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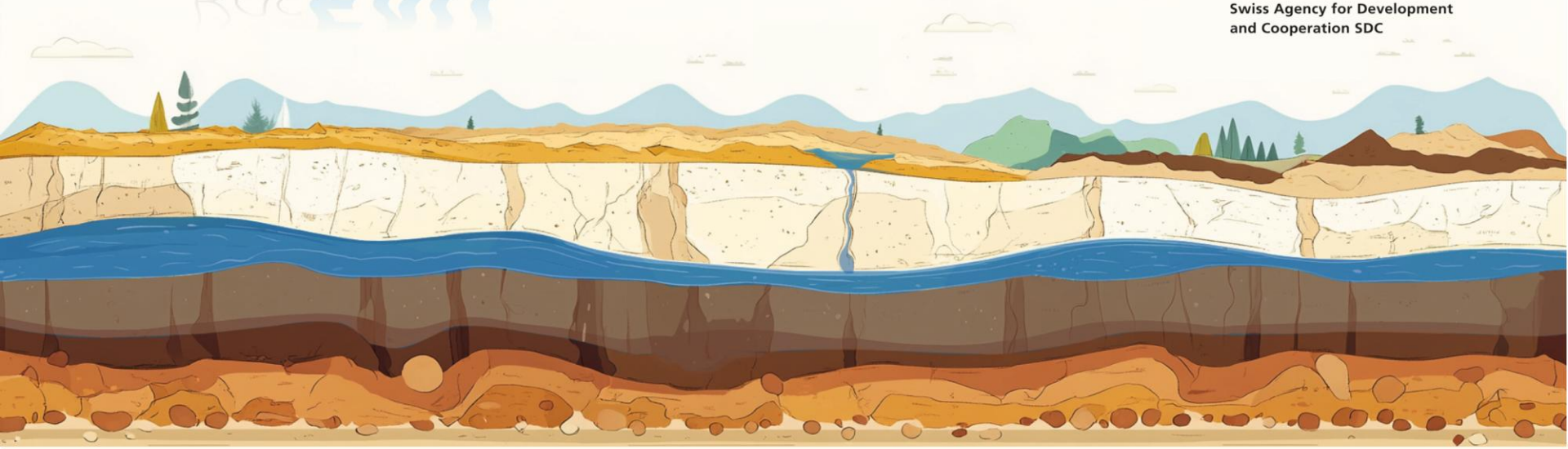

Transboundary Groundwater Management

RésEAU Learning Journey on Groundwater 2024/2025
Webinar 3 - 12.6.2025

we are starting soon!

Technical housekeeping

Your microphone is currently off
If you want to speak, click on the button at the bottom of the screen **to raise your hand.**
Thank you for opening the mic only upon invitation.

If you have comments or questions during presentations, please post them in the chat, or wait for the Q&A moment to unmute yourself.

If you can't hear or see: leave and rejoin the meeting, and close other programs

Parts of this event are being recorded and made available to the online knowledge platform RésEAU.

Contact Evana.breitenmoser@skat.ch if you need further support

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Where we are on our roadmap …

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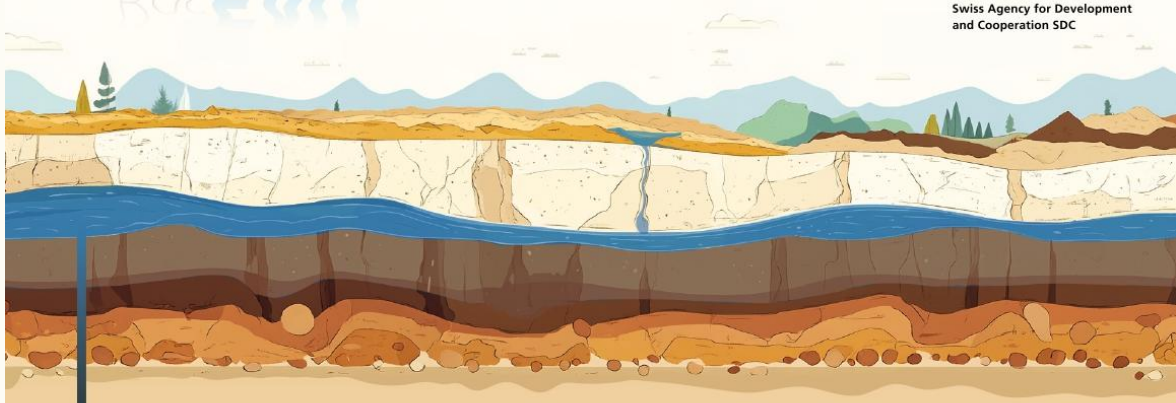

Roadmap - Learning Journey on Groundwater

Community of Practice on Groundwater 2025+

- **Regional in-person event(s) (support from RésEAU based on demand)**
  2025/2026
- **Series 2 of e-workshops (provided by RésEAU based on demand)**
  September-December 2025

Today:

- **E-workshop 3 – transboundary groundwater management**
  June 2025
- **E-workshop 2 – groundwater data & monitoring**
  May 2025
- **E-workshop 1 – groundwater governance & conjunctive management of surface and groundwater**
  March 2025
- **Launching Event**
  November 2024

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What will/may happen next?

- ***Trend Observatory on Water:*** Podcast on Managed Acquifer Recharge (MAR)
- ***RésEAU Brief*** on Groundwater synthecizing the LJ so far
- ***Further LJ E-workshop(s):***
  → Poll to explore interest
- ***Optional F2F event(s)*** based on demand -> express your interest to the Focal Point

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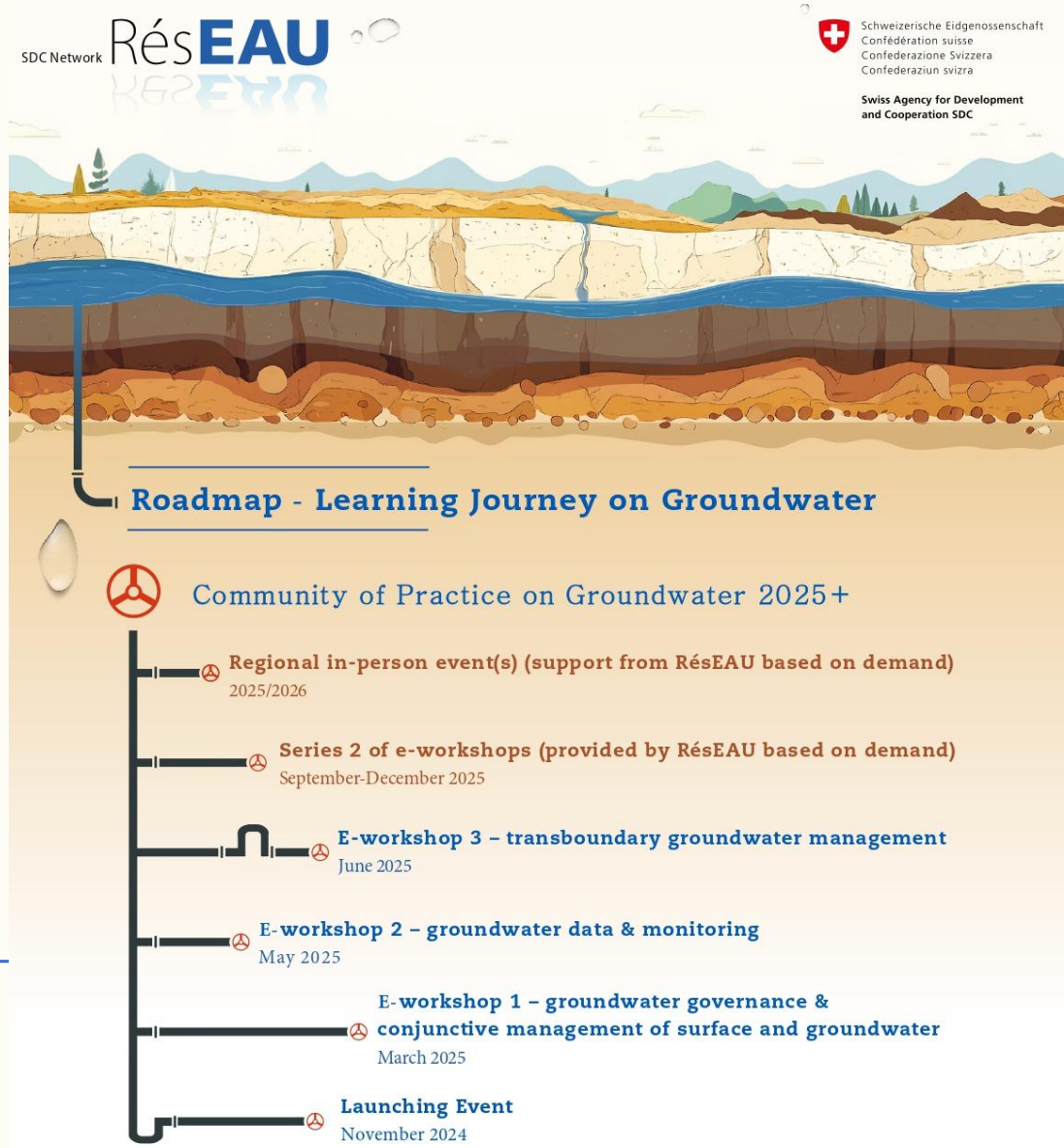

