

Implementation of adaptation to climate change activities in Latin America

- The adaptation agenda in Latin America World Bank
- The use of the Earth Simulator in climate projections in Latin America MRI
- Implementation of adaptation measures in Coastal Zones in the West Indies. SPACC project CCCCC
- Implementation of adaptation measures to climate impacts in Colombia. INAP project. IDEAM
- Adaptation to rapid glacier retreat in the Tropical Andes. PRAA project. CONAM
- Adaptation to climate impacts in the coastal wetlands of the Gulf of Mexico. INE

Adaptation to Climate Activities in Latin America Region

Experience with Adaptation Projects in Latin
America

Wvergara@worldbank.org

June 3rd, 2008



Climate change strategy in Latin America and the Caribbean

- a) To support low carbon growth, in particular in the energy and transport sectors, which represent the bulk of emissions in the region and to reduce emissions from deforestation and forest degradation;
- b) To support the process of adaptation, focused on key vulnerabilities (hotspots); and
- c) To support the linkages between knowledge, science and decision making.

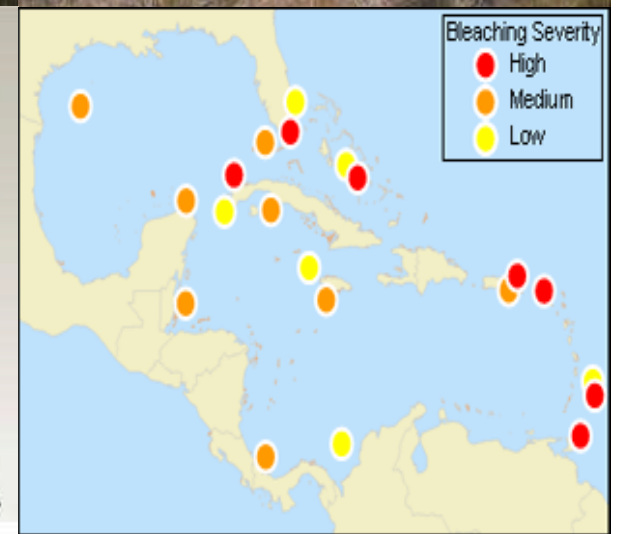
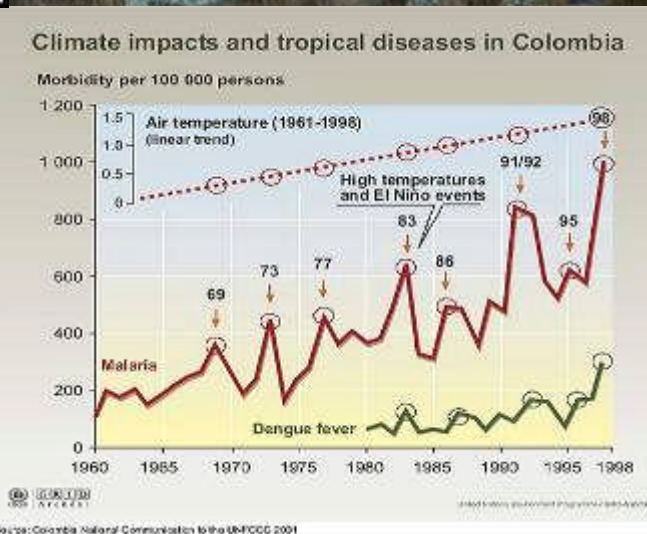
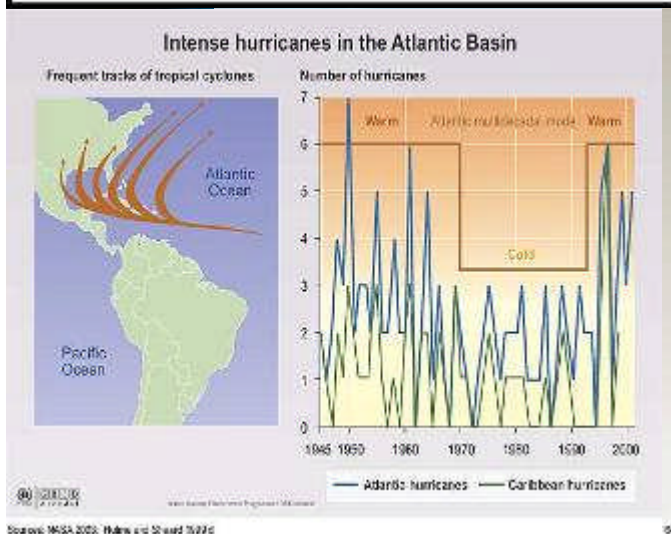
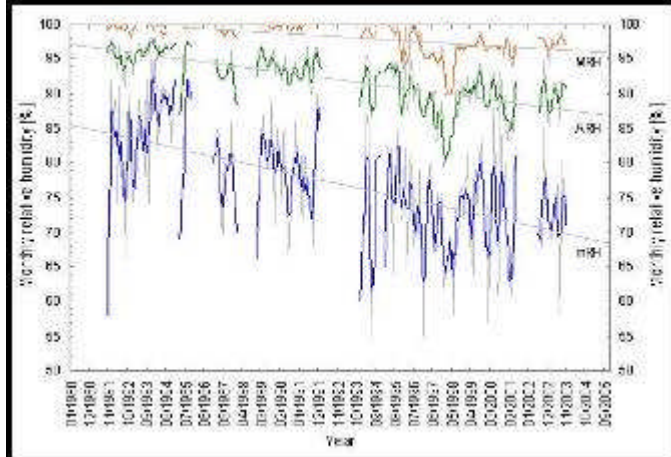
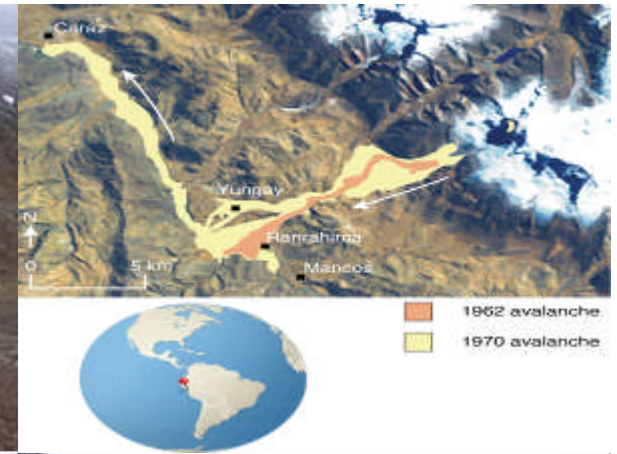
Emissions of CO2 in 2004

