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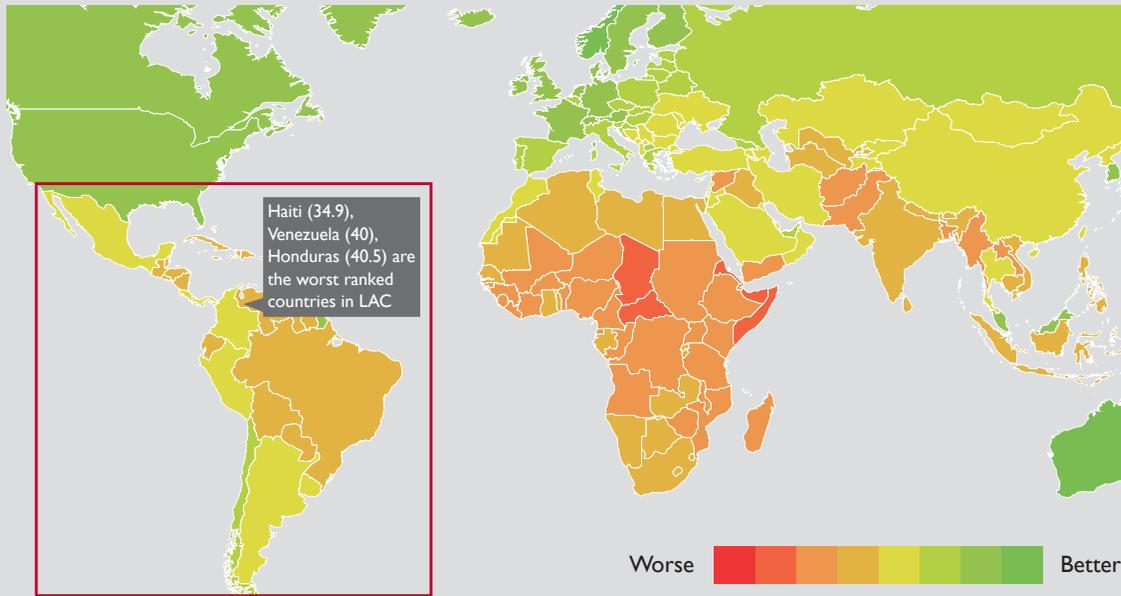
# Environment and Energy Landscape in Latin America and the Caribbean: An Analysis of Trends 2020-2030

Increased Adoption of Climate Adaptation

December 2020

# The Latin America and Caribbean region is among the most vulnerable regions to the consequences of climate change

## Climate change vulnerability index 2020

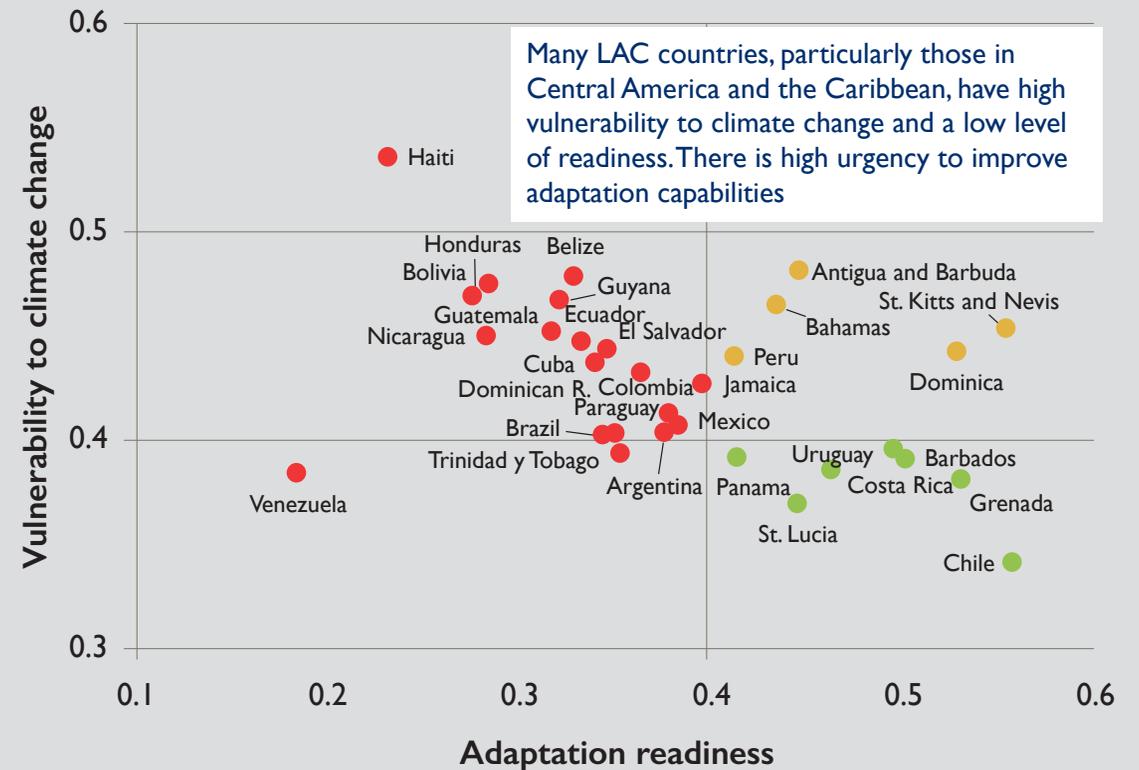


Central America and the Caribbean rank second and third, respectively, in the climate vulnerability index (after Africa)

Notes: The ND-GAIN Country Index summarizes a country's vulnerability to climate change and other global challenges in combination with its readiness to improve resilience. Vulnerability and readiness are ranked on a scale of 0-0.8, with 0 being extremely low vulnerability/low readiness and 0.8 being extremely high vulnerability/high readiness.

Sources: 1. The Notre Dame-Global Adaptation Index (ND-GAIN) Country Index, 2020, available: <https://gain.nd.edu/our-work/country-index/>; 2. Verisk Maplecroft, "Climate Change Vulnerability Index 2017," 2016; 3. ECLAC, "Economics of Climate Change in Latin America and the Caribbean: A Graphic View," 2018; 4. World Bank Data, "Population living in areas where elevation is below 5 meters (% of total population)," 2010.

## Vulnerability to climate change and adaptation readiness by country 2018



## Vulnerability:

“Measures a country’s exposure, sensitivity, and ability to adapt to the negative impact of climate change”

Vulnerability index is composed of:

- Exposure
- Sensitivity
- Adaptive capacity

## Readiness:

“Measures a country’s ability to leverage investments and convert them to adaptation actions. It includes economic, governance, and social readiness”

Vulnerability index is composed of:

- Economic readiness
- Governance readiness
- Social readiness

Source: The ND-GAIN Country Index Technical document.

