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1945-2015



International
Hydrological
Programme



General Overview of the Project 'The Impact of Glacier Retreat in the Andes' and related IHP activities

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International Hydrological Programme (IHP)
UNESCO

Flanders-UNESCO



Addressing Water Security: Climate Impacts and Adaptation responses in Africa, the Americas, Asia and Europe



Flanders
State of the Art



Managing Water Resources in (semi) Arid Regions of Latin America and the Caribbean (MWAR-LAC)



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International
Hydrological
Programme

Trust Fund (FUST)



The Impact of Glacier Melt on Water Resources: International Network for Adaptation Strategies



The Impact of Glacier Melt on Water Resources: International Network for Adaptation Strategies

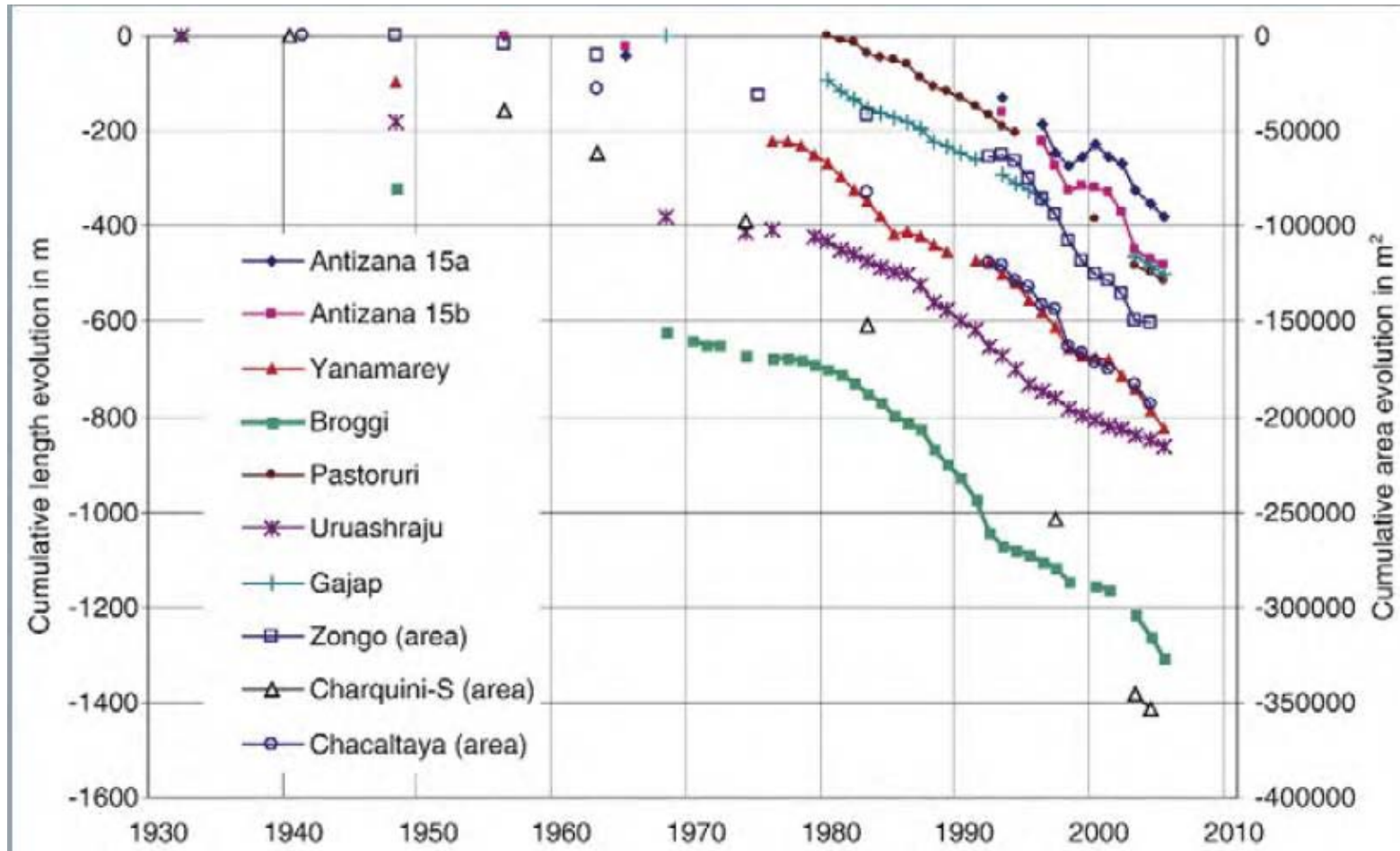
Develop a multidisciplinary network to build enhanced resilience to changes, particularly climate change, through improved understanding of vulnerabilities, opportunities and potential for adaptation





The Impact of Glacier Melt on Water Resources: International Network for Adaptation Strategies

Providing the science base to identify glacier conditions in Andean Countries

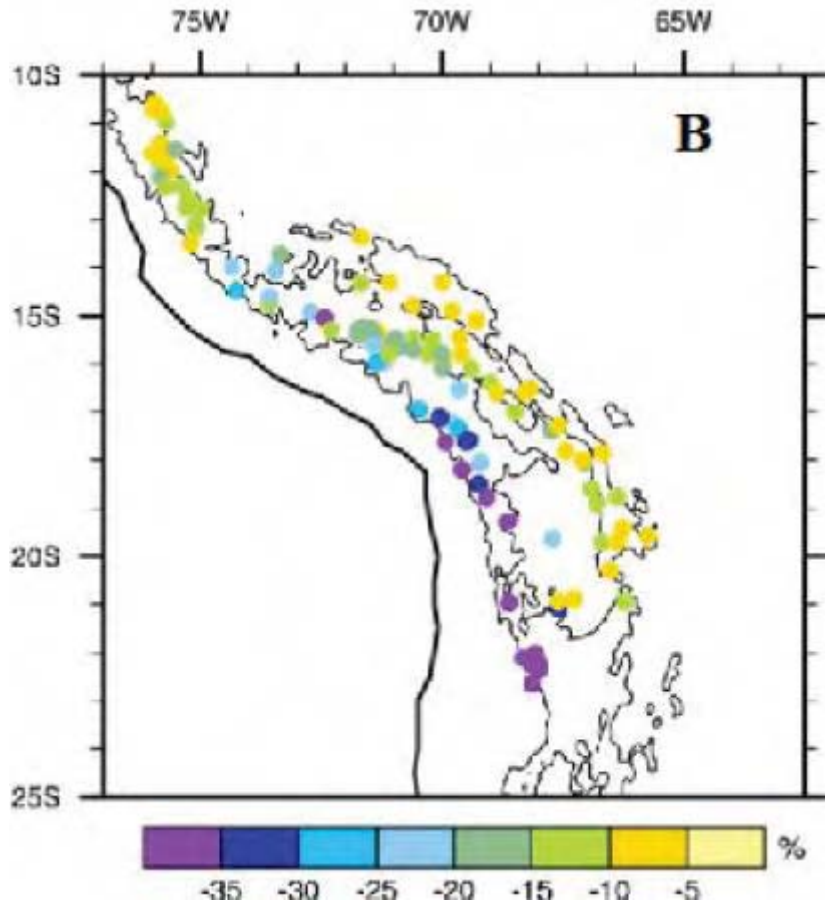


Reductions of glaciers with 40-60% in all Andean Countries

(Vuille et al., 2008)