<i>Country</i>	<i>Annual CO2 emissions (2004 MMt)</i>	<i>Carbon intensity (kg/PPP US\$, 2000)</i>	<i>Per capita Emissions (Mt/year)</i>	<i>Carbon path (% increase 1990-2004)</i>
United States	5.99	0.6	20.0	16.8
China	5.01	0.6	3.8	108.7
Germany	0.89	0.4	10.7	(15.8)
Japan	1.28	0.4	10.1	12.4
Brazil	0.33	0.2	1.8	58.2
Mexico	0.44	0.5	4.2	5.9
Colombia	0.05	0.2	1.2	(7.7)

Source: World Development Indicators, 2007

Current status of climate portfolio of the World Bank in Latin America

- Work started in 1997
- Regional strategy was made public in 2004
- 52 Kyoto protocol mitigation projects
- 9 adaptation projects
- 30 technical assistance and sector work activities
 - Low carbon growth assessments (Mexico & Brazil)
 - Flagship study
 - Amazon dieback risk analysis
 - Glacier and mountain wetlands dynamic analysis
 - Social dimensions of climate impacts



Climate hotspots

<i>Hotspot</i>	<i>Magnitude of Impact</i>	<i>Immediacy</i>	<i>Irreversibility</i>	<i>Economic Consequences</i>
Collapse of the coral biome in the Caribbean	Very High, region wide	Now	Complete	Large
Tropical Glacier retreat	Very High, region wide	Now	Complete	Large
Subsidence of coastal wetlands in the Gulf of Mexico	Very High, region wide	This century	Complete	Large
Amazon dieback	Very High, region wide	This century	Complete	Large

Key vulnerabilities

- Coral reef biome endangered by climate, will affect fisheries, tourism, biodiversity
- Mountain ecosystems suffering quick warming will affect water regulation and in turn water supply for urban use, agriculture, power and ecosystem integrity
- Amazon basin may contract to adjust for reduced rainfall in turn affecting water circulation at a regional and global scale
- Potential intensification of hurricanes will affect infrastructure, human settlements, biodiversity
- Coastal flooding affecting coastal ecosystems and settlements.

