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International  
Hydrological Programme  
of UNESCO



# *Global Assessment of Transboundary Aquifers*

## *ISARM and GEF TWAP*

*Holger Treidel*

*UNESCO, International Hydrological Programme (IHP)*



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# ISARM Programme

- The worldwide ISARM (Internationally Shared Aquifer Resources Management) Initiative is an UNESCO led multi-agency effort aimed at improving the understanding of hydrogeological, socio-economic, legal, institutional and environmental issues related to the management of transboundary aquifers.



- ISARM operates as an umbrella programme, (co)organising various TBA-related activities around the world.



# Transboundary Waters Assessment Programme



- Global Environment Facility (GEF) – International Waters
  - (i) The assessment will respond to the need of GEF IW and many ODA providers, IFIs and governments to **prioritize, and to focus scarce resources** where they can be more cost-effective in addressing transboundary concerns
  - (ii) It will allow to **monitor evolving trends**, and the impacts of GEF IW programs, and those of other agencies and actors
  - (iii) It will bring to the global attention the vulnerability of transboundary water systems, and catalyze action



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# What is TWAP?

- Five components („water system types“)
  - Transboundary Aquifers, and SIDS groundwater
  - Transboundary River basins
  - Transboundary Lake Basins and Reservoirs
  - Large Marine Ecosystems (LME)
  - Open Ocean
- Key partners have been selected to lead each component, along with a network of partners
- Building on existing initiatives and data sources
- Baseline assessment funded by GEF, follow-up assessments to be carried out by partners



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# What is TWAP?

- Duration: 2 years (2013-2014)
- Implementing Agency: UNEP
- Executing Partners: UNESCO-IHP, UNEP-DHI, ILEC, UNESCO-IOC
- Science Advisory Panel: one representative of each group
- Methodology: prepared by each component during the project preparation phase



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# TWAP – Design phase

- Medium Size Project (2008-2010):
  - Development of the Methodology for the Assessment of TBAs
  - Partnership Arrangements



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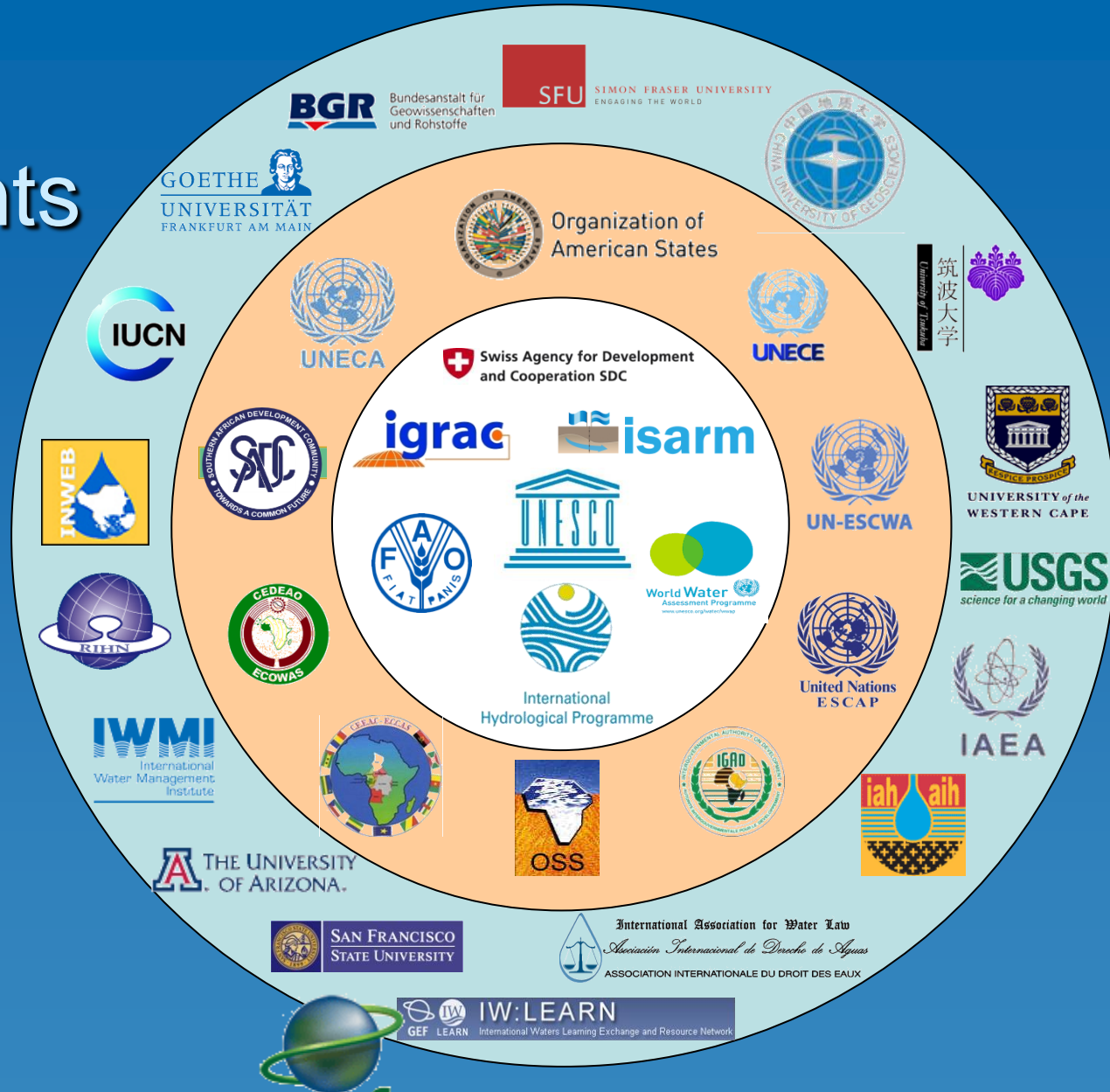