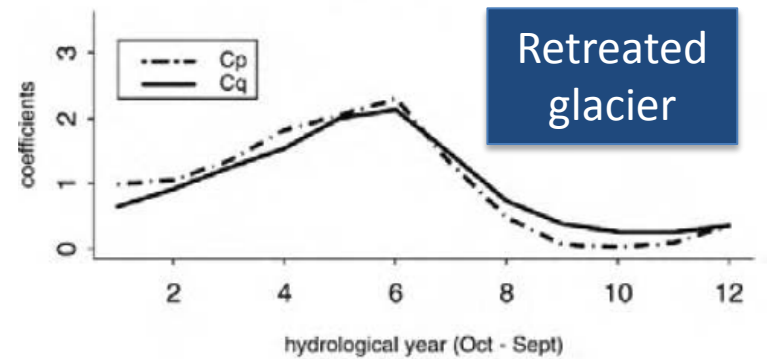


The Impact of Glacier Melt on Water Resources: International Network for Adaptation Strategies

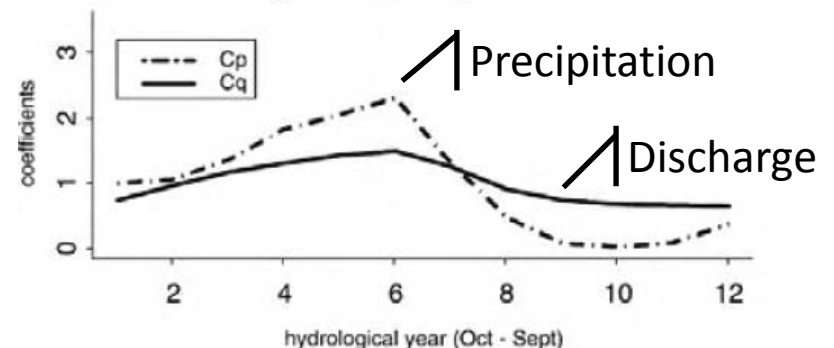


Projected changes in Precipitation
at high altitudes (2070-2099)

Cordillera Blanca, Perú
Querococha 3,2 % glaciation



Llanganuco 33,6 % glaciation



Significant impact on temporal
water resources distribution



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Flemish government



Imperial College
London

View Maps Disabled Tab

- Map Layers
- Glacier Contribution
 - Glaciers
 - Precipitation
 - Google Physical

Layer Settings

Showing data for:

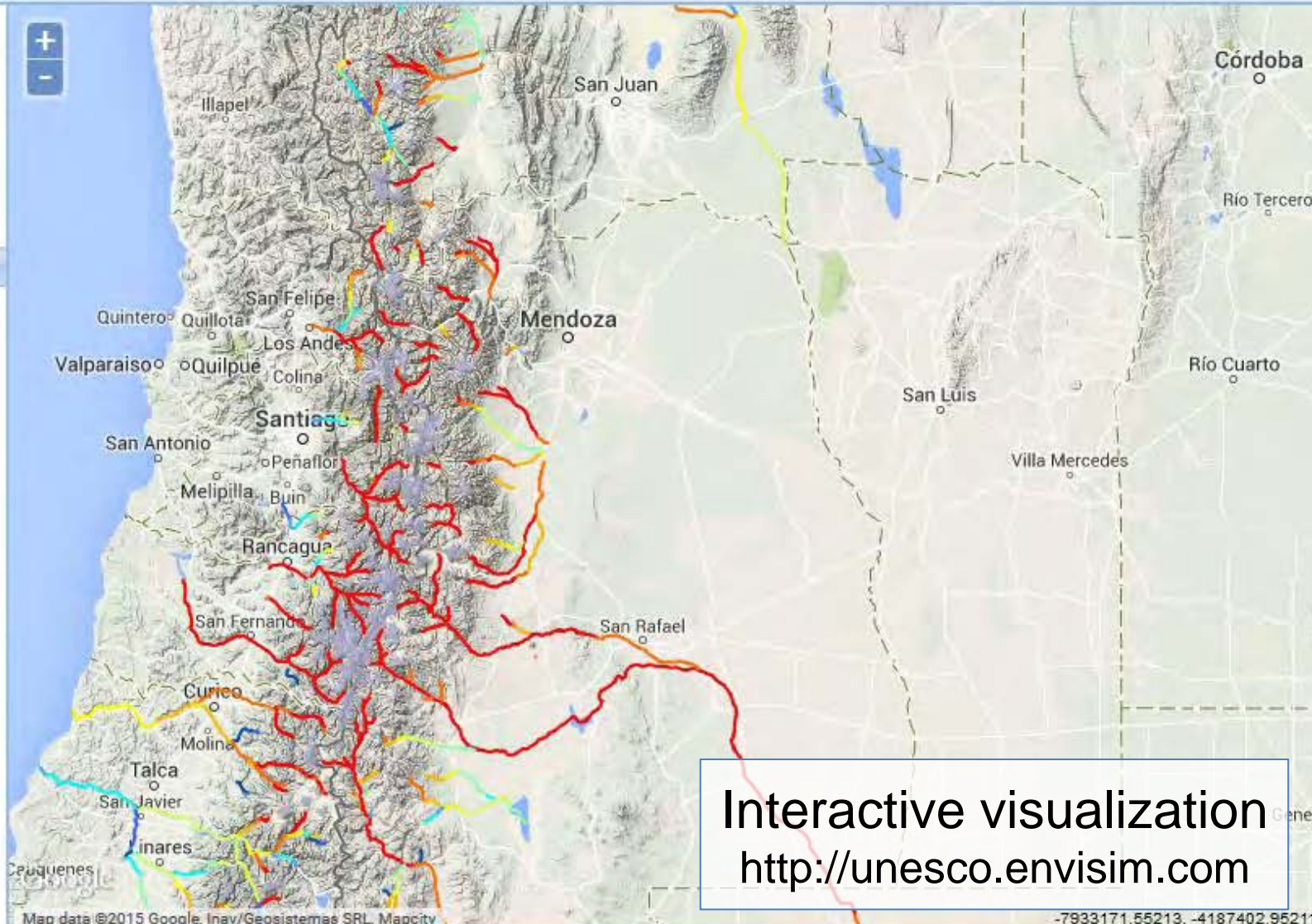
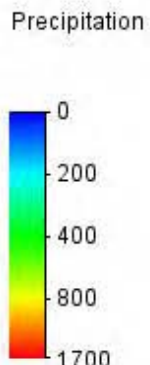
- Average
- Maximum

