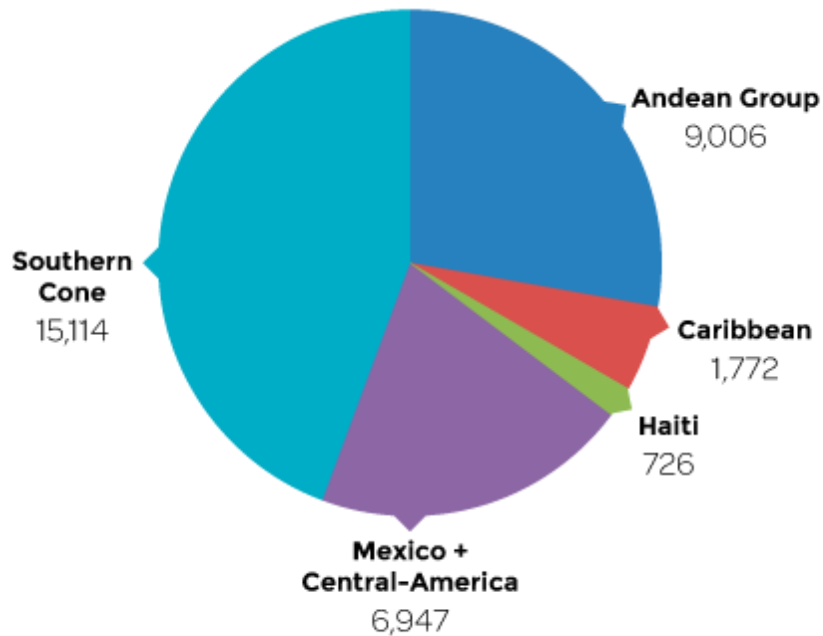
- Decreasing agricultural yields and pasture productivity, northward migration of agro/eco zones.
- Risks for nutrition status of the local poor.
- Risks for food price increases and cascading impacts beyond the region due to high export share of agriculture.



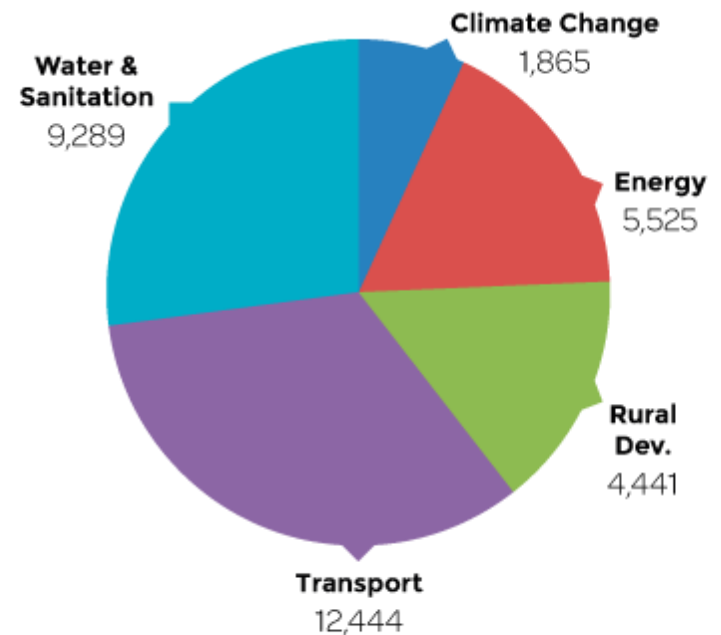
What Does This Mean for the IDB?

Snapshot of IDB's Infrastructure Portfolio: 2008 - 2014

APPROVED LOANS BY REGION
(US\$ million)



APPROVED LOANS BY SECTOR
(US\$ million)