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# Partnership Arrangements TWAP TBAs

1. Core Group
2. Regional Coordinators and Expert Networks
3. Key providers of expertise and data





For all significant transboundary water systems

Components

Assessment results

Main application

**1 - Inventory of transboundary water bodies**  
including assessing time-independent properties of these water bodies and their physical & socio-economic environment

**Identified water bodies & system parameters**  
(name, size, location and boundaries, general characterization, linkages, etc.)  
*System description*

**2 - Assessing time-dependent properties**  
of transboundary water bodies and their physical, socio-economic, legal and institutional environment

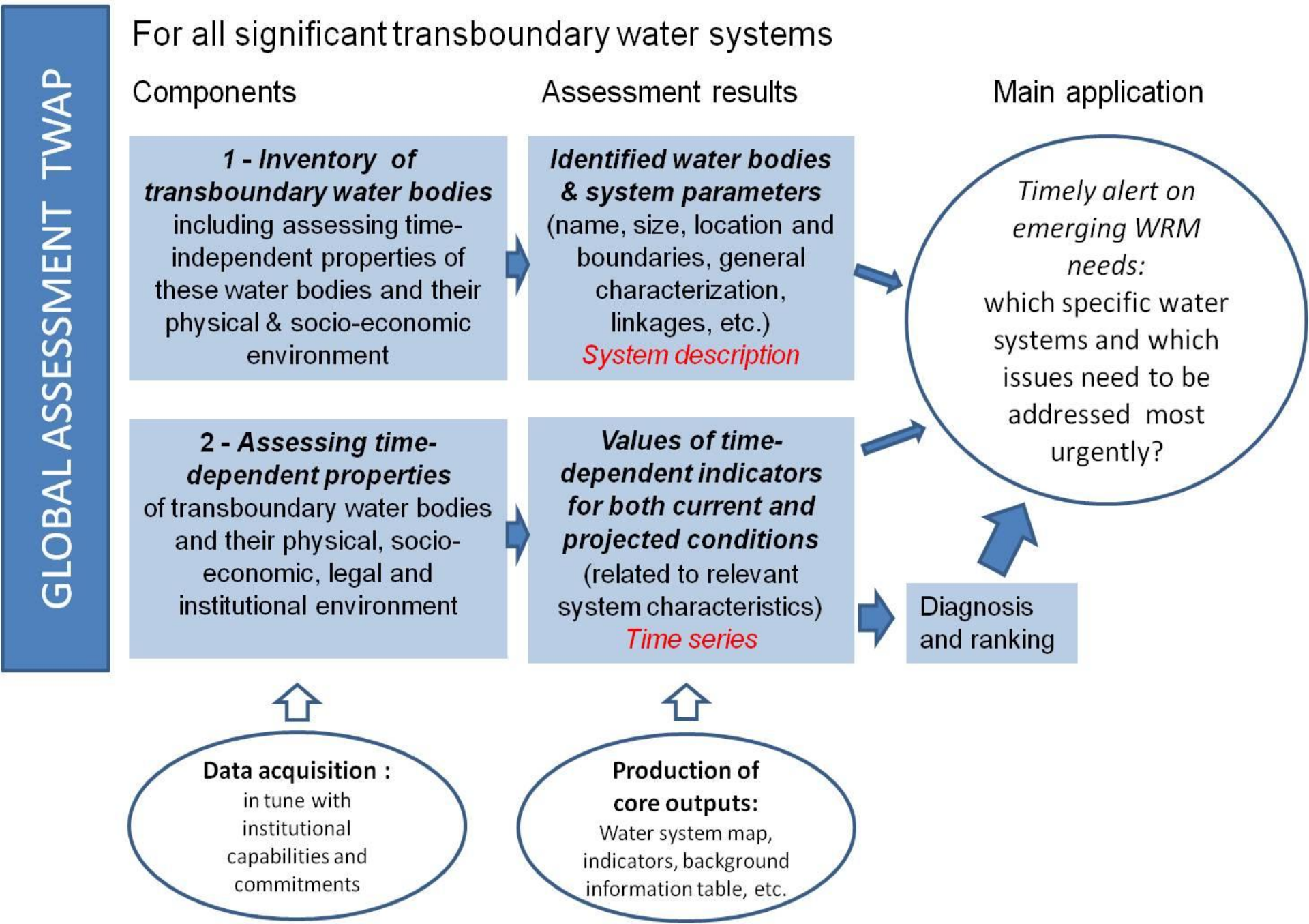
**Values of time-dependent indicators for both current and projected conditions**  
(related to relevant system characteristics)  
*Time series*

*Timely alert on emerging WRM needs:*  
which specific water systems and which issues need to be addressed most urgently?