Agenda

Input	Speaker
Keynote: Global overview in transboundary groundwater management	Chantal Demilecamps, Secretariat of the Water Convention, UNECE
Q&A on Keynote	
Case 1: Governance of Groundwater Resources in Transboundary Aquifers (GGRETA) - the Pretashkent Aquifer between Kazakhstan and Uzbekistan (Central Asia)	Serikzhan Atanov, former Project Coordinator of GGRETA in Central Asia at UNESCO, Water Management and Governance Specialist
Survey and break	Dr. Daniel Maselli, RésEAU Focal Point
Case 2: Al Hamad Groundwater basin between Jordan and Iraq	Dr. Marwan Alraggad, Head of INWRDAM
Case 3: The transboundary Azraq basalt aquifer: potential and cross-border cooperation	Prof. Mutawakil Obeidat, Director of the Water Diplomacy Center
Q&A on thematic inputs	Mufleh Alalaween, Regional Water Advisor for MENA, SDC
Concluding remarks	Prof. Mark Zeitoun, Head of Geneva Water Hub
Closing	Fabrice Fretz, Section Water, SDC

Global trends in transboundary groundwater management

Chantal Demilecamps, Water Convention Secretariat, UNECE

SDC Network RésEAU Webinar, 12 June 2025

UN WATER INTEGRATED MONITORING INITIATIVE FOR SDG 6 SDG INDICATOR 6.5.2 TRANSBOUNDARY WATER COOPERATION

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Progress on Transboundary Water Cooperation

Mid-term status of SDG Indicator 6.5.2, with a special focus on Climate Change

2024

United Nations | UN WATER UNECE unesco

3rd Progress Report on SDG indicator 6.5.2 (2024)

Transboundary Aquifers: Advancing Water Cooperation (SDG 6.5.2), Governance and Legal Frameworks

UN WATER INTEGRATED MONITORING INITIATIVE FOR SDG 6 SDG INDICATOR 6.5.2 TRANSBOUNDARY WATER COOPERATION

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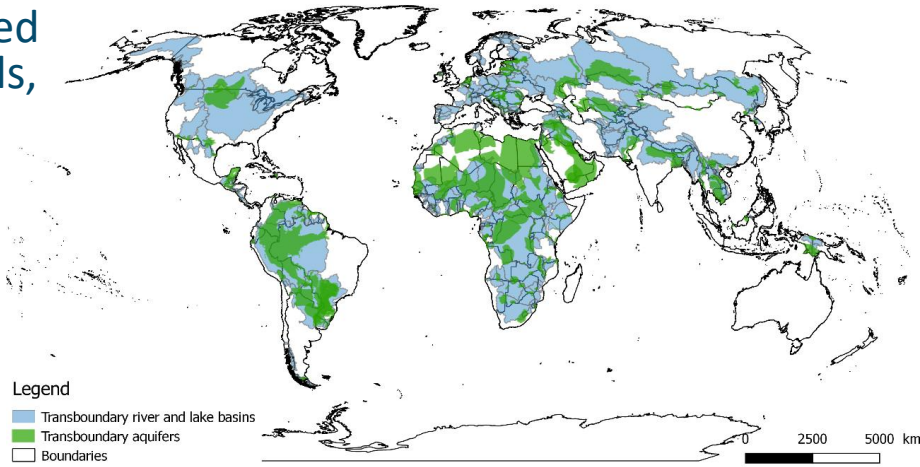
SDG 6: Ensure availability and sustainable management of water and sanitation for all.

Target 6.5: By 2030, implement integrated water resources management at all levels, including through transboundary cooperation as appropriate.



Indicator 6.5.1 Degree of IWRM

Indicator 6.5.2 Proportion of transboundary basin area with an operational arrangement for water cooperation

UN environment
United Nations Environment Programme

UNECE

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SDG indicator 6.5.2 process

- National reports collected and reviewed **every 3 years** (as for other SDG6 indicators):

  2017 => 2020 => ***2023 =>2026*** *=>2029*

- National reports undergo a review process by UNECE and UNESCO
- Data submitted to:
  UN Statistical Division (https://unstats.un.org/sdgs/dataportal)
  UN-Water SDG 6 data portal (https://www.sdg6data.org/en)

- Data used in:
  - Progress reports on transboundary cooperation worldwide
  - Progress reports on cooperation under the Water Convention
  - SDGs Progress reports
  - HLPF on Sustainable Development, UN Summit for the Future and similar

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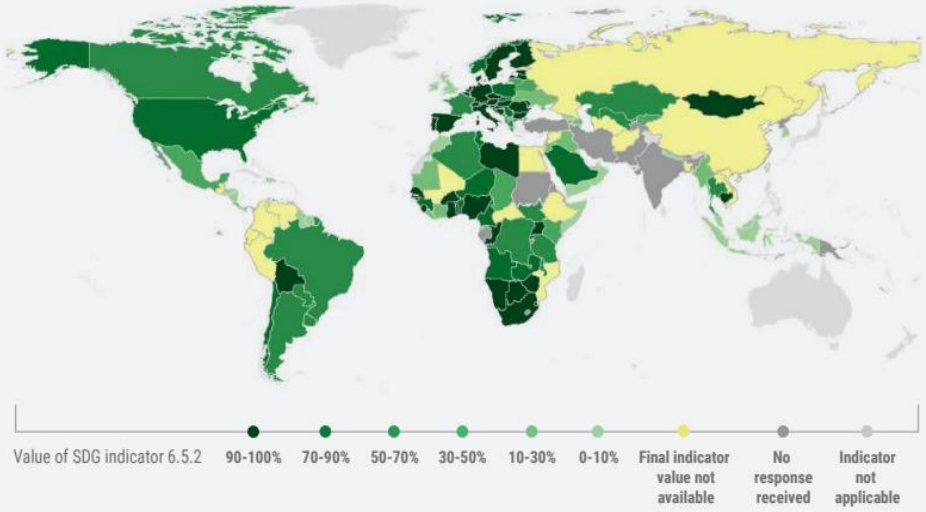
Results 3rd exercise: Globally not on track

- **129** responses received in 2023-2024 out of 153 UN Member States with transboundary waters
- **Only 43** countries have operational arrangements in place for **90% or more** of their shared rivers, lakes and aquifers
- **59%** global average of SDG indicator 6.5.2 value (no significant change since 2017)
- **8 countries** improved cooperation
- **20+ countries** have no operational arrangements in place for any of their transboundary waters
- Current rate of progress suggests that **only a third of countries sharing transboundary waters** would have most of their waters (90% or more) covered by operational arrangements by 2030

Global map of SDG indicator 6.5.2 value per country in the 3rd exercise



(*Source*: developed by UNESCO and UNECE).