Convey information on climate into the development process

- Provide a bridge between science and development ensuring access to data, tools for observation, modeling and planning
- Support R&D and international cooperation to develop and transfer low carbon and adaptation technologies

Partnership Latin America-Japan-World Bank

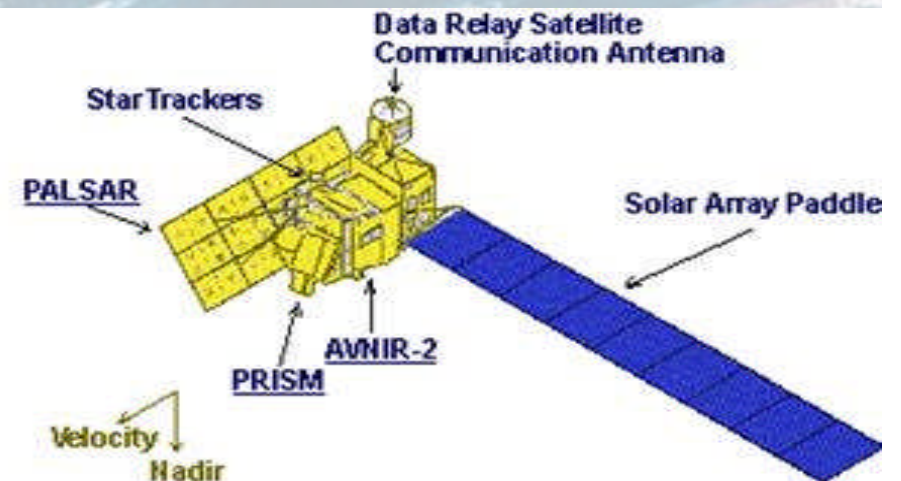


•Scope of Cooperation with JAXA/RESTEC.

- Monitoring of
- glacier region
 - coral reefs
 - coastal wetlands
 - amazon region

•Scope of Cooperation with MRI.

- training in Japan to enable efficient use of ES data
- technical assistance to interpret results
- scientific exchange
- cooperation for dissemination of results in scientific literature
- data storage
- feedback to ES for better future simulation at regional level



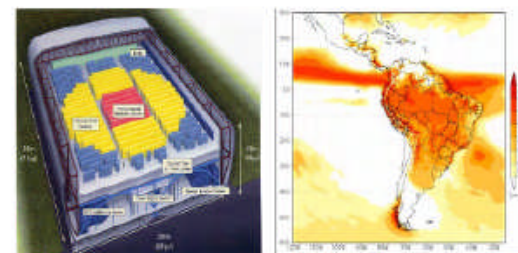
Support for modeling of future climate and impacts

- Application of Earth Simulator (MRI) results (Training, data compilation and interpretation)
 - Glaciarized Basins; Coastal Wetlands, Coral Reefs, Amazon basin
- Use of ensemble results from regional models
- Development and application of new tools for simulation of future impacts



Latin America and Caribbean Region
Sustainable Development Working Paper 30

Visualizing Future Climate in Latin America: Results from the application of the Earth Simulator



November 2007

By:

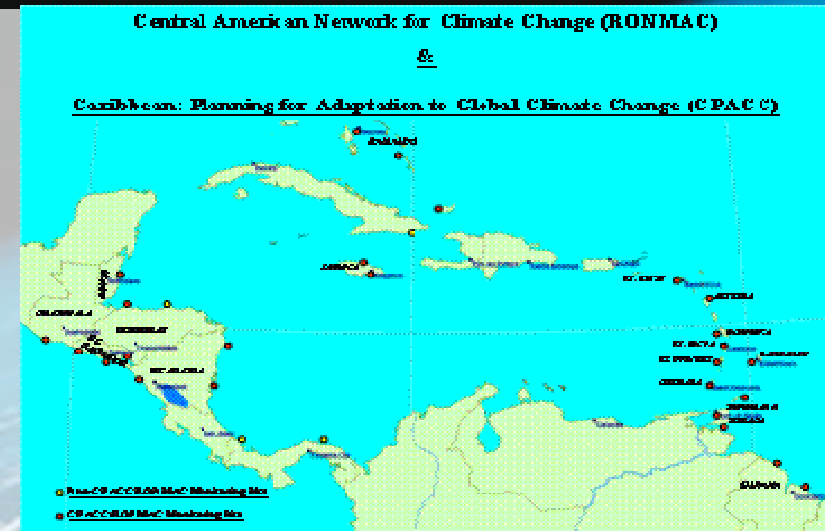
World Bank: Walter Vergara
Japan Agency for Marine-Earth Science and Technology: Hiroki Kondo
INE (Mexico): Edgar Pérez Pérez, Juan Matías Méndez Pérez and Victor Magaña Rueda
IDEAM (Colombia): María Constanza Martínez Arango and José Franklin Ruiz Murcia
SENAMHI (Peru): Grinia Jesús Avalos Roldán
INAMHI (Ecuador): Enrique Palacios

The World Bank

Latin America and the Caribbean Region
Sustainable Development Department (LCSSD)

Support for long-term climate observation systems.

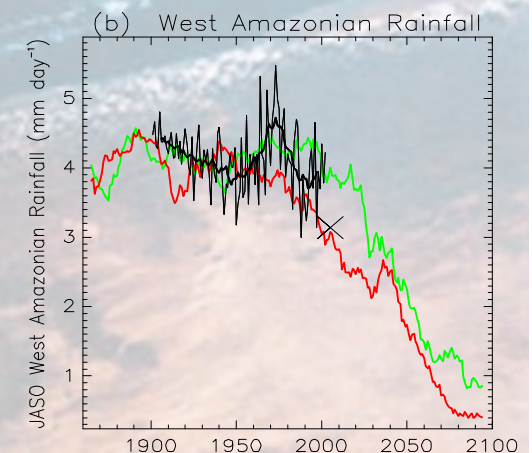
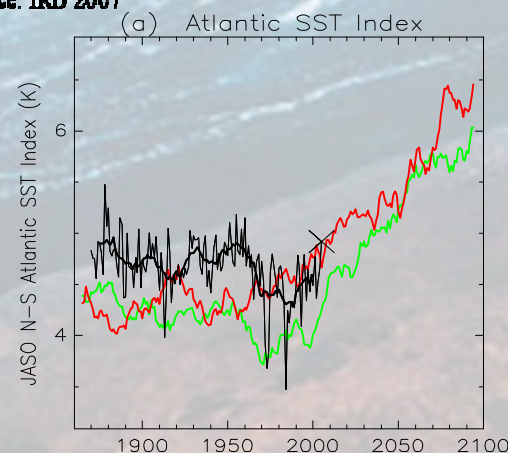
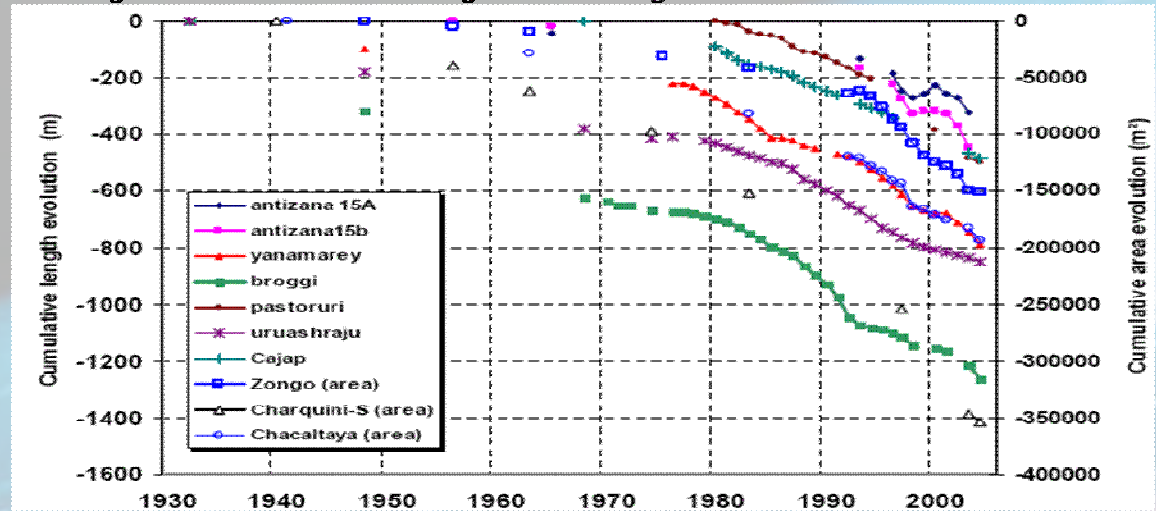
- Network of stations for SST and SL in the Caribbean
- Network of stations in glacierized basins of immediate economic relevance.
- Remote sensing (ALOS) of six basins in the Andes (Bolivia, Colombia, Ecuador, Peru)
- Coral bleaching observation (Jamaica)
- Paramo observation system (Colombia)