Legend

Glaciers

Glacier melt contribution (%)

- 1 - 2
- 3 - 4
- 5 - 6
- 7 - 10
- 11 - 15
- 16 - 20
- 21 - 25
- 26 - 35
- 36 - 50
- 51 - 100



Interactive visualization
<http://unesco.envisim.com>



The Impact of Glacier Melt on Water Resources: International Network for Adaptation Strategies

Capacity building of the Andean Countries

Field Course on Glacier Monitoring and Mass Balance

Valdivia, 2012



Climate School on Andean Climate Variability and Change

Lima, 2013





The Impact of Glacier Melt on Water Resources: International Network for Adaptation Strategies

Capacity building of the Andean Countries

New Publication:
Mass Balance Manual (2015)

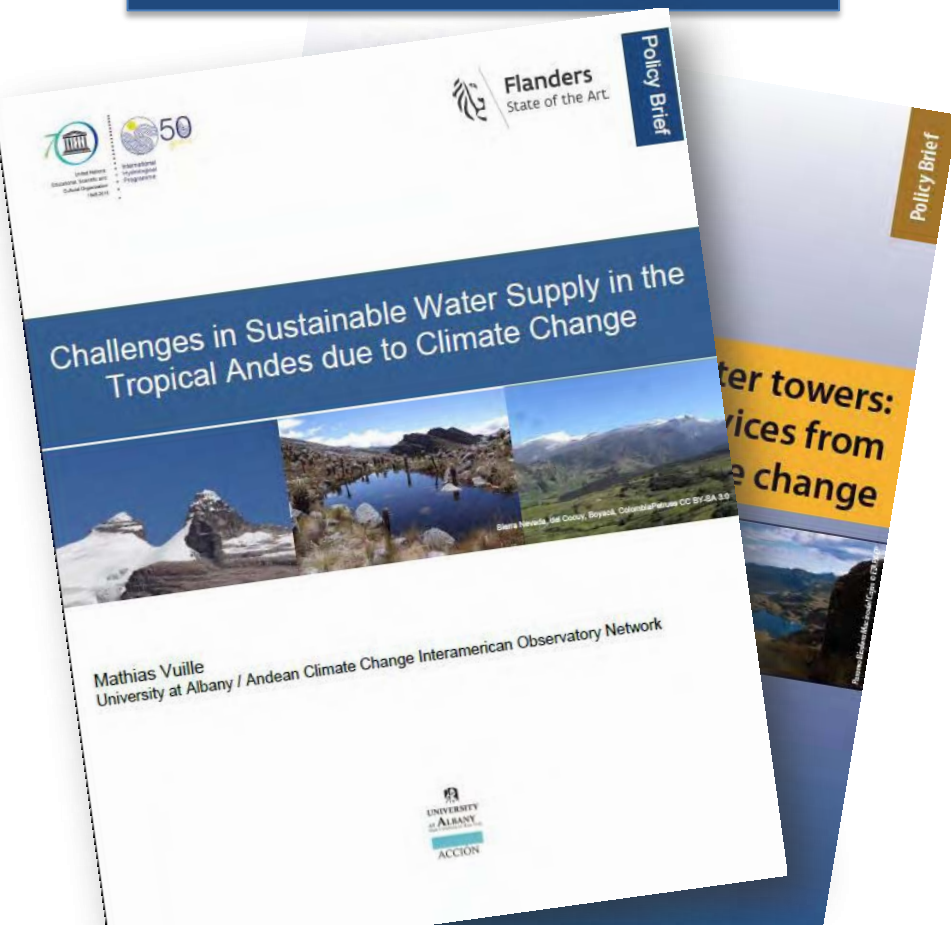




The Impact of Glacier Melt on Water Resources: International Network for Adaptation Strategies

Outreach to decision makers and the General Public

Policy briefs for Decision Makers



Exhibitions for the General Public





The Impact of Glacier Melt on Water Resources: International Network for Adaptation Strategies



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A- A+ [print icon] [email icon]

Inicio Oficina Regional de Educación Área
TERCE

Taller Ciudadanía Reunión glaci

Reunión glaci

Objetivos

Antecedentes

Contexto

Documentos

Sede de la reunión

Hotel y traslados

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El proyec
Andes: Re
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climático, a
políticas co
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fortaleciend

En seguimie

THE IMPACT OF GLACIER RETREAT IN THE ANDES

International Multidisciplinary Network
for Adaptation Strategies



INTERNATIONAL HYDROLOGICAL PROGRAMME
Division of Water Sciences

EQUIPO DE COORDINACIÓN

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Managing Water Resources in Arid and Semi-Arid Regions of Latin America and the Caribbean

Providing the Tools to Identify Climate Risks

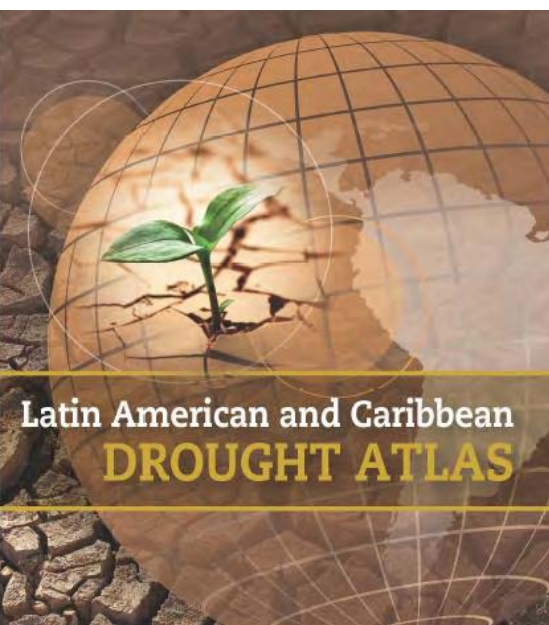
1) The Latin American and Caribbean Drought Atlas

Identifying the frequency of drought events:

- How rare is the current drought?
- How large a drought should we plan for?
- How rare is the drought of record?