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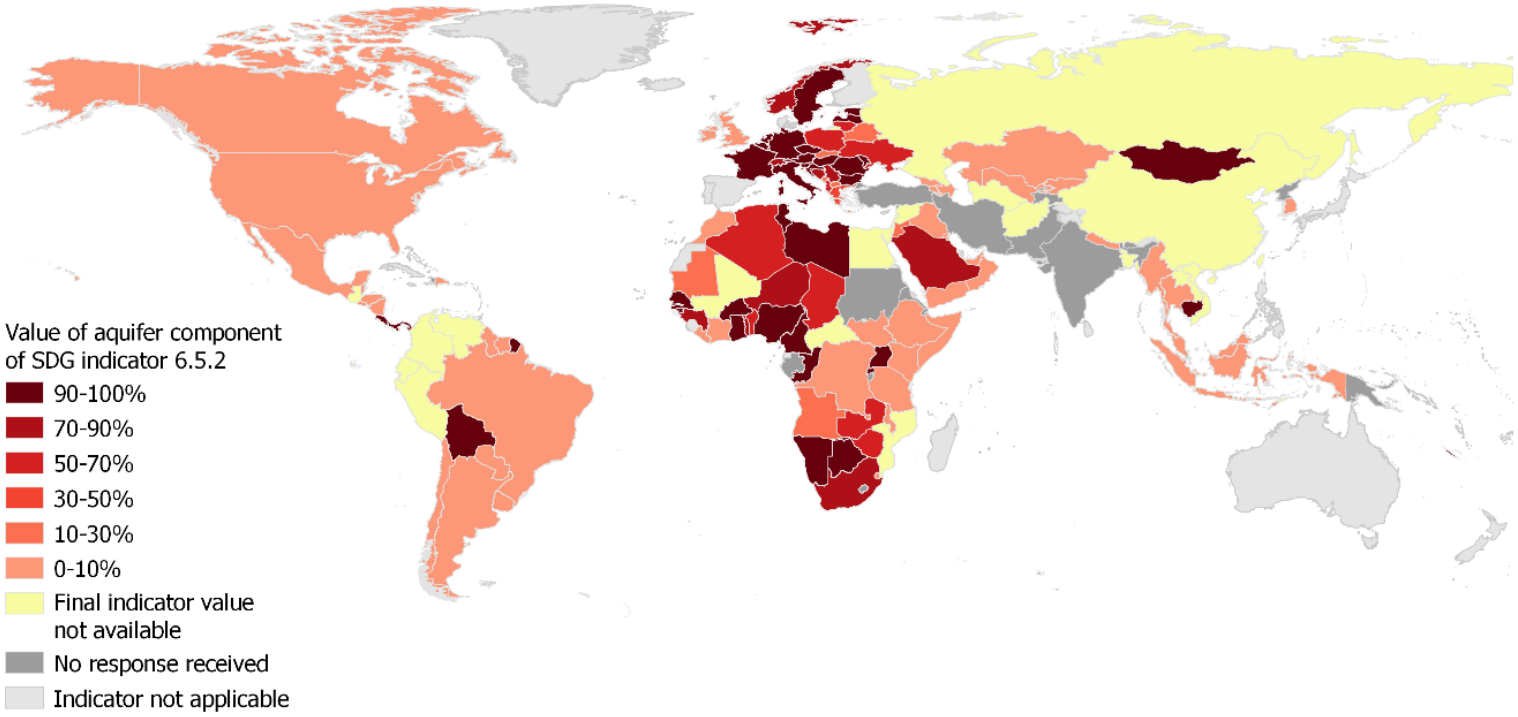
Results of the 3rd reporting in 2023 on SDG 6.5.2: Aquifer component (1)

Proportion of transboundary aquifer area in a country covered by an operational arrangement 2023/24



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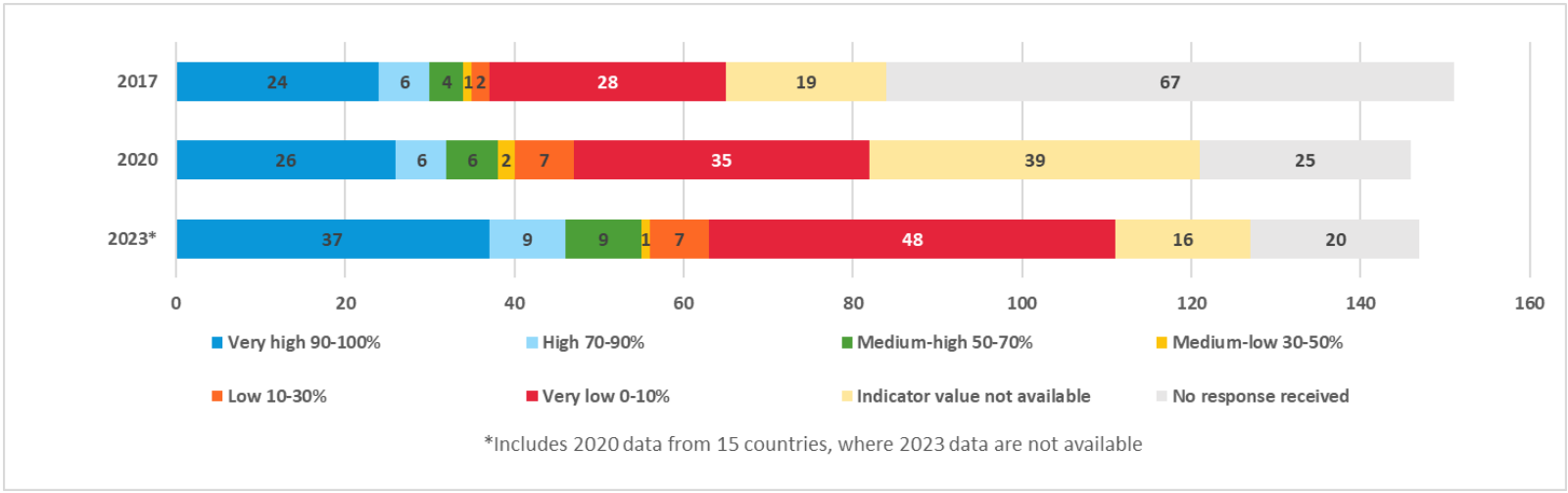
Results of the 3rd reporting in 2023 on SDG 6.5.2: Aquifer component (2)

- Aquifer component available for 111 countries (vs 94 in 2020)
- **For aquifers, average SDG 6.5.2 value 46**% (vs 42% in 2020)
- Countries with their transboundary aquifer area covered by operational arrangement:
  - 37 countries with more than 90% (vs 26 in 2020)
  - 48 countries with less than 10%

Number of countries sharing transboundary aquifers & breakdown SDG indicator 6.5.2 value (2017, 2020, 2023)



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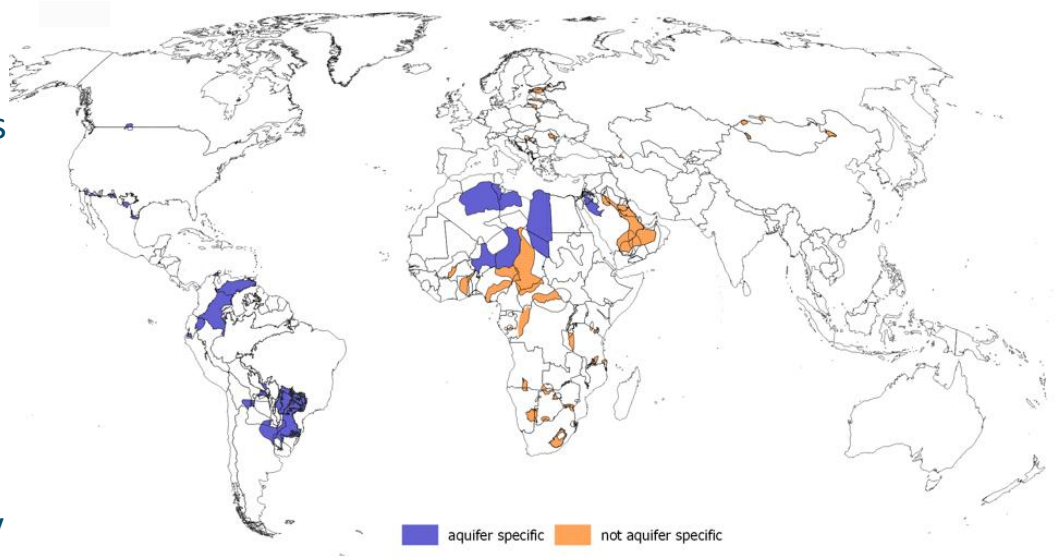
Aquifer-specific agreements and recent developments in aquifer cooperation

- **13 aquifer-specific arrangements** reported, only **8 operational**
- Reported cooperation and data on aquifers is often not harmonized among border countries
- Increased consideration of transboundary aquifers covered by non-aquifer specific arrangements, particularly in Africa:

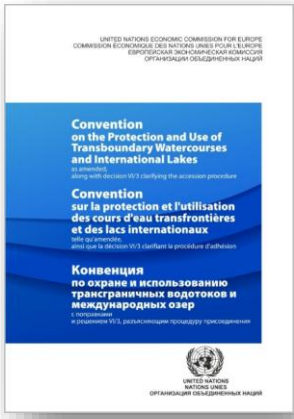
  ➢ Example: **Multi-Country Cooperation Mechanism** by Botswana, Namibia, and South Africa for Stampriet Transboundary Aquifer System nested in Orange-Senqu Watercourse Commission's **Ground Water Hydrology Committee**



Ch. Fraser and all. (2023)

