



Con el apoyo de la Alianza

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GONZALO RÍO ARRONTE, I.A.P.



UNFCCC - Technical workshop on water, climate change impacts and adaptation strategies

Mexico City, Mexico – 19 July 2012

Tools and methods for assessing and reducing
water resource vulnerability to climate change

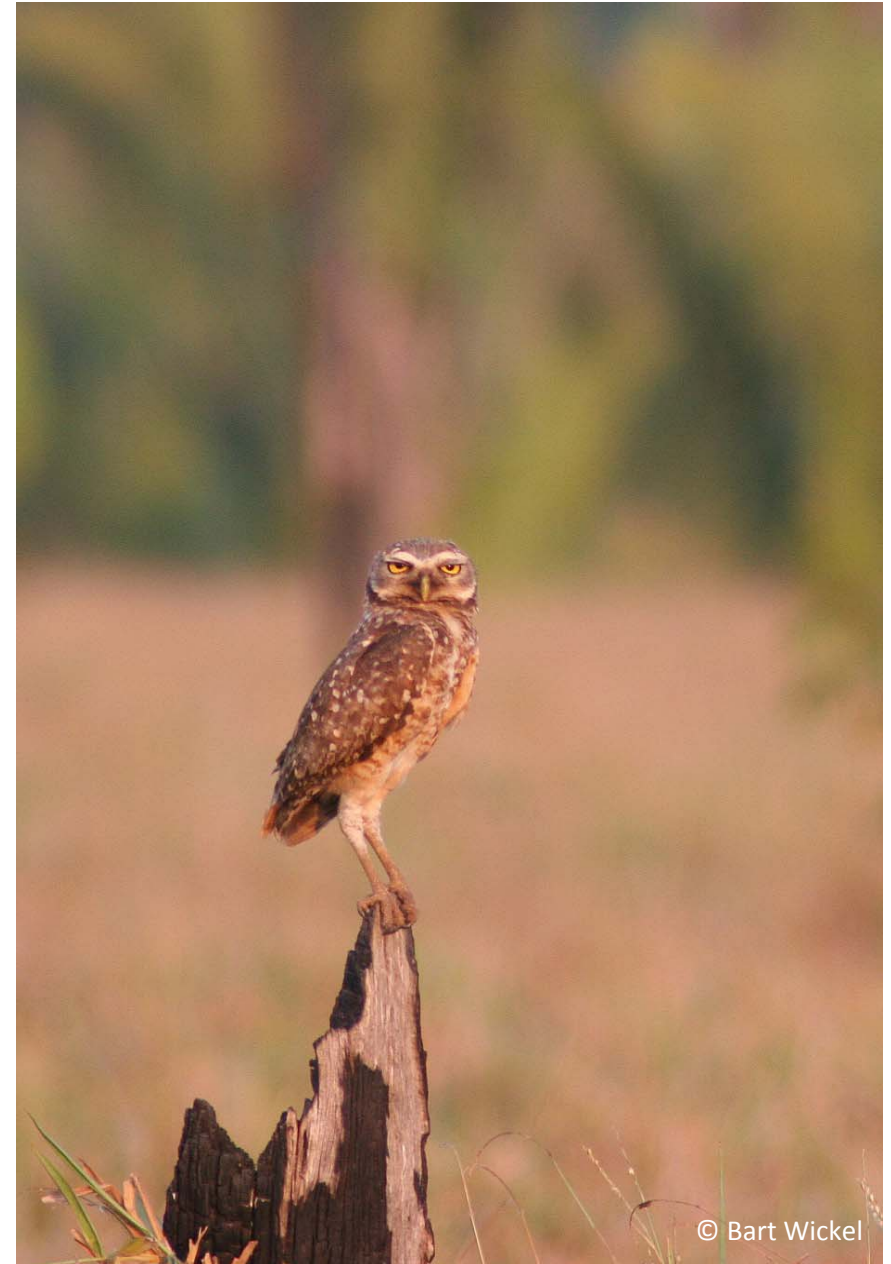
Bart (A.J.) Wickel and Sergio Salinas

E. Barrios N. Sindorf, S. Freeman (WWF)

J.H. Matthews (CI)

Structure

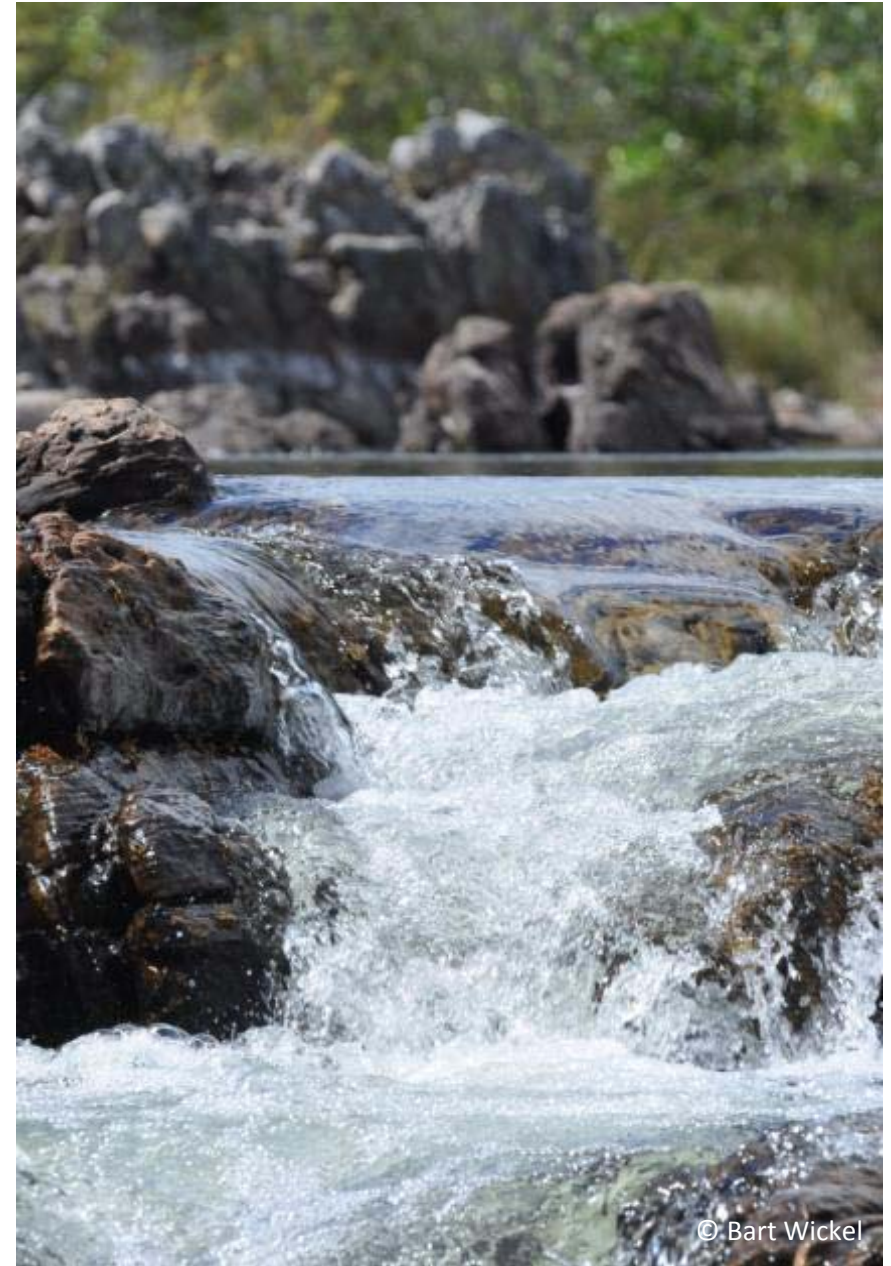
- Introduction
- Scalable vulnerability and resilience tools and methods
 - National to basin level – Water Reserves
 - Basin level - HydroBAT
 - Basin to community level – Flowing forward
- Conclusions