# The effects of climate change are already felt in the region and are only expected to get more severe in the coming decade (1 of 2)

## Climate change current and projected effects:



### Increased temperature

- Temperature in Central and South America has increased 0.7°-1.0°C since the mid-1970s
- It is estimated that by 2100, temperature will increase 1.6°-4.0°C in Central America and 1.7°-6.7°C in South America



### Increased sea levels

- In the 20<sup>th</sup> century, sea levels in the Caribbean rose ~1.8 mm/year, a faster pace than the global average (1.4 mm/year)
- From 2006-15, the rate of global sea level rise doubled, to 3.6 mm/year
- Under current conditions, sea levels in the Caribbean are expected to rise 1.5 m by 2100
- The Caribbean has the highest percentage in the world of its population living at elevations below 5 meters (12%)

Sources: 1. ECLAC, "The economics of climate change in Latin America and the Caribbean: Paradoxes and challenges of sustainable development," 2015; 2. IDB, "Sea-Level Rise Threats in the Caribbean: Data, tools, and analysis for a more resilient future," 2018; 3. IDB, "Seven things you need to know about disasters in Latin America and the Caribbean," 2018; 4. UNCTAD, "Climate Change Impacts and Adaptation for Coastal Transport Infrastructure in Caribbean SIDS," 2017; 5. Yale School of Environment, "Andes Meltdown: New Insights Into Rapidly Retreating Glaciers," 2020; 6. Lindsey R., "Climate Change: Global Sea Level," 2020; 7. Americas Quarterly, "Politics of Water - NEW AQ: Latin America's Invisible Crisis," 2019.

# The effects of climate change are already felt in the region and are only expected to get more severe in the coming decade (2 of 2)

## Climate change current and projected effects:



### Greater water scarcity

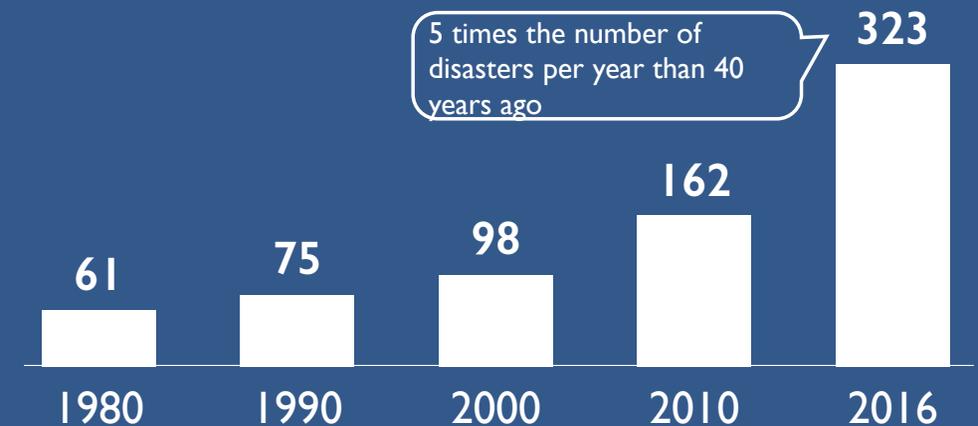
- Since 2000, Andean glaciers have shrunk three feet per year, affecting South American cities that rely heavily on glacier water
- More severe droughts in Central America's Dry Corridor
- 16 of LAC's 20 largest cities are under water-related stress, and three are expected to run out of water in the next decades



### Increased number of natural disasters

## The frequency of natural disasters has rapidly escalated

Number of natural disasters per year in LAC (1980-2016)



### From 1980 to 2016, more than 4,000 natural disasters:

- 297 million people affected and more than 290,000 deaths
- Estimated \$282 billion in economic losses
- Annually, the cost of natural disasters in LAC is equivalent to six times Belize's GDP

Sources: 1. ECLAC, "The economics of climate change in Latin America and the Caribbean: Paradoxes and challenges of sustainable development," 2015; 2. IDB, "Sea-Level Rise Threats in the Caribbean Data, tools, and analysis for a more resilient future," 2018; 3. IDB, "Seven things you need to know about disasters in Latin America and the Caribbean," 2018; 4. UNCTAD, "Climate Change Impacts and Adaptation for Coastal Transport Infrastructure in Caribbean SIDS," 2017; 5. Yale School of Environment, "Andes Meltdown: New Insights Into Rapidly Retreating Glaciers," 2020; 6. Lindsey R., "Climate Change: Global Sea Level," 2020; 7. Americas Quarterly, "Politics of Water - NEW AQ: Latin America's Invisible Crisis," 2019.

# Climate change results in higher poverty, food insecurity, and health risks and disproportionately affects the most vulnerable populations

## Climatic Drivers



**Increased temperature**



**Increased sea levels**



**Greater water scarcity**



**Increased number of natural disasters**

## Immediate effects



**Decreased agricultural productivity**

(e.g., droughts have resulted in crop yield reductions of 50-75% in Central America)



**Loss of biodiversity and forests**

(e.g., Colombia could lose 30% of its biodiversity due to climate change by 2050)



**Damaged infrastructure**

(e.g., since 2000, tropical storms and hurricanes have caused \$39 billion in damages in LAC)



**Decreased tourism**

(e.g., in 2017, the Caribbean lost an expected 800 thousand visitors due to hurricanes, resulting in a loss of \$741 million)

## Socioeconomic effects



**Loss of livelihoods and reduced incomes**  
(e.g., temperature and precipitation changes could cause a 20% reduction in rural incomes in Bolivia)



**Food/nutrition insecurity**

(e.g., 1.6 million people are severely food insecure in Central America's Dry Corridor; this is expected to worsen with falling agricultural productivity)



**Health risks**

(e.g., rise in the number of people at risk of dengue due to changes in geographic transmission zones and disease distributions)<sup>7</sup>



**Migration/displacement**

(e.g., research from Mexico shows that a 10% increase in the frequency of natural disasters results in a 5–13% increase in migration)



**Supply chain interruptions**

(e.g., excess rains in Colombia have caused road collapses that make it difficult to transport inputs and raw materials to main cities)

Sources: 1. OCHA, "Natural Disasters in Latin America and the Caribbean 2000-2019," 2020; 2. NRDC, "Latin America and International Day for Biodiversity"; 2018; 3. OCHA, "Natural Disasters in Latin America and the Caribbean 2000-2019," 2020; 4. IDB, "Protecting Tourism in the Caribbean through Smarter Crisis Management and Response Systems," 2019; 5. ECLAC, "Food and nutrition security and the eradication of hunger CELAC 2025: Furthering discussion and regional cooperation," 2016; 6. World Food Programme, "COVID-19: Millions at risk of severe food insecurity in Latin America and Caribbean," 2020; 7. ECLAC and IDB, "The Climate and Development Challenge for Latin America and the Caribbean Options for climate-resilient, low-carbon development," 2013; 8. E. Piguet and F. Laczko, "Migration and Climate Change in Latin America and the Caribbean," 2014; 9. Portafolio, "Derrumbes mantienen cerradas siete importantes vías del país," 2019.