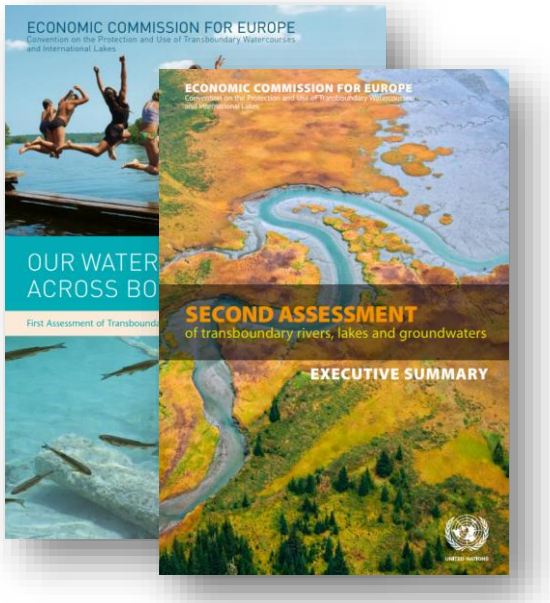
The UN Water Convention: supporting transboundary groundwater governance

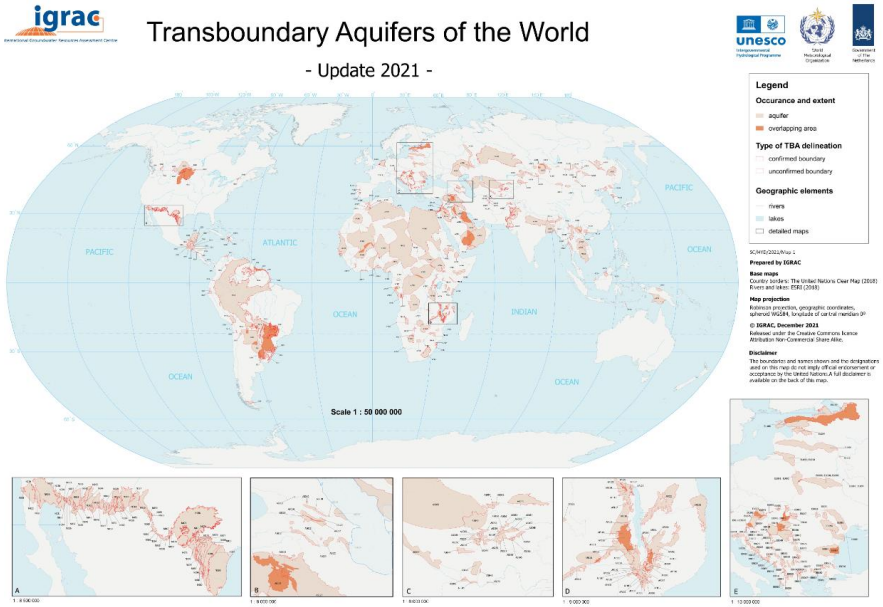
A **global legal and institutional framework** promoting cooperation for the management of both transboundary **surface water and** groundwater. Supports countries at different levels:



- **Data sharing, monitoring and assessment**
- **Legal development:** The Model Provisions on Transboundary Groundwaters provide a **basis for agreements on transboundary aquifers**.
- **Policy and technical guidance on different aspects of groundwater management:** on monitoring and assessment, data-sharing, water-food-energy-ecosystem nexus, adaptation to climate change
- **Promotion of experiences including on emerging issues**: e.g. on conjunctive water management.
- **Technical assistance for the development of cooperation:** e.g. project on the Senegalo-Mauritanian Aquifer Basin.

Stronger knowlege on groundwater and transboundary aquifers





- UNESCO IGRAC Transboundary Aquifers Map used data from UNECE regional assessments for Europe and Central Asia
- Aquifer data from SDG 6.5.2 national reports feed into the updates of the Transboundary Aquifers Map

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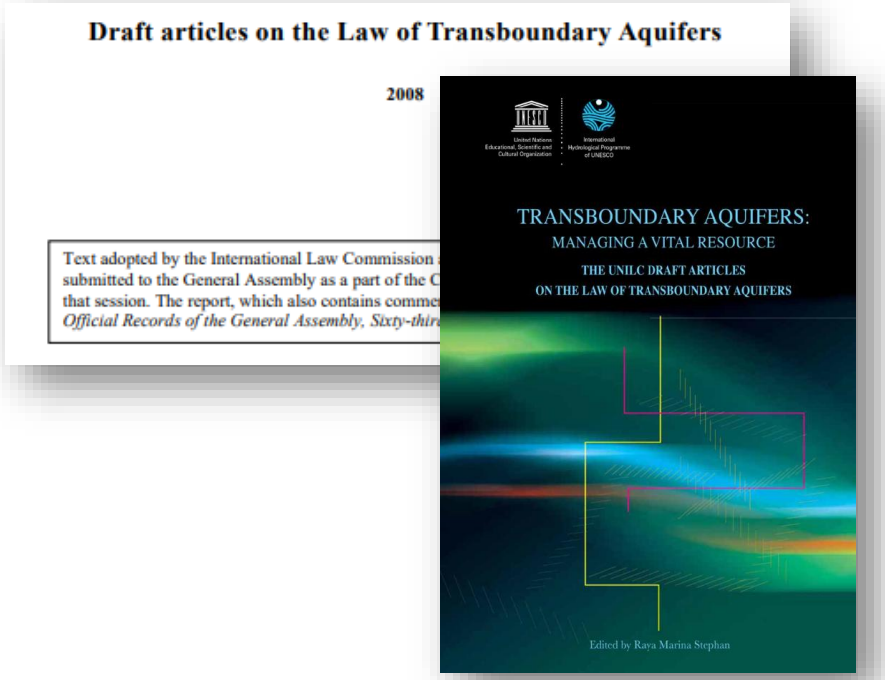
Practical guidance on governance: legal focus



Model Provisions on Transboundary Groundwaters by UNECE in 2014 inspired by *Draft Articles on the Law of Transboundary Aquifers* developed in 2008 with support of UNESCO IHP

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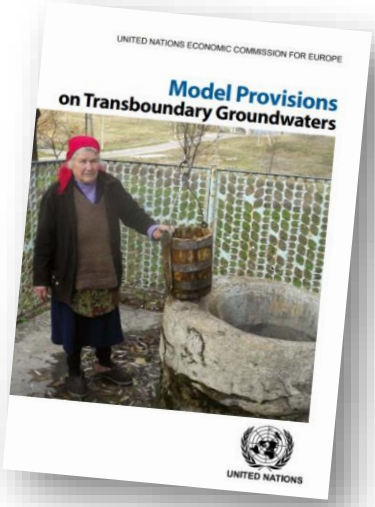
Model Provisions on Transboundary Groundwaters

1. **Prevent, control and reduce** transboundary impacts, ensuring **equitable and reasonable use**.
2. **Use** transboundary GW **sustainably**, maximizing long-term benefits and preserving GW ecosystems.
3. Cooperate in **identifying**, delineating and monitoring transboundary GW resources.
4. Integrate GW and surface water management.
5. **Prevent** and control GW **pollution**, esp. for drinking water sources.
6. **Exchange information & data** on transboundary GW conditions & usage.
7. Implement **joint/coordinated plans** for sustainable GW management.
8. Conduct **environmental impact assessments** for activities that could significantly affect transboundary GW.
9. Establish a **joint body** to implement these provisions and coordinate cooperation.



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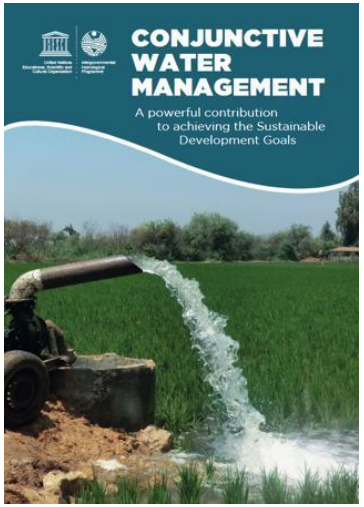
Conjunctive Water Management: National to Transboundary



On-going development of a Policy guidance on conjunctive management of surface waters and groundwaters under the Water Convention, with a focus on transboundary basins, by a dedicated Expert Group.

Includes an analysis of best practices.

