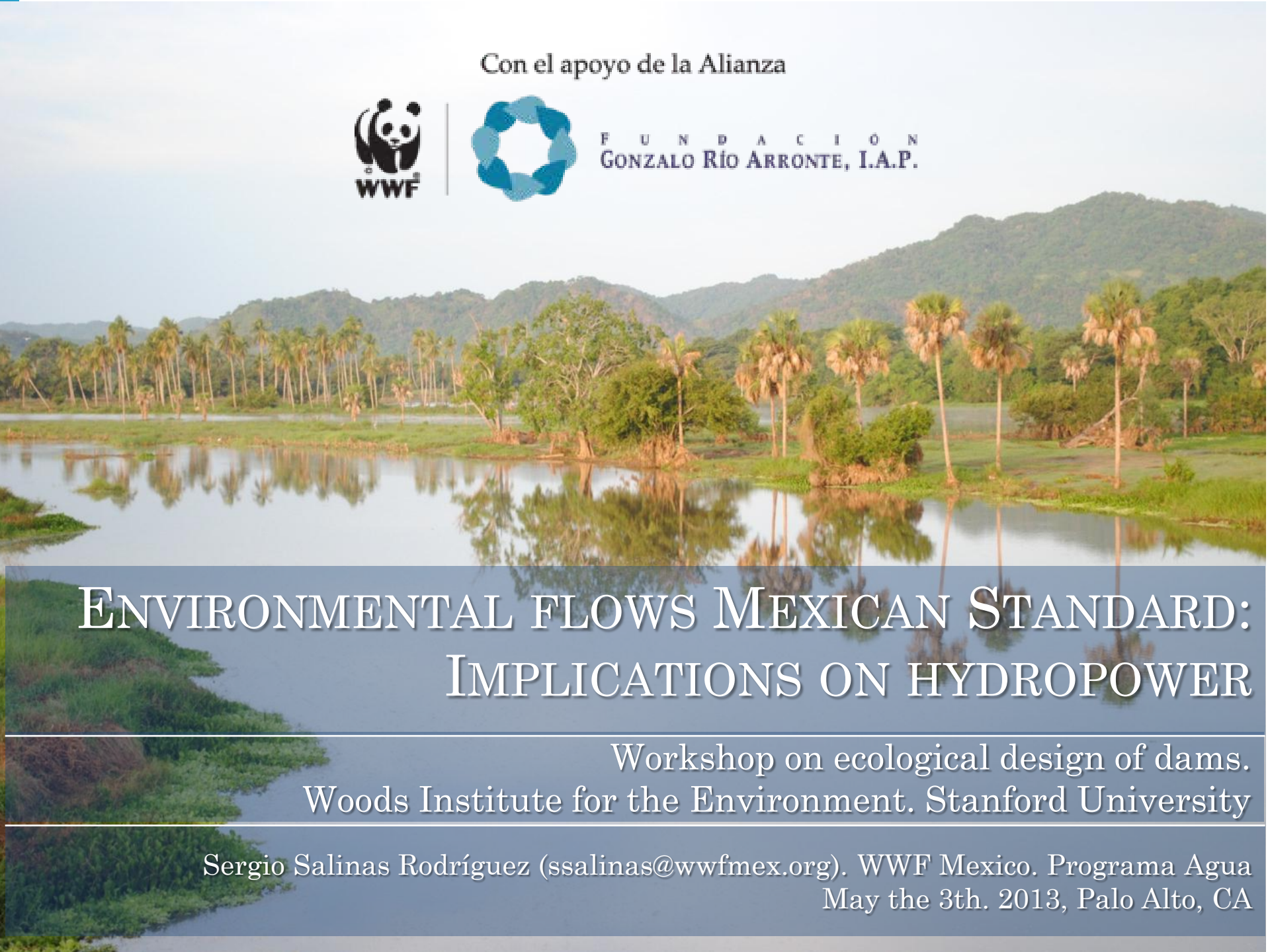

ENVIRONMENTAL FLOWS MEXICAN STANDARD: IMPLICATIONS ON HYDROPOWER

Workshop on ecological design of dams.
Woods Institute for the Environment. Stanford University