# There is a clear case for investing in climate adaptation given its human, economic, and environmental benefits, plus alignment with USAID priorities

Climate adaptation provides widespread benefits on three axes:



**Human** – protects lives, health, and reduces climate-related migration (e.g., reduces spread of diseases such as COVID-19)



**Economic** – has an excellent return on investment  
Estimates suggest that climate change will cost LAC between 1.5% and 5% of the region's GDP by 2050, while climate adaptation will cost less than 0.5% of regional GDP



**Environmental** – supports a sustainable development path that is more resilient to climate change  
Includes climate and environmental considerations in strategies (e.g., nature-based solutions)

Adaptation is integrated in USAID's priorities and closely aligns with several objectives:

USAID has developed guidelines for climate-resilient development, which include 1) mainstreaming adaptation measures into governance, planning, and budgeting and 2) mobilizing finance for adaptation

Other objectives include:



**1** Journey to Self-Reliance



**2** Decreasing migration from Central America



**3** Environmental and natural resource management

Notes: Sectors include Health, Feed the Future, and Economic Growth.

Sources: 1. ECLAC, "The economics of climate change in Latin America and the Caribbean: Paradoxes and challenges of sustainable development," 2015; 2. WRI, "Nature is An Economic Winner for COVID-19 Recovery," 2020.

# Climate adaptation solutions fall in four main categories: financing, policies, technologies and innovation, and education

## Financing



- Financing includes actions from public, private, or non-profit sectors to increase funding flows for developing and deploying adaptation technologies and innovation and for designing and implementing policies
- Examples: Funds, subsidies, and grants

Sources: 1, IPCC, "Managing the Risks of Extreme Events and Disasters to Advance Climate Change Adaptation (SREX): Glossary," 2018, from: [https://www.ipcc.ch/site/assets/uploads/2018/02/WGIIAR5-AnnexII\\_FINAL.pdf](https://www.ipcc.ch/site/assets/uploads/2018/02/WGIIAR5-AnnexII_FINAL.pdf); Asian Development Bank, "Technologies to Support Climate Change Adaptation in Developing Asia," 2014; 2, IISD, "The Multiple Benefits of Natural Infrastructure," 2018; 3, IDS, "A tool-kit for assessing climate mitigation and adaptation funding mechanisms," 2011; 4, OECD, Aid Targeting the Objectives of the Framework Convention on Climate Change.

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## Policy



- Regulation includes the design of public policies to enable and further expand adoption of climate adaptation interventions
- Examples: National adaptation plans (NAPs) and nationally determined contributions (NDCs)

Sources: 1. IPCC, "Managing the Risks of Extreme Events and Disasters to Advance Climate Change Adaptation (SREX): Glossary," 2018, from: [https://www.ipcc.ch/site/assets/uploads/2018/02/WGIIAR5-AnnexII\\_FINAL.pdf](https://www.ipcc.ch/site/assets/uploads/2018/02/WGIIAR5-AnnexII_FINAL.pdf); Asian Development Bank, "Technologies to Support Climate Change Adaptation in Developing Asia," 2014; 2. IISD, "The Multiple Benefits of Natural Infrastructure," 2018; 3. IDS, "A toolkit for assessing climate mitigation and adaptation funding mechanisms," 2011; 4. OECD, "Aid Targeting the Objectives of the Framework Convention on Climate Change."

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## Technologies & innovation

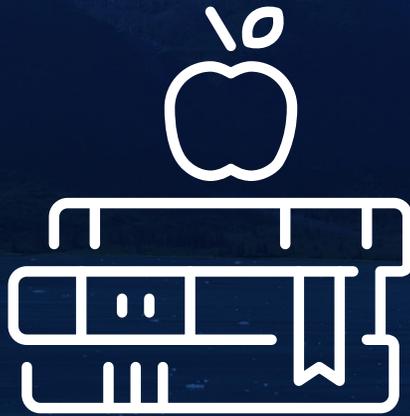


- Technologies and innovation are tools and practices that reduce vulnerability to, diminish the effects of, and/or build resilience to climate change
- Examples: hard (e.g., infrastructure, equipment), soft (e.g., institutional arrangements), urban (e.g., smart energy grids), rural (e.g., precision agriculture), and innovations in natural infrastructure (e.g., urban gardens)

Sources: 1. IPCC, "Managing the Risks of Extreme Events and Disasters to Advance Climate Change Adaptation (SREX): Glossary," 2018, from: [https://www.ipcc.ch/site/assets/uploads/2018/02/WGIIAR5-AnnexII\\_FINAL.pdf](https://www.ipcc.ch/site/assets/uploads/2018/02/WGIIAR5-AnnexII_FINAL.pdf); Asian Development Bank, "Technologies to Support Climate Change Adaptation in Developing Asia," 2014; 2. IISD, "The Multiple Benefits of Natural Infrastructure," 2018; 3. IDS, "A toolkit for assessing climate mitigation and adaptation funding mechanisms," 2011; 4. OECD, Aid Targeting the Objectives of the Framework Convention on Climate Change.

# Climate adaptation solutions fall in four main categories: financing, policies, technologies and innovation, and education

## Education



- Education, training, and public awareness on climate adaptation with the objective of increasing people's understanding on the ways of counteracting the effects of climate change can be imparted through educational centers, government actions, and the media

Examples: Climate change forums

Considering USAID's main capabilities and the traction of climate adaptation solutions in LAC, this report will focus on policies, technologies, and financing

Sources: 1. IPCC, "Managing the Risks of Extreme Events and Disasters to Advance Climate Change Adaptation (SREX): Glossary," 2018, from: [https://www.ipcc.ch/site/assets/uploads/2018/02/WGIIAR5-AnnexII\\_FINAL.pdf](https://www.ipcc.ch/site/assets/uploads/2018/02/WGIIAR5-AnnexII_FINAL.pdf); Asian Development Bank, "Technologies to Support Climate Change Adaptation in Developing Asia," 2014; 2. IISD, "The Multiple Benefits of Natural Infrastructure," 2018; 3. IDS, "A toolkit for assessing climate mitigation and adaptation funding mechanisms," 2011; 4. OECD, Aid Targeting the Objectives of the Framework Convention on Climate Change.