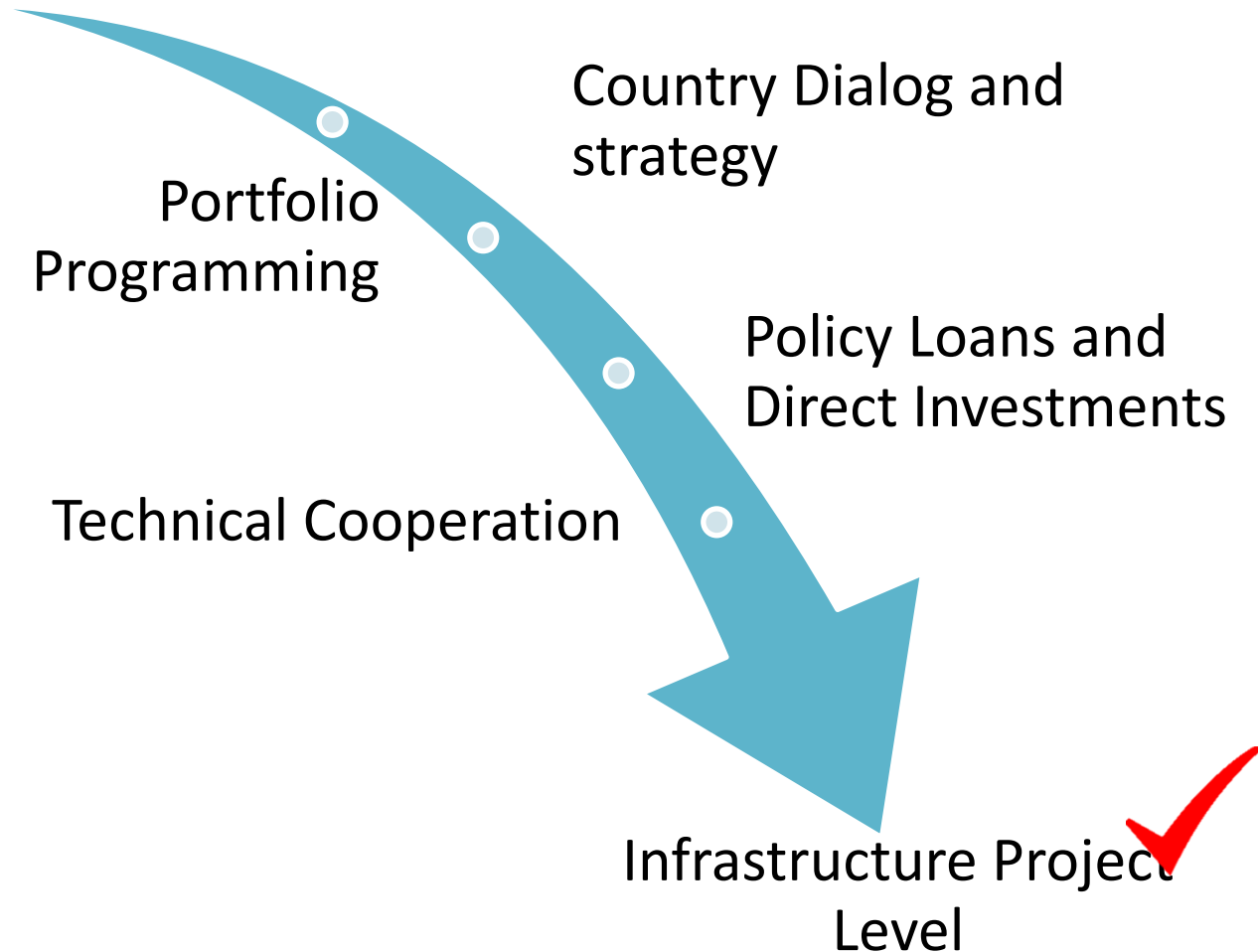


TOTAL = US \$33.565 BILLION

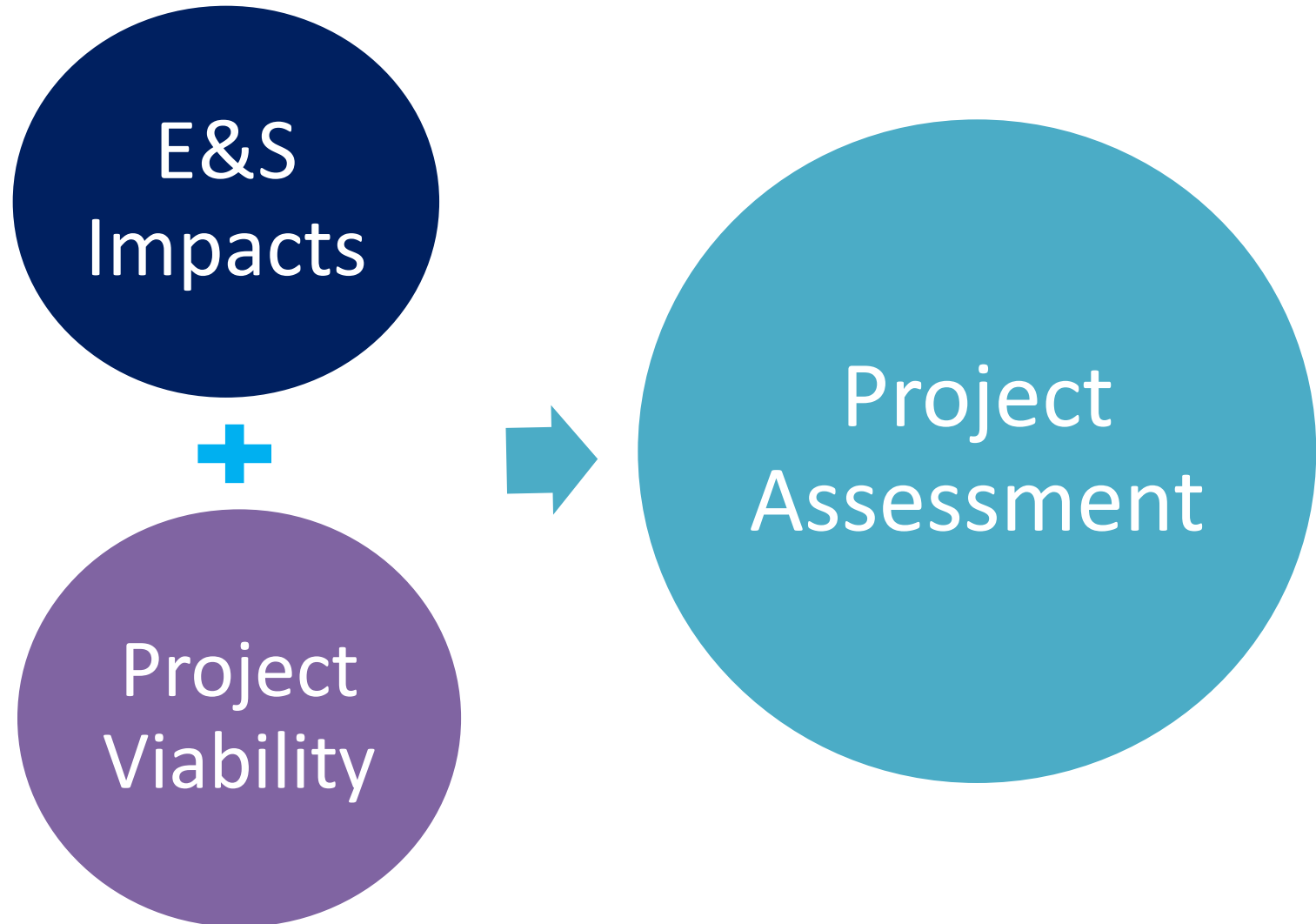
How Can We Manage the Risks in Our Infrastructure Projects?

Bank Intervention Points

Sector level



Two Aspects of IDB Project Review



Road Project and Changes in Temperature and Precipitation



Road Project and Changes in Temperature and Precipitation

E&S Impacts:

- Increased erosion and landslides:
 - water quality impacts
 - Biodiversity impacts
- Loss of ecosystem services (fishing, etc.)
- Damage claims from water uses
- Induced flooding beyond road
- Loss of social benefits if road closed
- Community Safety: loss of evacuation route



Road Project and Changes in Temperature and Precipitation

Project Viability:

- Durability of road materials (increased construction & maintenance costs)
- Increased slope instability
- Road damage from flooding and landslides
- Repayment risks
- Loss of developmental impacts from inability to provide revenue or reliable connectivity.
- Cancellation of community CSR projects