Sergio Salinas Rodríguez (ssalinas@wwfmex.org). WWF Mexico. Programa Agua
May the 3th. 2013, Palo Alto, CA

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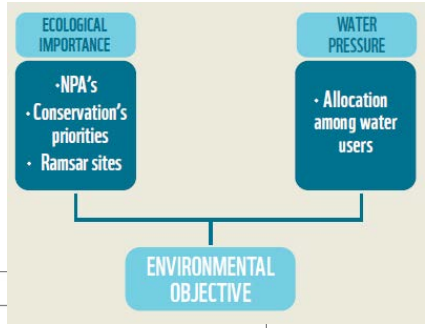
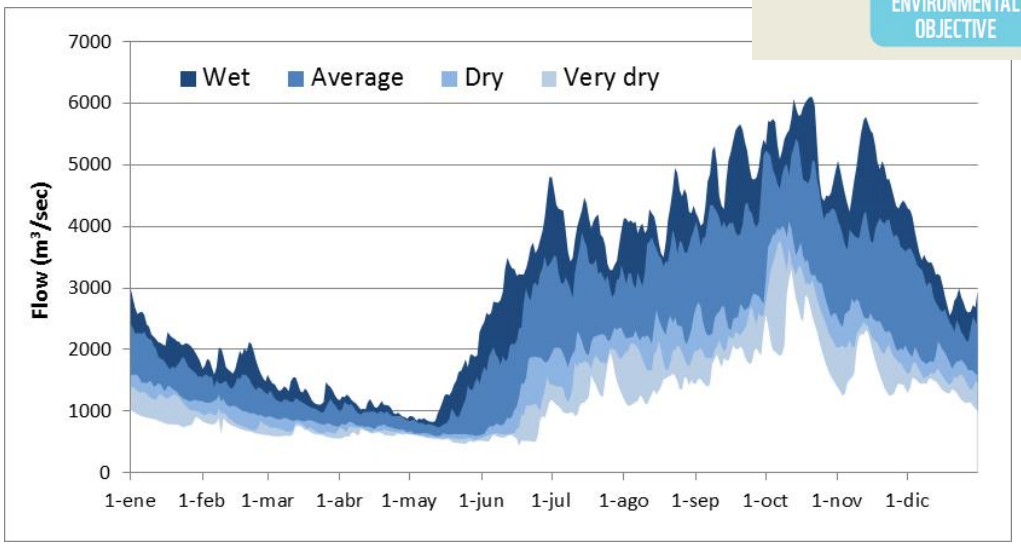
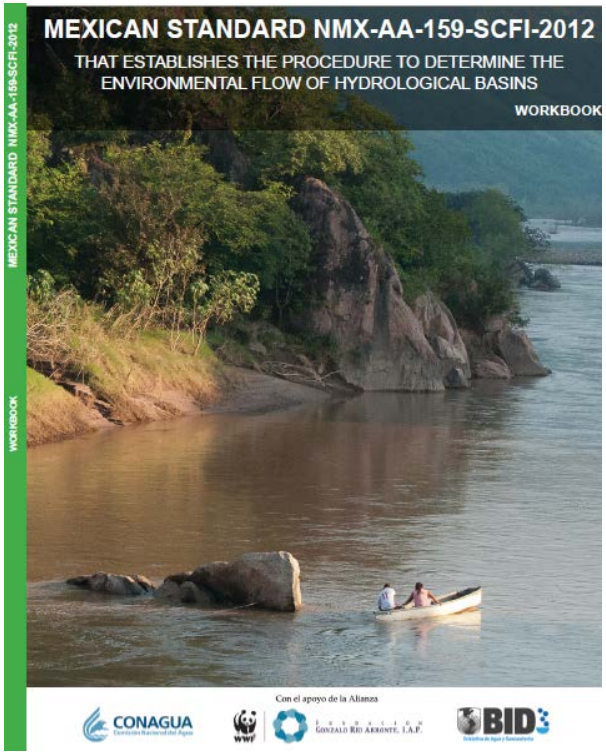
ENVIRONMENTAL FLOWS MEXICAN STANDARD