Burrowing owl, Brazil

The climate change opportunity

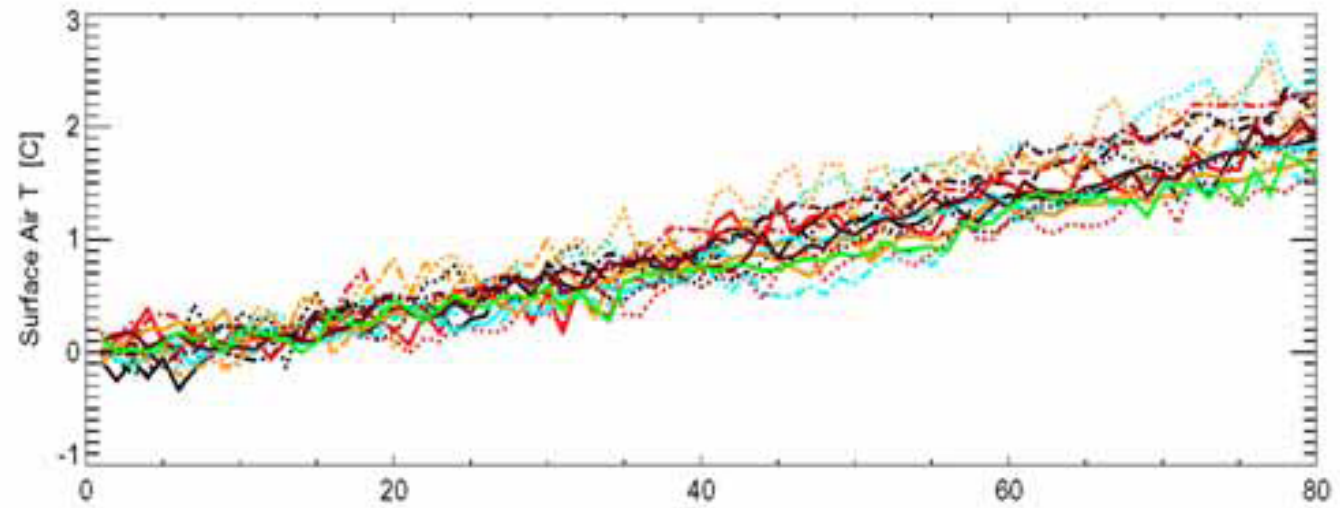
- There is common understanding that we are facing a serious set of problems
- Water is a key issue in economical and human development and conservation (Food, Water and Energy Security)
- The water and conservation science communities hold a wealth of tools, data products and solutions
- There is an opportunity to demonstrate a conservation based approach to development



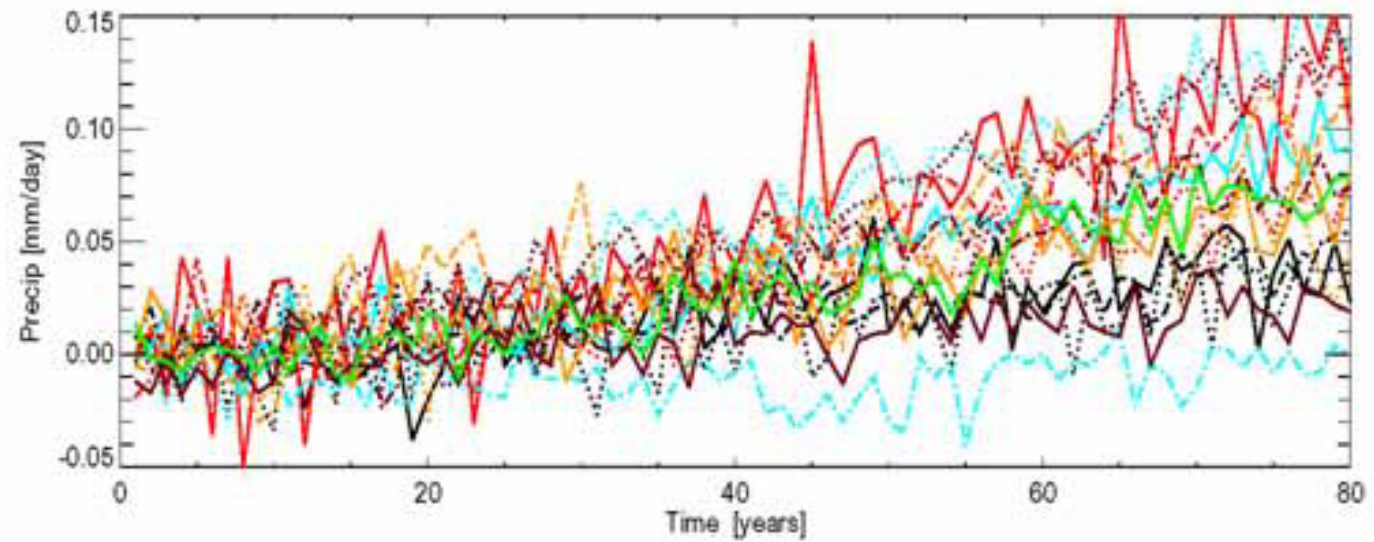
Chapada dos Veadeiros, Brazil

Models and adaptation

Temperature

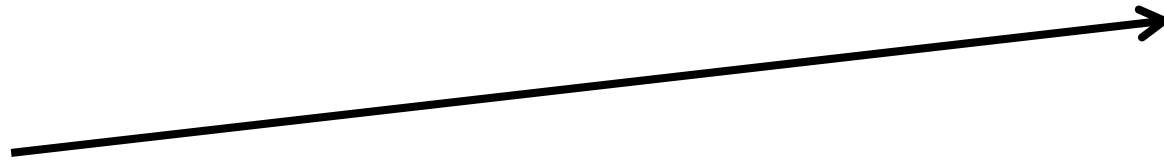


Precipitation

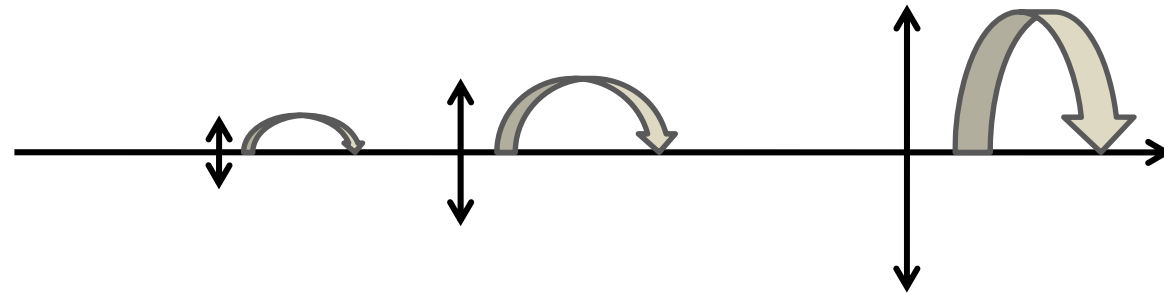


Vulnerability to what change?

A linear change in mean climate?