# FINANCING | Financing for climate adaptation has gained momentum, but available funding remains low compared to funding for mitigation

## Stakeholders financing climate adaptation

**Public sector:** Creation of public sector budget to finance national adaptation plans and nationally determined contributions

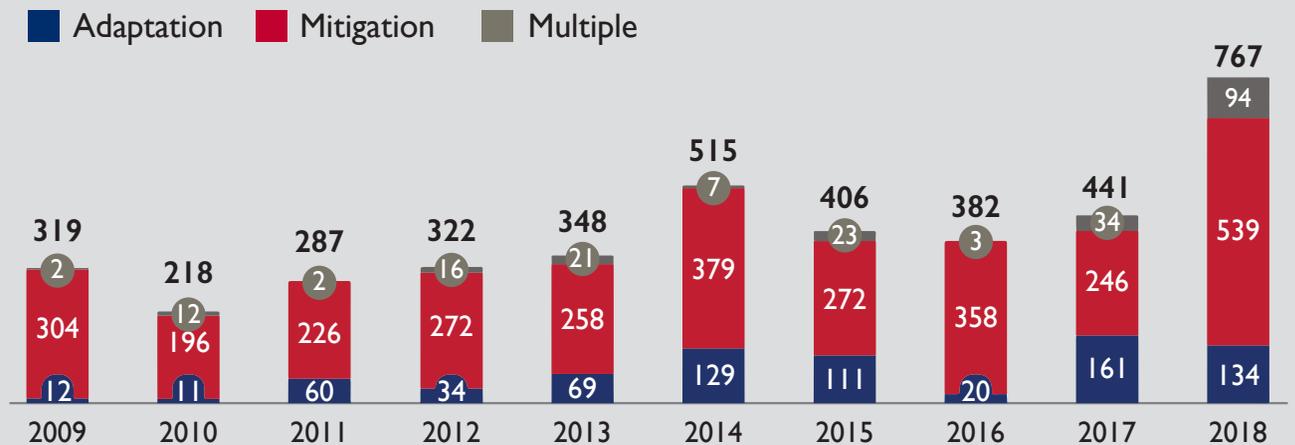
**Private sector:** Investment in climate adaptation through corporate social responsibility and in some cases, as a core part of the business model (e.g., agriculture companies)

**Multilaterals and donors:** Development of climate funds to provide loans, grants, and equity for climate adaptation

**A large gap still remains in the availability and homogeneity of publicly available climate adaptation data, particularly from governments and the private sector, making it difficult to quantify aggregate adaptation financing in LAC**

## Financing from multilaterals and donors in LAC

\$ million



LAC represents 16% of total adaptation funding from 2003-2018

The main sectors receiving funding from climate adaptation funds in the region are water supply & sanitation (32%), general environmental protection (17%), and agriculture (14%)

The countries receiving the most funding have been Bolivia (15%), Argentina (9%), and Grenada, Colombia, and Jamaica (each with 7%)

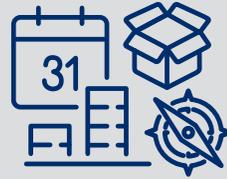
Source: 1. Mongabay, Cash for conservation: Do payments for ecosystem services work?, 2017; 2. Montagnini F, Finney C, Payments for environmental services in Latin America as a tool for restoration and rural development. Ambio. 2011; 3. Profor, Lessons learned for REDD + from payment-for-services programs environmental and conservation incentives, 2012

# FINANCING | To increase financing for climate adaptation, LAC must address key challenges in awareness, demand, and cross-sector collaboration



## Awareness

- **Poor understanding from governments** of the importance and the benefits of climate adaptation (e.g., increasing productivity and resilience)
- **Lack of knowledge from the private sector** on proven business models and awareness of available funding streams



## Demand and supply

- **Low demand for adaptation finance** from the private sector, research institutions, NGOs, and other stakeholders
- **Challenging for funders to identifying projects** that have a satisfactory return on investment and projects that have the greatest potential, given mitigation and adaptation priorities
- Climate adaptation projects may require longer loan repayment periods; however, **existing loan terms may be too short**



## Government capacity

- **Limited capacity to combine available financial resources**, which would enable access to a wider variety of financing resources and improve financial management and fund allocation (e.g., combining different instruments in a single project, using an instrument to restructure the term of another instrument)

Sources: 1. UNDP, Preparación para Financiamiento Climático; 2. UNDP, Catalizando el financiamiento para enfrentar el cambio climático.

# CASE STUDY | Mainstreaming climate adaptation in disaster reconstruction funds in Colombia

## Context



- The adaptation fund was created to reconstruct regions affected by the La Niña phenomenon in 2010-2011, which affected 3 million people and resulted in economic losses of \$6.1 billion
- As of 2015, Colombia's Adaptation Fund executes risk management and climate adaptation projects in different sectors and regions

## Operations



- Receives financing from the national budget and international actors
- Yearly budget ranges around \$350-500 million
- The fund has five macro-projects and operates in seven sectors: housing, education, health, water, environment, reactivation, and transportation

## Outcomes



- By December 2019, the fund had financed the reconstruction of 107 aqueducts (out of a goal of 130) and 32,000 homes (out of a goal of 44,000) and the installation of 457 hydrometeorological stations
- Colombia reports the fund's budget in its national budget, making it one of the only countries in LAC with publicly available adaptation financing data
- The fund is a good starting point, but the country is still facing challenges in terms of climate adaptation, e.g., there have been significant catastrophes, including the disappearance of an entire town due to mudslides

Sources: Fondo Adaptación, "Programas y proyectos: avances," n.d.; Fondo Adaptación, "Presupuesto," n.d.; Latino Adapta, "Funding Challenges of Climate Change Adapting in Latin America and The Caribbean," 2019; Trinomics, "Investigación de casos exitosos en financiamiento climático en la región Latinoamericana," 2017.



# POLICIES

# **POLICIES | Countries have recognized the importance of adaptation and are incorporating adaptation into policy frameworks through several actions**

Policies guide the selection of adequate adaptation interventions and responses to climate change, set priorities, and specify implementation. Adaptation policies take several forms:

## **National adaptation plans (NAPs)**

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Identify adaptation needs and help develop and implement strategies to tackle those needs. NAPs have two objectives: 1) build adaptive capacity and resilience, and 2) integrate climate adaptation into existing policies and development plans, for different levels and sectors

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## **Nationally determined contributions (NDCs)**

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Targets and measures governments pledge to undertake to curb emissions and tackle climate change, in line with the Paris Agreement; in some cases, these have an adaptation focus

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## **Development and economic plans**

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Incorporate adaptation measures transversally in national or sector development and economic plans (e.g., Colombia included climate adaptation in 2018-22 development plan)

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## **Adaptation legislation**

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Laws passed by legislative branches that mandate climate change adaptation