- 9/20/2012: Mexican environmental flow standard officially published Norma Mexicana de Caudal Ecológico - NMX-AA-159-SCFI-2012
- By law ecosystems are legitimate users of water

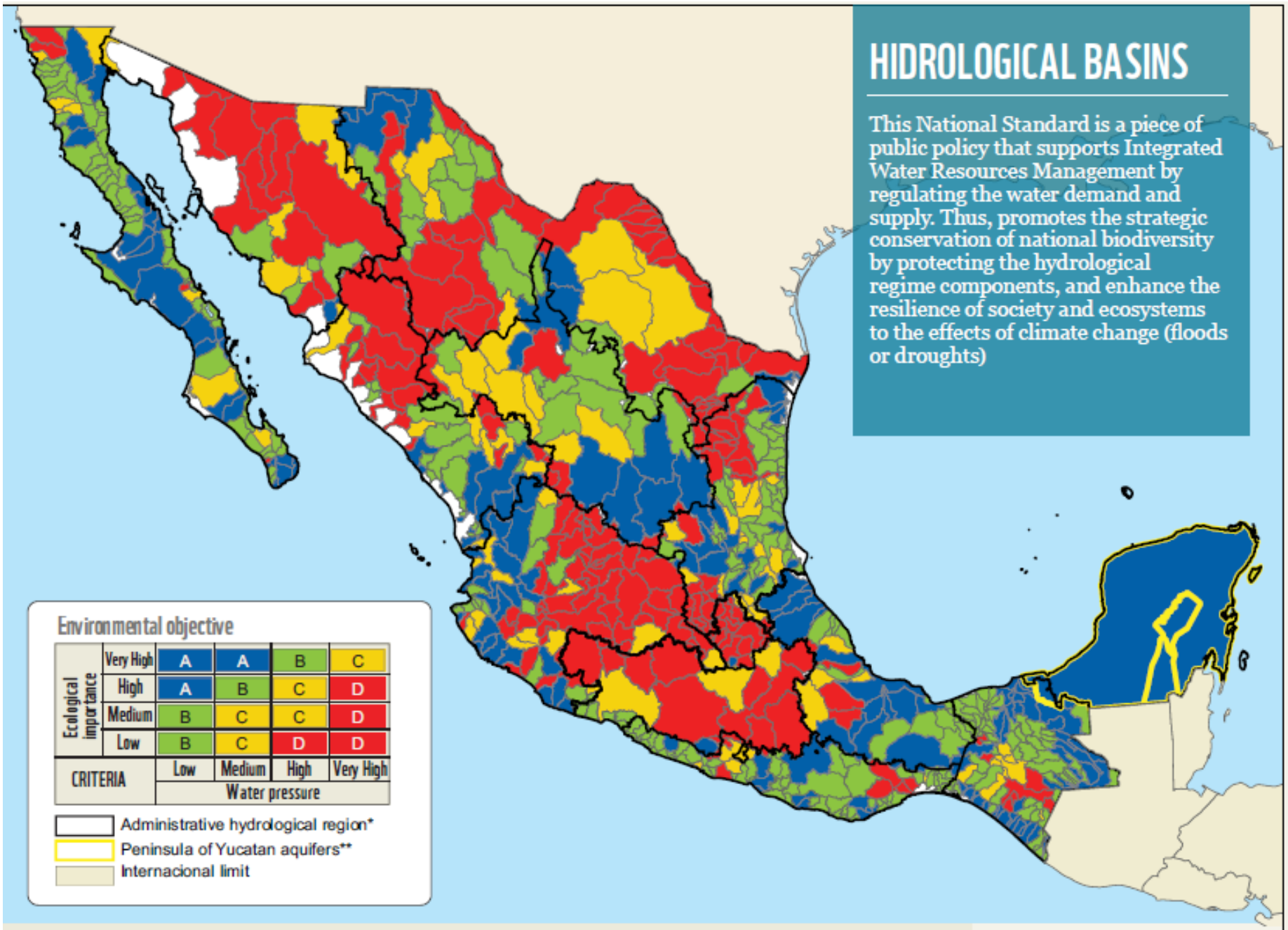






HIDROLOGICAL BASINS

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)



