

**PURDUE**  
UNIVERSITY

**RETAC**  
CONACYT



# **Water Security and Water Research in Mexico**

*Úrsula Oswald Spring*

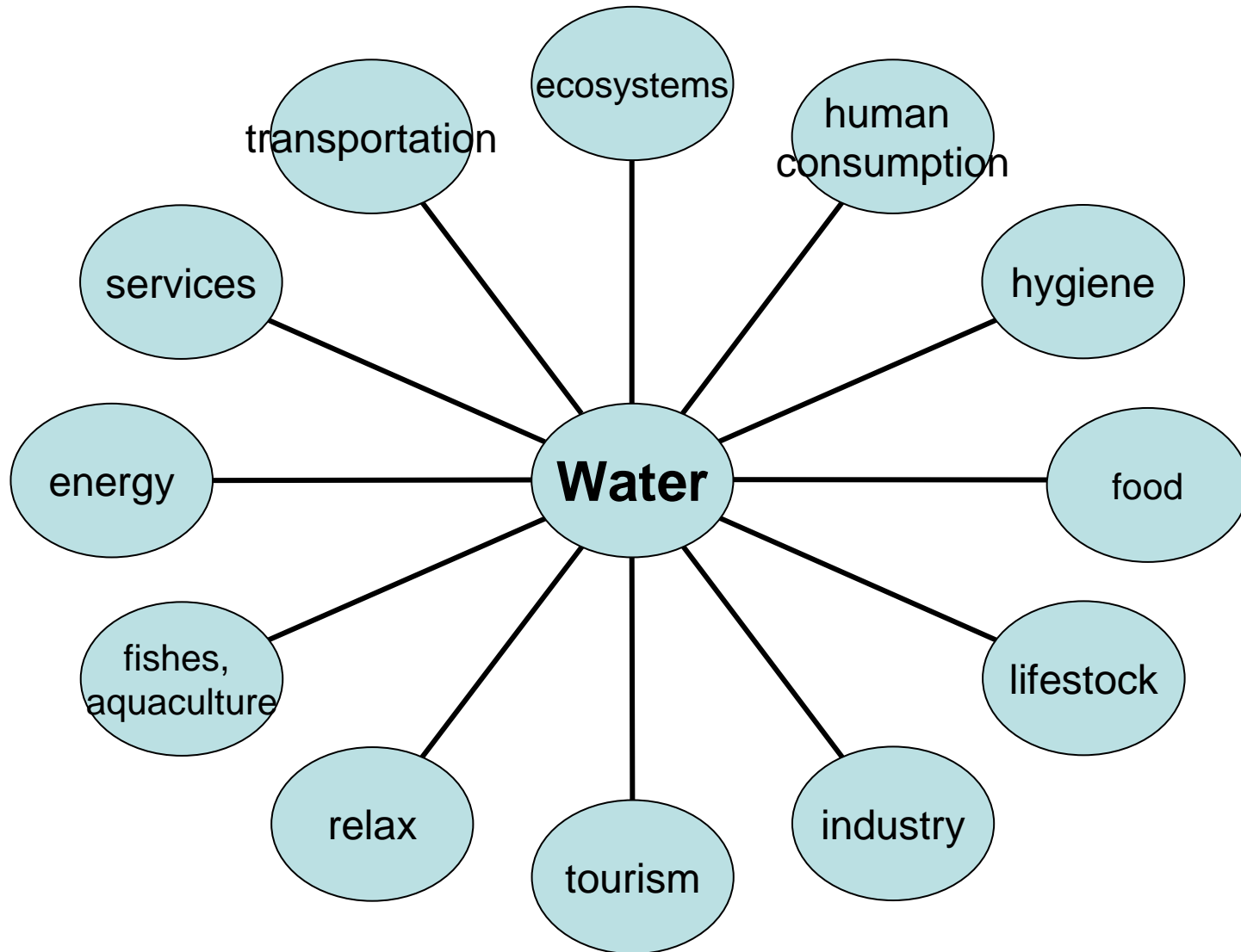
**National University of Mexico: CRIM-UNAM  
National Coordinator of the Water Network,  
CONACYT: RETAC**

**West Lafayette, IN 47907, 26-30, April 2010**

# Content

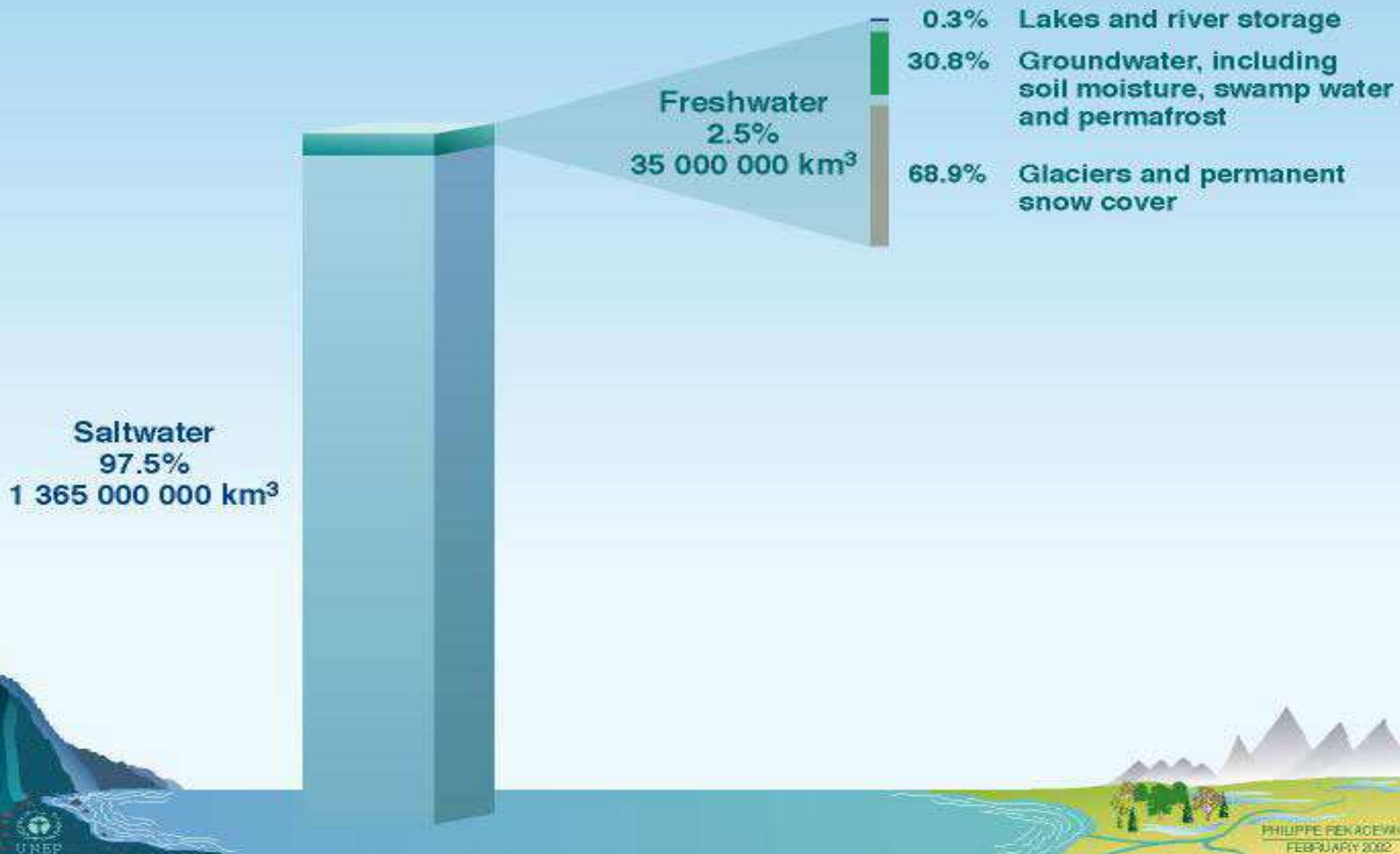
1. Use of water
2. Water security
3. Water and agriculture
4. Water stress
5. Value and use of of water
6. Water research in Mexico
7. Lessons learnt: awareness building

# Uses of Water



# A World of Salt

## Total Global Saltwater and Freshwater Estimates



# Water Security

- Water is vital for the life and health of people and ecosystems
- **One common goal:** *to provide water security in the 21st Century (WWFII, The Hague):*
  - This means ensuring that freshwater, coastal and related ecosystems are protected and improved;
  - sustainable development and political stability are promoted;
  - every person has access to enough safe water at an affordable cost to lead a healthy and productive life
  - the vulnerable are protected from the risks of water-related hazard
- Water resources are under **threat** from pollution, overexploitation, land-use changes, unsustainable use, climate change and other anthropogenic forces.
- Links between threats and poverty: the poor who are hit first and hardest (slum dwellers without basic services).
- One simple conclusion: **business-as-usual is not an option.**