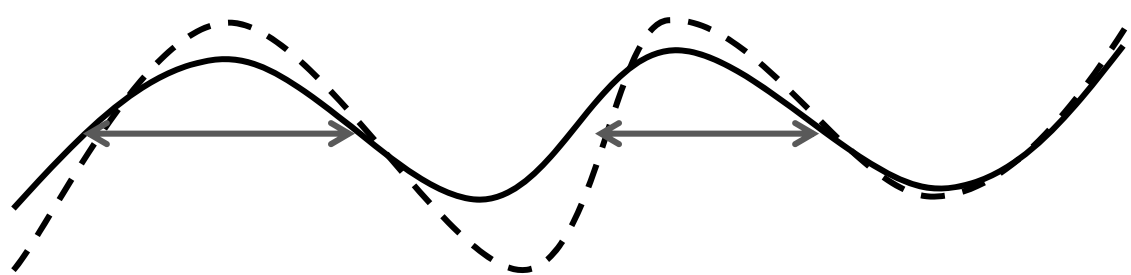
OR
Intensification of extreme events



Extreme events

Floods
Hurricanes
Tornadoes
Drought

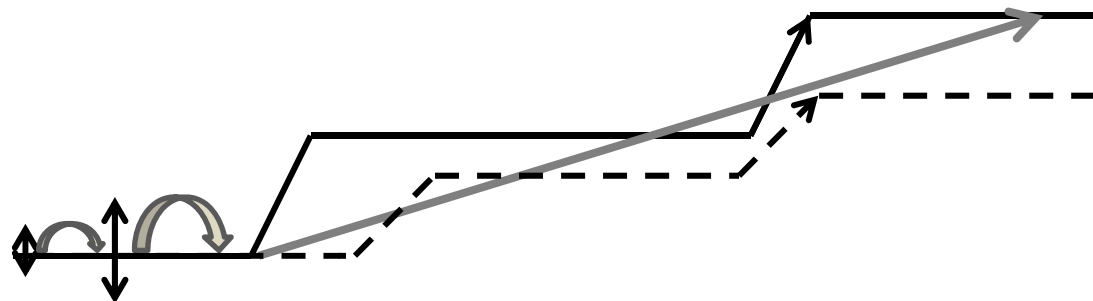
OR
Shifts in seasonality



Seasonal shifts

Snow/ice melt
Dry season duration
Spring burst
Migration

OR
State level shifts



State level shifts

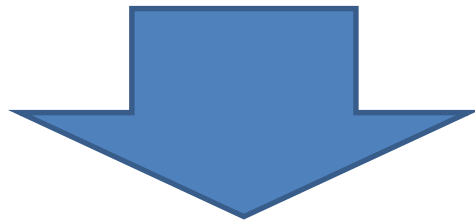
Fire regime shift
Perennial
→ Intermittent
Forest
→ savanna

Climate Change = Water Change

Community
based
adaptation



Ecosystem
based
adaptation



System based **Adaptation**

- Water is the integrative element
 - Water resource vulnerability
- Recognizes the needs of people and ecosystems
 - Adaptive IRBM – **IRBM+**



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Chapada dos Veadeiros, Brazil