*Hydrological basins in white are still un analysis to obtain their environmental objectives
**Environmental objective according aquifers in formation in Peninsula of Yucatan

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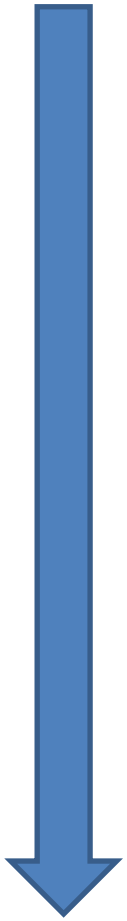
METHODOLOGIES

- Hydrological
  - Tennant method
  - Hydrological high detailed
  - ….
- Habitat simulation
  - PHABSIM
  - IFIM
  - ….
- Holistics
  - BBM
  - DRIFT
  - ….



Increase in analysis detail and costs according the EFA goals

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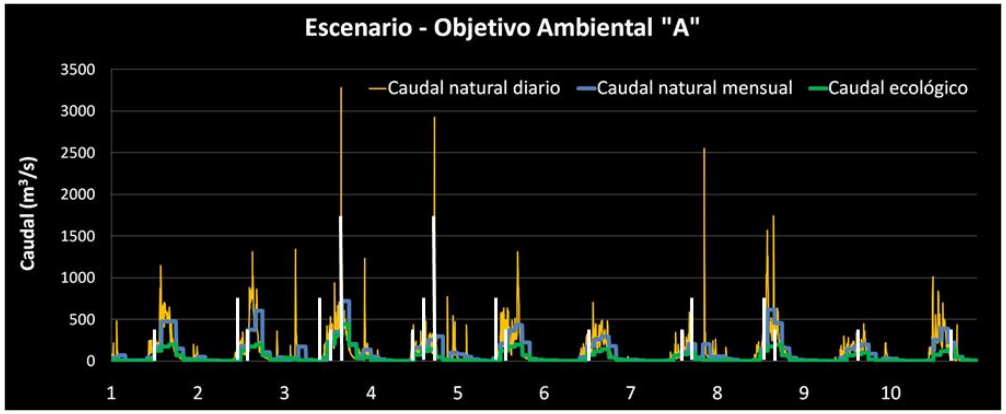
IMPLICATIONS IN HYDROPOWER

- High detail in hydrological analysis
  - Seasonal flows for ordinary conditions
    - It must consider wet, average, dry, and very dry year conditions
  - Floods regime
    - A flood regime considering three types of pulses, all with their respective attributes (magnitude, duration, frequency, timing and rate of change):
      - Flood with an intra-annual pulse
      - Low inter-annual magnitude flood (Return's period: 1.5 years)
      - Medium inter-annual magnitude flood (Return's period 5 years)



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IMPLICATIONS IN HYDROPOWER

- EFA within an holistic approach
  - Hydrology, hydraulics, geomorphology, geohydrology, water quality, aquatic vegetation, fish, macroinvertebrates, and social aspects
  - In addition of hydrologic modeling and to the response of the ecosystem's biota, it is also required:
    - Habitat simulation modeling
    - Modeling of scenarios to support decision making
  - The EF proposal shall consider a scheme for dry and average years and should reach a determined conservation state for target species and hydrological connectivity, even with the operation of the HP
  - The EFA is considered as a feasibility study

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CONAGUA
COMISIÓN NACIONAL DEL AGUA

BID
Iniciativa de Agua y Saneamiento

The Mexican National Water Law

- Art. 41… the federal government could implement through a decree the total or partial reservation of national water with the objective of **ensure the minimal ecological flow for ecological protection**.