## Freshwater stress

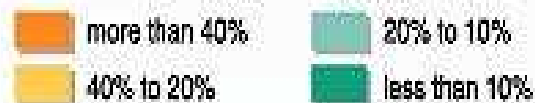


1995



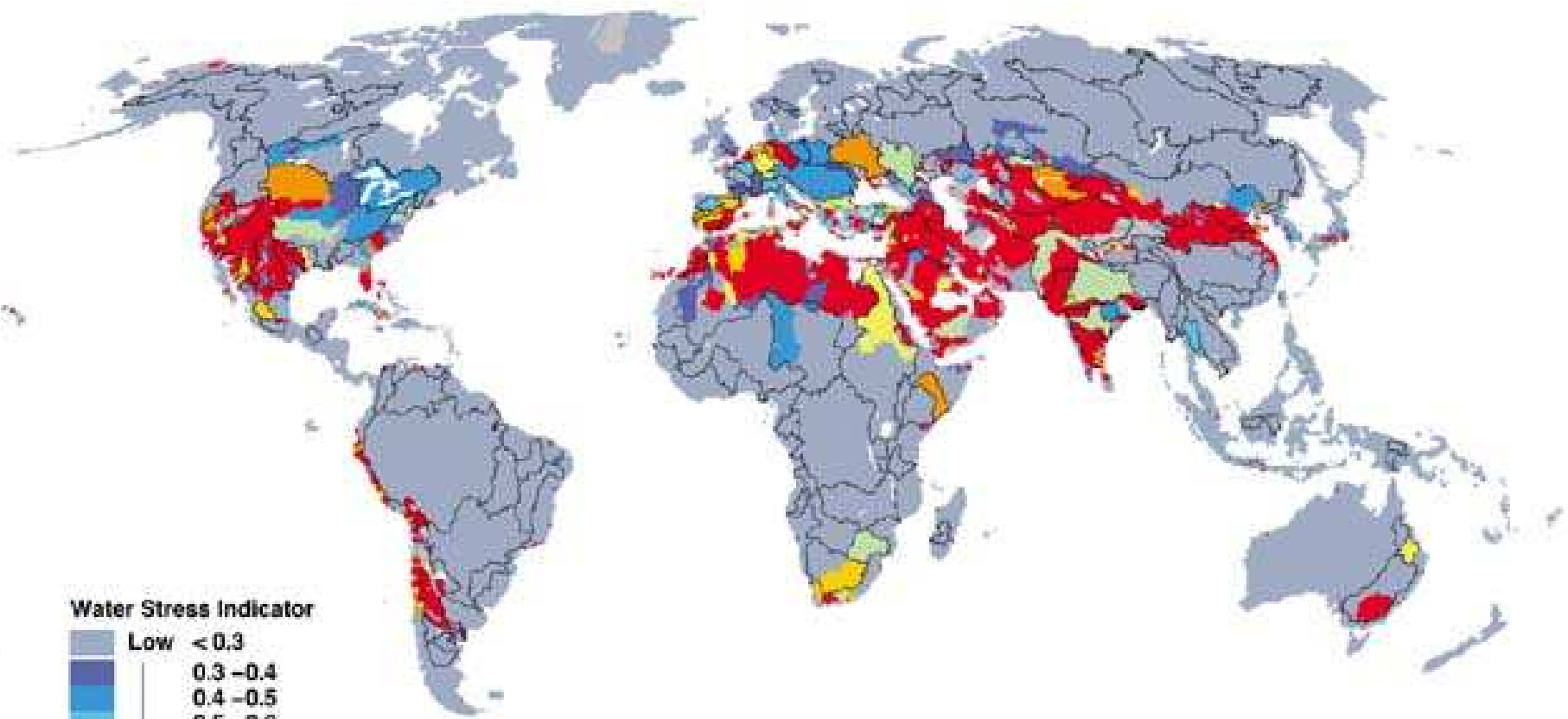
2025

water withdrawal as percentage of total available

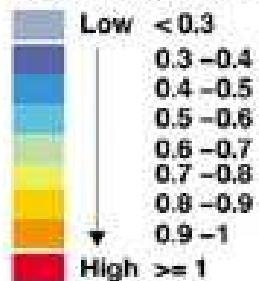


**North Africa, Middle East, South Africa, India and Mexico are seriously affected by water stress from 1995 on. Climate change will increase water stress in Sudan, Kenya, Mauritania, China, Pakistan, Australia, Peru, Chile and some European countries.**