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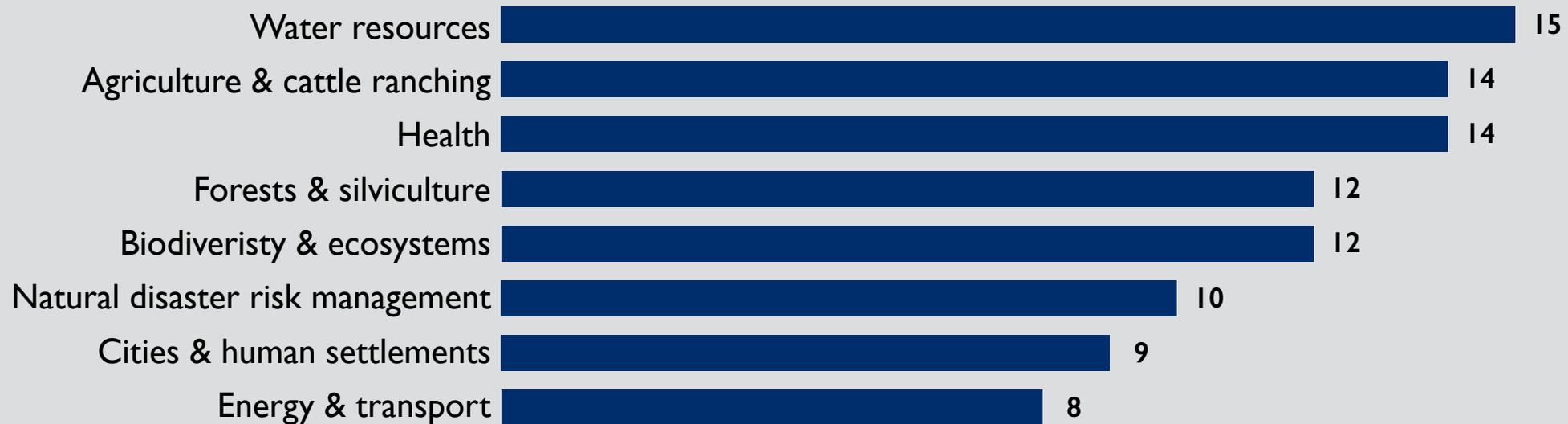
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# POLICIES | Following the Paris Agreement, LAC has made ambitious adaptation commitments in its NDCs

## Adaptation commitments in NDCs

30 of 32 LAC countries analyzed include adaptation in their NDCs, with the sectors having the most adaptation commitments being water resources, agriculture and cattle ranching, and health

### Most commonly prioritized sectors for adaptation commitments (# of countries)



- Countries have also made adaptation commitments in infrastructure, coastal and marine zones/resources, fishing and aquaculture, food security, and tourism

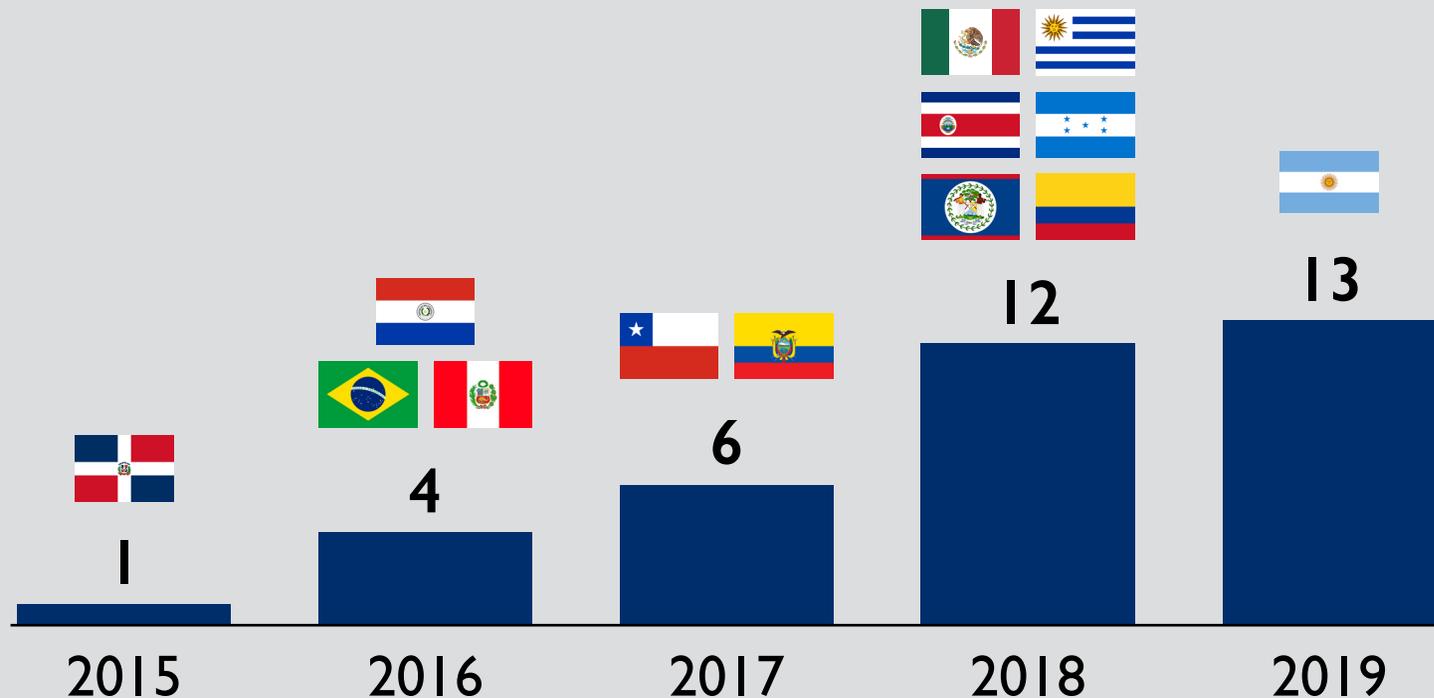
**Adaptation commitments are also expanding, with 10 countries including new adaptation goals in 2020**

Sources: 1. Libélula, BID, PNUD, “Hacia un desarrollo resiliente y bajo en emisiones en Latinoamérica y el Caribe: Progreso en la implementación de las Contribuciones Nacionalmente Determinadas (NDC),” 2019; 2. ECLAC, “Economics of Climate Change in Latin America and the Caribbean A Graphic View,” 2018; 3. Eco Ltd Group, “Boosting climate finance for adaptation actions under the NDCs in Latin America and the Caribbean,” 2019.

# POLICIES | To achieve their NDCs, LAC nations have begun developing NAPs

## Total number of NAPs in LAC by year (2015-2019)

Flags represent new countries with NAPs that year



- Other countries do not have NAPs, but have incorporated adaptation in key policy documents:
- *National development plans:* Bolivia, El Salvador
- *National climate change plans:* Cuba
- *Both development and climate plans:* Guatemala, Jamaica
- Panama currently includes adaptation in its 2015 National Climate Change Strategy and plans to develop its NAP in 2023
- Venezuela lacks adaptation strategies in all capacities

- In general, NAPs have placed the most attention on **water resources, biodiversity, and agriculture**
- NAPs are beginning to incorporate adaptation into the strategies of ministries and institutions focused on **women and vulnerable populations**

Sources: Libelula, "Hacia un desarrollo resiliente y bajo en emisiones en Latinoamérica y el Caribe: Progreso en la implementación de las Contribuciones Nacionalmente Determinadas (NDC)," 2019; Efe, "Uruguay lanza un plan nacional para adaptación de ciudades al cambio climático," 2018; Gobierno de la República de Panamá, "Estrategia Nacional de Cambio Climático 2050"; Peru Ministerio del Ambiente, "Perú Se Adapta al Cambio Climático: Plan Nacional De Adaptación," 2016; La Ruta del Clima, "Costa Rica Trabaja en su Plan de Adaptación," 2018.