- Art. 86 BIS 1, The Commission is allowed to…**"promote water reserves or ecological reserve according to the law to preserve wetlands"**

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CONAGUA
COMISIÓN NACIONAL DEL AGUA

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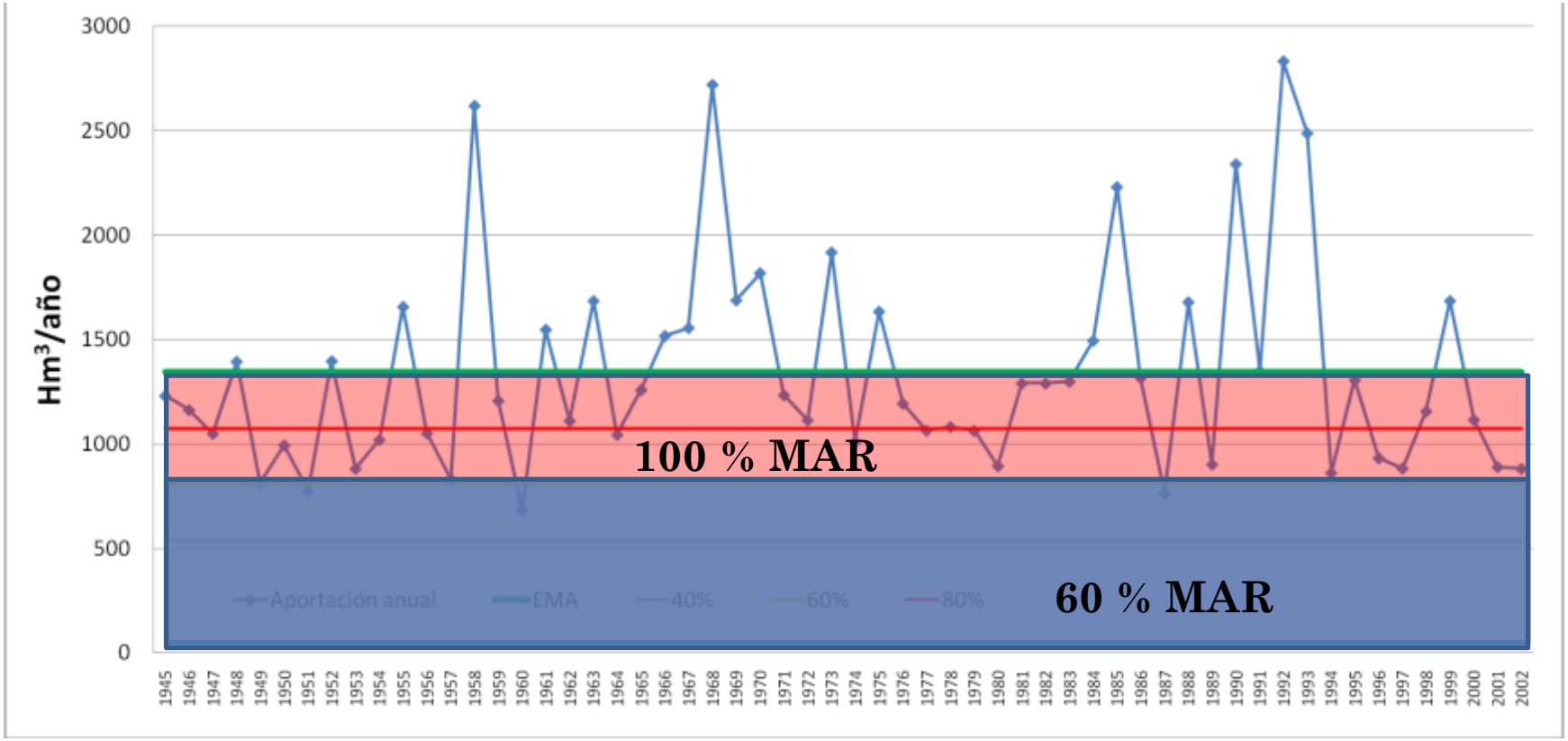