A long-term regional activity, spanning the 2008-2015 period:

- 12494 precipitation stations analyzed
- From 21 countries in the region
- More than 10 regional workshops were organized
- Funding provided through multiple sources



Latin American and Caribbean
DROUGHT ATLAS

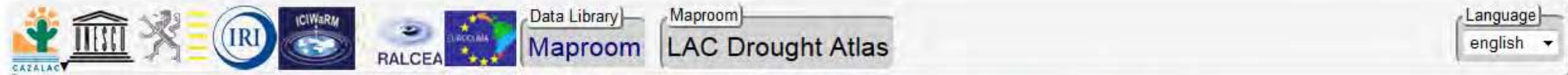


Programa Hidrológico Internacional



The Latin American Drought Atlas

Accessible on-line in Spanish and English



LAC Drought Atlas

Historical drought frequency analysis for the countries of Latin America and the Caribbean.

This maproom shows the results of the Regional Frequency Analysis using L-Moments. The complete analysis is described in Nuñez et al. (2010).

The Drought Atlas was developed in collaboration with the International Center for Integrated Water Resource Management (ICIWaRM) and the European Joint Research Centre (JRC).

Regional workshops were organized with support from the Flanders-UNESCO Trust Fund (FUST) and in collaboration with the EU-funded projects Euroclima and RALCEA.



References

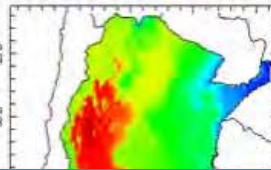
Nuñez, J.H., K. Verbist, J. Wallis, M. Schaeffer, L. Morales, and W.M. Cornelis. 2011. Regional frequency analysis for mapping drought events in north-central Chile. *J. Hydrol.* 405 352-366.

Maximum Expected Precipitation | Minimum Expected Precipitation | Historical Drought Frequencies

Maximum Expected Precipitation

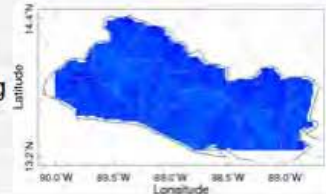
Argentina

This map shows the maximum precipitation amounts for multiple return periods for Argentina using a Regional Frequency Analysis using L-moments



El Salvador

This map shows the maximum precipitation amounts for multiple return periods for El Salvador using a Regional Frequency Analysis using L-moments (RFA-LM).



Guatemala

Three types of maps available:

- Maximum expected precipitation for different return periods
- Minimum expected precipitation for different return periods
- The return period associated with different drought intensities

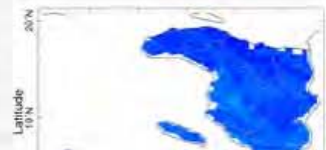
Belize

This map shows the maximum precipitation amounts for multiple return periods for Belize using a Regional Frequency Analysis using L-moments (RFA-LM).



Haiti

This map shows the maximum precipitation amounts for multiple return periods for Haiti using a Regional Frequency Analysis using L-moments



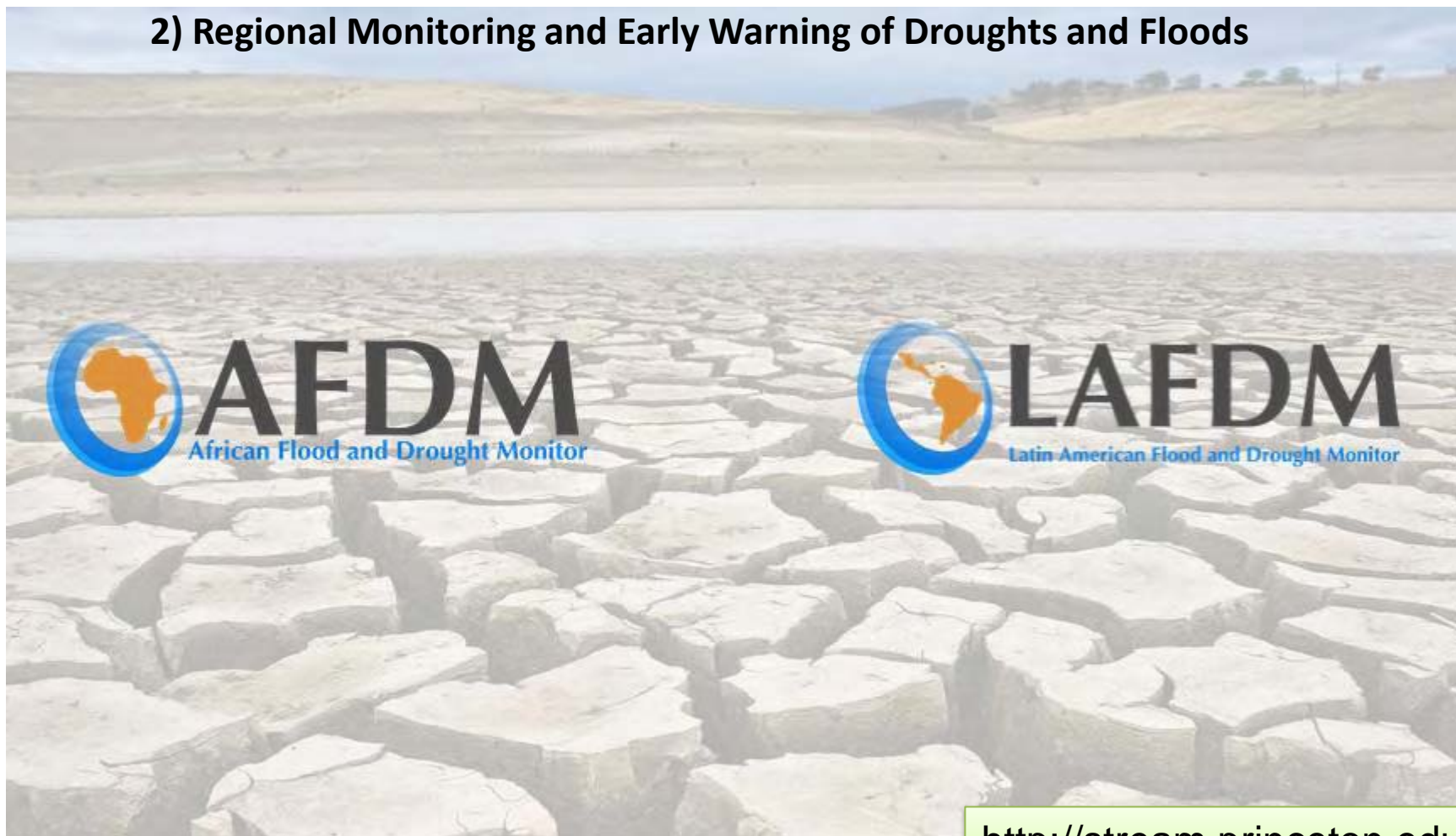
<http://www.climatedatalibrary.cl/CAZALAC/maproom/>