Examples: WWF Freshwater adaptation projects

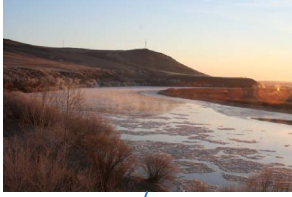
Forest conservation



Reconnecting wetlands and floodplain restoration



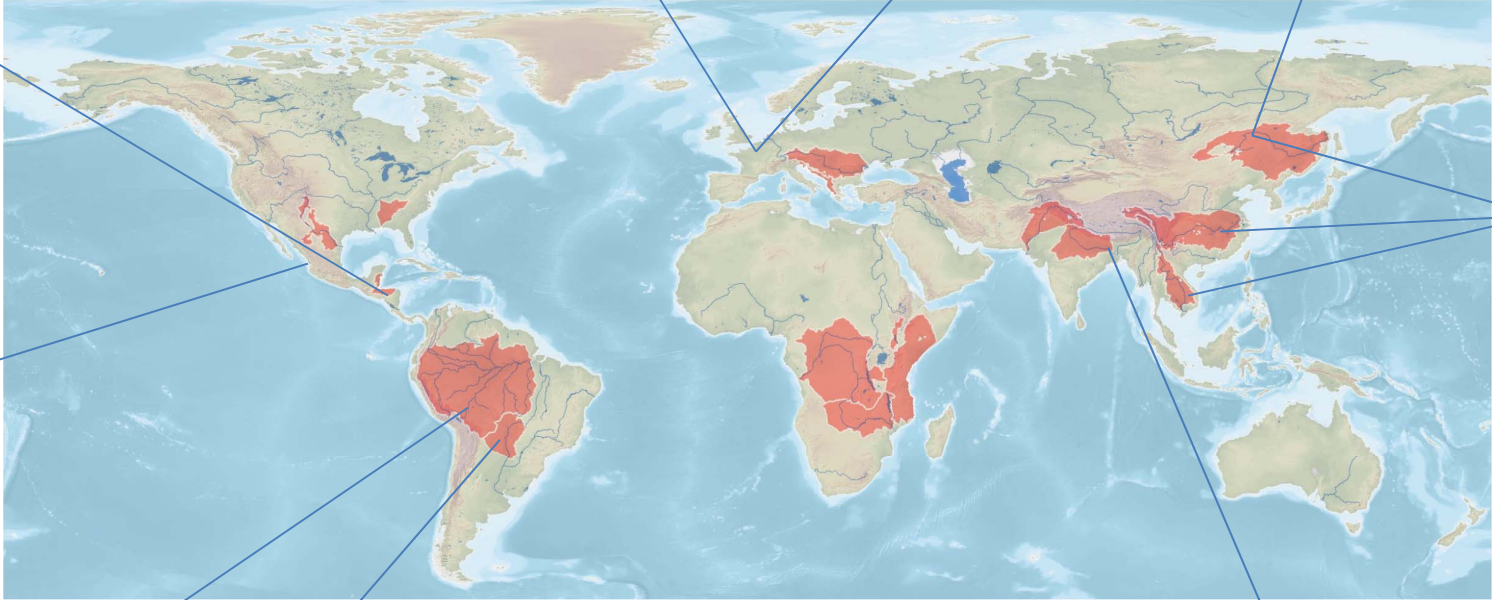
River and wetland conservation



Preventing maladaptation and "green"/softer infrastructure



Water reserves



River and wetland conservation, source water protection

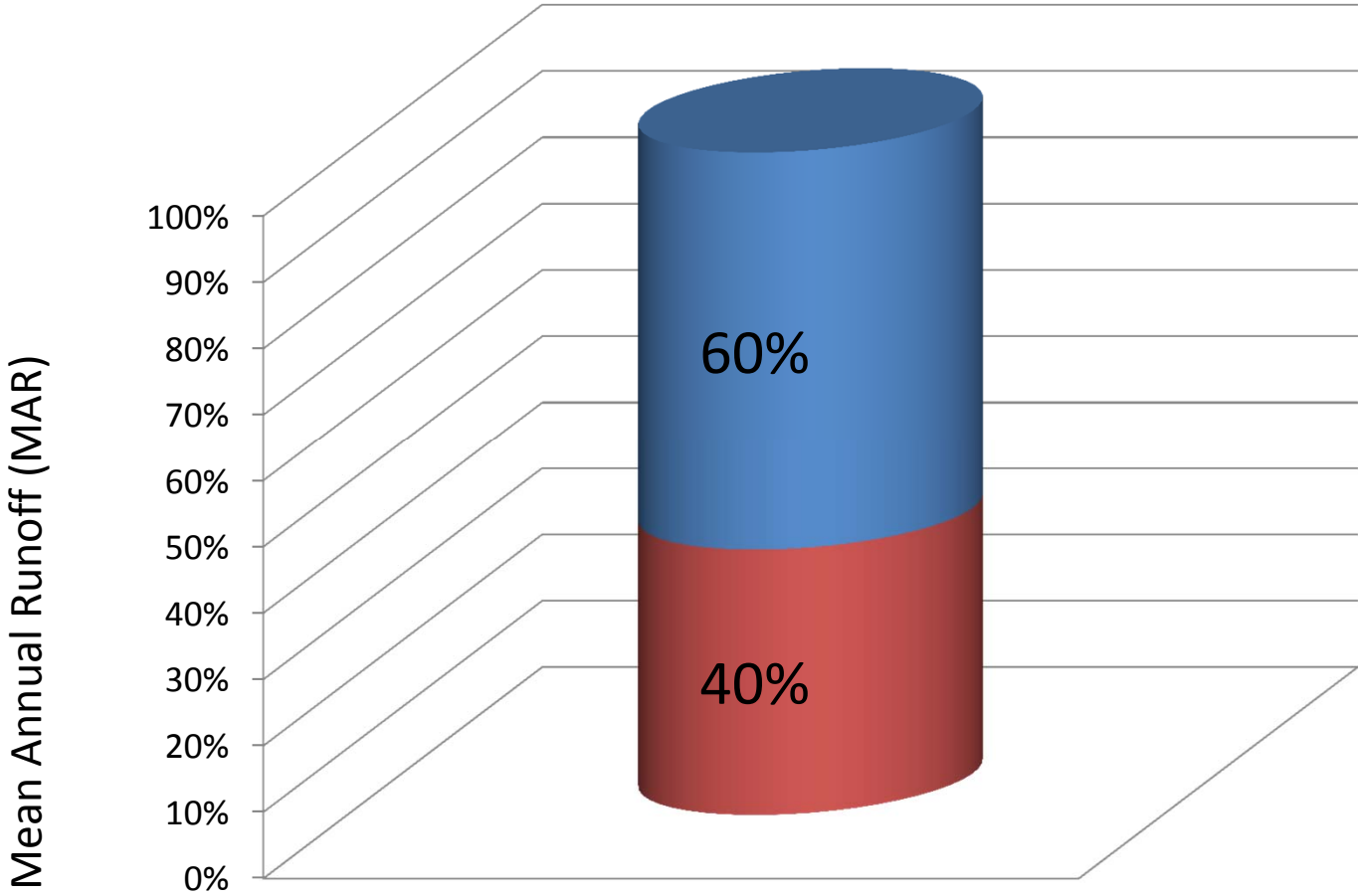


Disaster risk reduction and source water protection

National to basin level adaptation – Water Reserves

Water pressure = $\frac{\text{Water use}}{\text{Water resources}}$

> 40%
High water stress

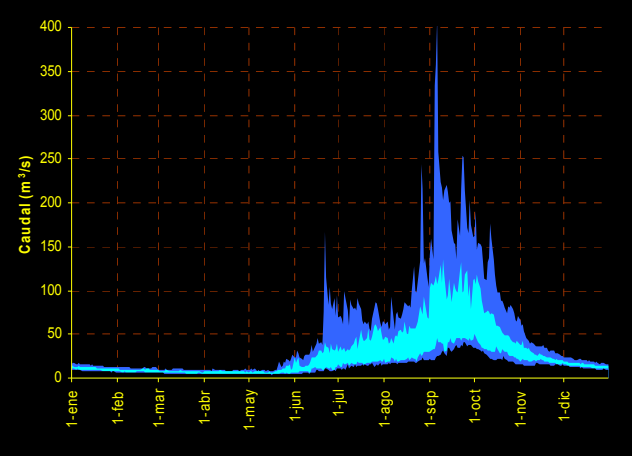


Risk management

WATER EXPLOITATION INDEX

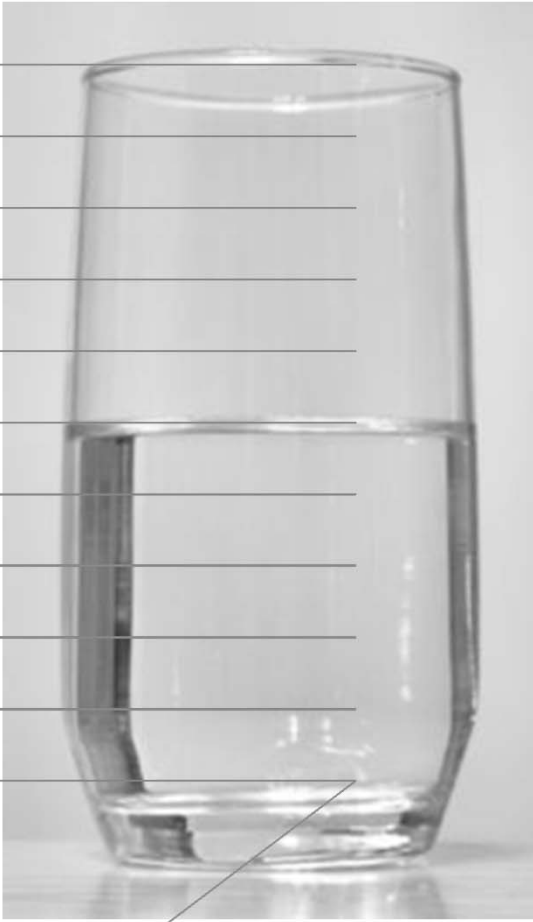
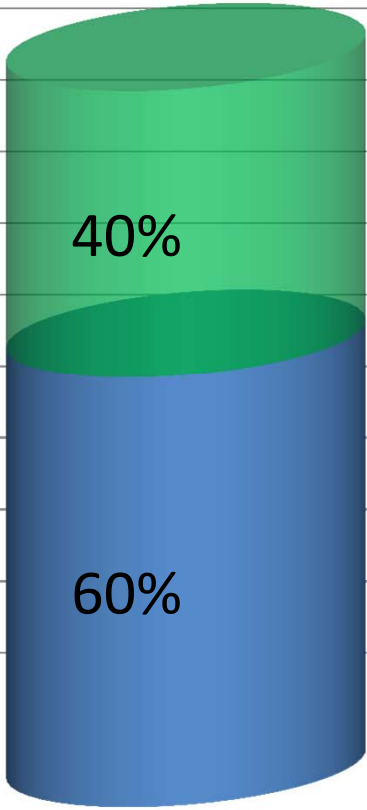
Source: European Environment Agency

National to basin level adaptation – Water Reserves



> 60%

Mean Annual Runoff (MAR)

