Assessment of Transboundary Aquifers in Europe (and the rest of the world)
Groundwater from Global Perspective

- IGRAC - International Groundwater Resource Assessment Centre is (since 2003) UNESCO and WMO groundwater centre

- IGRAC facilitates and promotes global sharing of information and knowledge required for sustainable groundwater resources development and management

- Focused on information and knowledge management, transboundary aquifer assessment and groundwater monitoring

- Receives financial support from the Government of The Netherlands

- In-house partner of UNESCO-IHE in Delft, The Netherlands
IGRAC Portal

International Groundwater Resources Assessment Centre

Welcome to the World of Groundwater

The World’s groundwater resources are of key importance to sustainable development. However, making full benefit from the available groundwater resources and controlling effectively the ubiquitous groundwater-related problems are very demanding tasks. Sharing groundwater information and experience on a worldwide scale would be of great help in this respect. This is what IGRAC supports and promotes.

IGRAC is dedicated to groundwater information and knowledge in the widest sense, on a worldwide scale and on a non-commercial basis.

Global Groundwater Information System-GGIS

GGIS is an interactive portal to groundwater-related information and knowledge.

Transboundary Aquifers of the World


www.un-igrac.org
What is a Transboundary Aquifer?

- Transboundary aquifer or transboundary aquifer system means, respectively, an aquifer or aquifer system, parts of which are situated in different States;
Why do we need a TBA assessment?

- **The fact:** many aquifers cross the political borders

- **Potential cross-boundary problems:** changes in groundwater flow, levels, volumes (quantity) and dissolved substances (quality).

- **Actions:** TBA assessment, monitoring and appropriate management.

- **Benefits:** eliminating potential sources of conflict and improving the overall benefit from groundwater.
Internationally Shared Aquifers

- ISARM Regional Activities, Core group, portal..
- UNECE Assessments in Europe and Asia
- Participation in GEF (Global Environment Facility) projects
- Development of a TBA Methodology and a TBA Course, contribution to UNILC, WW
- Transboundary Aquifers of the World Map
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.
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
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 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
TBA assessment in Africa

2009

2012
TBAs of the World - 2012
Atlas of Transboundary Aquifers

- Includes basic info about aquifers, regional cooperation and references
- The first global publication (other than a map – delineation process)
- Very limited info/no analysis
Global TBA Information System
Overview of Global Transboundary Aquifer Assessment Activities
Inventory of TB Groundwaters 1999

The UNECE Task Force on Monitoring & Assessment

- Only locations and a recognition status

- Lesson learned - challenges of:
  - TB groundwater assessment
  - International data harmonisation

- Added value:
  - Pioneering role in addressing TBAs!
  - Formulating TBA characteristics
  - Pan European overview
The First UNECE Assessment 2007

First Assessment of Transboundary Rivers, Lakes and Groundwaters

- Only South-Eastern Europe and Caucasus & Central Asia
- Approximate delineation (circles & ovals)
The First UNECE Assessment 2007

First Assessment of Transboundary Rivers, Lakes and Groundwaters

- followed the Driving Forces-Pressures-State-Impact-Responses (DPSIR) framework also adopted by the EEA
- a clear regional overview of current groundwater status (including the transboundary impact and management measures), of pressures and of future trends and prospects.
- Facts and Figures for each aquifer
A river catchment approach – no separate descriptions of aquifers

It is difficult to implement a balanced (IWRM) assessment, especially in areas with large rivers (groundwater easily remains insufficiently addressed).

EU WFD defines groundwater bodies (GWBs) rather than aquifers, causing the harmonisation difficulty at the borders of the EU.

Country-based questionnaires contain still unprocessed information that is potentially useful for further TBA assessment.
The Second UNECE Assessment 2011

Second Assessment of Transboundary Rivers, Lakes and Groundwaters
The Second UNECE Assessment 2011
The Second UNECE Assessment 2011
The Second UNECE Assessment 2011
GEF DIKTAS Project in SEE

- In the last decade, Global Environment Facility co-funded several large TBA assessment projects.
- Comparing with ISARM and UNECE, GEF projects concentrate often on one aquifer (system) allowing in-depth analysis.
- TDA - Transboundary Diagnostic Analysis
Transboundary specifics are usually found in (hydro)geological classifications, data and information management, legislation, organisational structure, etc.

Further than an assessment: consultation/cooperation mechanisms and agreeing on joint strategic actions (SAP)
Out of 7019 GWBs in total holding specifications related to TBA attribute, only 124 transnational GWBs have been reported. In case of 4588 datasets the column is left empty.
Transboundary GWB vs Aquifers
Closing remarks

• TBAs: hydrogeological maps vs aquifer maps
• TBA representation in 2D (multilayer, inclination, depth, etc)
• Aquifers vs Ground Water Bodies
  • Aquifers: hydrogeological units; no vertical delineation (inclination of layers or presence of aquifer systems not taken in account)
  • GWBs: managerial units (‘distinct volume of water within an aquifer or aquifers’); distinction of GWB layers (horizons).
• Transboundary aquifers and transboundary GWBs at the (current) borders of the European Union
• Transboundary aquifers within the European Union
• Mapping is just a first step!
• Main obstacles: invisible groundwater – lack of knowledge, ‘strategic information’, insufficient cooperation among countries and among international organisations
Assessment of Transboundary Aquifers

- It’s all about people….
Thank you for your attention

International Groundwater Resources Assessment Centre

United Nations Educational, Scientific and Cultural Organization

Government of The Netherlands

World Meteorological Organization