# Zones with Highest Water Stress

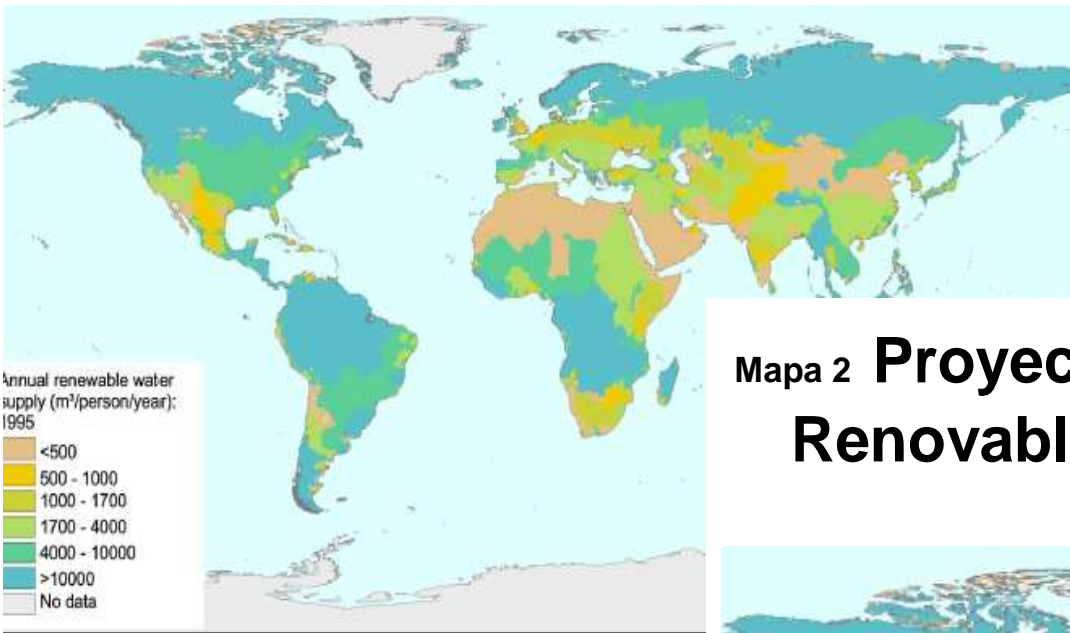


## Water Stress Indicator

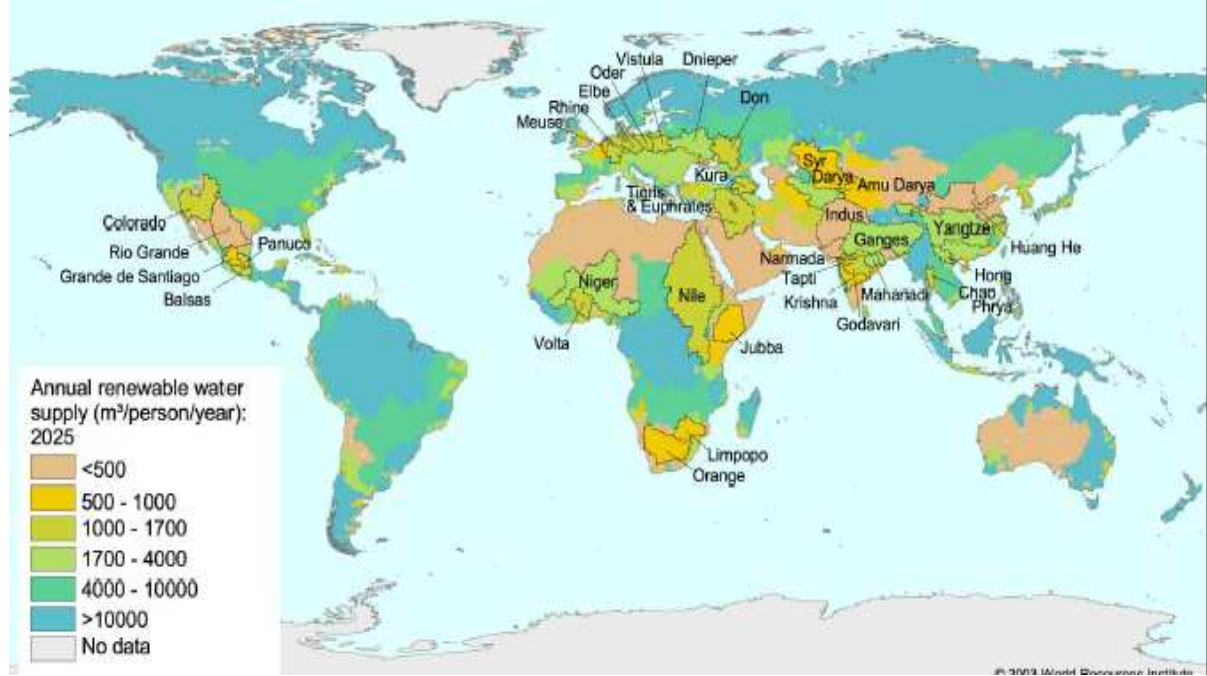


— No discharge  
— Major River Basins

# Mapa 1 Reservas de Agua Renovable por Año/Persona/Cuenca (1995)



# Mapa 2 Proyecciones de Reservas de Agua Renovable por Año/Persona/Cuenca (2025)





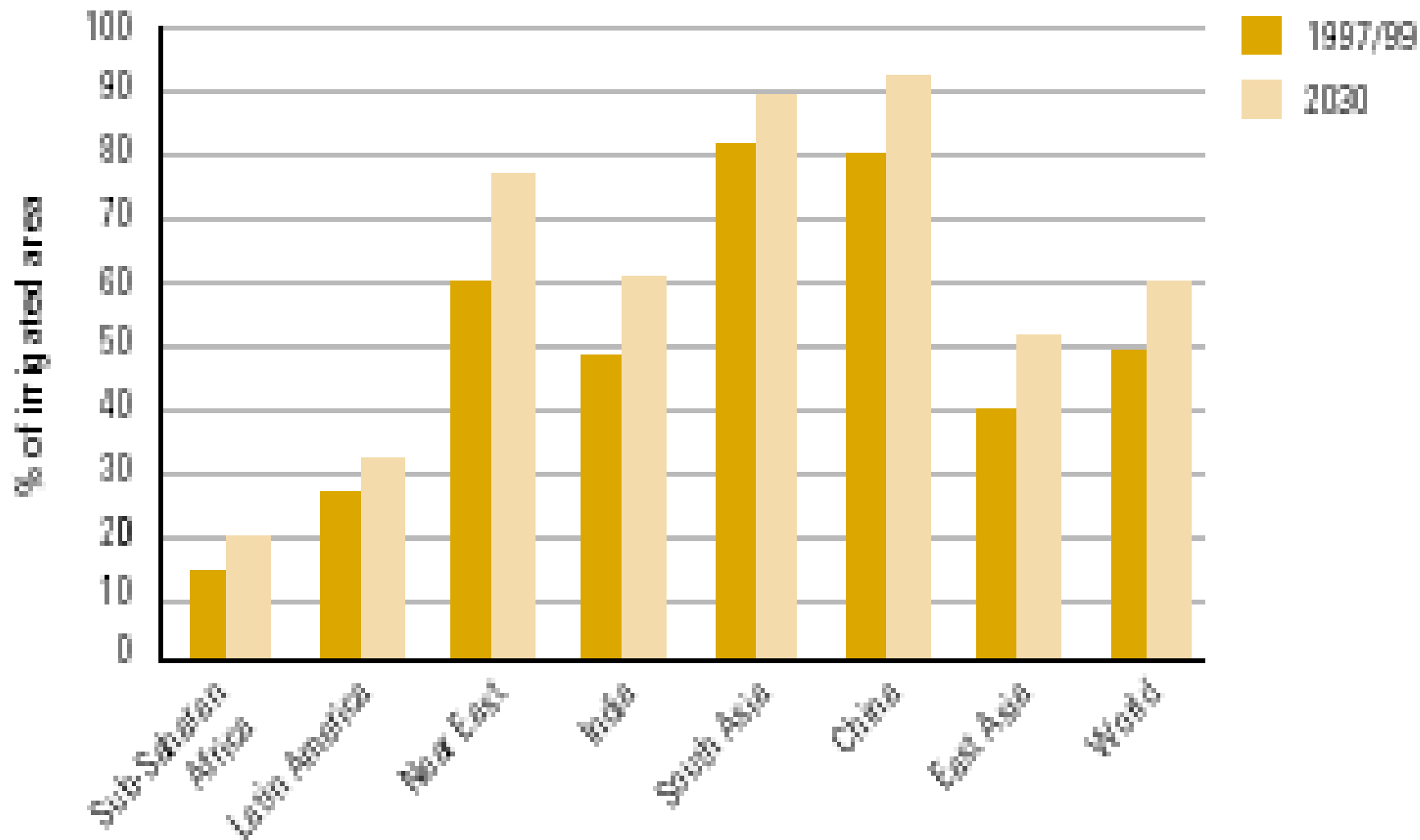
# Water Use in Agriculture

## Irrigated Areas



(c) Center for  
Environmental Systems Research,  
University of Kassel, Nov 2000