Analytical and technical work

- Assessment of the climate impacts on net surface hydrology in Peru
- Risk analysis of Amazon dieback
- Options for coral repopulation
- Barrier analysis for renewables

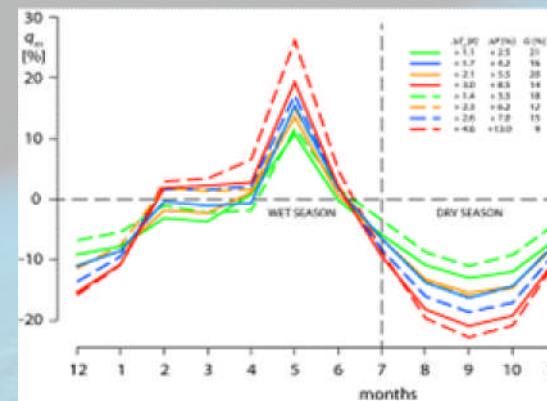
Figure 3. Cumulative loss in length for selected glaciers in the Andes since 1870



Some guiding principles on adaptation

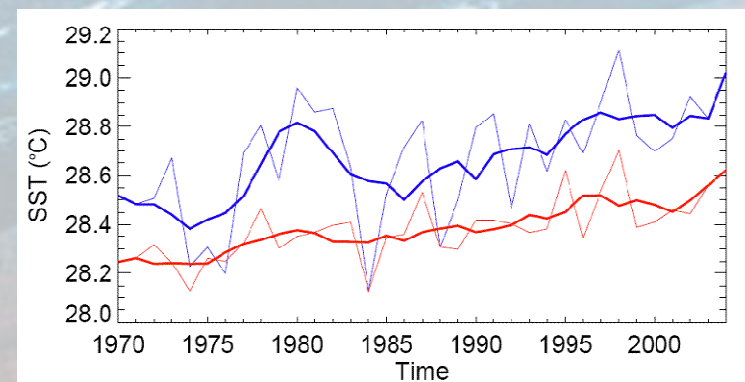
- Tackle trends before variability (nature is noisy, resources are limited)
- Focus on ecosystems first, then sectors (ecosystem services are used by economic sectors and other populations)
- Think long-term, start small
- Adaptation without mitigation is a losing proposition (no level of adaptation commitments can make up for continuing emissions from energy intensive societies)