Diagnosis and ranking

**Data acquisition :**  
in tune with institutional capabilities and commitments

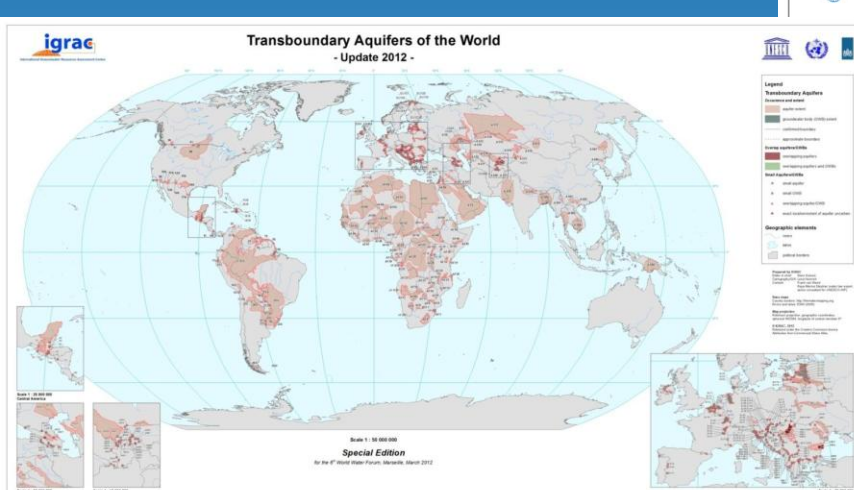
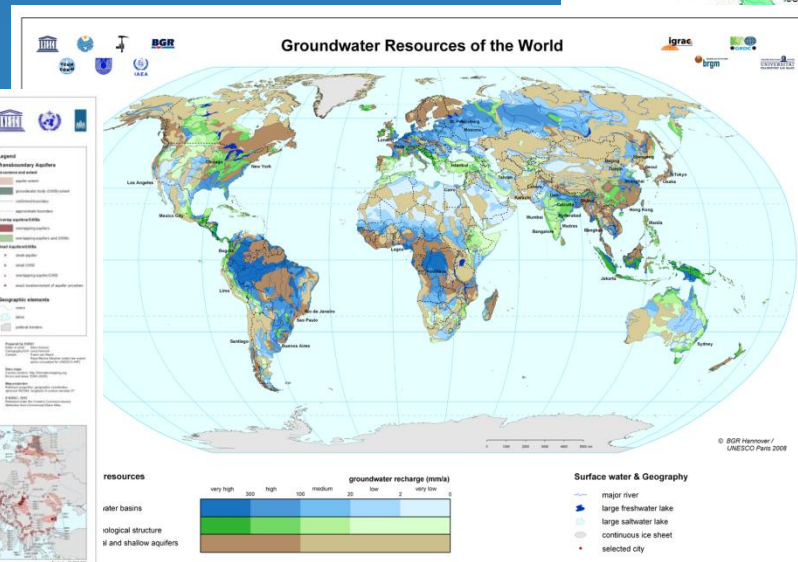
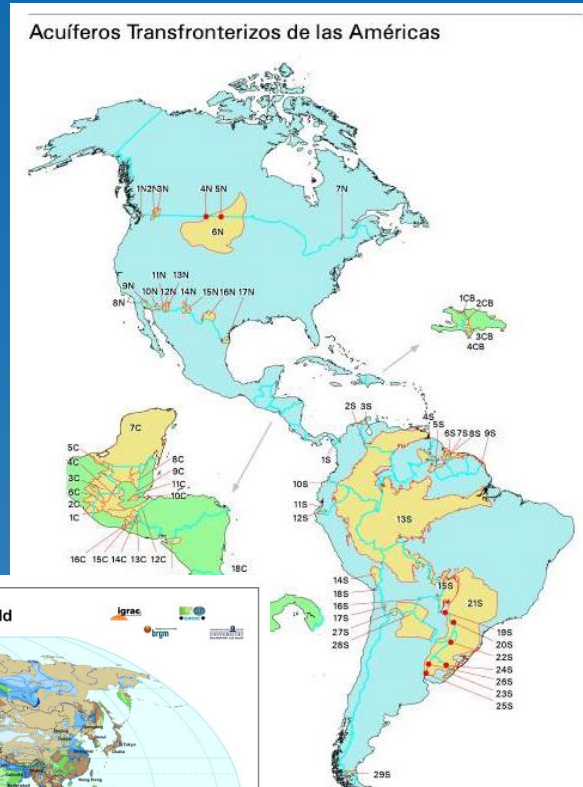
**Production of core outputs:**  
Water system map, indicators, background information table, etc.





# Inventory and Characterization

- Assessment will be based on:
  - UNESCO ISARM
  - WHYMAP and WHYMAP GIS
  - IGRAC
  - UNESCO IHP Chairs and Centres
  - Partners at national, regional and global level



# Conceptual framework **Scale and Scope**

- **Scale:** Global assessment – all transboundary aquifers, but:
  - TBAs: exclude very small systems (< 5,000 km<sup>2</sup>): 166 TBAs plus X
  - Collaboration with regional organizations
- **Scope:** acquisition of *sufficient* information to understand characteristics and trends of groundwater systems and the interconnected socio-economic and environmental systems
- Based on existing information
  - Central role of **national and regional experts**