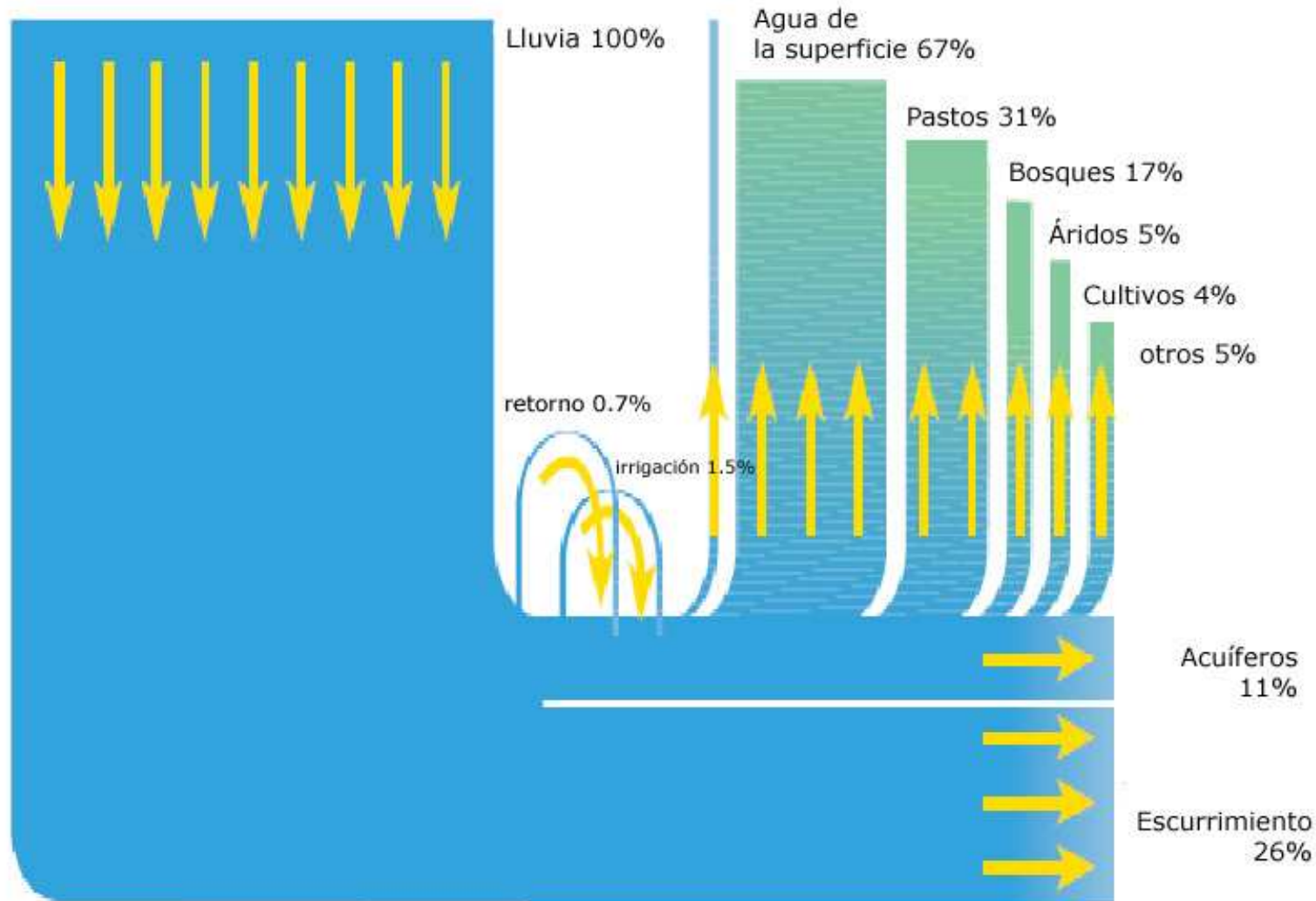
# Potential of irrigation in the world



# Global flow of green and blue water

## Flujos globales de agua verde y azul

Agua azul  
Agua verde

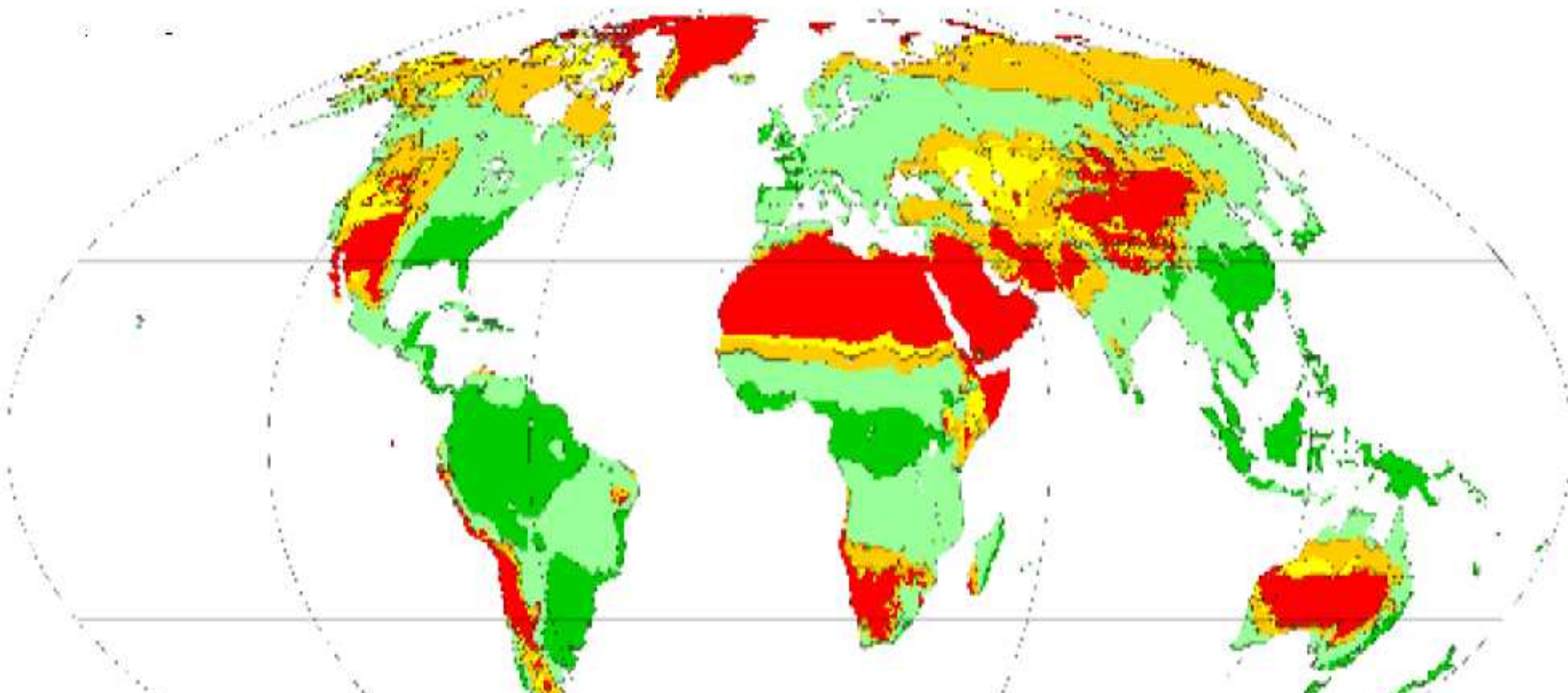


# Virtual Water Balance in Countries ( $m^3/c/y$ ) in 2000

**Azul: Exportación**  
**Rojo: Importación**



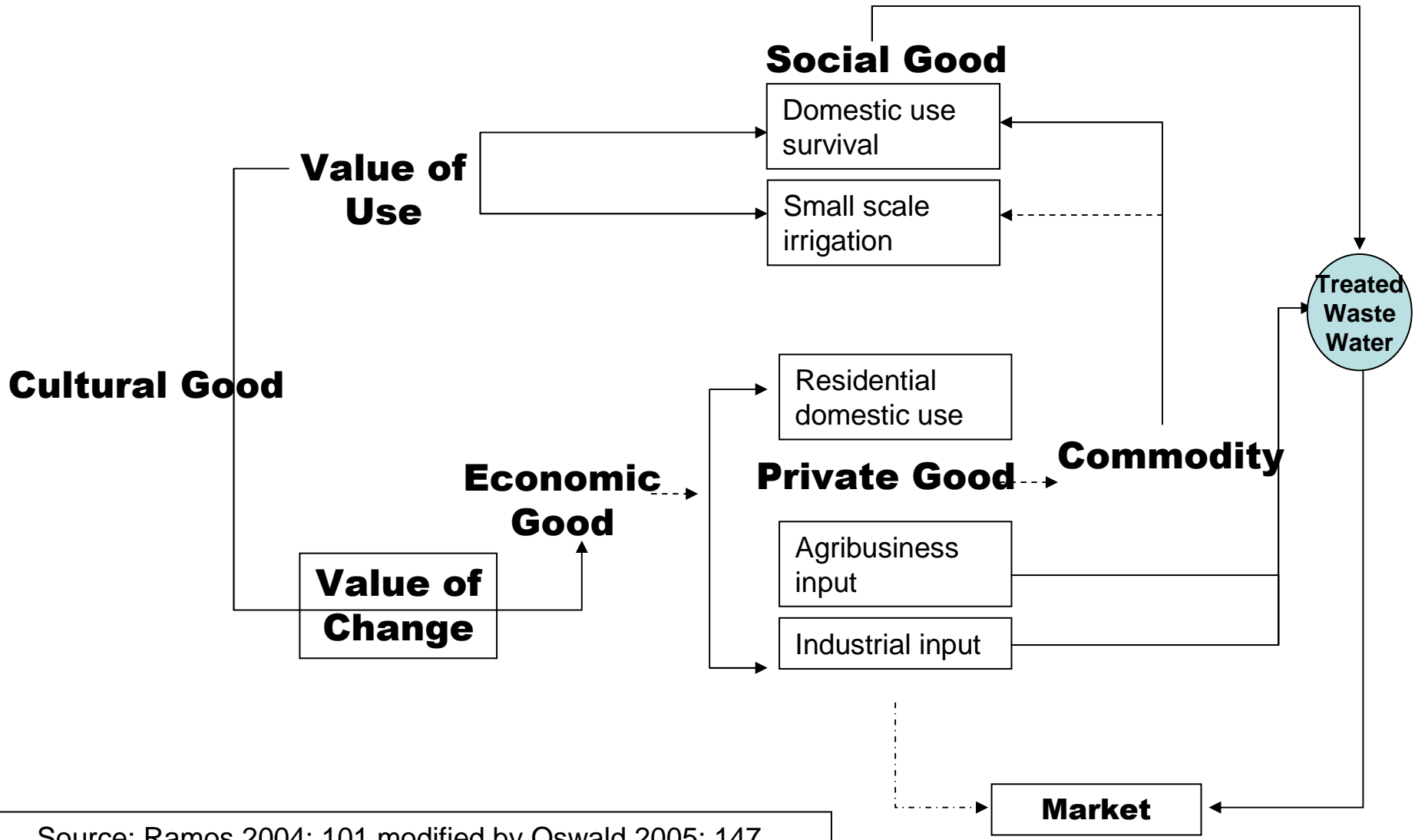
# Dryland Zones of the World



**Kofi Annan: “Drought and desertification are threatening the well-being and livelihood of more than one billion people in 110 countries of the world“.**