Figure 5. Runoffs from Llanganuco Glacier (Peru) for different climate scenarios



Source: Juen et al., in press

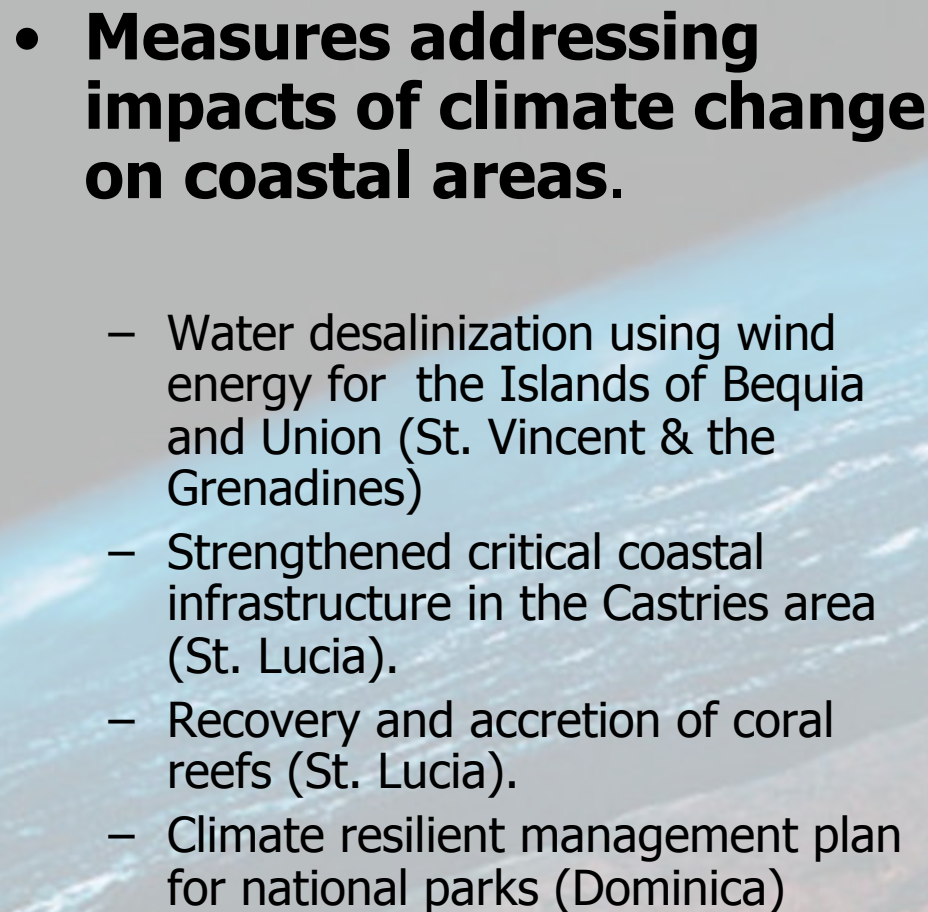
The graph highlights the water regulation function played by tropical glaciers in Los Andes under different scenarios. Large increases in temperature reduce water regulation function.



Portfolio of adaptation activities under execution or preparation

<i>Project</i>	<i>ID</i>	<i>Milestone in FY08</i>	<i>Cost (US\$ million)</i>
Regional: Mainstreaming Adaptation to Climate Change Impacts	73389	Completion of sector adaptation assessments	10.0
Colombia: Integrated National Adaptation Program	83075	Midterm review. Adaptation measures under implementation.	14.9
Regional Implementation of Adaptation Measures in Coastal Zones in the West Indies	90731	Adaptation measures designed	5.5
Regional Adaptation to Impacts of Rapid Glacier Retreat in the Tropical Andes	98248	Board Approval	32.5
Mexico: Adaptation to Climate Impacts in the Gulf of Mexico Wetlands	100438	Council Approval	13.5
Regional: Implementation of Adaptation Measures in Coastal Ecosystems of Global Biological Importance	107047	Council Approval	8.3
Guyana: Conservancy Adaptation (*)	103539	Board approval	5.0
Total			89.7

Adaptation measures in coastal zones of the West Indies (approved: Sept. 2006)

- 
- **Measures addressing impacts of climate change on coastal areas.**
 - Water desalinization using wind energy for the Islands of Bequia and Union (St. Vincent & the Grenadines)
 - Strengthened critical coastal infrastructure in the Castries area (St. Lucia).
 - Recovery and accretion of coral reefs (St. Lucia).
 - Climate resilient management plan for national parks (Dominica)



Colombia: Integrated National Adaptation Plan (approved: Apr. 2006)

- High altitude moorlands (water regulation, carbon storage, hydro-energy)

- Riparian belts, reforestation, habitat conservation

Health Impacts (Increased exposure to Malaria and Dengue)