# **POLICIES | Key challenges remain to successfully incorporate actionable and transformative adaptation policies in the region**



## **Government coordination**

### **Lack of awareness at all government levels**

- Poor mainstreaming of adaptation policies at municipal, state, and national governments

### **Lack of mechanisms for interinstitutional coordination**

- Insufficient adaptation measures in non-traditional sectors
- Low involvement of different entities and ministries in building adaptation strategies; consequently most countries have been unable to transversally apply adaptation policies in all sectors and ministry plans



## **Government capacity**

### **Low capacity for decision-making and implementation**

- Low government capacity and technical knowledge on what works (for policy development and implementation)
- Insufficient use of scientific information for decision-making
- Lack of training on the difference between development and climate-resilient development
- Ineffective enforcement mechanisms and regulations
- Insufficient knowledge sharing platforms and protocols for learning

### **Lack of tools for implementation and evaluation**

- Inexistent or ineffective monitoring and evaluation mechanisms, which impede adequate policy and regulation implementation

Source: UNDP, UNEP, and GEF, "Latin America in Focus: Regional Brief on National Adaptation Plans," n.d.

# POLICIES | Key challenges remain to successfully incorporate actionable and transformative adaptation policies in the region



## Financing

- Insufficient local and national government funding for climate adaptation
- Poor links and mechanisms (i.e., guarantees) to facilitate access to international financing (i.e., multilaterals, bilaterals)
- Low private sector investments in adaptation (i.e., fiscal incentives)



## Cross-sector support

- Insufficient private sector and other stakeholder involvement, particularly vulnerable populations; as a result there are few effective multi-stakeholder plans
- Poor enabling conditions or incentives for the private sector to adhere to and prioritize adaptation in their operations
- Insufficient behavioral changes among citizens (e.g., changes in demand for electromobility and clean energy have been slow)

Source: UNDP, UNEP, and GEF, "Latin America in Focus: Regional Brief on National Adaptation Plans," n.d.

# CASE STUDY | Tackling climate change in Bogota by incorporating adaptation into a citywide climate plan



## Context

- In 2010, Bogotá drafted its Regional Integral Climate Change Plan for Bogota-Cundinamarca (PRICC)
- Takes a regional approach and focuses on strengthening institutions and enhancing cooperation between agencies



## Approach to address the challenge

- Promotes and facilitates the incorporation of climate change considerations into development agendas
- Strengthens institutional capacity to reduce climate change vulnerability
- Strong institutional commitment, including financial incentives for agencies and institutions to join
- Under its adaptation strategies, PRICC has adaptation measures for hydraulic resources (e.g., design and implementation of sustainable sewage systems), biodiversity and ecosystem services (e.g., soil stability measures), risk management (e.g., creation of drought plan), spatial planning, and sustainable production and consumption (e.g., promotion of green markets)



## Key Achievements

- From 2010 to 2018, the areas in the Process of Ecological Restoration in Bogotá increased by 50% (119 hectares in 2010 to 179 hectares in 2018)
- From 2012 to 2018, the annual sustainable construction record increased from 16,500 m<sup>2</sup> to 26,000 m<sup>2</sup>
- From 2011 to 2018, the area of vertical gardens in Bogotá increased from 20 to 3,953 m<sup>2</sup>

Sources: 1. IDEAM and PNUD, "Identificación de Medidas y Formulación de Proyectos de Mitigación y Adaptación a la Variabilidad y al Cambio Climático en la Región Capital Bogotá-Cundinamarca," 2014; 2. PNUD and Cooperación Española, "Programa Regional Sobre Cambio Climático para América Latina y el Caribe 2009-2015," 2015; 3. Observatorio ambiental de Bogotá, Indicadores Cambio climático, 2019.

# CASE STUDY | Jamaica's nationwide climate adaptation strategy, anchored on sector integration

## Context



- Jamaica's 2009 "National Development Plan, Vision 2030" determined climate adaptation as a national priority
- The plan calls for vulnerable sectors to develop their own adaptation planning

## Key milestones



**2013:** Established **Climate Change Division** to coordinate activities across different sectors

**2014:** Created the **Climate Change Focal Point Network**, with participation from all ministries, departments, and agencies

**2015:** Developed the **Climate Change Policy Framework**, which prioritizes the most vulnerable sectors (12 total), including forestry, agriculture, energy, and water

**2017:** 1) Drafted Forestry Sector Strategy and Action Plan; 2) Trained staff across ministries and departments on budgeting; and 3) Provided specific training on adaptation for the Climate Change Focal Point Network

## Key strengths



- Strong monitoring and evaluation framework, applied by the Climate Change Division
- Sector integration approach, achieved via two mechanisms
  - Incorporating climate adaptation into Jamaica's development plan, which enables interaction between sectors
  - Working through the Climate Change Focal Point Network when creating sector strategies and action plans, which provides representation from all sectors

Source: NAP Global Network 2017.



Photo: Paula Prekopova on Unsplash



# TECHNOLOGY & INNOVATION

# TECHNOLOGY | Climate adaptation technologies have helped improve climate resilience in multiple sectors (1 of 2)

## Technology types



### Agriculture

- Drip irrigation and irrigation efficiencies
- Water capture systems
- Adapted crops (i.e., drought-tolerant)
- Precision farming
- Tech. for livestock (i.e., ventilation systems)
- Agroforestry



### Natural resources

- Material reuse and recycling
- Constructed wetlands



### Coastal zones

- Dikes, tidal barriers, and sea-walls
- Early warning and evacuation systems
- Hazard insurance
- Disaster-resistant building technologies
- Drainage technologies
- Desalination systems



### Urban infrastructure

- Energy and water efficiency
- Urban heat moderation technologies
- Flood prevention technologies
- Disaster-resistant building technologies
- Leakage management
- Non-water-based sanitation
- Extensive green roofs and green covering shelters



### Public health

- Cool or green roofs to reduce heat effects
- Air conditioning

Note: Rallying the Region to Action on Climate Change.

Sources: 1. Dialogo Chino, "5 low-cost technologies that help protect Latin America's environment," 2019; 2. Global Opportunity Explorer, "Fortaleza: Utilizing Digital Tools To Transform Waste," 2018; 3. IDB and GSMA, "Technology for Climate Action in Latin America and the Caribbean: How ICT and Mobile Solutions Contribute to a Sustainable, Low-Carbon Future," 2018; 4. World Bank, CIAT, and CATIE, "Climate-Smart Agriculture in El Salvador," 2014; 5. SPORE, "Modernising climate adaptation in the Caribbean," 2018; 6. Think Nature, "Nature-Based Solutions Handbook," 2020.