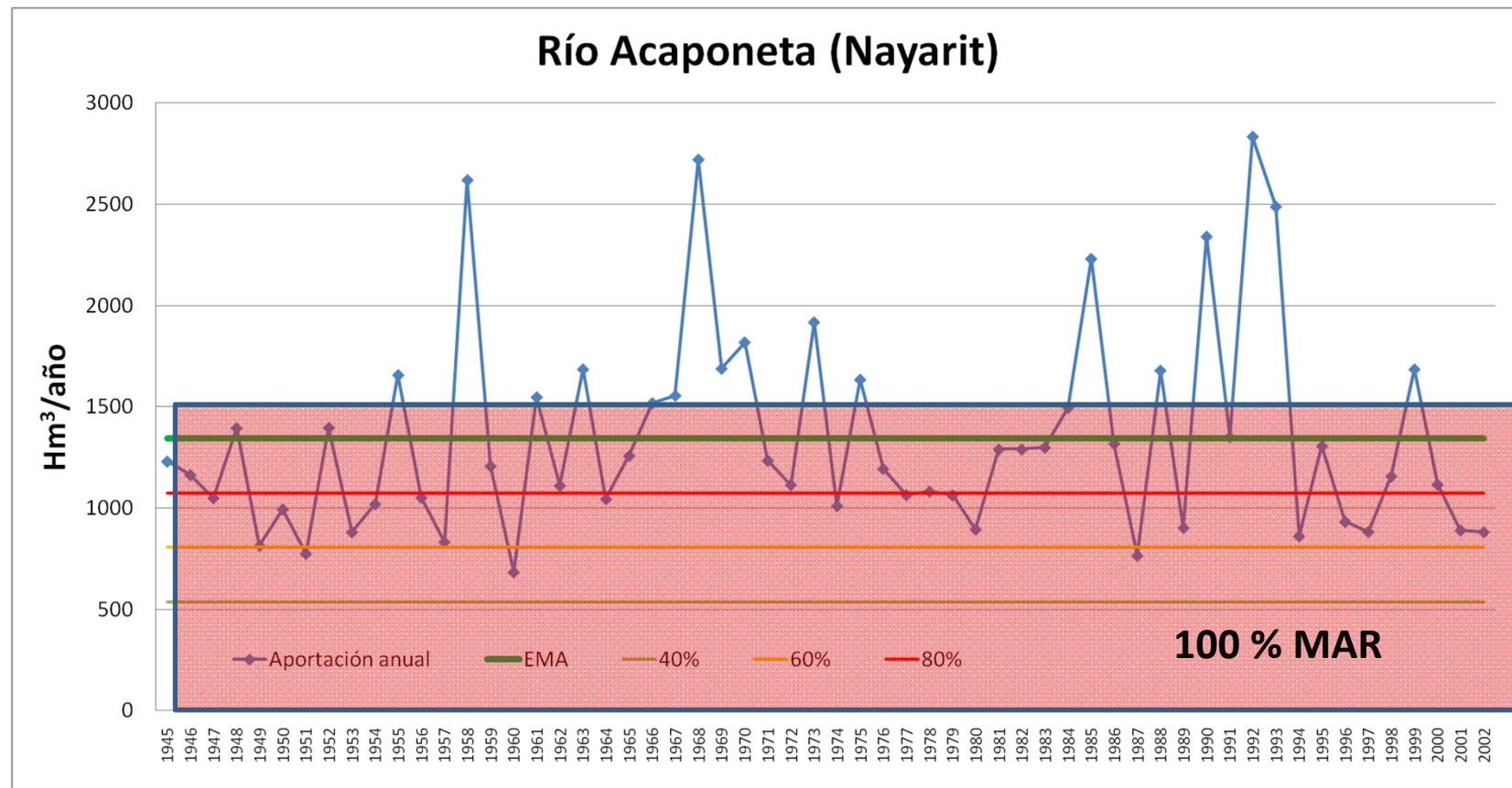


Natural infrastructure and water management are the great allies

National to basin level adaptation – Water Reserves

Climate change vulnerabilities:

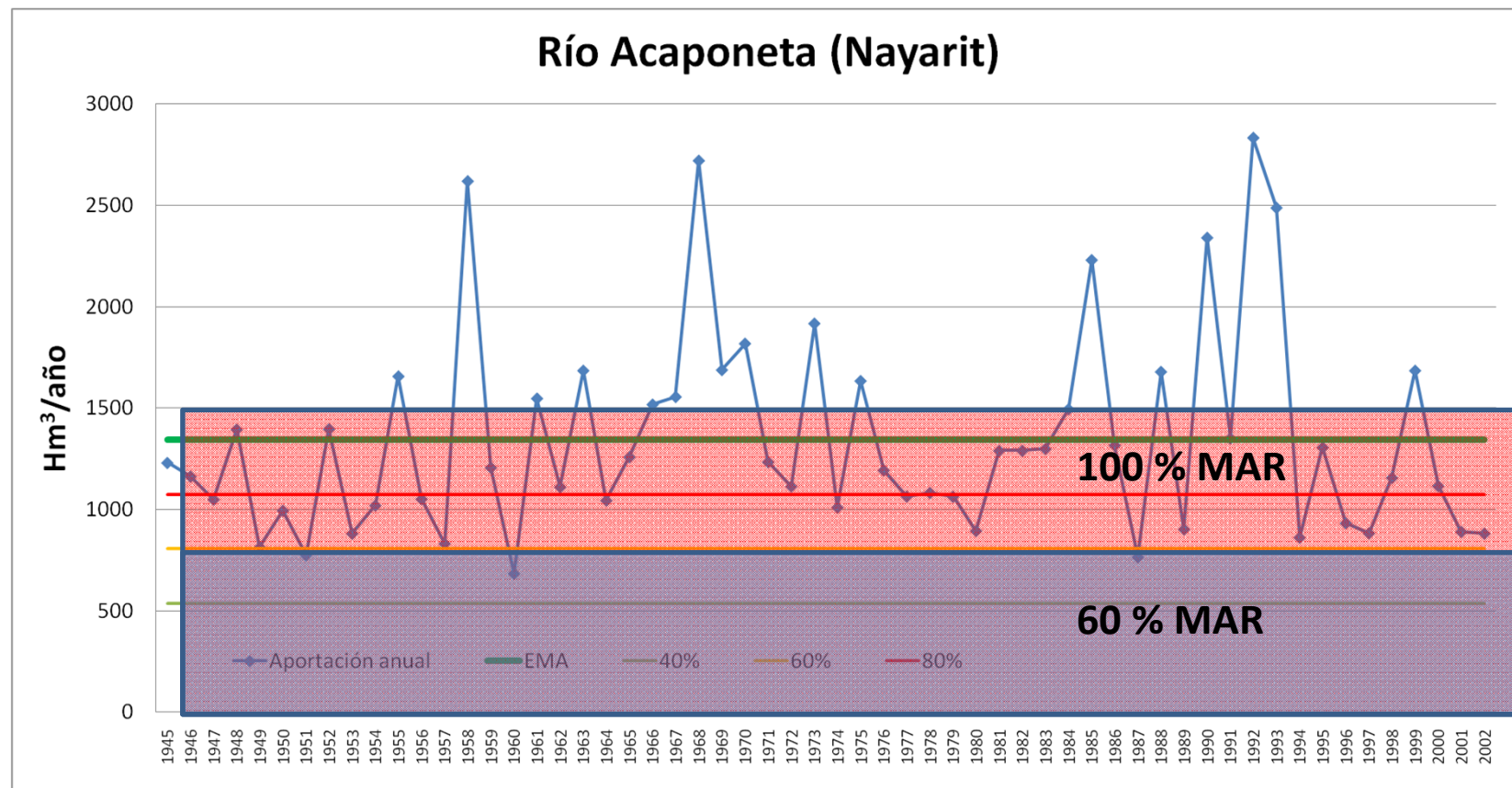
- Extreme events: physical capacity to manage /attend risk foods
- Variability in water availability: with main focus in droughts
- Overalllocation



National to basin level adaptation – Water Reserves

Water reserves:

- Reduce user water risk
- Prevents overallocation
- Reduce water resource vulnerability
- Secure/increase adaptive capacity of both people and nature