Lead Parties: Estonia and The Gambia

Partners: UNESCO, CeReGAS, GTK, IGRAC, IAH, SADC-GMI

6 CLEAN WATER AND SANITATION

SDG INDICATOR 6.5.2

TRANSBOUNDARY WATER COOPERATION

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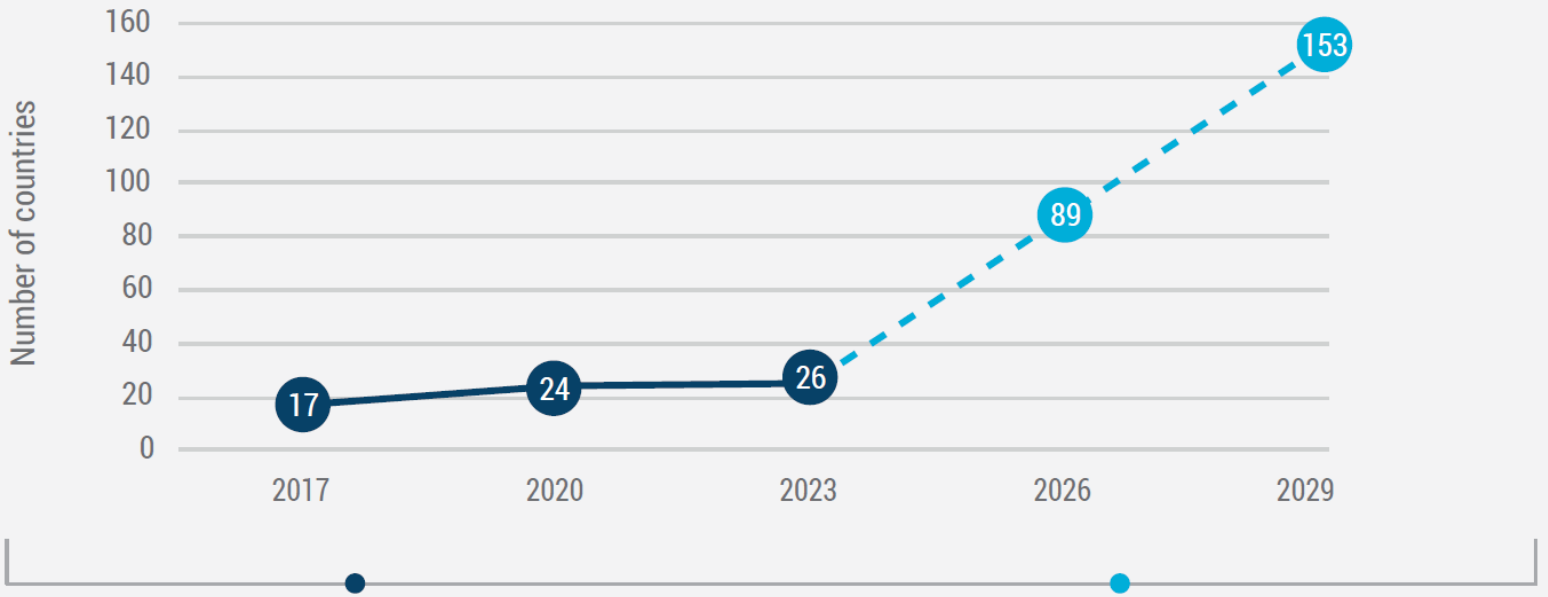
Recommendations: Progressing Transboundary Water Cooperation (1)

Number of UN Member States with all transboundary waters covered by operational arrangements under SDG indicator 6.5.2: current levels and progress needed



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Recommendations: Progressing Transboundary Water Cooperation (2)

Ensuring that operational arrangements cover all transboundary aquifers by 2030 remains a priority => need to improve **data** availability and foster **cooperation**

- Call on **all countries to engage** in 6.5.2 reporting in 2026, and enhance data availability on aquifers
- **Mobilize and build political will for transboundary water cooperation**
- At national level, use 6.5.2 to take stock, identify gaps, and **develop actions plans**. Where possible, **coordinate 6.5.2 reporting at basin level**
- Capitalize on the legal frameworks (1992 Water Convention; Draft Articles on the Law of Transboundary Aquifers) to **develop new agreements where lacking**
- Use 6.5.2 as an opportunity to address **data gaps** (i.e. transboundary aquifers, data exchange) and invest in **capacity building**

Thanks for listening!

Water Convention Secretariat, UNECE

Chantal.Demilecamps@un.org and water.convention@un.org

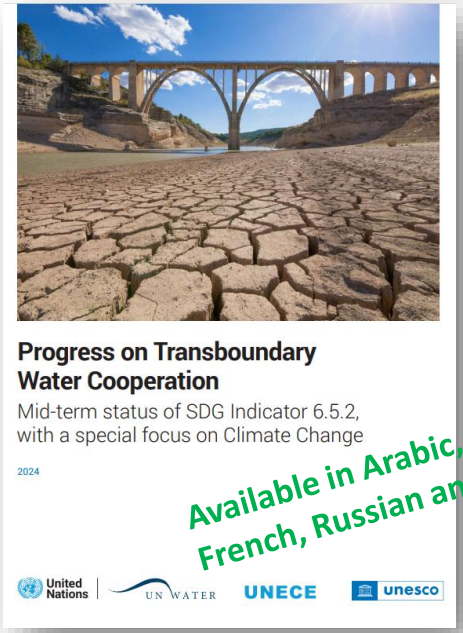
6.5.2 Contact and Helpdesk

UNECE:

transboundary_water_cooperation_reporting@un.org

UNESCO:

transboundary_water_cooperation_reporting@unesco.org



Available in Arabic, English, French, Russian and Spanish

Download the report!

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Q&A

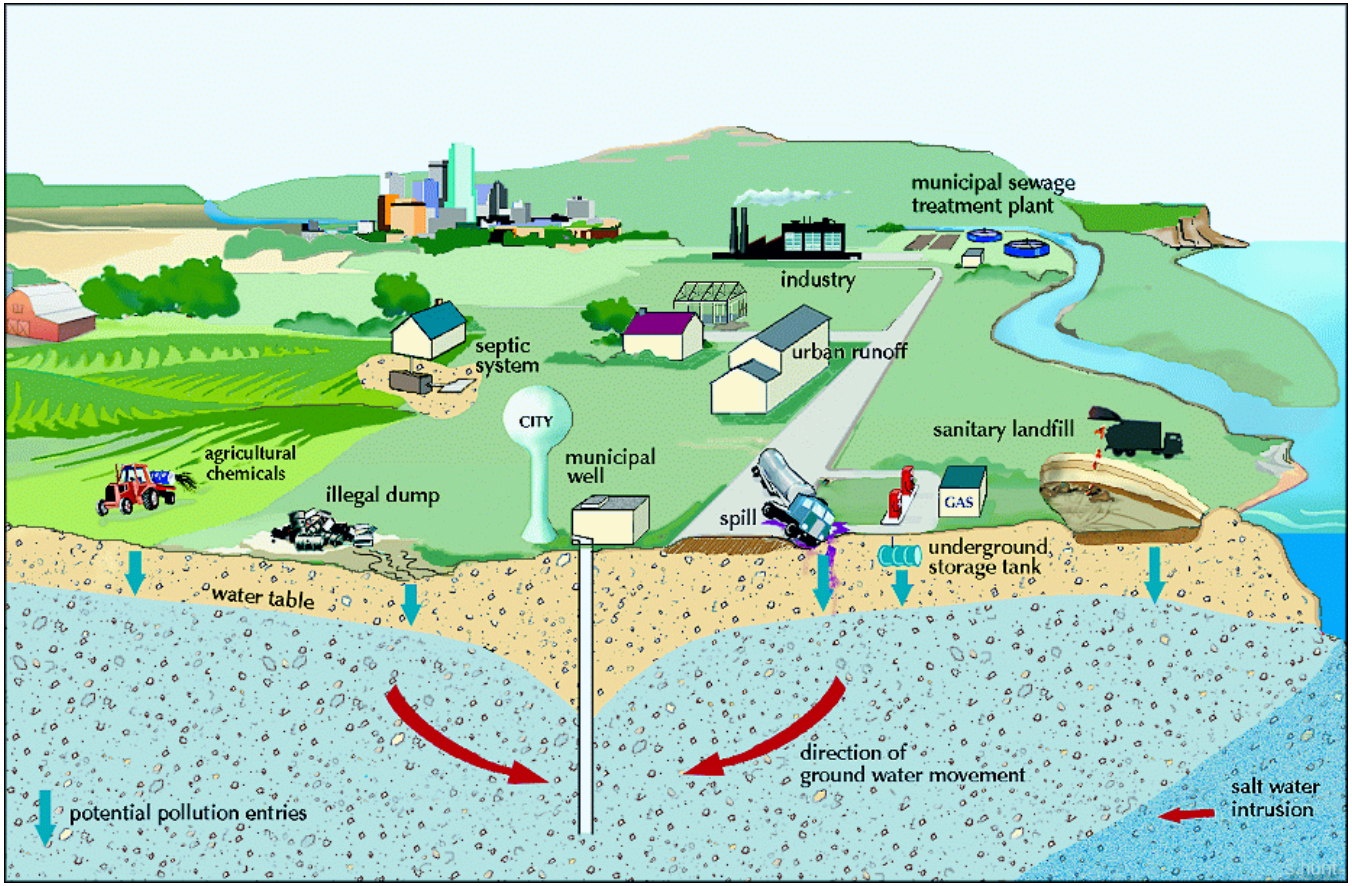
Governance of Groundwater Resources in Transboundary Aquifers (TBA)