hyperarid      arid      semi-arid      dry subhumid      non-dryland

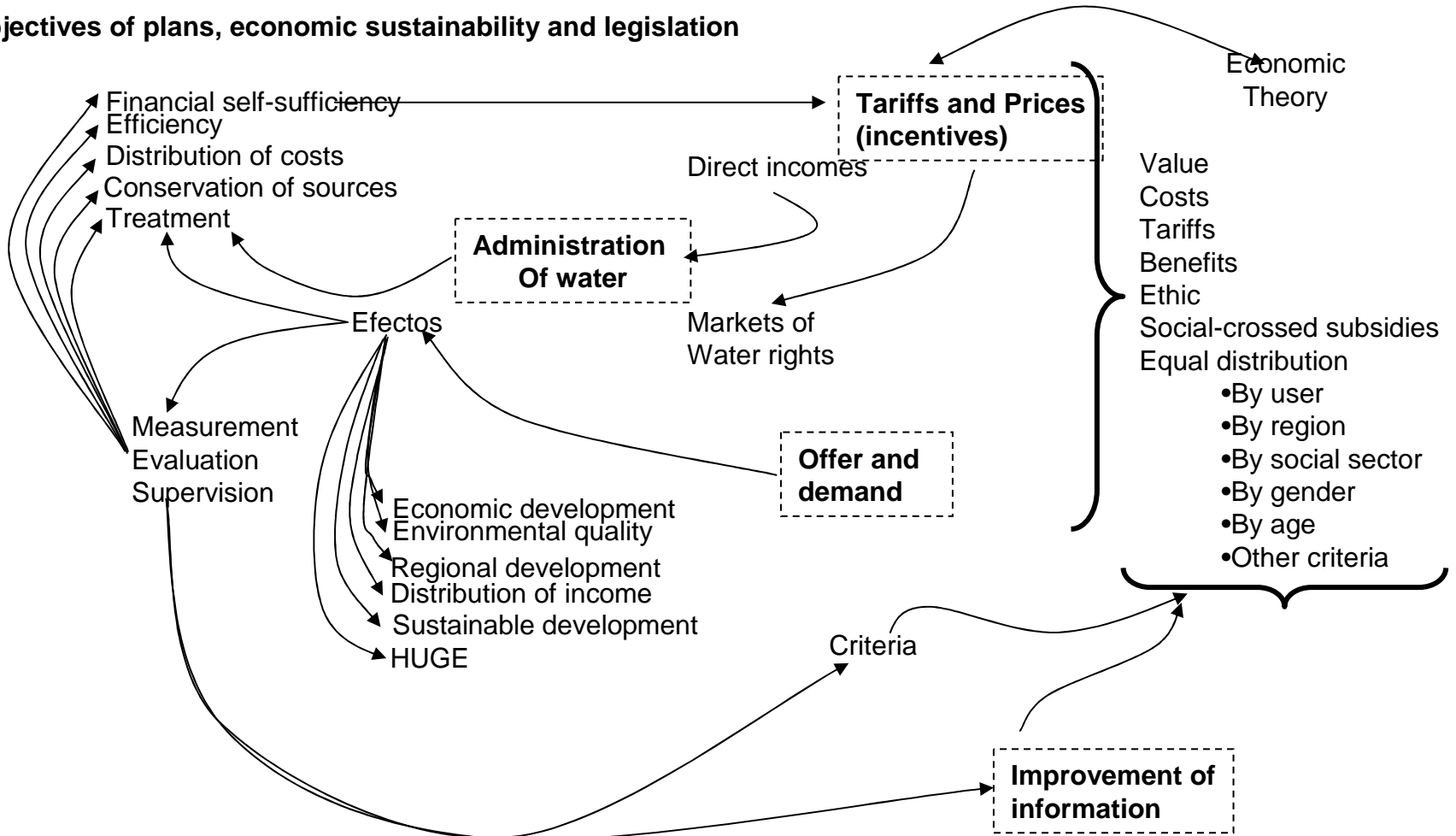
# Logics of Value of Water



Source: Ramos 2004: 101 modified by Oswald 2005: 147

# Economy of Water

Objectives of plans, economic sustainability and legislation



# Water research in Mexico

**Elaboration of a national of the scientific and technological state of art of water research, institution, business and urgent research themes**

**Mexican state of art in water research**

**National and international sources of financing**

**Objetivos específicos**

**Potential projects feasible to link up with public and private sector (business with environmental ethic)**

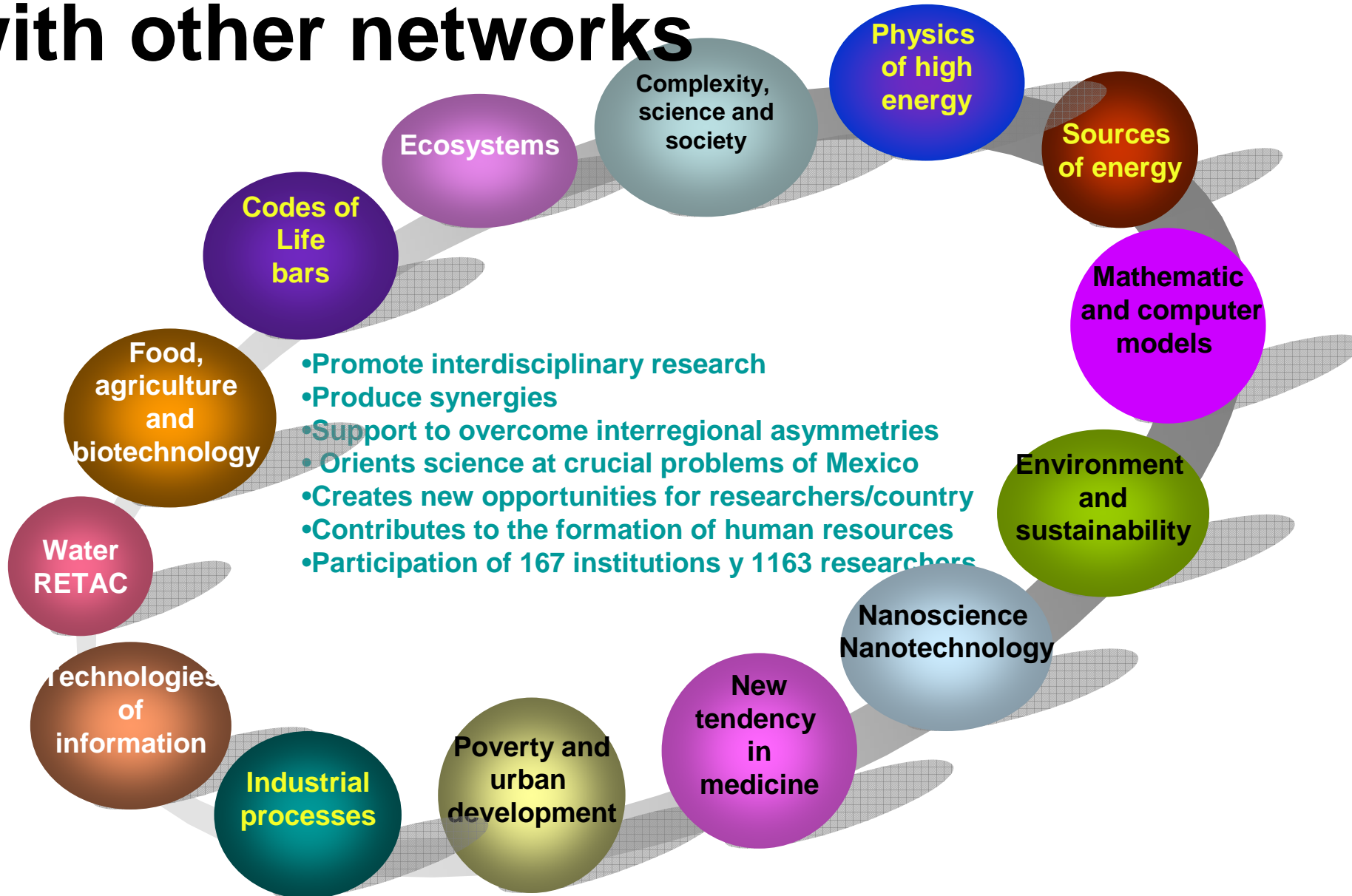
**Catalogue of:**  
- Human resources  
- Capacity for formation of new resources  
- Infrastructure in collaboration with business an government

**Projects oriented to resolve or create conditions to tackle strategic problems of Mexican society in cooperation with government and business in water management**

**Multi-institutional and interdisciplinary projects relating problems from basic science, engineering, integral basin management, ecosystem services and water culture**