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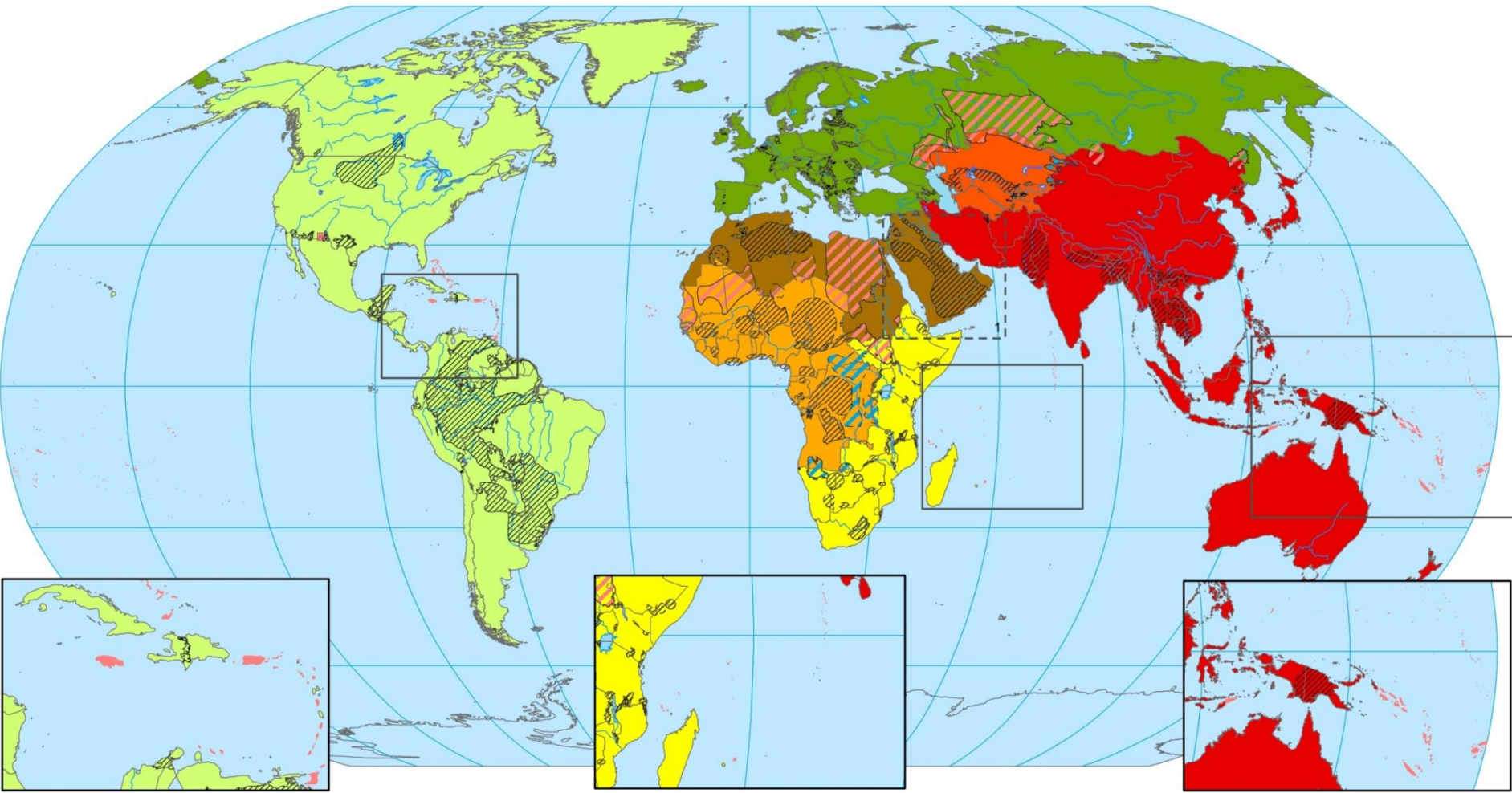


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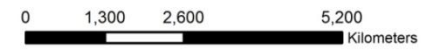


# Regions for the TWAP Groundwater component & TBA and SIDS to be assessed



**Legend**

World Grid	approximate boundary	<b>Regions TWAP TBA</b>	Region Asia (Subregion: Central Asia)
Country borders	confirmed boundary	Region Americas	Region Asia (Subregion: South-Eastern Asia & Pacific)
Countries without TBA in TWAP	TBAs (Boundary to be defined)	Region Europe	
Rivers	TBA not selected for TWAP	Region North Africa & Western Asia	
Lakes	Small Island Developing States (SIDS)	Region Africa (Subregion: Central-Western Africa)	
		Region Africa (Southern-Eastern Africa)	



<sup>1</sup> Delineation of Transboundary Aquifers located in the UN-ESCWA (United Nations Economic and Social for Western Asia) will be updated with results from the Inventory of Shared Water Resources in Western Asia, once published jointly by BGR (Federal Institute for Geosciences and Natural Resources) and ESCWA.