- Strengthen detection and prevention programs and infrastructure

Insular areas

- Improve resilience of water supply systems in
- San Andres Island

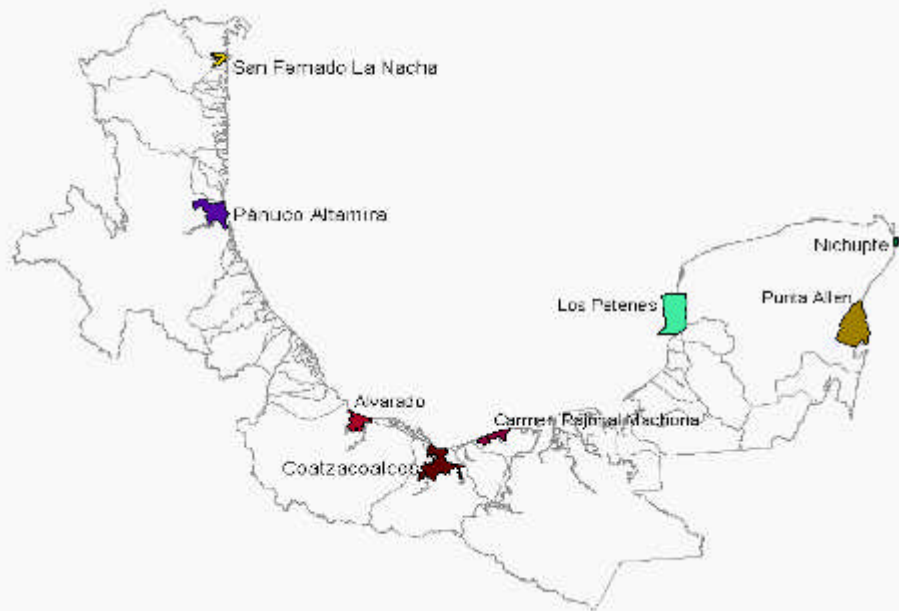


Adaptation to climate impacts in Glaciarized basins (Bolivia, Ecuador Peru) approved May 2008

- Water supply
 - Development of alternative sources
 - Demand management
 - Engineered storage
- Energy supply
 - Diversification of supply
- Agriculture
 - Alternative crops,
 - Advanced irrigation systems



Mexico: Adaptation to climate impacts in coastal zones (to be approved by Dec 08)



Strengthening of coastal infrastructure
Coastal zoning
Restoration and protection of coastal ecosystems
Climate resilient water management

Scheduled Council Approval:
June 2008



Amoya: Environmental Services Project (under construction)