THE MEXICAN PUBLIC POLICY CASE

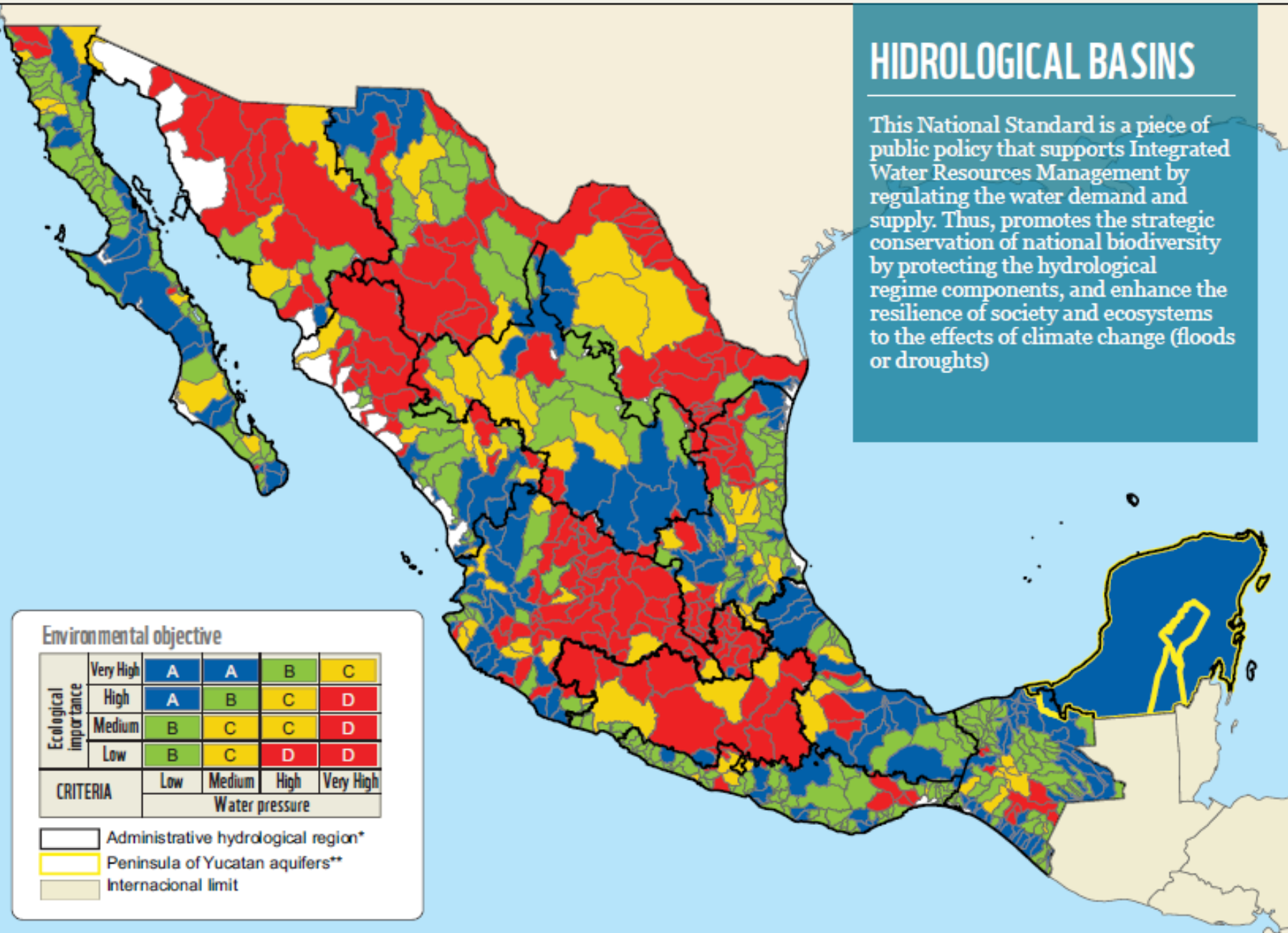
- Water Reserves are considered in National Water Law
- It came out the need for a National Standard to estimate that water reserve.
 - It was developed based on mexican and international experience, with the participation of the academy, government agencies, and NGO.
 - It recognizes:
 - A needed balance between water use and ecological importance
 - Surface and groundwater integration
 - Preventive principle for sensible ecosystems
 - Climate variability



HIDROLOGICAL BASINS

This National Standard is a piece of public policy that supports Integrated Water Resources Management by regulating the water demand and supply. Thus, promotes the strategic conservation of national biodiversity by protecting the hydrological regime components, and enhance the resilience of society and ecosystems to the effects of climate change (floods or droughts)

ER
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tion
water
S



Environmental objective

Ecological importance	Very High	A	A	B	C
	High	A	B	C	D
	Medium	B	C	C	D
	Low	B	C	D	D
CRITERIA		Low	Medium	High	Very High
		Water pressure			

- Administrative hydrological region*
- Peninsula of Yucatan aquifers**
- Internacional limit

*Hydrological basins in white are still un analysis to obtain their environmental objectives

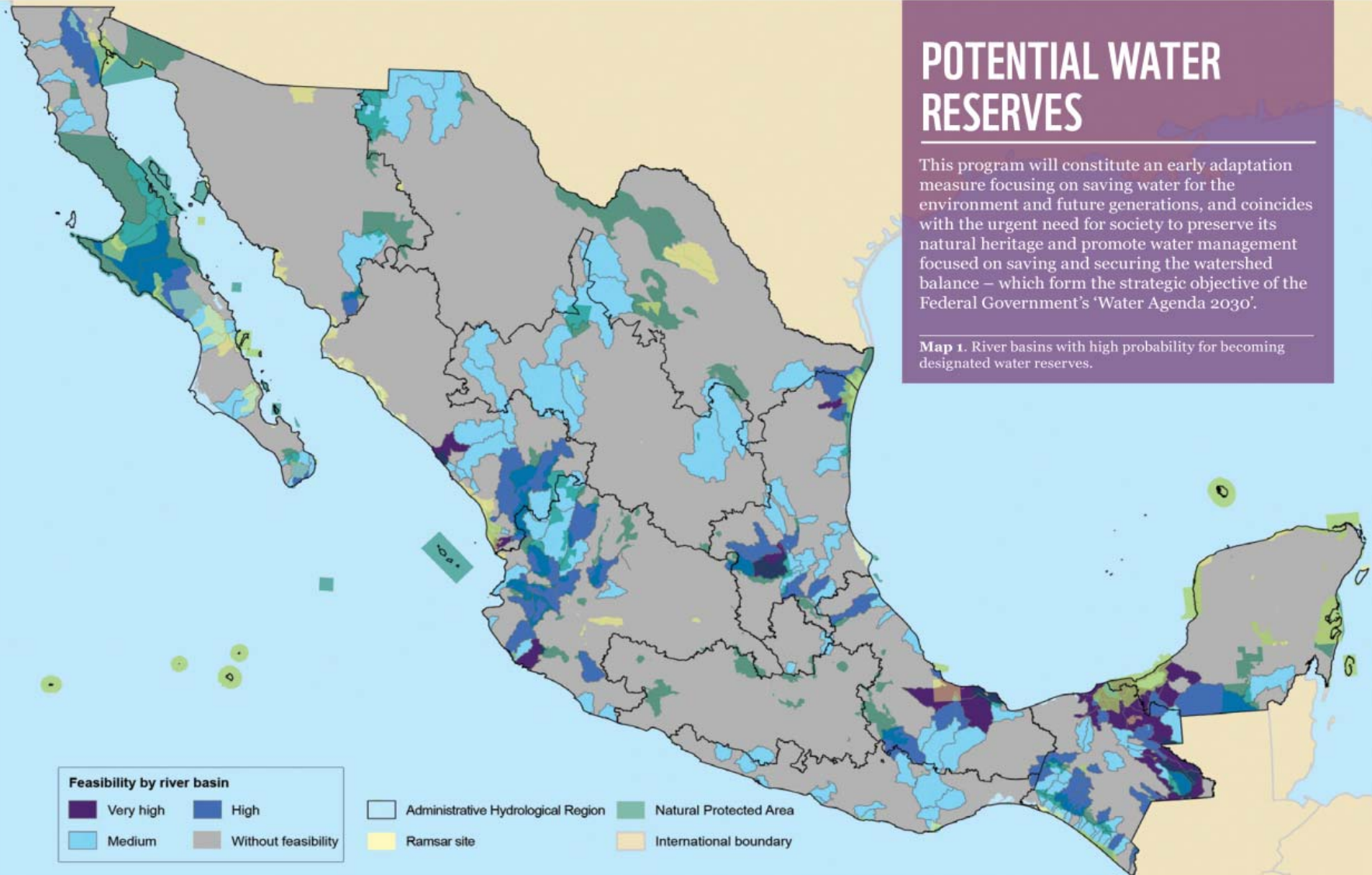
**Environmental objective according aquifers in formation in Peninsula of Yucatan

National to basin level adaptation – Water Reserves

POTENTIAL WATER RESERVES

This program will constitute an early adaptation measure focusing on saving water for the environment and future generations, and coincides with the urgent need for society to preserve its natural heritage and promote water management focused on saving and securing the watershed balance – which form the strategic objective of the Federal Government's 'Water Agenda 2030'.