# TECHNOLOGY | Climate adaptation technologies have helped improve climate resilience in multiple sectors (2 of 2)

## Examples in LAC

### Mexico

Climate smart buildings (e.g., HSBC Bank Tower) that are energy and water efficient, and that are equipped with sustainable wastewater systems and urban heat technologies; SMN platform to monitor disasters

### El Salvador

Meteorological Observatory, an electronic climate information service; SERVIR platform monitors disasters in Central America

### Colombia

ICT in Medellin for smart transport and ready early warning system, UNGRD platform to monitor disasters

### Ecuador

ReciVeci app for waste management; partnership between Amazon Watch Digital Globe, Planet, and Amazon Conservation Team to use satellite maps against deforestation

### Chile

Thaki geospatial platform



### Antigua and Barbuda

RRACC<sup>1</sup> Project - Hydroponic greenhouses; drip irrigation; water catchment system



### Dominica

RRACC<sup>1</sup> Project - Drainage systems, improved seawall technologies



### Brazil

Online system for waste management responsibilities in Fortaleza; Ericsson Telefónica partnership to provide smart transport solutions using mobile broadband; Servir-Amazon platform to monitor disasters



### Argentina

Buenos Aires - water and weather monitoring system to facilitate data-driven emergency decision-making

Note: Rallying the Region to Action on Climate Change. SMN refers to Mexico's National Weather Service, Servicio Meteorológico Nacional.

Sources: 1. Dialogo Chino, "5 low-cost technologies that help protect Latin America's environment," 2019; 2. Global Opportunity Explorer, "Fortaleza: Utilizing Digital Tools To Transform Waste," 2018; 3. IDB and GSMA, "Technology for Climate Action in Latin America and the Caribbean: How ICT and Mobile Solutions Contribute to a Sustainable, Low-Carbon Future," 2018; 4. World Bank, CIAT, and CATIE, "Climate-Smart Agriculture in El Salvador," 2014; 5. SPORE, "Modernising climate adaptation in the Caribbean," 2018; 6. Think Nature, "Nature-Based Solutions Handbook," 2020.

# TECHNOLOGY | Despite the increased adoption of climate adaptation technologies, several key challenges impede greater usage



## Enabling environment

### Suboptimal environment for innovation

- Insufficient public and private funding for technology research and development (i.e., grants, subsidies)
- Inadequate entrepreneurial ecosystem
- Few policies and regulations that encourage the transition to adaptation technologies
- Low investment in building innovation capacity (i.e., prototype design, technology testing, piloting)
- Weak regulations/enforcement on technology development (i.e., intellectual property rights, patents)



## Cross-sector collaboration

### Insufficient collaboration across sectors

- Lack of knowledge sharing among sectors and actors
- Lack of multi-stakeholder partnerships for technology development and deployment



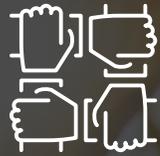
## Awareness

### Slow consumer level adoption

- **Low awareness:** Individuals and private companies lack education on long-term benefits of adaptation technologies (i.e., cost benefits, well-being benefits); challenging to achieve behavioral changes (i.e., use of clean energy, urban mobility practices)
- **Unaffordability:** Little access to financing for technology adoption (i.e., microcredits, loans); few mechanisms to increase affordability (i.e., lowering costs, tax breaks, other monetary incentives)
- **Inaccessibility:** Low technology literacy (i.e., need technical assistance on the use of technologies)

Sources: 1. IDB, “Developing solutions for climate adaptation and resilience is a business opportunity for SMEs in Latin America and the Caribbean,” 2020; 2. IDB, “Small and medium-sized businesses are among the most innovative enterprises in building climate resilience,” 2020; 3. IDB and GSMA, “Technology for Climate Action in Latin America and the Caribbean: How ICT and Mobile Solutions Contribute to a Sustainable, Low-Carbon Future,” 2016.

# CASE STUDY | MasAgro Program – adapting maize production to the effects of climate change



## Challenge

- In the next 10 years, climate change could decrease Mexican agricultural production by 25% due to soil erosion and water scarcity
- Mexican smallholder farmers traditionally utilize suboptimal agricultural practices and inadequate fertilizers, which must be adapted to the increasing effects of climate change



## 2015 results

- 48 seed producing SMEs participated in MasAgro programs; seed sales for these companies increased 44%
- Average income for MasAgro participating maize producers was 23% higher than the regional average
- 46 technicians certified in sustainable agriculture and 55 trained – cumulatively, MasAgro has certified 294 technicians



## Approach to address the challenge

- Joint initiative between CIMMYT and SAGARPA to support smallholder farmers that have limited access to technology and market information<sup>1</sup>
- Development of innovative agricultural practices including precision agriculture and conservation agriculture
- Development and increased use of improved, high-performance seed varieties

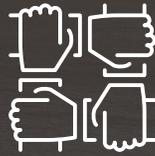
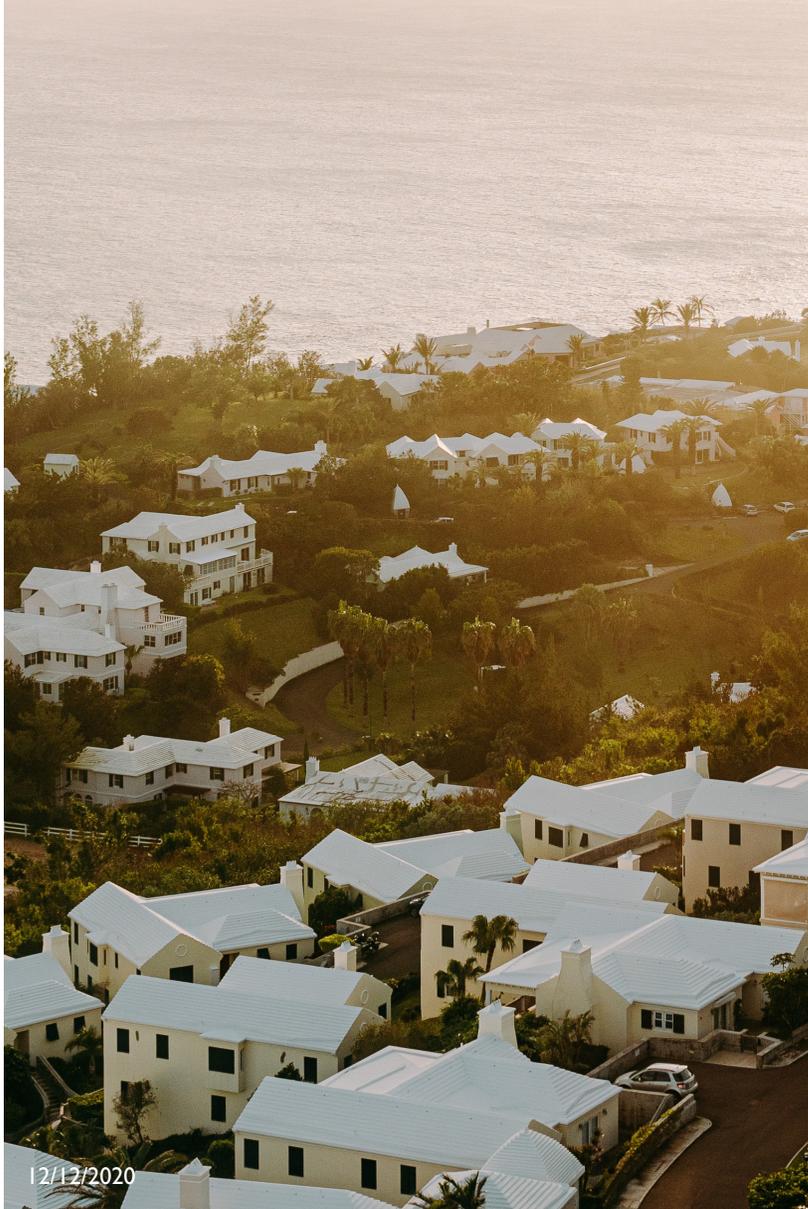