Road Project and Changes in Temperature and Precipitation



Hydropower Plant and Changes in Precipitation Patterns



Hydropower Plant and Changes in Precipitation Patterns

E&S Impacts:

- **Extreme variability: water quality impacts**
- **Biodiversity impacts – loss and instability**
- **Conflicts with communities over water resources, food security**
- **Loss of ecosystem services (fishing, etc.)**
- **Increased GHG emissions**

Hydropower Plant and Changes in Precipitation Patterns

Project Viability:

- **Decreased generation capacity – loss of profits, penalties under power provider agreements;**
- **Repayment risks**
- **Loss of developmental impacts from inability to provide increased power access etc.**
- **Cancellation of community CSR projects**
- **Higher maintenance costs**

Hydropower Plant and Changes in Precipitation Patterns



Tourism Project and Increased Storm Intensity and SLR



Tourism Project and Increased Storm Intensity and SLR

E&S Impacts:

- Coastal erosion
- Habitat loss
- Water quality
- Water availability and prioritization / stress on local services
- Health and safety / emergency response

Tourism Project and Increased Storm Intensity and SLR

Project Viability:

- Physical losses (repair costs)
- Loss of Power/Water supplies
- Decreased guests: loss of profits short- and long-term
- Repayment risks
- Loss of developmental impacts from inability to provide jobs, local revenue, etc.
- Higher insurance costs
- Cancellation of community CSR projects

Tourism Project and Increased Storm Intensity and SLR



What Can Be Done?

- Really understand – qualify and quantify – risks
- Revise design: stronger / more flexible to change
- Add adaptation and risk reduction features
- Prepare to respond
- Proper risk allocation



Guidance methodologies and data

IDB
Inter-American Development Bank
Environmental Safeguards Unit
TECHNICAL NOTE
No. IDB-TN-633

Climate Change Data and Risk Assessment Methodologies for the Caribbean

Prepared by:
Tetra Tech, Inc.

CLIMATE CHANGE RISK ASSESSMENT

Approach and Tools for the Caribbean

The Challenge

The Caribbean 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.

Climate Change Risk Assessment Assistance

The IDB Environmental Safeguards Unit (ESU) provides a step-wise approach to assist project sponsors to better understand their project's risk to climate change, and to identify measures that could be implemented to mitigate that risk.

The approach is structured as a three-step process, and provides the flexibility to tailor the assessment to project-specific needs.

IDB
TETRA TECH

Climate Change Risk Management Options for the Agriculture 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 agriculture 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	How the Option Addresses Hazard	Relative Cost	Implementation Feasibility
Climate Change Risk Management Options			
Hazard and Impact to Sector Sea Level Rise Loss of arable land from inundation or potential saltwater intrusion	Routes water away from field	\$\$\$	Ranges from moderately easy to difficult to implement depending on the size of the levee
Install levees to keep water out of desired farmed areas	Decreases soil salinity	\$\$	Moderately easy to implement
Increase the quantity of irrigated water to reduce effect of salt load on crop	Reduces additional saltwater intrusion and allows irrigation by water of more suitable quality	\$\$	Difficult to implement; depends on availability of alternative water supplies and more efficient technologies
Where possible, reduce dependence on groundwater supply by using surface water where available	Creates an artificial barrier to saltwater intrusion	\$\$	Moderately difficult to implement
Consider an artificial recharge of groundwater to prevent saltwater intrusion	Routes water away from field	\$\$\$	Difficult to implement; large social costs
Hazard and Impact to Sector Storm Surge Inundation of crops, possibly by saltwater	Reduces potential for flooding	\$\$, but depends on setting	Ranges from moderately easy to difficult to implement depending on the size of the levee
Move farmed areas inland, west to more natural vegetation that provides storm surge protection such as mangroves and wetlands	Reduces potential for flooding	\$\$, but depends on setting	Ranges from moderately easy to difficult to implement depending on the size of the levee
Install levees to keep water out	Reduces potential for flooding	\$\$, but depends on setting	Ranges from moderately easy to difficult to implement depending on the size of the levee
Hazard and Impact to Sector Hurricane Winds Damage to crops by wind	Provides extra security to prevent trees from falling over	\$	Easy to implement
Use guide wires to protect large trees from high winds; build wind breaks; use allee cropping	Reduces crop losses	\$	Easy to implement; may not be feasible for some crops
Harvest early, if possible	Reduces crop losses	\$	Easy to implement; may not be feasible for some crops
Hazard and Impact to Sector Flooding Damage to crops	Removes standing water following a flood	\$\$	Moderately easy to implement but the process takes time because of the establishment of new annual plants
Install pumping systems to dewater fields	Reduces crop losses	\$\$	Moderately easy to implement but the process takes time because of the establishment of new annual plants
Change type of crop to one that can handle temporary inundation (e.g. orchards, vineyards)	Reduces crop losses	\$\$	Moderately easy to implement but the process takes time because of the establishment of new annual plants