Map 1. River basins with high probability for becoming designated water reserves.



WWF.ORG.MX

© 1986 Panda Symbol WWF - World Wide Fund For Nature (also known as World Wildlife Fund)
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Feasibility study and GIS available at: • www.conagua.gob.mx
 • www.wwf.org.mx/reservas-de-agua

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Inter-American Development Bank



CONAGUA
 Comisión Nacional del Agua

Basin level Assessments - HydroBAT

Evaluate

- Elevation, gradients
- Water Resources Distribution
- Connectivity
- Population distribution

Analyze

- Aquatic Classification
- Ecosystem Services
- Connectivity Analyzes
- Climate Vulnerability

Visualize

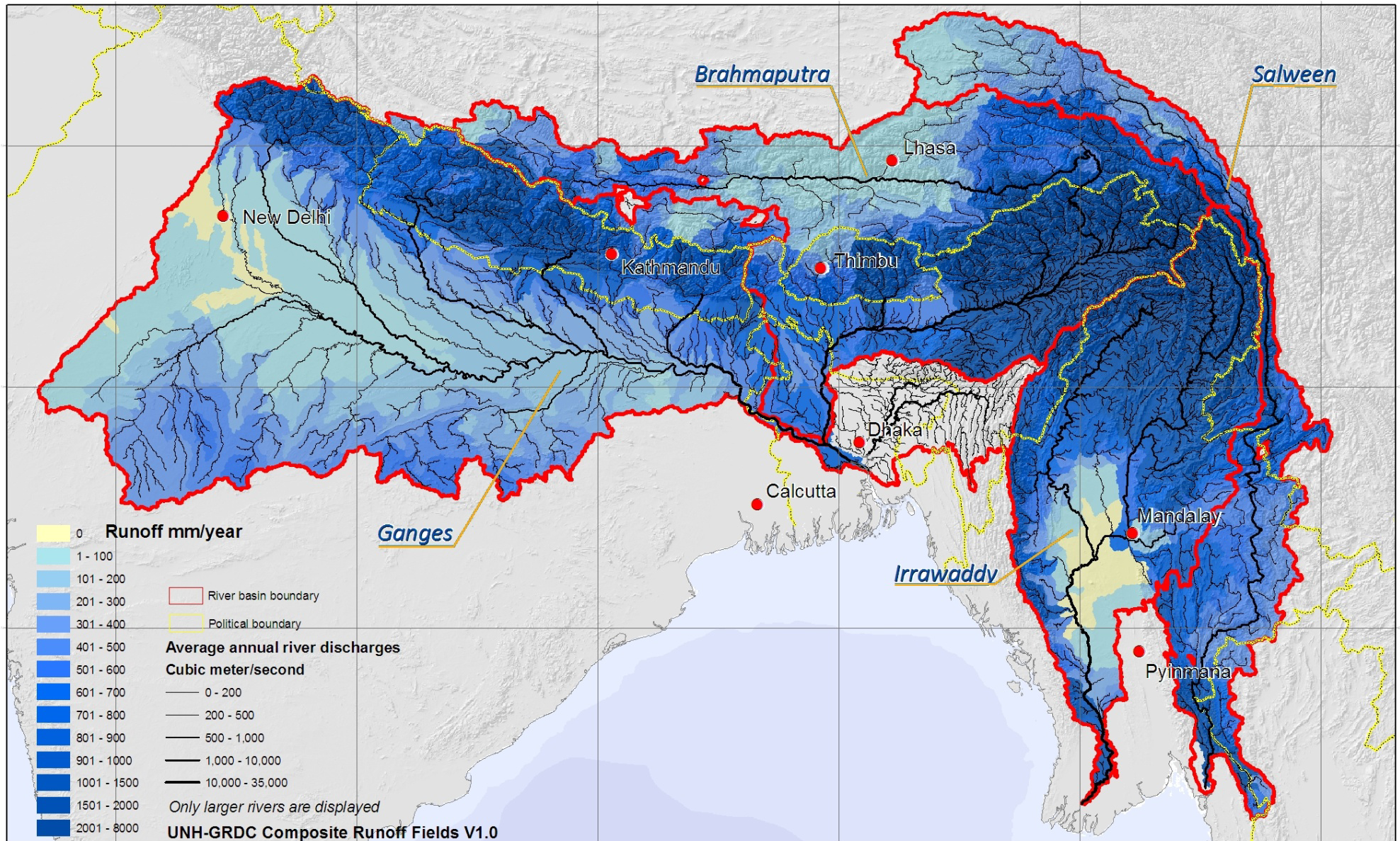
- Visualization of My Basin and Analytics data