Risk Management

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CONAGUA
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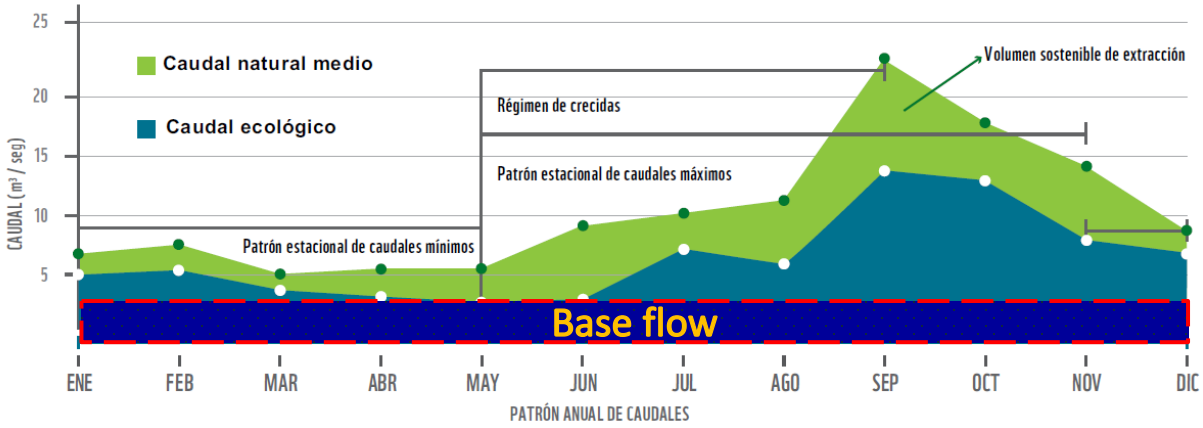
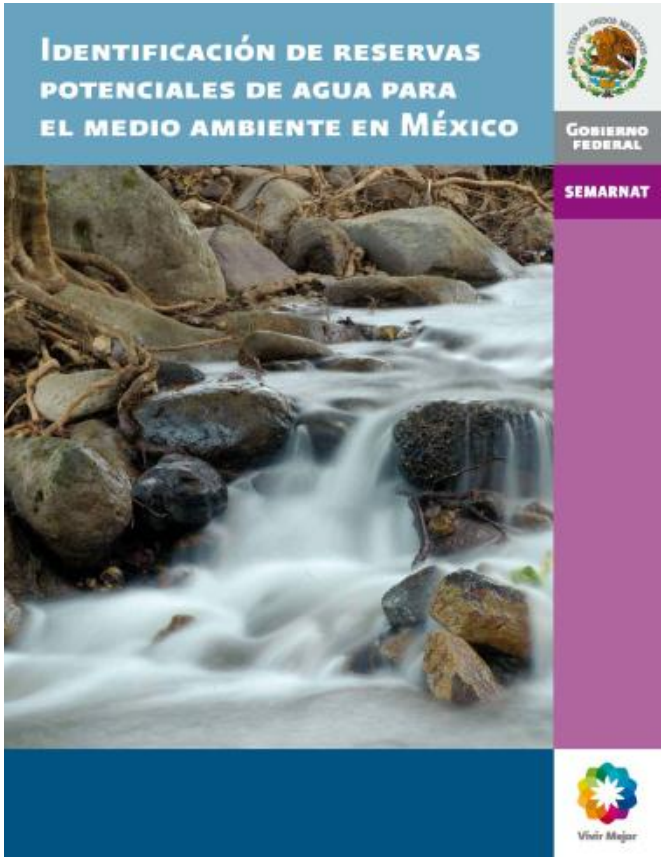
- Water managers could be the best partners of freshwater conservationist: at the end both must look for keeping water in nature

  - Promotion of integrated management: surface and groundwater
  - Prevents overallocation