# Current status & scenarios

- Assessment of the current status of TBAs and SIDS aquifers, based on a set of indicators
- Modeling and scenario building for the future status: projections of global change drivers and set of indicators for 2030 & 2050
  - University of Frankfurt, Petra Döll



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# Indicators for the TWAP Assessment

- **Level 1 baseline assessment: 10 core indicators to be applied**
  - Value of aquifer and potential function (Annual amount of renewable groundwater resources per capita, natural background gw quality...)
  - Role and importance of groundwater for humans and the environment (Human dependency on groundwater, ecosystem dependency on groundwater...)
  - Changes in groundwater state (depletion, pollution)
  - Drivers of change and pressures (population density, groundwater development stress)
  - Enabling environment for management of TBAs/SIDS (legal, insitutional frameworks in place)
  - Implementation of the groundwater resources management measures (abstraction control, gw quality protection)
- **Level 2 assessment: 10 addtional indicators**



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- TWAP is building on what has been achieved by ISARM
  - both in terms of data & information and partnerships/networks
- TWAP will complement ISARM by advancing the inventory and assessment of TBAs
- TWAP is multidisciplinary as is ISARM
  
- ISARM focused on the characterization – TWAP will complement that and carry out the indicator-based assessment
- TWAP will assess current conditions and make “guesstimates” for projected future conditions

# Thank you



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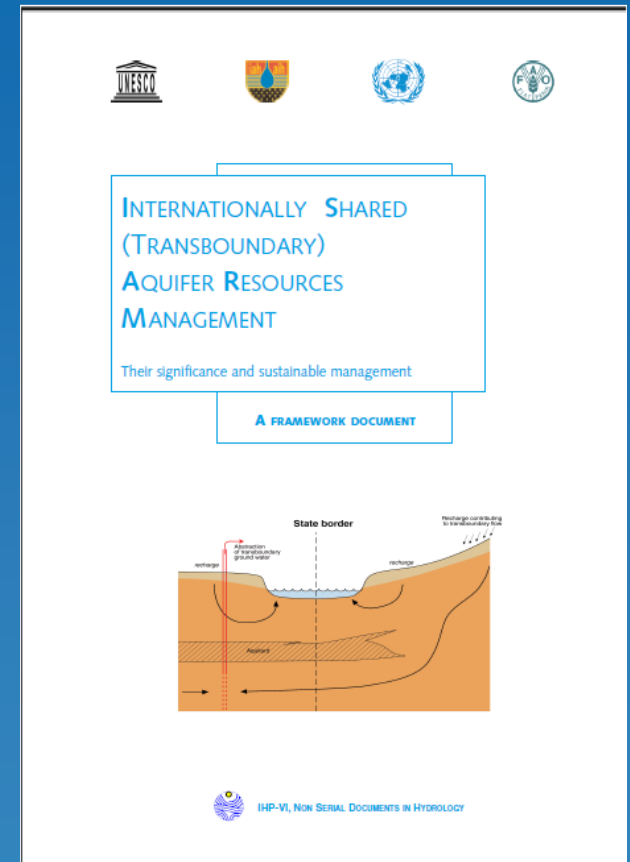


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# ISARM Background

- **June 2000:** in recognition of the importance of transboundary aquifer systems as a source of freshwater in certain regions of the world, UNESCO IHP Council decided to launch an ISARM initiative to promote studies on transboundary aquifers.
- A cooperation was established with IAH (TARM commission), UNECE, FAO and other regional and international institutions.
- A framework document in 2001, describing the main aspects of the internationally shared aquifers and setting up the basis for the TBA assessment