# Transversal interrelation of RETAC with other networks



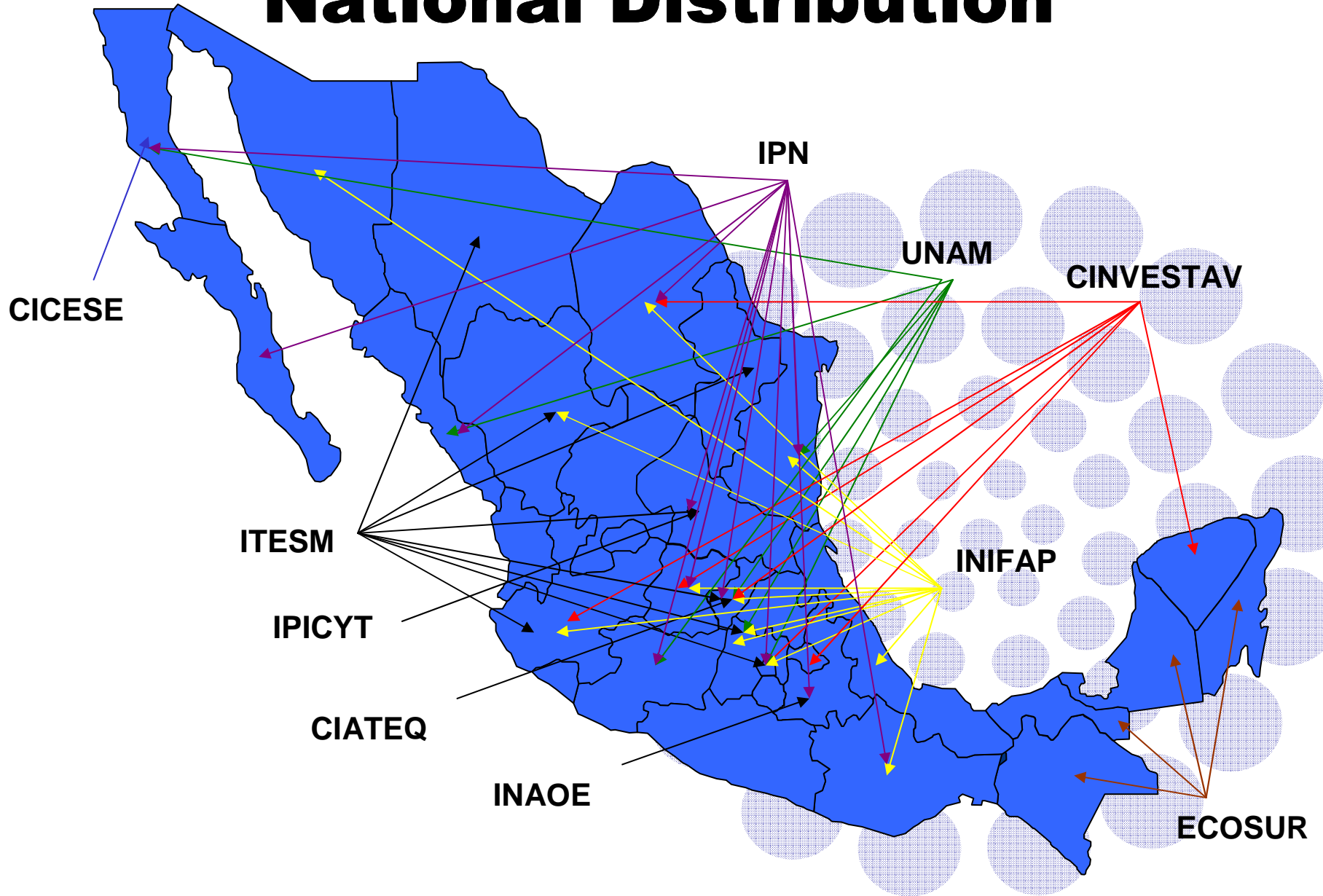
# **5 Basic themes/research topics**

- 1. Hydrological processes and management of basins**
- 2. Water availability, interaction with ecosystems, uses, reuse (irrigation), efficiency**
- 3. Water quality and health**
- 4. Social effects of water management, conflicts and hydro-diplomacy**
- 5. Institutions, policy, economy of water and legal aspects**

# Interinstitucional Participation

- Centro de Investigación Científica de Yucatán, A.C.
- Centro de Investigación en Geografía y Geomática “Ing. Jorge L. Tamayo”, A.C
- Centro de Investigación y Asistencia en Tecnología y Diseño del Estado de Jalisco
- Centro de Investigación y Desarrollo Tecnológico en Electroquímica
- Centro de Investigaciones Biológicas del Noroeste
- CIBNOR
- CIESAS
- CINVESTAV
- Corporación Mexicana de Investigación en Materiales S. A. de C. V
- El Colegio de la Frontera Norte
- El Colegio de Postgraduados
- El Colegio de San Luis
- El Colegio de Tlaxcala A.C.
- El Colegio de la Frontera Norte
- El Colegio de México
- El Colegio de Michoacán
- El Colegio de Sonora
- Fondo para la Comunicación y la Educación Ambiental A.C.
- Grupo La Norteña
- IMTA
- Inst. de Investigaciones, Dr. José M. Luis Mora
- Instituto Tecnológico de Monterrey
- Ingeniería de Innovación Integral S.A. de C. V.
- INIFAP
- Instituto Tecnológico de Culiacán
- Instituto Tecnológico de Sonora
- IPN
- Observatorio del agua para el estado de Veracruz, ABCC
- UAEM
- UAM-Ixtapalapa, Xochimilco, Azcapozalco
- UA Querétaro
- UNAM
- Universidad Autónoma Chapingo
- Universidad Autónoma de Aguascalientes
- Universidad Autónoma de Ciudad Juárez
- Universidad Autónoma de Coahuila
- Universidad Autónoma de San Luis Potosí
- Universidad Autónoma de Yucatán
- Universidad Autónoma del Estado de México
- Universidad de Guadalajara
- Universidad de las Américas
- Universidad de Quintana Roo
- Universidad de Sonora
- Universidad Veracruzana