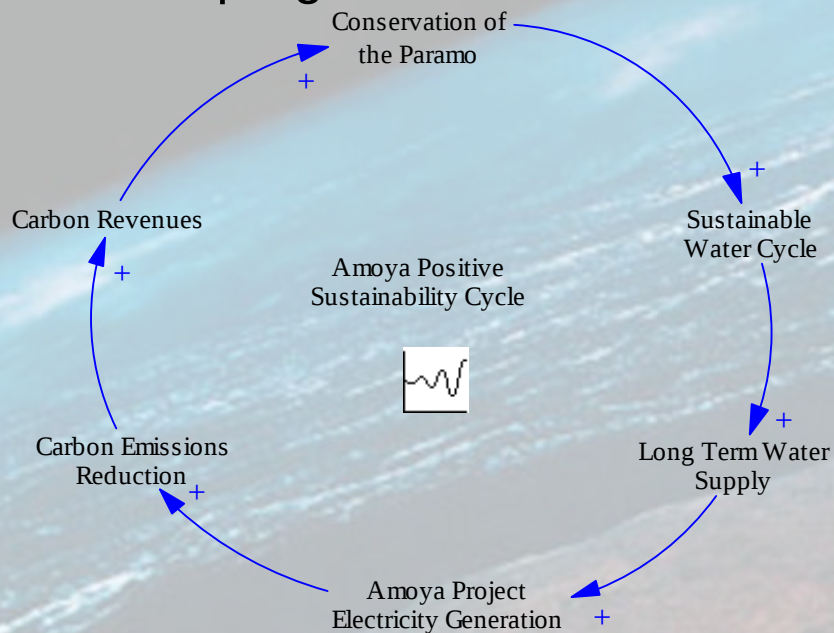
80 MW Run of river project

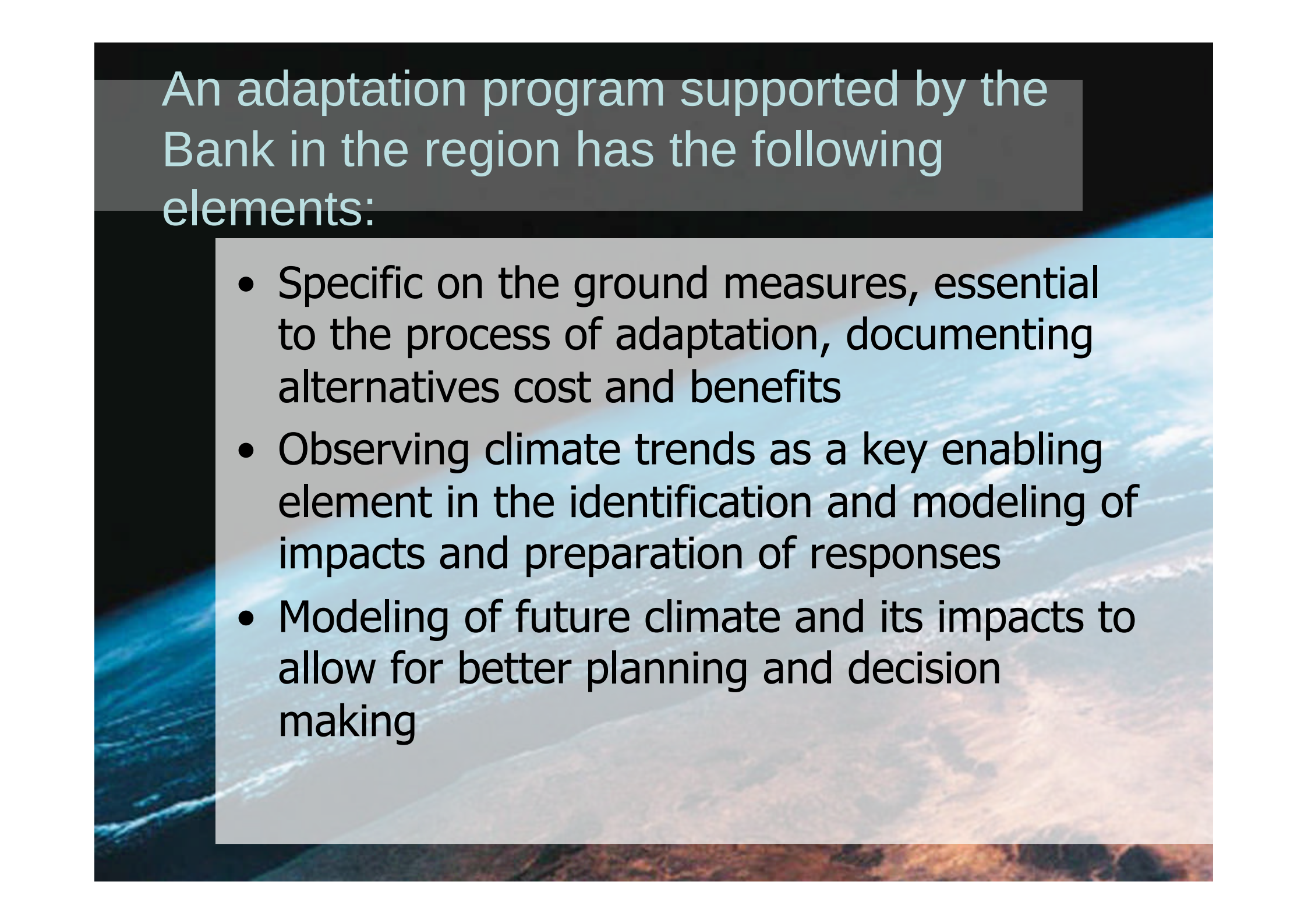
20% of carbon revenues

Support a:

--environmental

--social program



The background of the slide is a photograph of Earth taken from space, showing a curved horizon, blue oceans, and white clouds. A semi-transparent dark grey box is positioned at the top left, containing the title text.

An adaptation program supported by the Bank in the region has the following elements:

- Specific on the ground measures, essential to the process of adaptation, documenting alternatives cost and benefits
- Observing climate trends as a key enabling element in the identification and modeling of impacts and preparation of responses
- Modeling of future climate and its impacts to allow for better planning and decision making