Basin level Assessments - HydroBAT

Evaluate

Analyze

Visualize

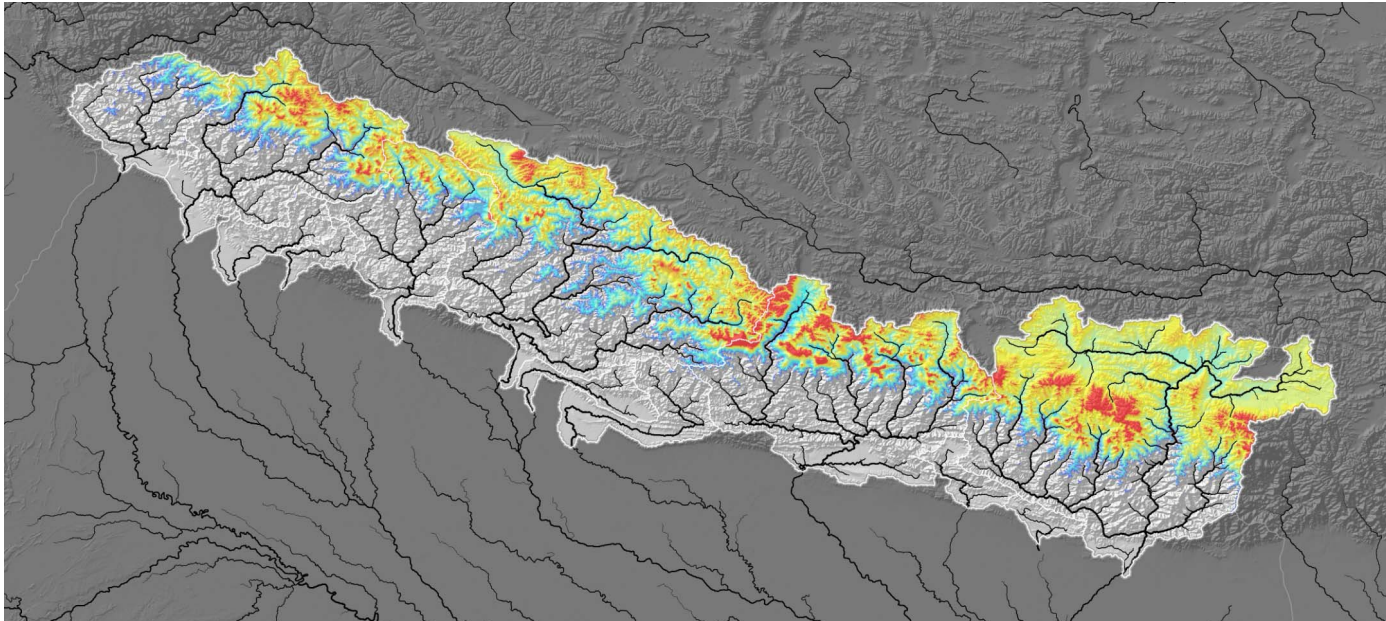


Basin level Assessments - HydroBAT

Evaluate

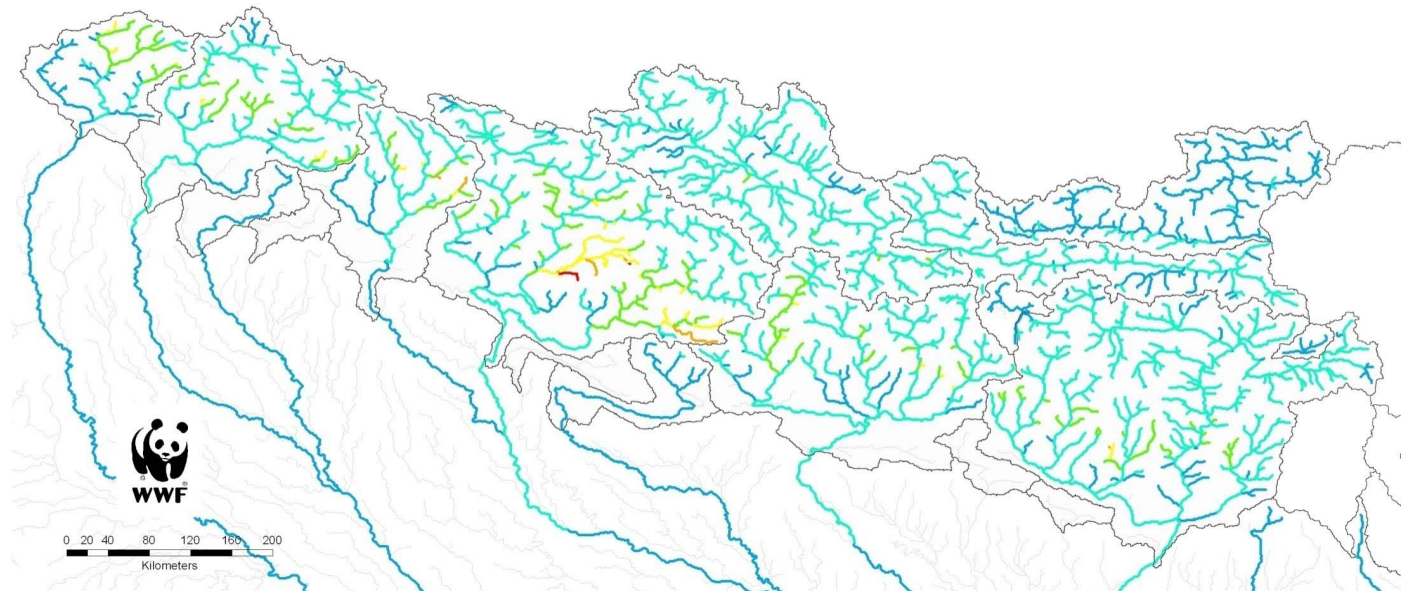
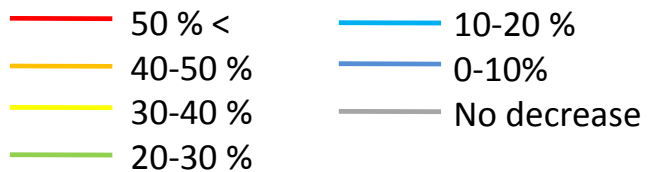
Analyze

Visualize



Relative snow pack sensitivity

Decrease in duration of
upstream snow season



Flowing Forward

Characteristics:

- Framework approach
- Combines climate and development scenarios
- Combines participatory approaches with desk studies and scientific analyses
- Looks at communities and the environment

Appropriate Scale:

Landscape/Watershed

Strengths:

- Flexible
- Integrated approach
- Not restricted to data-heavy analyses
- Integrates outputs from other tools

WORKSHOP REPORT

Freshwater Ecosystem Vulnerability Assessment The Indrawati Sub-Basin, Nepal

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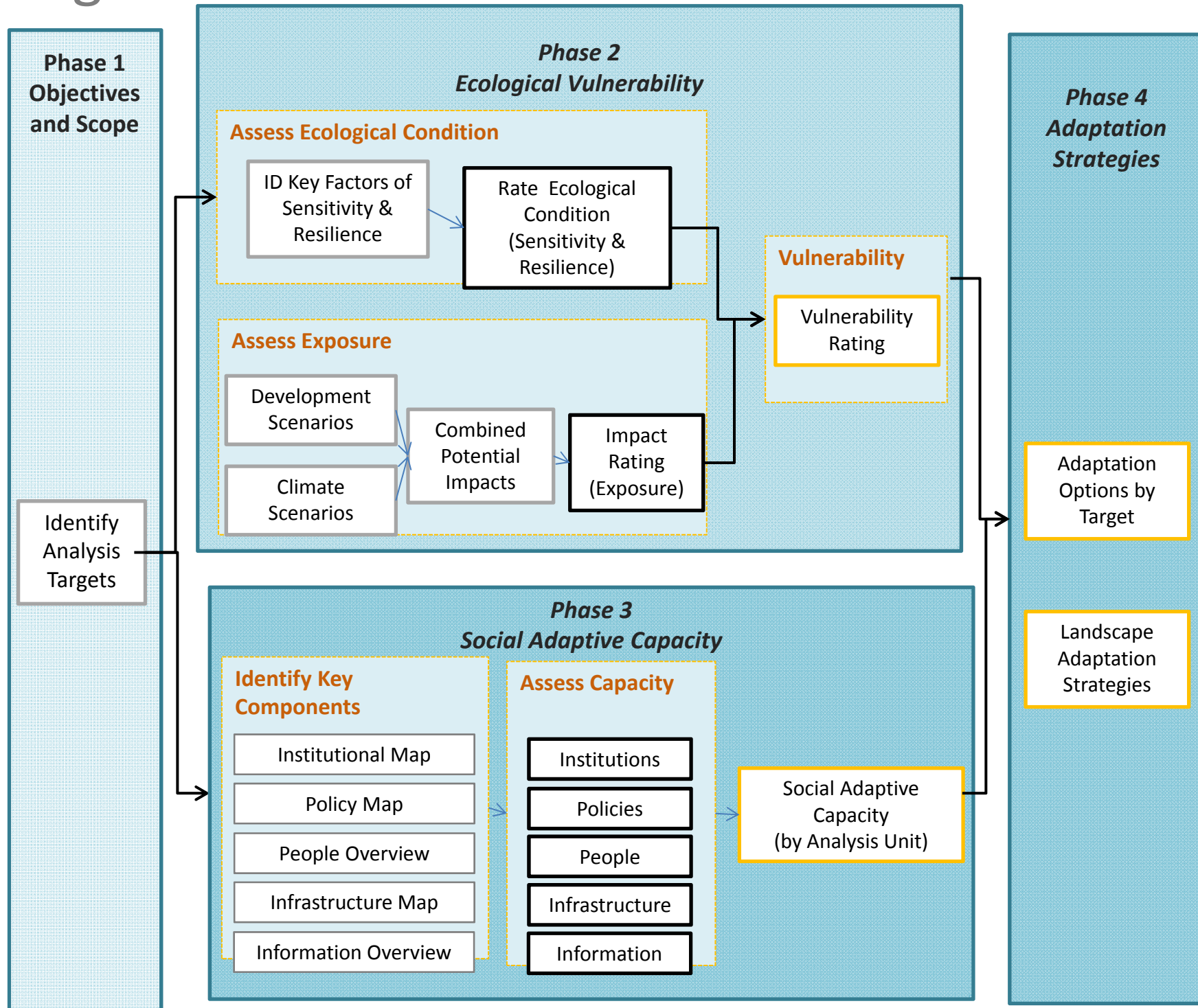
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NICHOLAS INSTITUTE
FOR ENVIRONMENTAL POLICY SOLUTIONS
DUKE UNIVERSITY



Flowing Forward



Resources

Water Reserves of Mexico:

www.wwf.org.mx/water-reserves

The flowing forward report:

<http://www.floatingforward.org/>

The Indrawati VA report:

<http://niwater.org/2011/08/workshop-report-ecosystem-based-vulnerability-assessment-in-nepal/>

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Thanks for your attention

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