Managing Water Resources in Arid and Semi-Arid Regions of Latin America and the Caribbean

Providing the Tools to Identify Climate Risks

2) Regional Monitoring and Early Warning of Droughts and Floods



<http://stream.princeton.edu/>

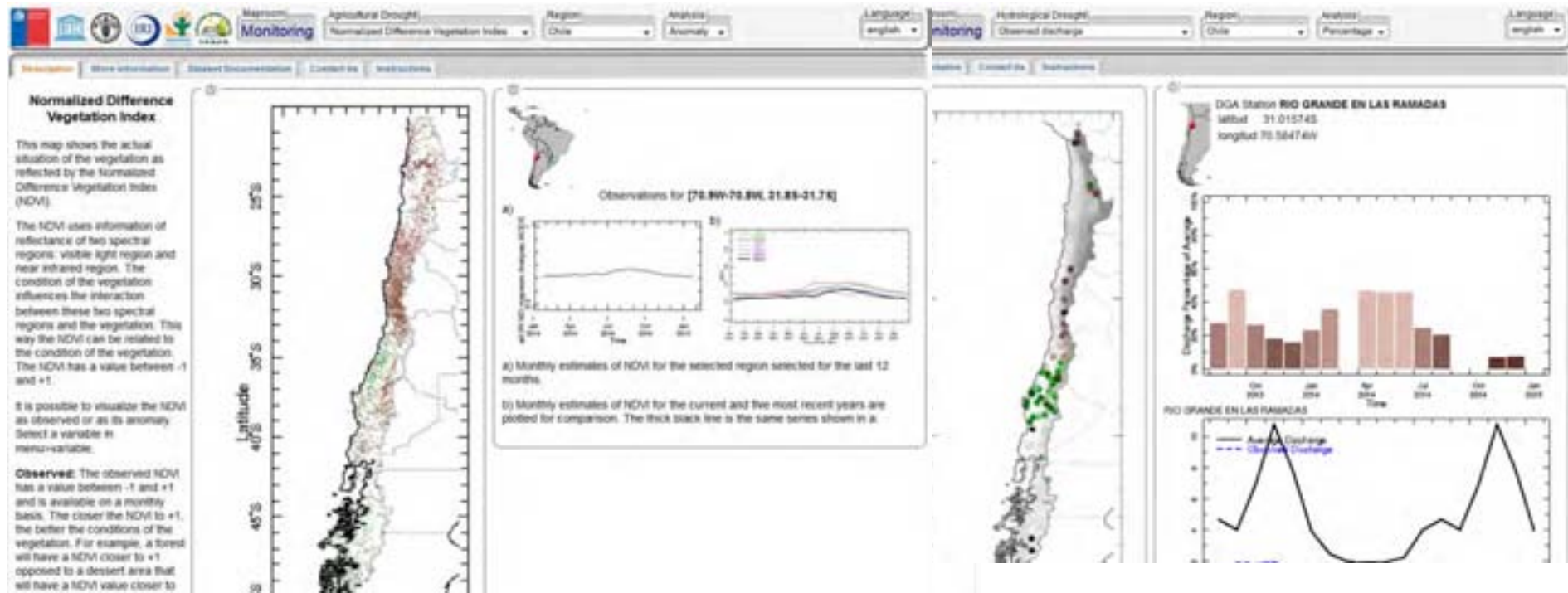


Managing Water Resources in Arid and Semi-Arid Regions of Latin America and the Caribbean

Providing the Tools to Identify Climate Risks

3) National Drought Observatories (Chile, Peru, Colombia, Honduras, Uruguay)

- Place current drought into context (National Drought Atlas)
- Unlocking national datasets for monitoring different aspects of drought and climate risks
- Forecasting at seasonal timescales (3 months ahead)



The Chilean Agroclimatic Observatory

Supporting Integrated Drought Policy based on objective combined drought indicators

Identification of communities under drought conditions

Descripción Más información Documentación Contactanos Instrucciones

Índice de Sequía Combinado

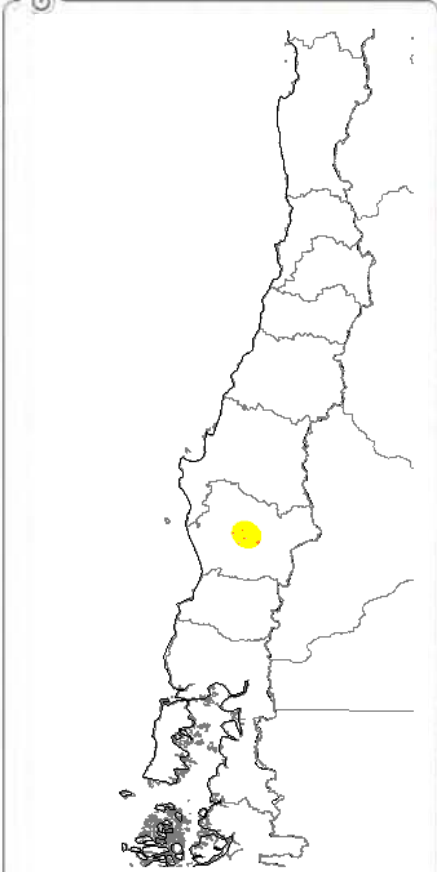
Este mapa muestra el Índice de Sequía Combinado (CDI) cual informa sobre la condición actual de sequía en Chile.

El Índice Sequía Combinado combine indicadores de la sequía meteorológica (Índice de Precipitación Estandarizado, IPE), la sequía agrícola (FAPAR) e información de humedad de suelo. De esta manera es posible de reducir falsas alarmas de sequía. El CDI entrega una visión holística de la situación de sequía usando un clasificación específica.