Case study: Pretashkent Transboundary Aquifer between Kazakhstan and Uzbekistan (Central Asia)

Serikzhan ATANOV
International Consultant
Transboundary Water Cooperation

- **An invisible resource**
- **It is difficult to manage what is unknown**
- ***Importance of knowledge***

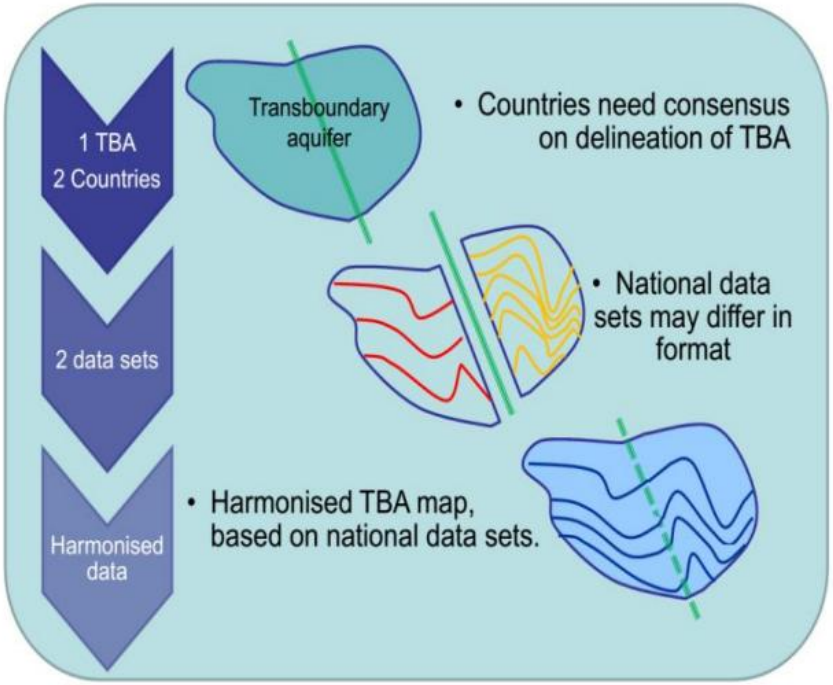
Groundwater management goes beyond water resources alone



Zaporozec & Miller, Groundwater Pollution (UNESCO, 2000)

Functions to be performed in the frame of collaboration:

- Regular data exchange and knowledge development
- Monitoring of transboundary aquifer (joint monitoring in perspective)
- Development of management plans
- Protection of ecosystems, recharge and discharge zones
- Prevention of environmental pollution



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Intergovernmental Hydrological Programme

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GGRETA
GOVERNANCE OF GROUNDWATER RESOURCES IN TRANSBOUNDARY AQUIFERS

GROUNDWATER RESOURCES GOVERNANCE in TRANSBOUNDARY AQUIFERS

(GGRETA Project)

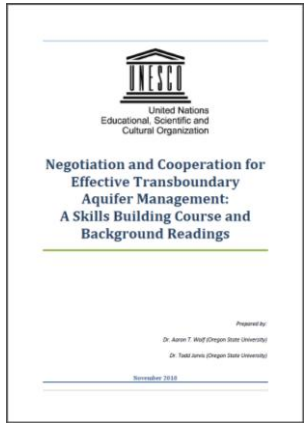
The Pritashkent aquifer is an artesian system of transboundary aquifers between Kazakhstan and Uzbekistan.

Due to over-exploitation, there has been a steady **decline of the water table**.

Since groundwater in the Pretashkent aquifer is practically non-renewable, this situation requires **transboundary cooperation on the sustainable use of the aquifer.**

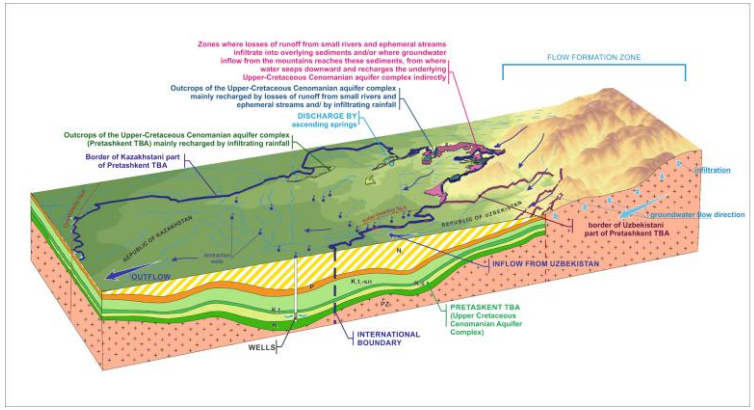
Project phases

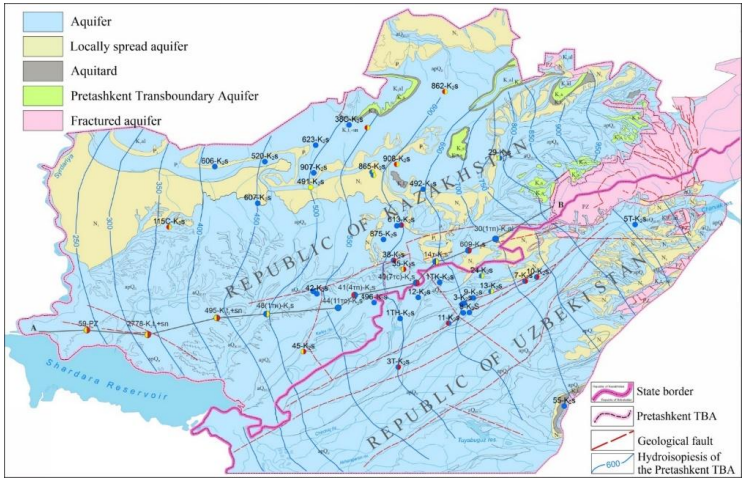
Phase 1: Situational Analisys *(2015-2016)*
Phase 2: Hydrodiplomacy - removing barriers, impeding international cooperation *(2016-2019)*
Phase 3: Modeling, scenarios, road map *(2019-2022)*

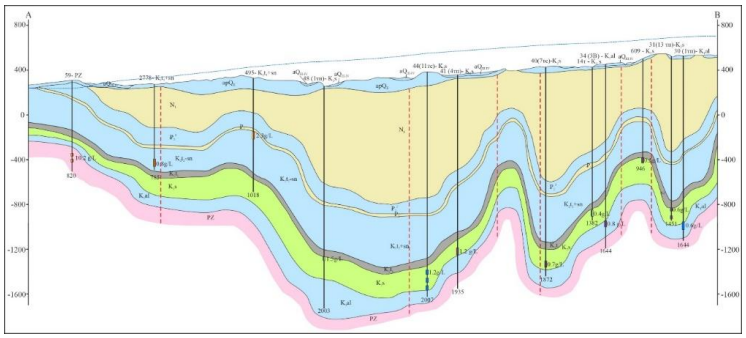


Science as a basis for cooperation

1. Modeling
2. Scenarios of the Aquifer depletion
3. Technical Meetings and Consultations with Stakeholders
4. Joint Action Programme