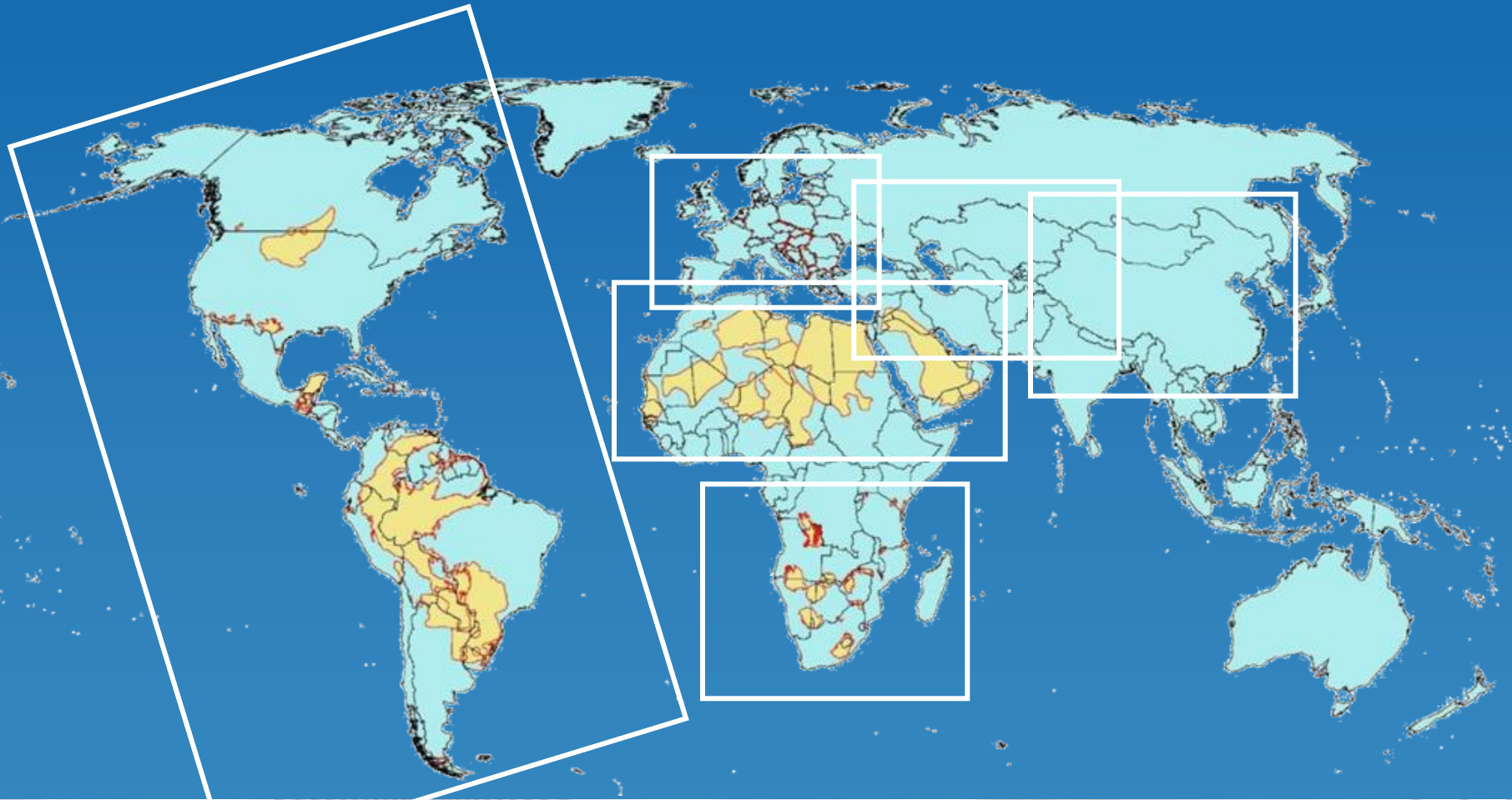


# TBA Assessment Methodology

- **Hydrogeological Aspect**
  - Delineation and description
  - Classification, diagnostic analysis and zoning
  - Data harmonisation and information management
- **Environmental issues**
- **Socio-economic framework**
- **Institutional settings**
- **International legal framework**