El CDI considera tres niveles de impacto cada uno con tres niveles de intensidad:

Tabla 1: Niveles de impacto del CDI

Nivel de impacto	Nivel de intensidad	Criterios
Observación - Déficit en la precipitación		
1		EPI -1 < -2
2		EPI -3 < -1
3		EPI -3 < -1 + EPI -12 < -1
Precaución - Déficit en la humedad de suelo		
4		Anomalía Humedad de Suelo < -1 + EPI -1 < -2
5		Anomalía Humedad de Suelo < -1 + EPI -3 < -1
6		Anomalía Humedad de Suelo < -1 + EPI -3 < -1 + EPI -12 < -1
Alerta - Estrés hídrica en la vegetación después de un déficit en la precipitación/humedad de suelo		
7		Anomalía de FAPAR < -1 + EPI -1 < -2
8		Anomalía de FAPAR < -1 + EPI -3 < -1
9		Anomalía de FAPAR < -1 + EPI -3 < -1 + Anomalía Humedad de Suelo < -1
10		Anomalía de FAPAR < -1 + EPI -3 < -1 + EPI -12 + Anomalía Humedad de Suelo < -1



Feb 2013
Jan 2014

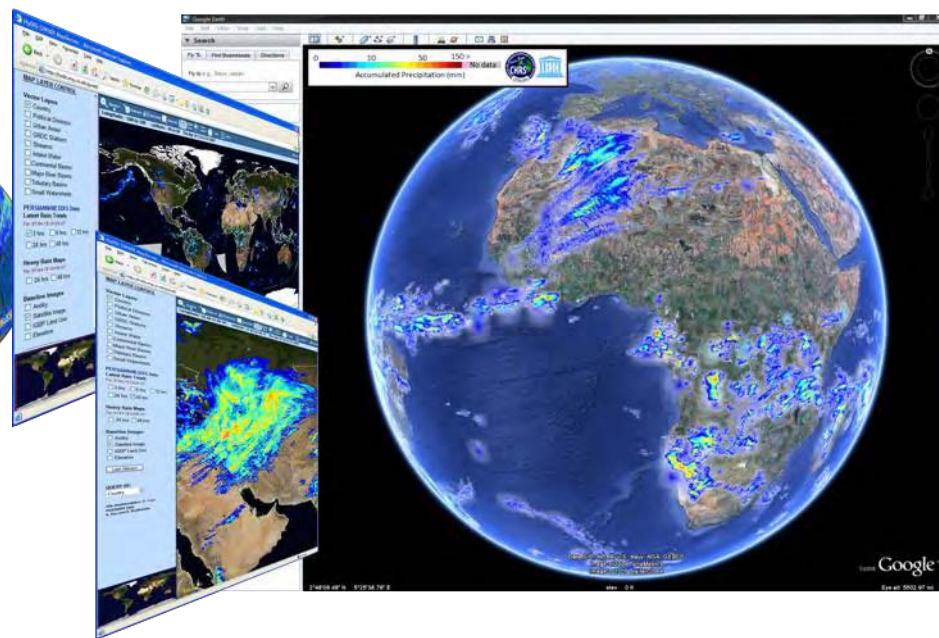
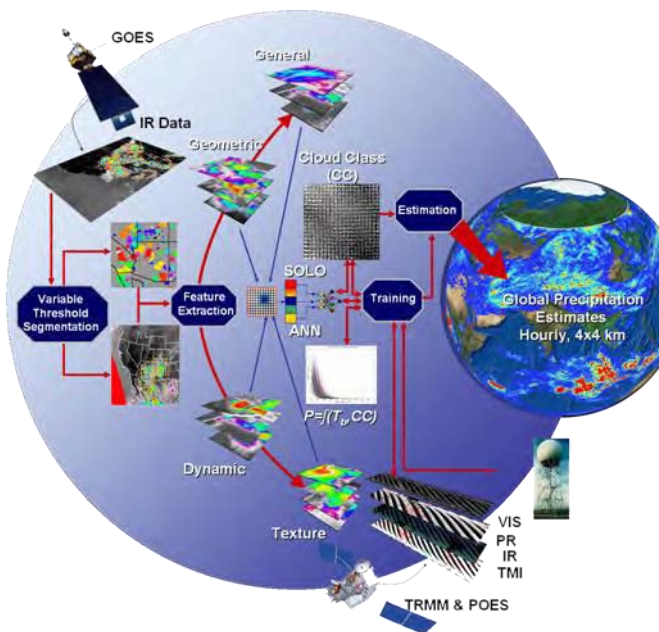


Managing Water Resources in Arid and Semi-Arid Regions of Latin America and the Caribbean

Providing the Tools to Identify Climate Risks

4) Calibrated Remote Sensing Precipitation Estimates

GWADI-GeoServer



Web Services

Calibration of the Geoserver using Local Datasets

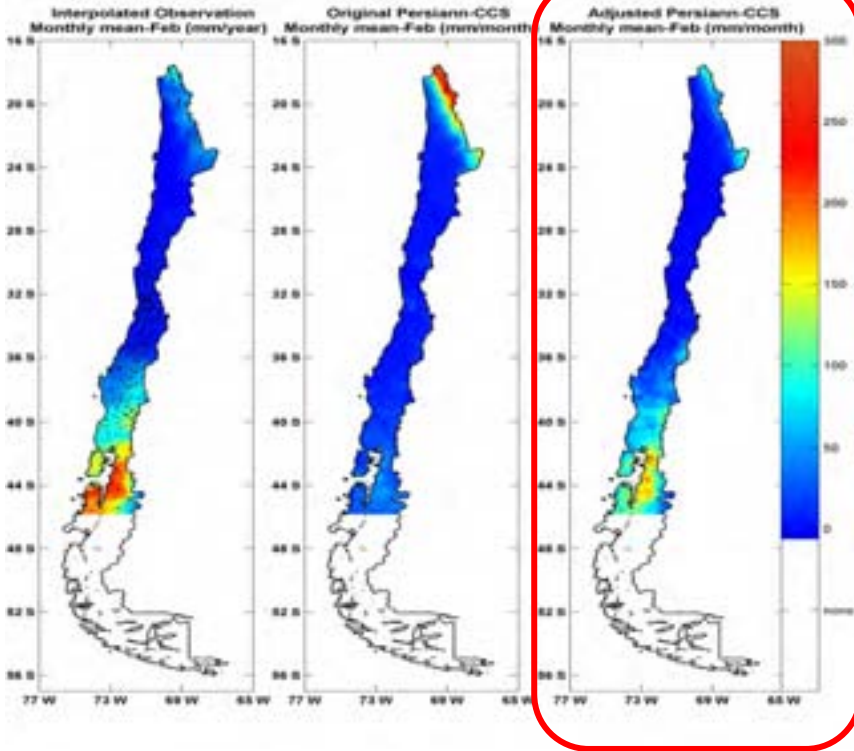
February (dry summer)

August (rainfall season)