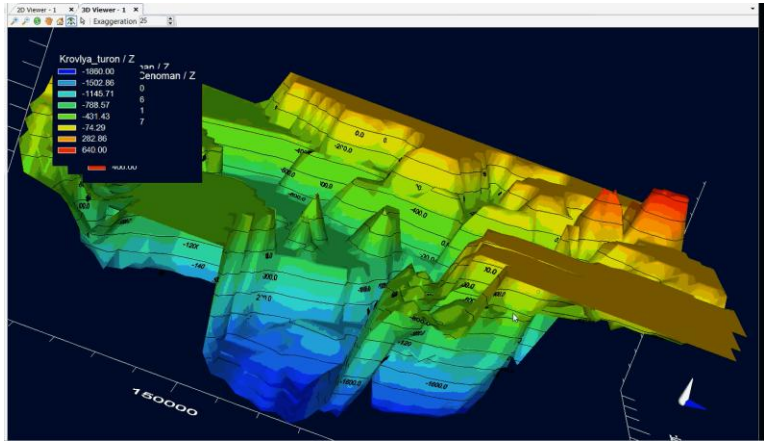
Modeling and scenarios

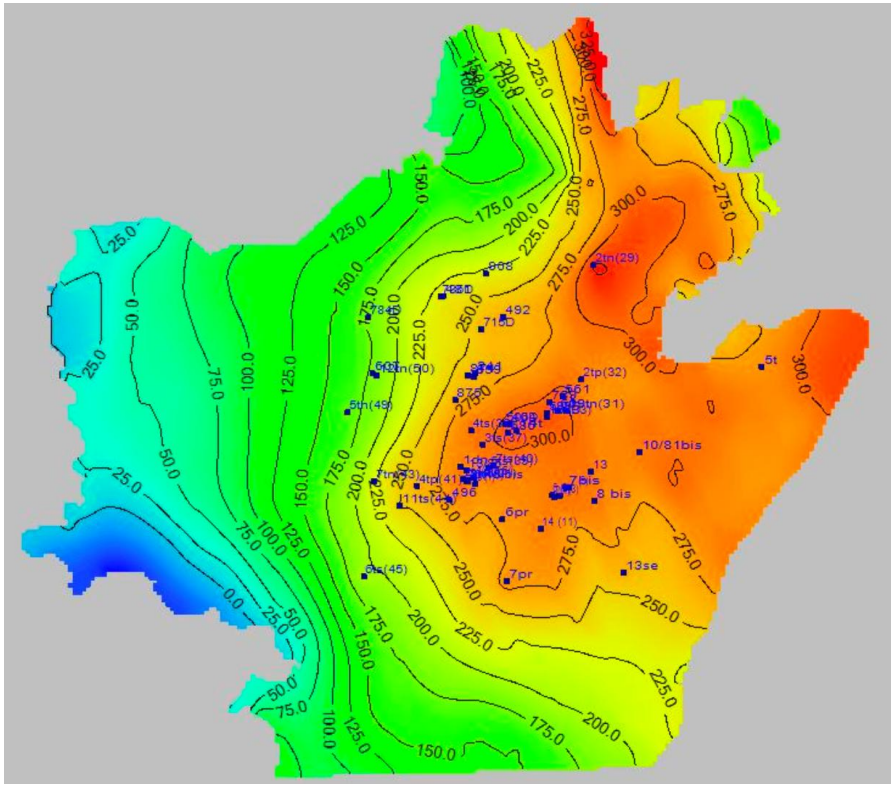
Intensive water abstraction ->

Water table depletion ->

Water availability & quality issues ->

(transboundary) Economic impact





Consultations and Roadmap

- Joint Model as a mechanism for cooperation development
- Strengthening **information and knowledge** exchange
- Recommendations for TBA exploitation based on scenarios results

↓

- **Roadmap**

Roadmap & Broader Context

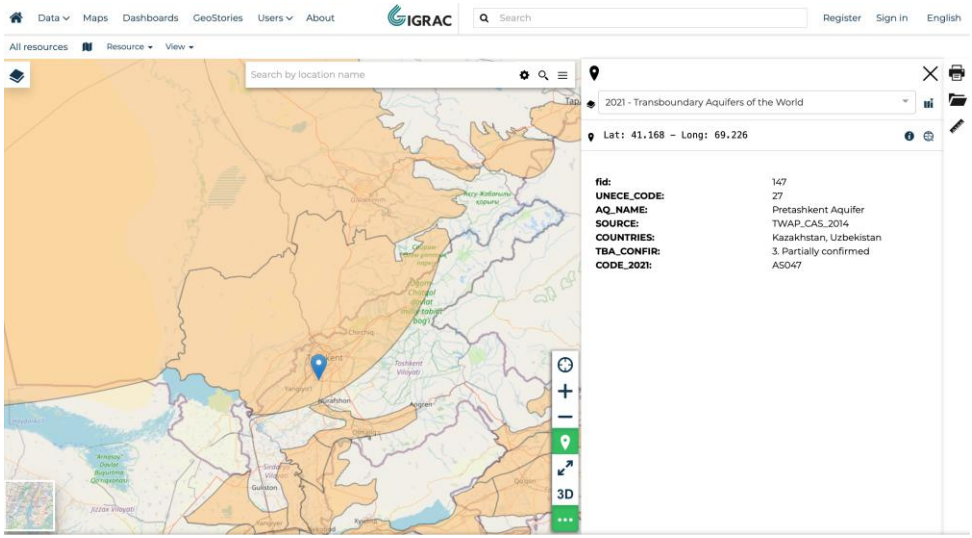
Roadmap on protection and sustainable use of groundwater resources of the Pretashkent Transboundary Aquifer (PTBA):

- Improvement of the legal framework for cooperation (MoU)
- Monitoring and Information/Knowledge Exchange
- Strengthening institutional aspects of groundwater governance on the national levels
- Assessments (socio-economical impact)

Roadmap & Broader Context

- Contribution to SDG 6.5.2 Indicator on transboundary cooperation

The Convention on the Protection and Use of Transboundary Watercourses and International Lakes (Water Convention)



Challenges & Lessons Learned (Pretashkent Aquifer Case)

- **Fossil Water**

Pretashkent aquifer is fossil (non-renewable) groundwater; translation inconsistencies and classification as a confined aquifer create communication gaps.

- **Inherited Legislation**

Existing laws prioritize data security over transparency, limiting access and sharing of groundwater data.

- **Prioritize Information Exchange Over Raw Data Sharing**

Given data security constraints, focus on exchanging processed insights and interpretations instead of raw groundwater data.

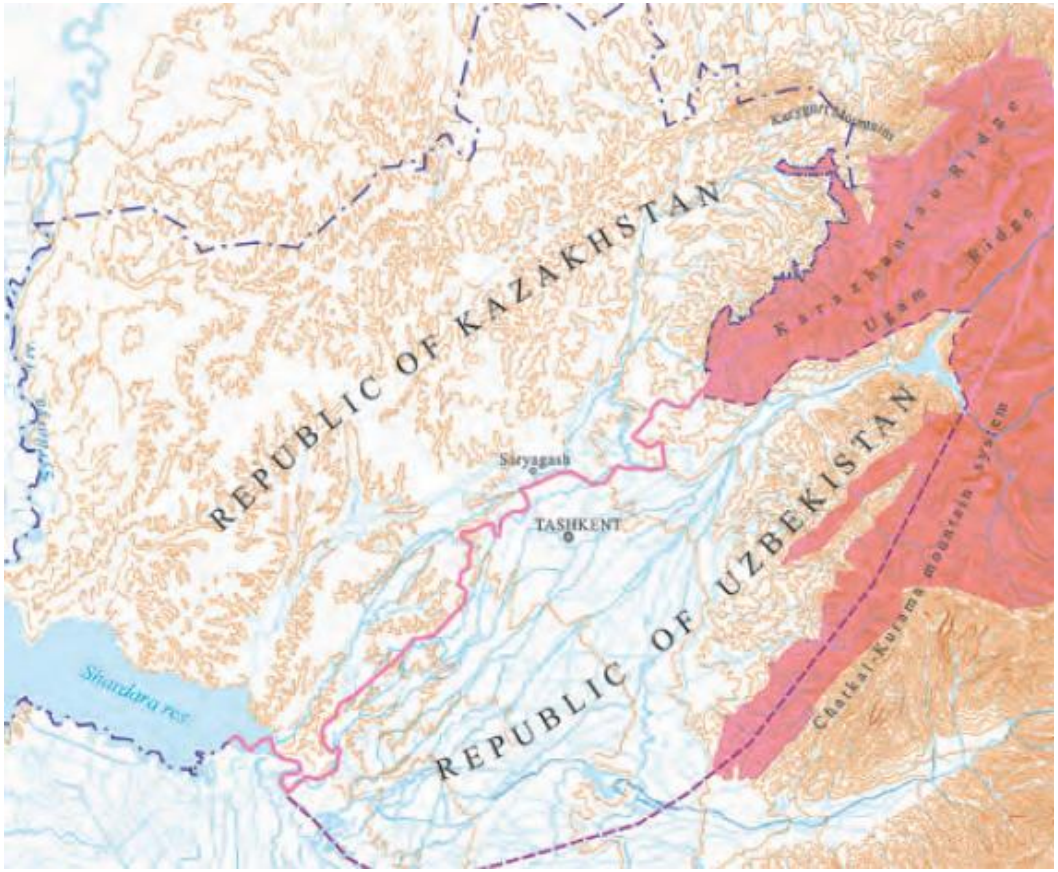
- **Fragmented Legal Framework**

Groundwater governance spans multiple codes (e.g., Water Code, Subsoil Law), creating overlaps and legal ambiguities.