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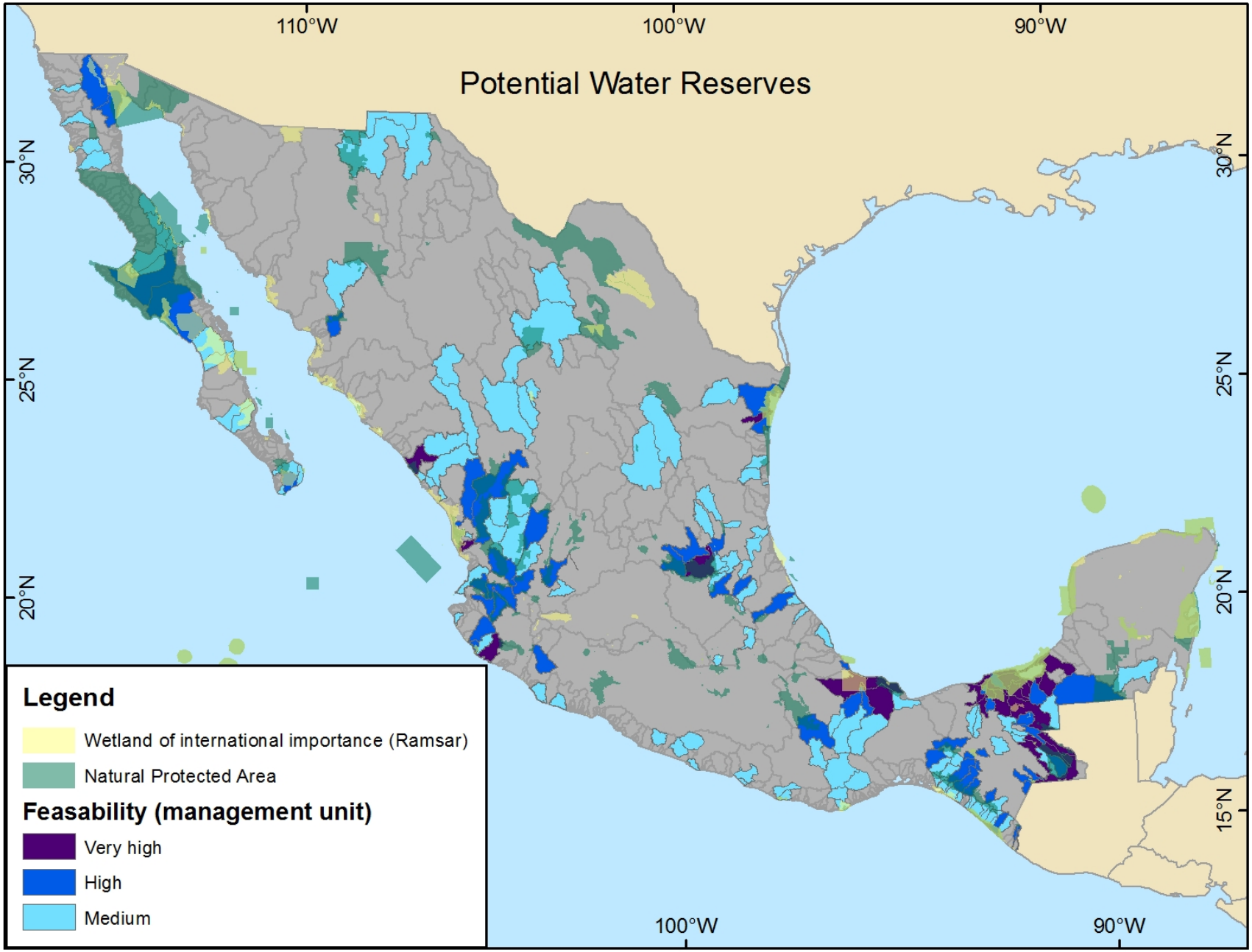
Potential Water Reserves
110°W
100°W
90°W
30°N
25°N
20°N
15°N
Legend
Wetland of international importance (Ramsar)
Natural Protected Area
Feasability (management unit)
Very high
High
Medium