Observed

Satellite

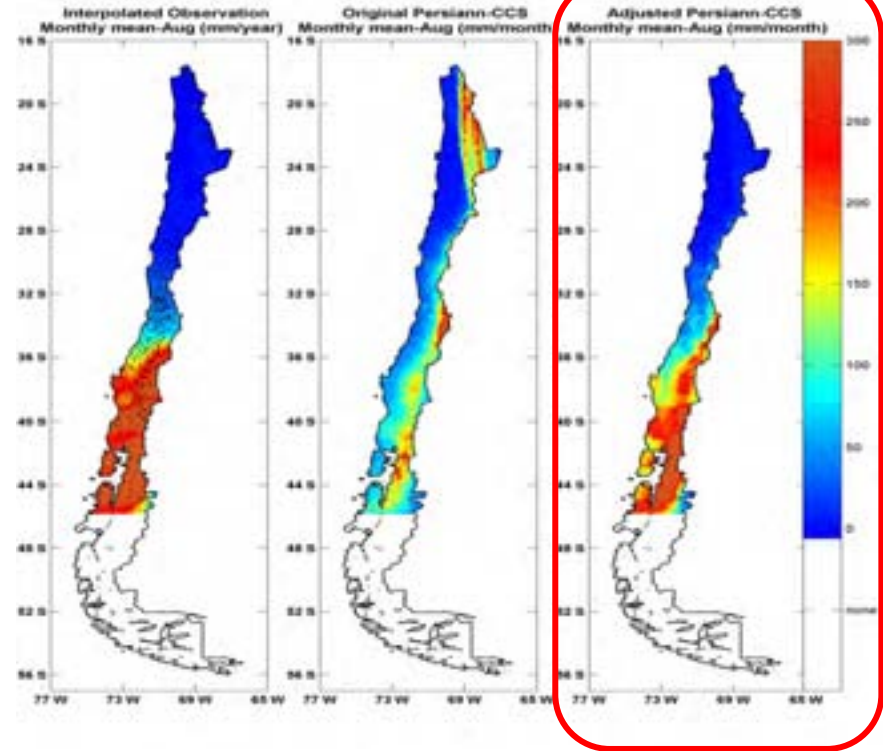
After Calibration



Observed

Satellite

After Calibration



Significant improvement of satellite precipitation estimates after calibration

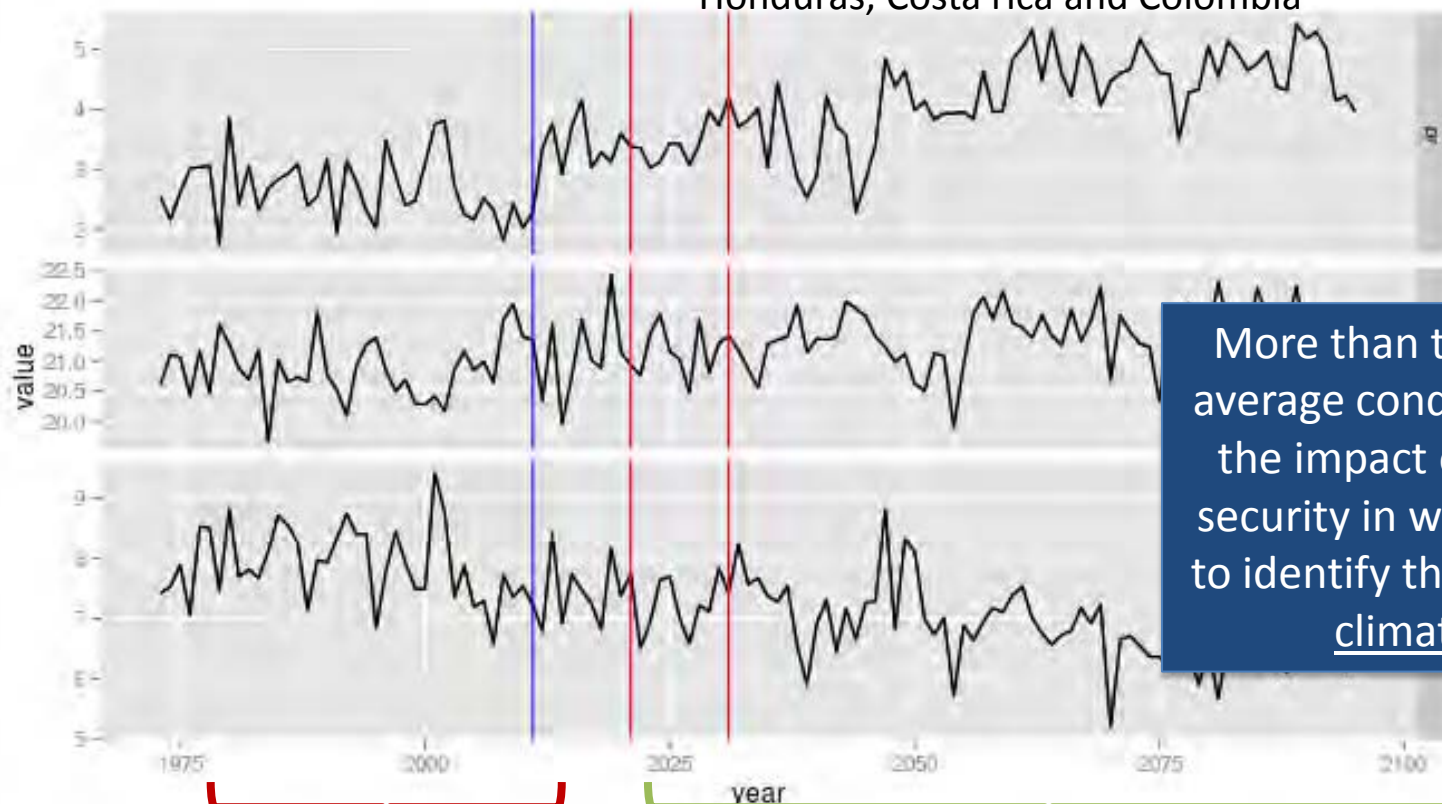


Managing Water Resources in Arid and Semi-Arid Regions of Latin America and the Caribbean

Providing the Tools to Identify Climate Risks

5) Provide Water Resources Projections at the Near Term Climate Change Horizon

Regional Programme in pilot watersheds in Peru, Chile, Bolivia, Argentina, Honduras, Costa Rica and Colombia



Observations

Probabilistic Projections

More than to know changes in average conditions, to anticipate the impact of CC on the water security in watersheds, we need to identify the range of expected climatic variability



Managing Water Resources in Arid and Semi-Arid Regions of Latin America and the Caribbean

Launch of the Community of Practice on Drought Management Tools for LAC





Managing Water Resources in Arid and Semi-Arid Regions of Latin America and the Caribbean

More information, presentations and tools can be found on the MWAR-LAC site

MWAR-LAC

Managing Water Resources in Arid and Semi-Arid Regions of Latin America and the Caribbean