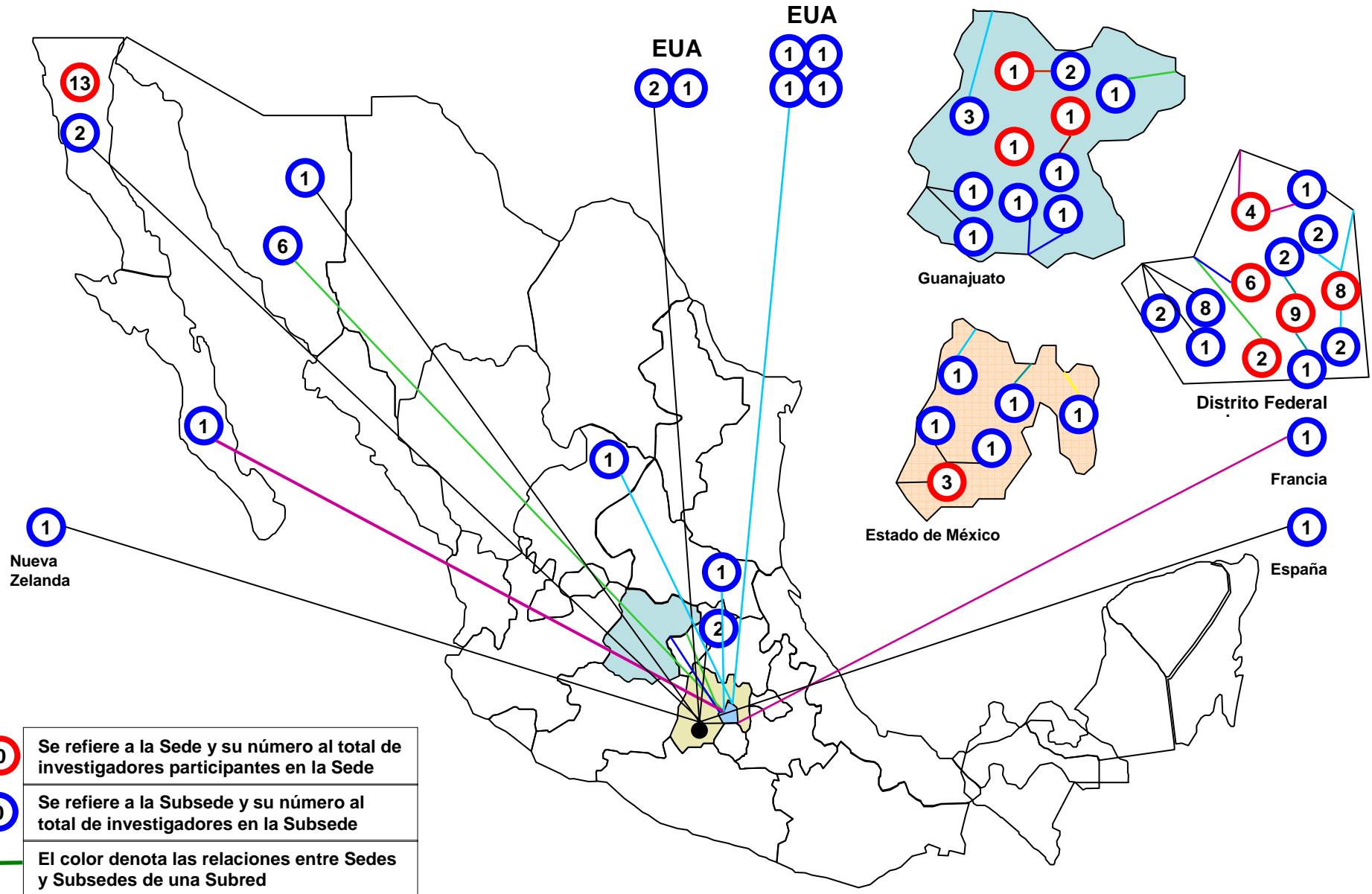
# National Distribution



# Support to existing networks

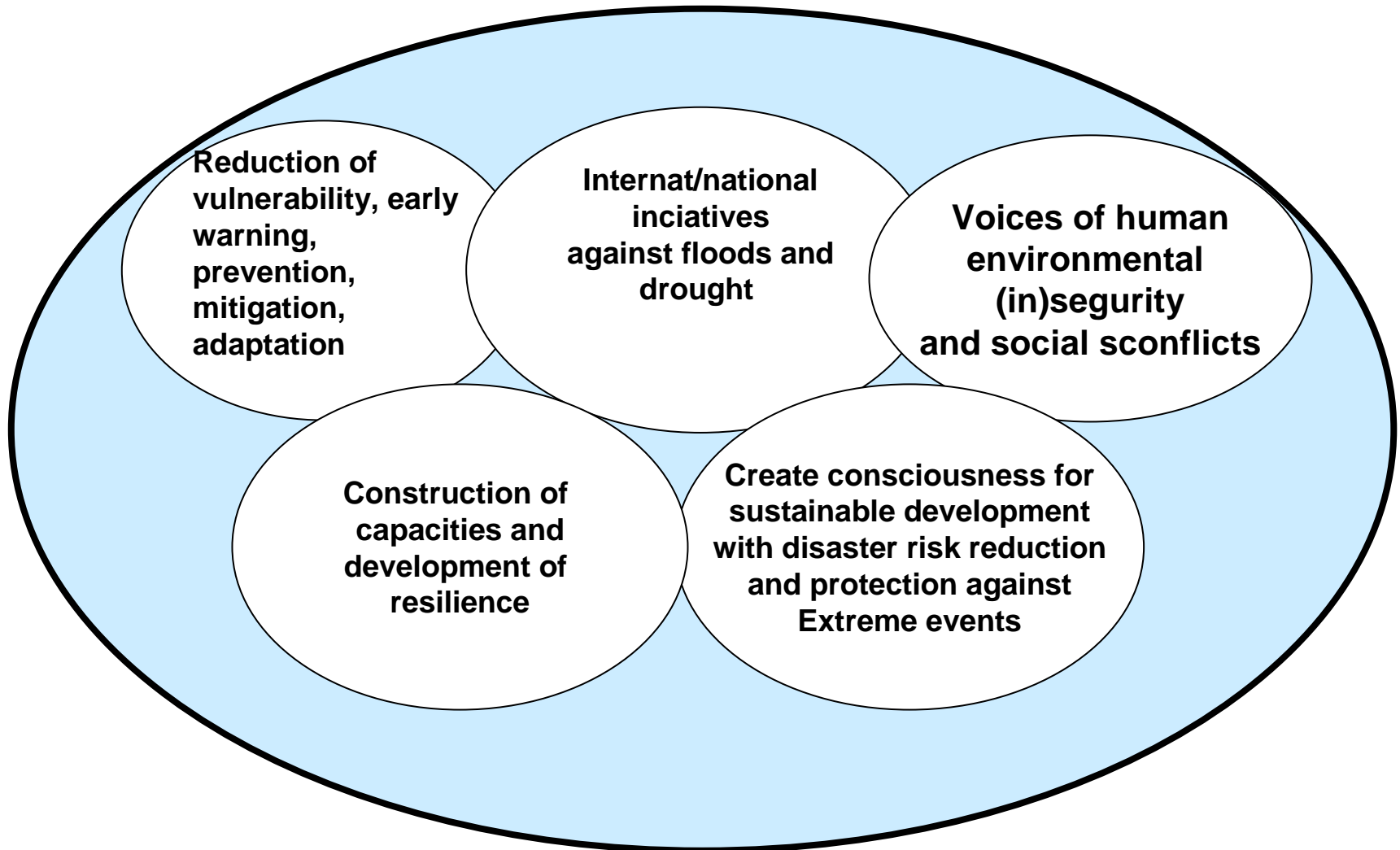
- PUMAGUA, UNAM
- ATL El Portal del Agua desde México, UNESCO-IMTA
- Cátedra UNESCO-IMTA: El Agua en la Sociedad del Conocimiento
- Center for US Mexican Studies, Universidad de California, San Diego
- Centro Interamericano de Recursos del Agua: Cuenca Lerma- Chapala-Santiago
- El Observatorio Ciudadanos del Agua, Saltillo, Coahuila
- Fondo para la Comunicación y la Educación Ambiental A.C, [www.agua.org.mx](http://www.agua.org.mx)
- Fondo para la Comunicación y la Educación Ambiental, A.C.
- Grupo Interdisciplinario del Agua: GIA, San Cristóbal de las Casas, Chiapas, CONACYT
- HIDRORED- Red de potabilización y depuración de Agua (UAEM, México)
- Instituto de Investigaciones Dr. José María Luis Mora
- La Red de Institutos Nacionales Iberoamericanos de Ingeniería e Investigación Hidráulica (CIP-OEA)
- Observatorio del agua para el estado de Veracruz, ABCC
- PUMAgua, UNAM
- Red de Desarrollo Sustentable de la UAM
- Red de Género, Salud y Ambiente, Centro de Investigación en Materiales Avanzados, SEP-CONACYT
- Red de Investigación Agua, Ciudad y Territorios (CNRS, Francia)
- Red de investigación de Agua UAM
- Red de Investigación sobre Agua - Cuenca del Río Bravo
- Red de Investigadores del Agua en Cuencas del Norte de México. RECUNOR
- Red de Investigadores sobre Agua en la Frontera México-Guatemala-Belice (RISAF)
- Red de Investigadores Sociales en Agua, Colegio de Posgraduado
- Red del Agua de la Academia Mexicana de Ciencias
- Red Franco Mexicana del Agua (IRD)
- Red Internacional de Investigación La Salle (RIILSA)
- Revista Digital Independiente Voz Universitaria (UNAM)
- UNIVERSIA México-Red de Universidades Red de Oportunidades

# Integration and creation of international networks

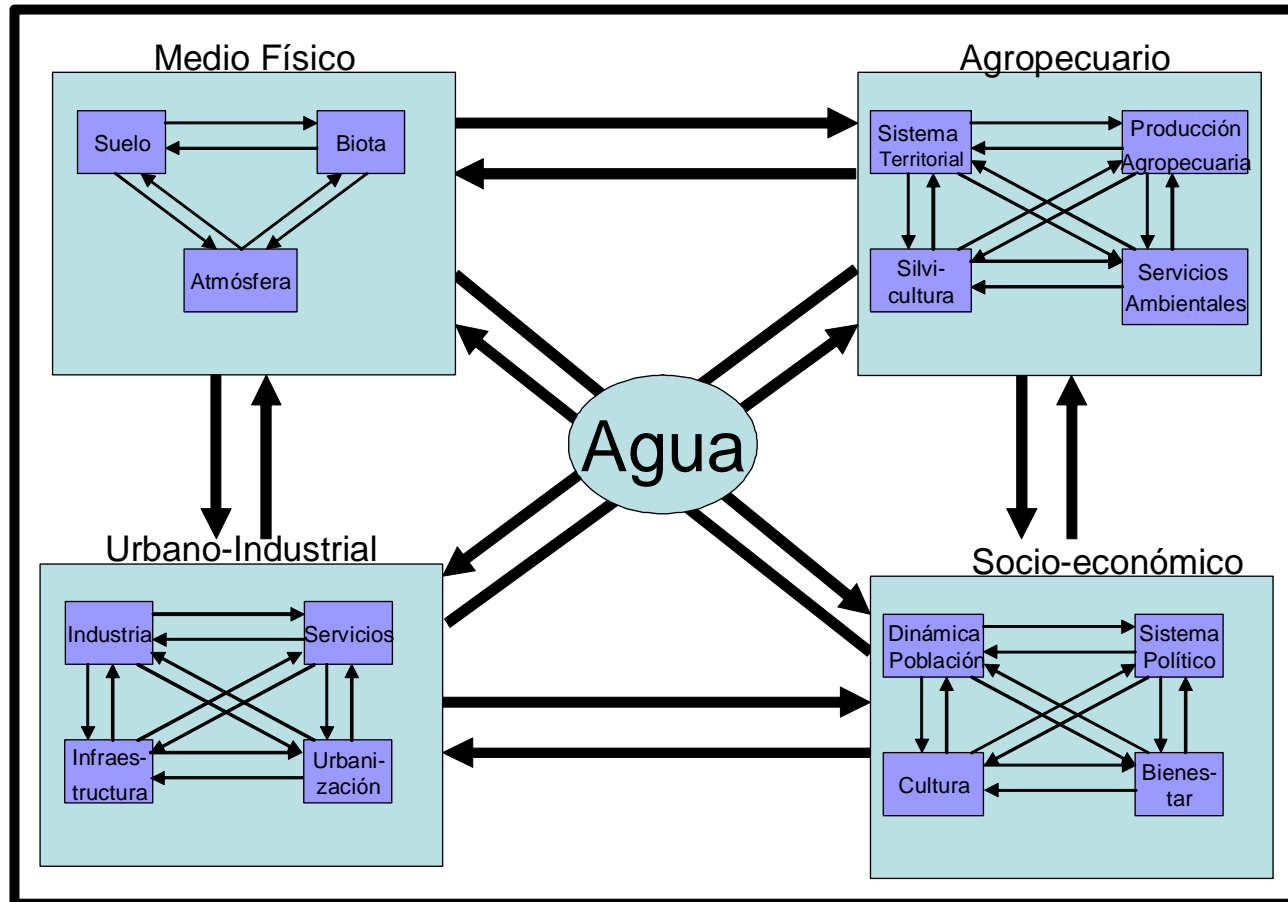


# Central objectives of the research of RETAC in Mexico

**The basin as a hydrological unit for planning and development of a multi-sectorial, multi-institutional and multidisciplinary research and actions**