## Expected benefits

- Increase in national production of maize – from 5 million to 9 million tons in ten years
- Contribute five times more to the economy, in added value, not considering the extra grains SHFs will be able to produce
- Job creation and decreased migration
- Poverty decreases and more decentralized development

Sources: 1. IDEAM and PNUD, "Identificación de Medidas y Formulación de Proyectos de Mitigación y Adaptación a la Variabilidad y al Cambio Climático en la Región Capital Bogotá-Cundinamarca," 2014; 2. PNUD and Cooperación Española, "Programa Regional Sobre Cambio Climático para América Latina y el Caribe 2009-2015," 2015; 3. Observatorio ambiental de Bogotá, Indicadores Cambio climático, 2019..

# CASE STUDY | Building water and energy resiliency in Bermuda



## Challenge

- Bermuda frequently experiences hurricanes and droughts, which used to severely damage infrastructure, including the country's power and water supply

## Approach to address the challenge

To reduce the large-scale effects of frequent hurricanes and droughts, Bermuda has:

- Moved 100% of transmission cables and 50% of distribution cables underground, with plans to move all cables underground in the next few years
- Developed plans on the part of Belco, the national electricity supplier plans to implement a grid modernization project to prevent outages
- Place fuel generators at an elevation of 4.5 meters to ensure power during floods or sea level rises
- Promoted the use of solar energy and renewable energy, such as electromobility
- Modified building codes, including banning constructing houses with wood and requiring all houses to be painted with a white hard covering that protects them from extreme winds
- Designed roofs to capture water, with a water tank installed below each house



## Benefits

- Every house has a clean water reserve of approximately 25,000 liters
- Eliminates the need for a potable water network
- Reduced damage to infrastructure and homes
- More reliable energy supply and greater energy security



Source: IDB, "An Example of Climate and Energy Resilience for the Caribbean," 2018.



# CALLS TO ACTION

# CALLS TO ACTION | A holistic, cross-sectoral approach is needed to expand the use of market-based-mechanisms toward environmental outcomes



**The underlying drivers of environmental challenges are often systemic issues** that cut across local economic, social, and cultural realities that are profoundly difficult to address

**Making progress on these challenges often requires cross-cutting approaches** that draw on resources and capabilities from local communities themselves along with support from government, private sector, civil society, academia, and donors

**The high-level ideas outlined in this section are often interdependent;** they need to be implemented in tandem in order to be effective

**They also require a keen understanding of local context to determine whether and how they might apply** given the size and diversity of the region

Source: Dalberg analysis

# Call to action | In order to increase adoption of climate adaptation, LAC must have the following enabling factors in place (1 of 6)



## Public sector

### Strengthen monitoring and tracking

- Develop Monitoring, Reporting, and Verification (MRV) system for climate finance, which allows countries to calculate the flows they receive and channel to combat climate change

### Strengthen regulatory framework and its application/enforcement

- Develop national adaptations plans (NAPs) with clear programs, implementation plans, ownership, and funding
- Incorporate adaptation measures into national plans (e.g., country development plans) and sector specific plans (e.g., transport plans, energy plans)
- Develop policies to encourage investors to invest in climate adaptation projects

### Develop financing mechanisms to encourage private sector engagement in climate adaptation

- Provide direct loans, grants, equity, or guarantees to private sector projects on climate adaptation
- Develop bonds for climate adaptation (e.g., Catastrophe bonds)

# Call to action | In order to increase adoption of climate adaptation, LAC must have the following enabling factors in place (2 of 6)



Civil Society

## Increase participation in planning and monitoring

- Participate in public consultation process on policies and technologies to adopt

## Engage on activism and advocacy

- Increase pressure on public and private sector players to adopt climate adaptation technologies and policies
- Hold governments accountable for their climate adaptation commitments
- Give voice to the most vulnerable sectors and populations to climate change and that therefore need climate adaptation the most

# Call to action | In order to increase adoption of climate adaptation, LAC must have the following enabling factors in place (3 of 6)



## Private sector

### Develop business models innovation

- Develop and implement business models that include adaptation measures and increase resilience and profitability (e.g, increase Ag yields)
- Formulate viable financial and technical climate adaptation projects

### Increase financing/investing

- Increase engagement of private sector companies as investors for adaptation projects
- Develop new financial products (i.e., climate index insurance)

### Establish collective action

- Establish industry associations that encourage voluntary reporting of climate adaptation finance flows to allow for better monitoring

# Call to action | In order to increase adoption of climate adaptation, LAC must have the following enabling factors in place (4 of 6)



## Academia/Research

### Research and knowledge dissemination

- Quantify the effects of climate change and its impact on different sectors in LAC specific contexts
- Research best practices in climate adaptation and success stories, and disseminate the impact

### Innovative

- Develop new climate adaptation technologies (e.g., heat resistant seeds)

### Update curricula

- Update curricula across a diverse range of disciplines to adequately address climate adaptation

### Engage the community

- Serve as “hubs” in their communities on adaptation issues
- Advocate for specific adaptation policies at the local, state, and national levels

# Call to action | In order to increase adoption of climate adaptation, LAC must have the following enabling factors in place (5 of 6)



## Support governments to expand technical capacity

- Build local capacity on climate adaptation, including technical capacity, and implementation and monitoring of NAPs and other adaptation policies
- Support governments mainstream adaptation policies into national plans and sector specific plans
- Provide tools and develop strategies to build resilience to climate variability and risks (e.g., USAID's Climate-Resilient Development Framework, 2014)

## Provide access to climate services

- Provide access to climate service information on longer-term weather conditions (e.g., historical weather patterns and expected future climate conditions)
- Train meteorologists and others to develop tools to help planners
- Develop economic estimations of the value of climate services to farmers and other users of climate data
- Evaluate climate services programs

# Call to action | In order to increase adoption of climate adaptation, LAC must have the following enabling factors in place (6 of 6)



## Facilitate knowledge transfer and collaboration across countries (cross-Mission learnings)

- Cross learning from other Missions – USAID reaches nearly 30 countries in Africa, Asia, and Latin America with science, knowledge, tools, and actions to adapt to change

## Support private sector engagement for climate adaptation (sectors/geographies with USAID)

- Support the development of public private partnerships for climate adaptation

## Support the development of financing mechanisms for climate adaptation

- Increase lending to private sector companies to promote climate finance (e.g., grants)
- Provide risk sharing mechanisms (e.g., guarantees)
- Invest in innovative finance structures to fund projects to demonstrate viability or overcome hesitance

**THANK YOU**



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