MANAGING WATER RESSOURCES IN ARID & SEMI-ARID REGIONS OF LATIN AMERICA & THE CARIBBEAN

United Nations Educational, Scientific and Cultural Organization
International Hydrological Programme

Flanders State of the Art

ALAC
of the Arid and Semi-Arid Regions of Latin America and the Caribbean

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International Hydrological Programme

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Contact Sitemap

English Español

About MWAR LAC
Project Activities
International Symposium on Drought Management Tools
Newsletters

Latest News

International Expert Symposium "Coping with Droughts" 19.11.2014
The occurrence of droughts in Latin America and the Caribbean has a large impact on societies and local economies, causing long-term consequences for countries and their population (IDB, 2000). [more]

Category: Events

Flood Drought Monitor for Latin America and the Caribbean conducts technology transfer in Santiago de Chile 17.11.2014
Predicting current and future periods of flooding and drought is the main characteristic that the Monitor System for Latin America and the Caribbean offers. The Monitor was designed to forecast these phenomena. With the goal of... [more]

Category: Research



Addressing Water Security: Climate Impacts and Adaptation Responses in Africa, the Americas, Asia and Europe

**VULNERABILITY
ASSESSMENT,
MAPPING AND
IMPLEMENTATION
OF ADAPTATION
STRATEGIES**

**RAISE AWARENESS
ON POTENTIAL
IMPACTS OF CLIMATE
CHANGE ON
MOUNTAIN
GLACIERS AND
DOWNSTREAM
WATER SUPPLY**



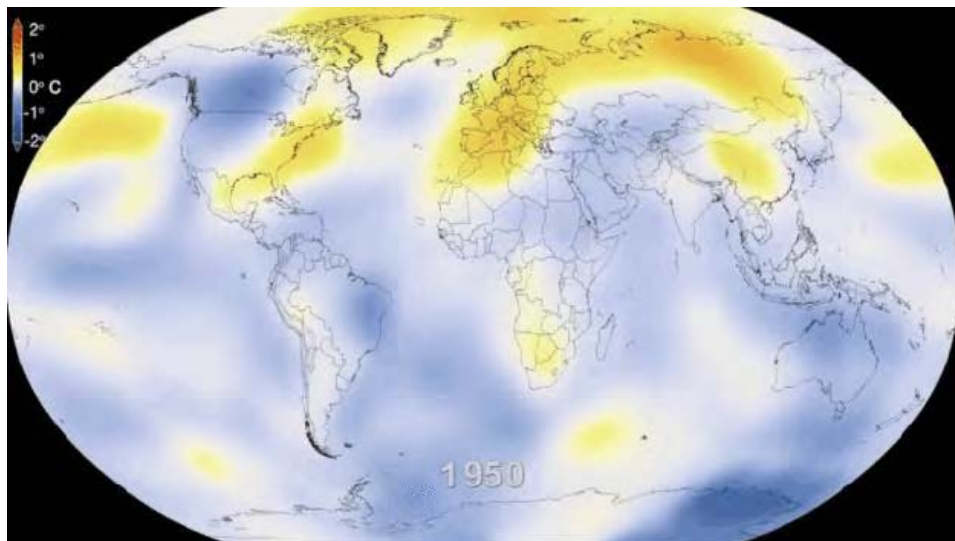
**DEVELOPMENT
OF A GLOBAL
KNOWLEDGE
FORUM**



Addressing Water Security: Climate Impacts and Adaptation Responses in Africa, the Americas, Asia and Europe

VULNERABILITY ASSESSMENT, MAPPING AND IMPLEMENTATION OF ADAPTATION STRATEGIES

1) Climate Change Risk and Vulnerability Assessment in Mountainous Regions



“ A detailed assessment of current and future water demands and availability will be developed in selected pilot areas, evaluating climate variability and change ” at the medium term horizon (2020-2050)

Expected outputs

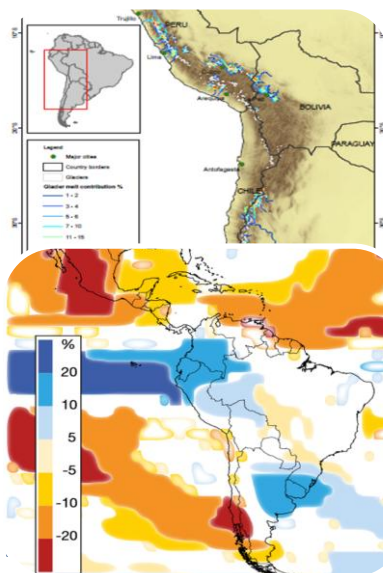
Vulnerability of multi-purpose water resources identified considering the impacts of climate variability and change.



Addressing Water Security: Climate Impacts and Adaptation Responses in Africa, the Americas, Asia and Europe

VULNERABILITY ASSESSMENT, MAPPING AND IMPLEMENTATION OF ADAPTATION STRATEGIES

2) Implementation of Climate Risk Management



Glacier Melt Impact

IPCC Climate Change Scenarios

Climatic Risk Monitoring and Early Warning system for pilot areas

Expected outputs

- Tools developed to support mountain communities to assess climate risk/vulnerability
- Stakeholders trained in the use of climate information for decision making



Addressing Water Security: Climate Impacts and Adaptation Responses in Africa, the Americas, Asia and Europe

VULNERABILITY ASSESSMENT, MAPPING AND IMPLEMENTATION OF ADAPTATION STRATEGIES

3) Case Studies from Latin America and the Caribbean



Water Resources Management
in Highland Communities

Water Augmentation Techniques for
Increased Climatic Resilience



Adaptive Water and
Soil Conservation



Addressing Water Security: Climate Impacts and Adaptation Responses in Africa, the Americas, Asia and Europe

RAISE AWARENESS ON POTENTIAL IMPACTS OF CLIMATE CHANGE ON MOUNTAIN GLACIERS AND DOWNSTREAM WATER SUPPLY

4) Awareness raising programme and outreach activities



- High-level policy meetings in Asia, Africa and Latin America
- Organization of work groups to address the information gaps.
- Engage citizens in understanding climate change and its impacts;
- Dissemination of scientific results to policy and decision makers, water managers' and stake holders as well as affected local populations



Addressing Water Security: Climate Impacts and Adaptation Responses in Africa, the Americas, Asia and Europe

DEVELOPMENT OF A GLOBAL KNOWLEDGE FORUM

5) Annual Global Knowledge Forum



- A repository of data and knowledge in coordination with partner institutions from Asia, Africa and LAC on climate change adaptation strategies
- Communication and Dissemination



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Thank you!

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