# Global Overview of ISARM activities



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# UNESCO - OAS

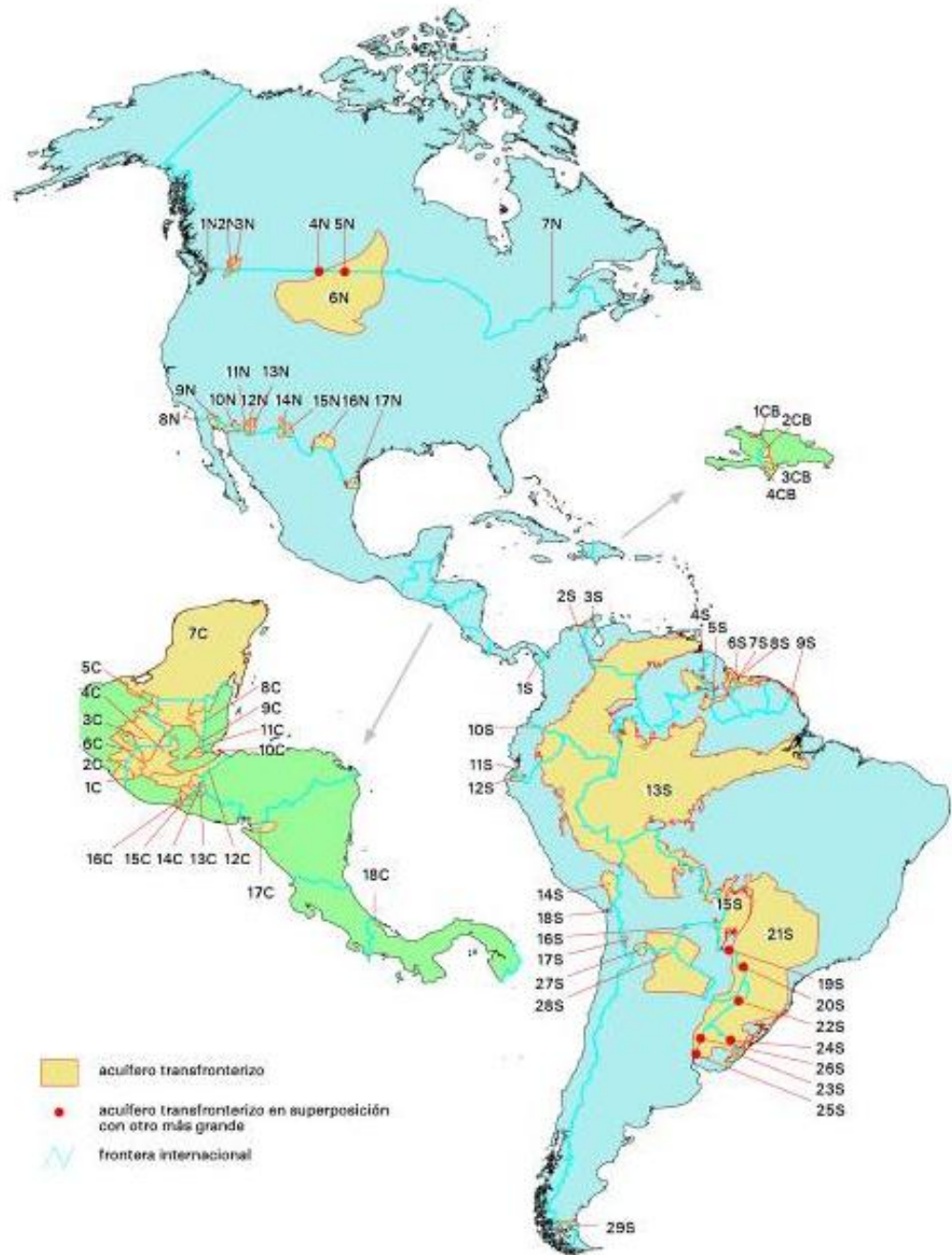
## ISARM of the AMERICAS

Phase I - Inventory of Transboundary Aquifers of the Americas (2003 - 2006):

Phase II - Institutional and Legal issues (2006 - 2007)

Phase III - Regional Vision for Managing Transboundary Aquifers (2007 - 2008)

### Acuíferos Transfronterizos de las Américas



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# ISARM Regional Activities

- Since its start in 2000, ISARM launched a number of regional initiatives designed to assess transboundary aquifer systems and to encourage aquifer sharing states to work cooperatively toward mutually beneficial and sustainable aquifer development.
- Cooperation with regional organisations is crucial for success of ISARM activities.
- The most numerous initiatives carried out in Africa (Tripoli 2002 , Cape Town 2005, 2007, Tripoli 2008, Nairobi 2010, 2011, Duala 2011, 2012...)
- The most advanced assessment so far is of ISARM Americas (hydrogeology, legal and institutional frameworks, socio-economic framework...)
- South East Europe Caucasus and Central Asia in cooperation with UNECE
- ISARM Western Asia in cooperation with Geological Survey of China