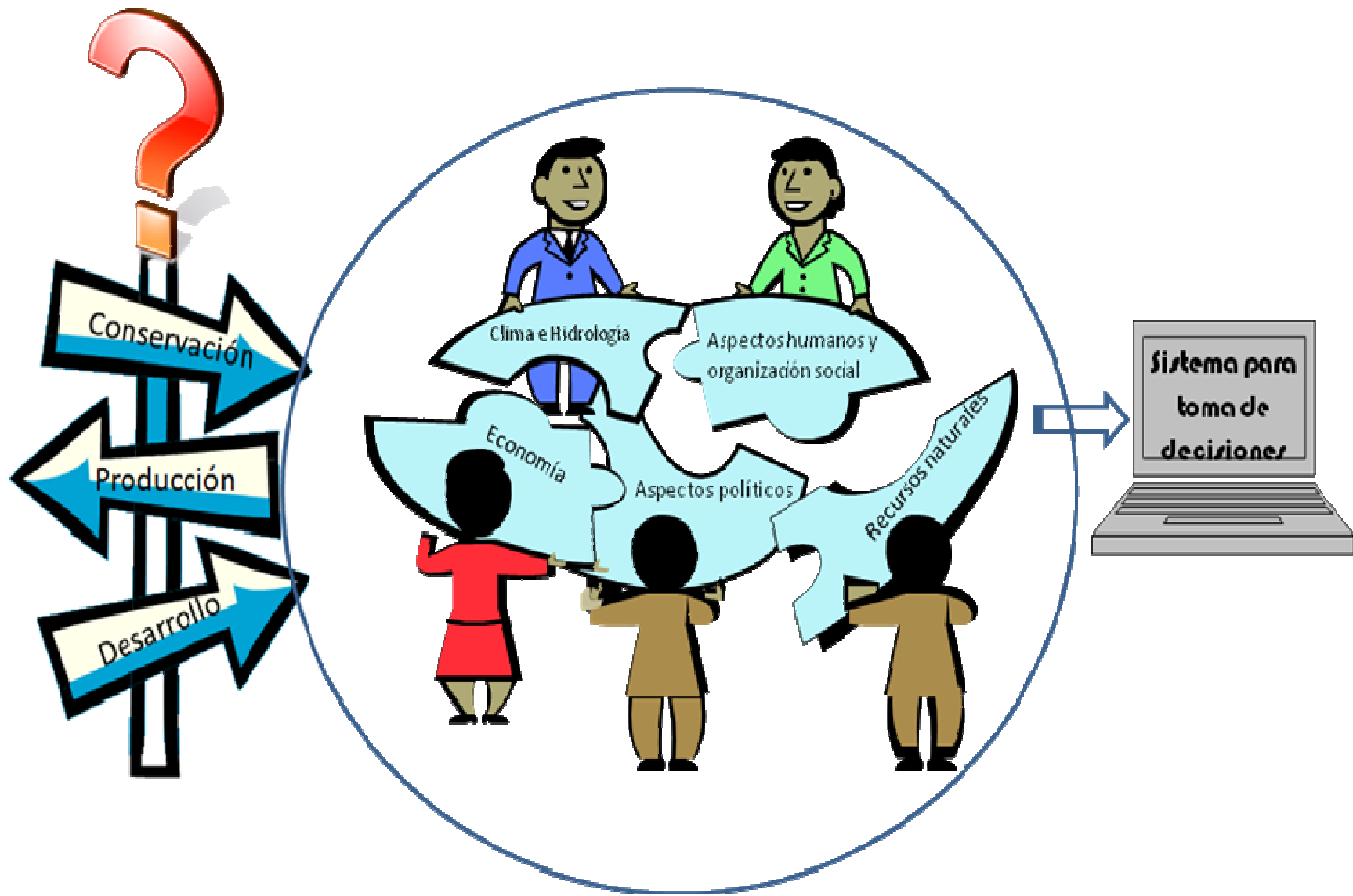


# System approach of an integral water management and sustainable development (Oswald, 2005)



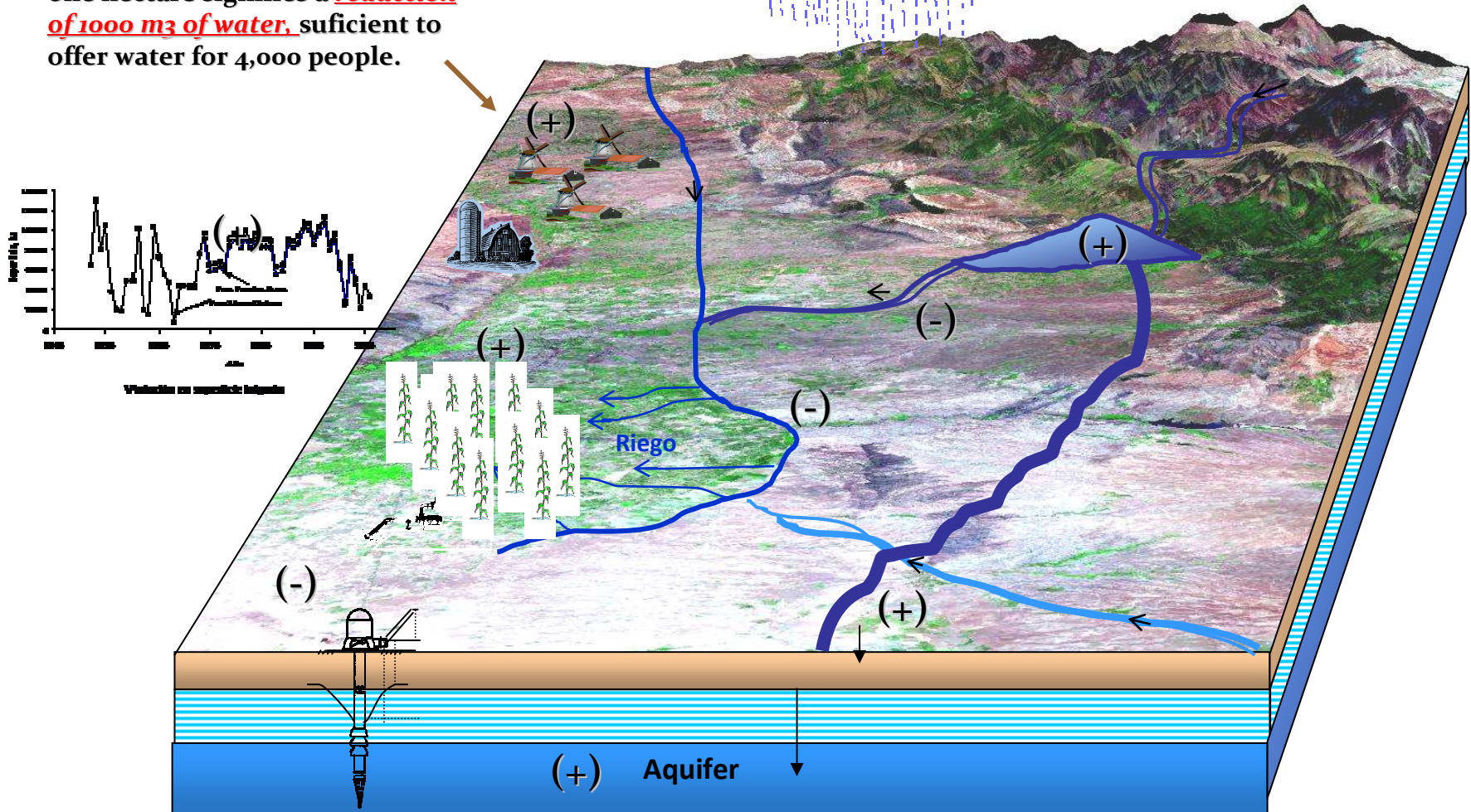


# Multidisciplinary, multi-sectorial and multi-institutional research



# Impact in cascade: Crops resistant to drought

10cm of less water for irrigation in one hectare signifies a **reduction of 1000 m<sup>3</sup> of water**, sufficient to offer water for 4,000 people.



Relation: biotechnology, genetic, hydrology, agriculture sociology, economy, health, livelihood, poverty alleviation, etc.

## **Awareness Raising**

- Dissemination of information on water security issues based on the scientization of water research, through cooperation with leading universities and research institutes globally.

## **Policy Advocacy**

- Epistemic community to foster cooperation & bring together science and policy making on water security issues (FAO, WHO, WMO, UNDP, UNEP, UNESCO), and international workshops for systematic interchange of practical experiences for territorial governance with social cohesiveness. Pro-active strategies for adjustment and mitigation to water threats.

# Capacity Building

- Strengthening traditional and innovative knowledge for embedding the assessment of levels of water security into the environmental impact and risks assessment, land use planning and environmental auditing.
- Training on best practices for conflict settlement mechanisms at the sub regional and national levels.

## Financing: Channelling Resources

International, climate related financial institutions (IFAD, GEF), micro credit, insurance and land use micro investments for local development programmes and, regional organizations and national donors (ministries of development cooperation and environment) to improve policies for water security.

# Achieving sustainable soil, water, food Security for poor people affected by GEC

- **Food security & sovereignty:** FAO, Via Campesina, peasants and women
- **Water security:** II World Water Forum (2000), local authorities, women' organization
- **Health security:** WHO, national government, traditional medicine, indigenous
- **Human, gender and environmental:** a HUGE security addresses major related challenges for the people affected by GEC.



**Thank you for your attention**

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