Guidance methodologies and data

Climate Change Risk Management Options for the **Tourism Sector**

Climate Change Risk Management Options	How the Option Addresses Hazard	Relative Cost	Implementation Feasibility
<i>Hazard and Impact to Sector</i> Sea Level Rise Destruction of or damage to tourist structures and dependent structures (transportation, utilities, etc.) and loss of beach area to erosion			
Elevate structure(s)	Elevates and protects infrastructure from major impact	\$-\$\$	Easy to implement during design/construction; moderately difficult to implement after construction
Promote development of natural protective features, such as wetlands and mangroves, in vulnerable areas; limit destruction of such areas where they currently exist	Mitigates storm surges that may be enhanced with rising sea levels	\$-\$\$	Moderately easy to implement; could require social and political will
Harden vulnerable coastline and protect coastal infrastructure using seawalls and breakwaters	Reduces inundated areas	\$\$\$\$	Difficult to implement; could result in adverse impacts
Replenish beaches as a near-term solution	Temporarily counteracts loss of beaches from erosion	\$\$	Moderately difficult to implement; requires capacity, political and social will, could have adverse impacts
Identify and develop alternative inundation safe transportation routes	Provides transportation routes	\$	Easy to implement
Re-site structure(s) or consider sea level rise risk in the siting and design of new structures; implement setbacks	Reduces exposure	\$-\$\$	Moderately easy to difficult to implement, depending on site conditions; could require political will
<i>Hazard and Impact to Sector</i> Storm Surge Destruction of or damage to tourist structures and dependent structures (transportation, utilities, etc.)			
Elevate structure(s)	Reduces exposure	\$-\$\$	Easy to implement during design/construction; moderately difficult to implement after construction
Use breakaway walls ¹	Reduces damage potential from water	\$\$	Moderately easy to implement
Re-site structure(s) or consider sea level rise risk in the siting and design of new structures	Reduces exposure	\$-\$\$	Moderately easy to difficult to implement, depending on site conditions; could require political will
Develop road closure map	Allows tourists to be moved safely	\$	Easy to implement
<i>Hazard and Impact to Sector</i> Hurricane Winds Destruction of or damage to tourist structures and dependent structures (transportation, utilities, etc.) exposed to high winds			
Use hurricane straps for houses/structures	Reduces damage potential from wind	\$-\$\$	Easy to implement
Shuttering	Reduces damage potential from wind	\$\$	Easy to implement

Guidance methodologies and data

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Useful Links

- IPCC Fifth Assessment Report (AR5) Working Group Contributions:
<https://www.ipcc.ch/report/ar5/>
- Series: Turn Down the Heat, The World Bank:
<http://www.worldbank.org/en/topic/climatechange/publication/turn-down-the-heat>
- Climate Change Data and Risk Assessment Methodologies for the Caribbean:
https://publications.iadb.org/handle/11319/6453?scope=123456789/1&thumbnail=false&order=desc&rpp=5&sort_by=score&page=0&query=climate+change+data+risk+assessment&group_by=none&etal=0
- Addressing Climate Change within Disaster Risk Management: A Practical Guide for IDB Project Preparation:
<https://publications.iadb.org/bitstream/handle/11319/6910/Addressing%20Climate%20Change%20within%20Disaster%20Risk%20Management.pdf>

Thank You

Hilary Hoagland-Grey

hilaryhg@iadb.org