- **Promote Science-Based, Horizontal Cooperation**

Avoid politicizing groundwater issues by fostering collaboration among scientific institutions and technical agencies, focusing on information exchange rather than formal data sharing, which can trigger involvement of political structures and complicate the process.

Questions? Glad to address them during the Q&A



Survey and short break

Hamad Transboundary Groundwater basin

Dr. Marwan Alraggad
Executive Director

INWRDAM
WATER DIPLOMACY

12 June 2025

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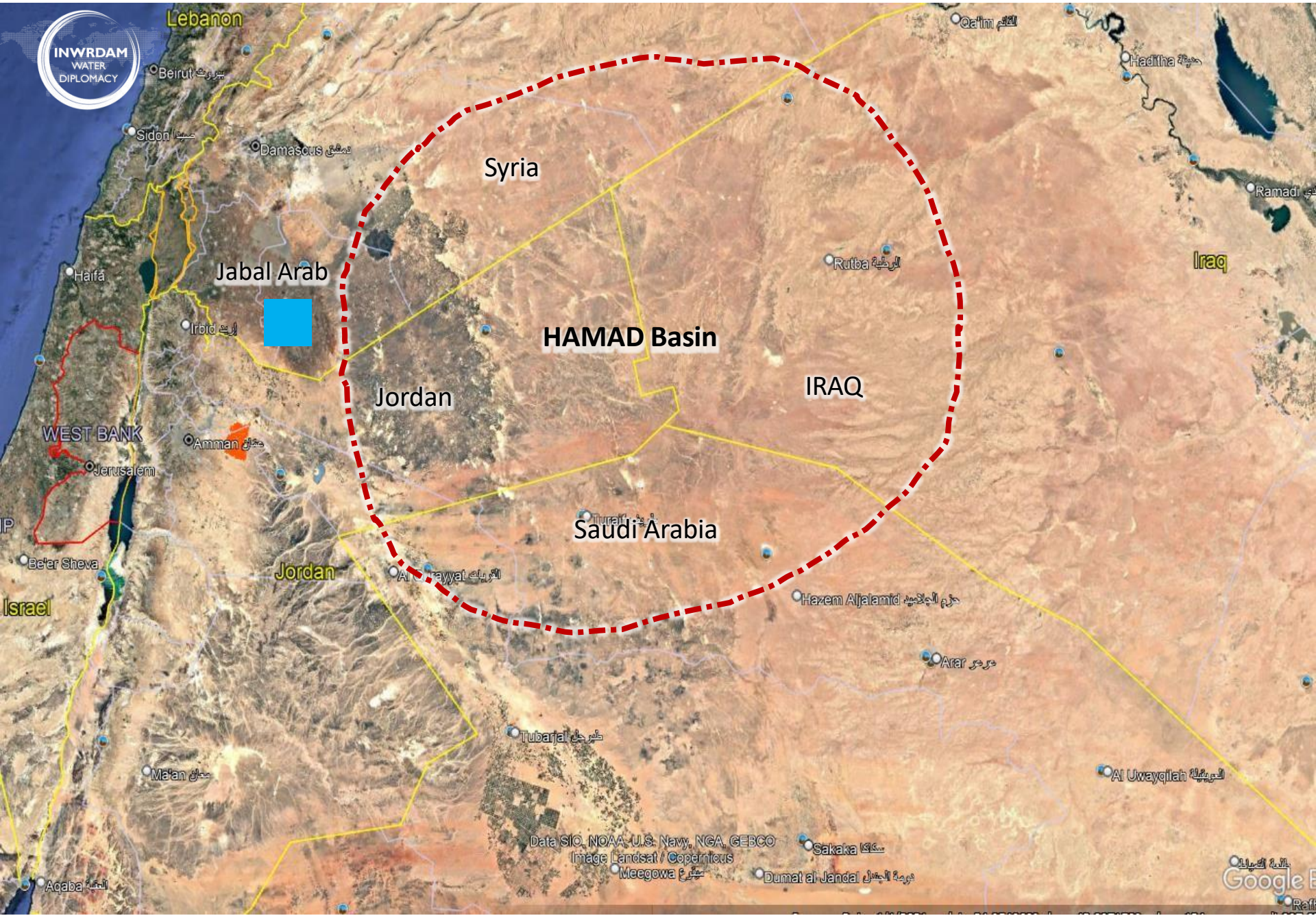
INWRDAM
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Damascus
Syria
Haifa
Jabal Arab
Irbid
HAMAD Basin
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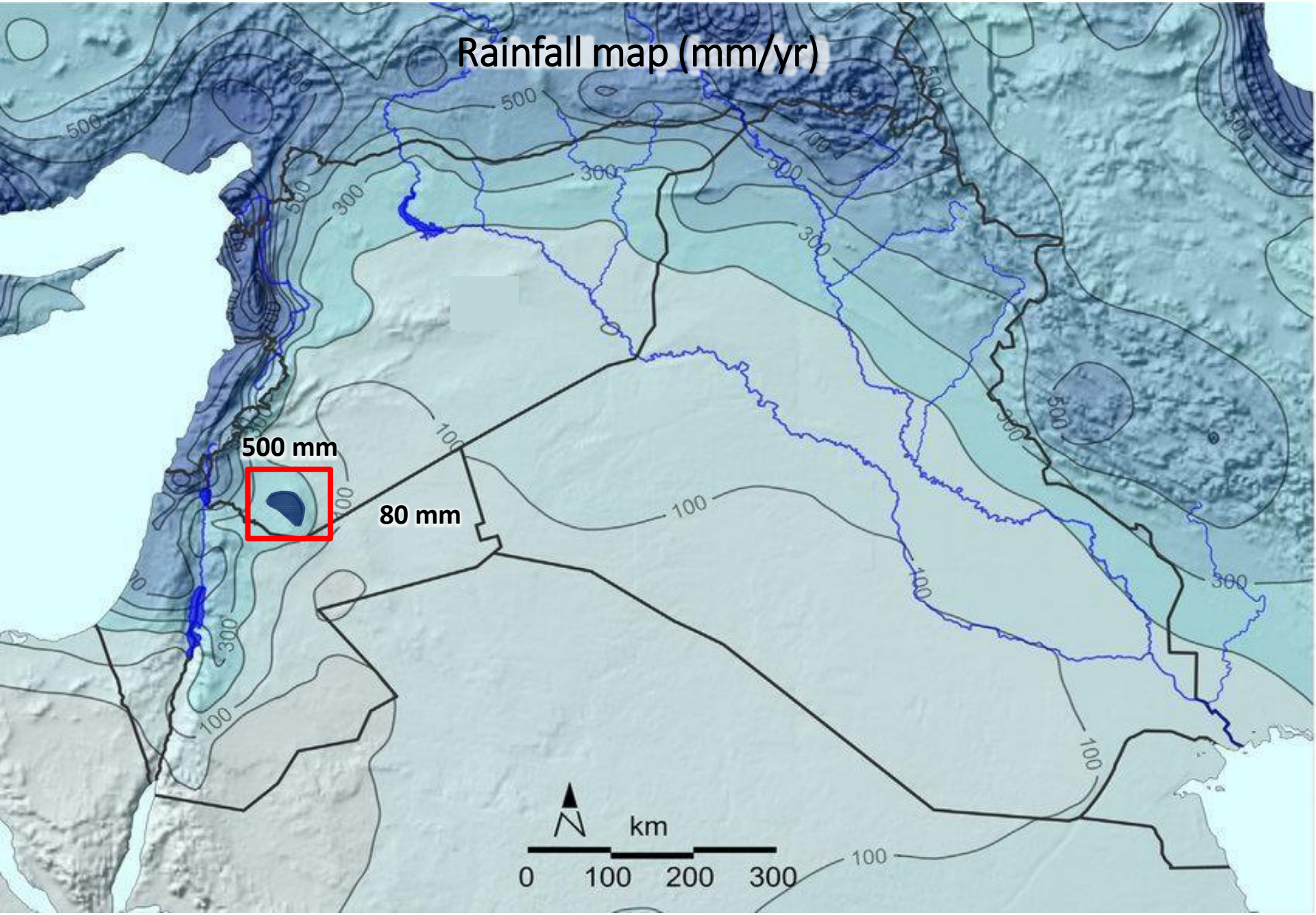
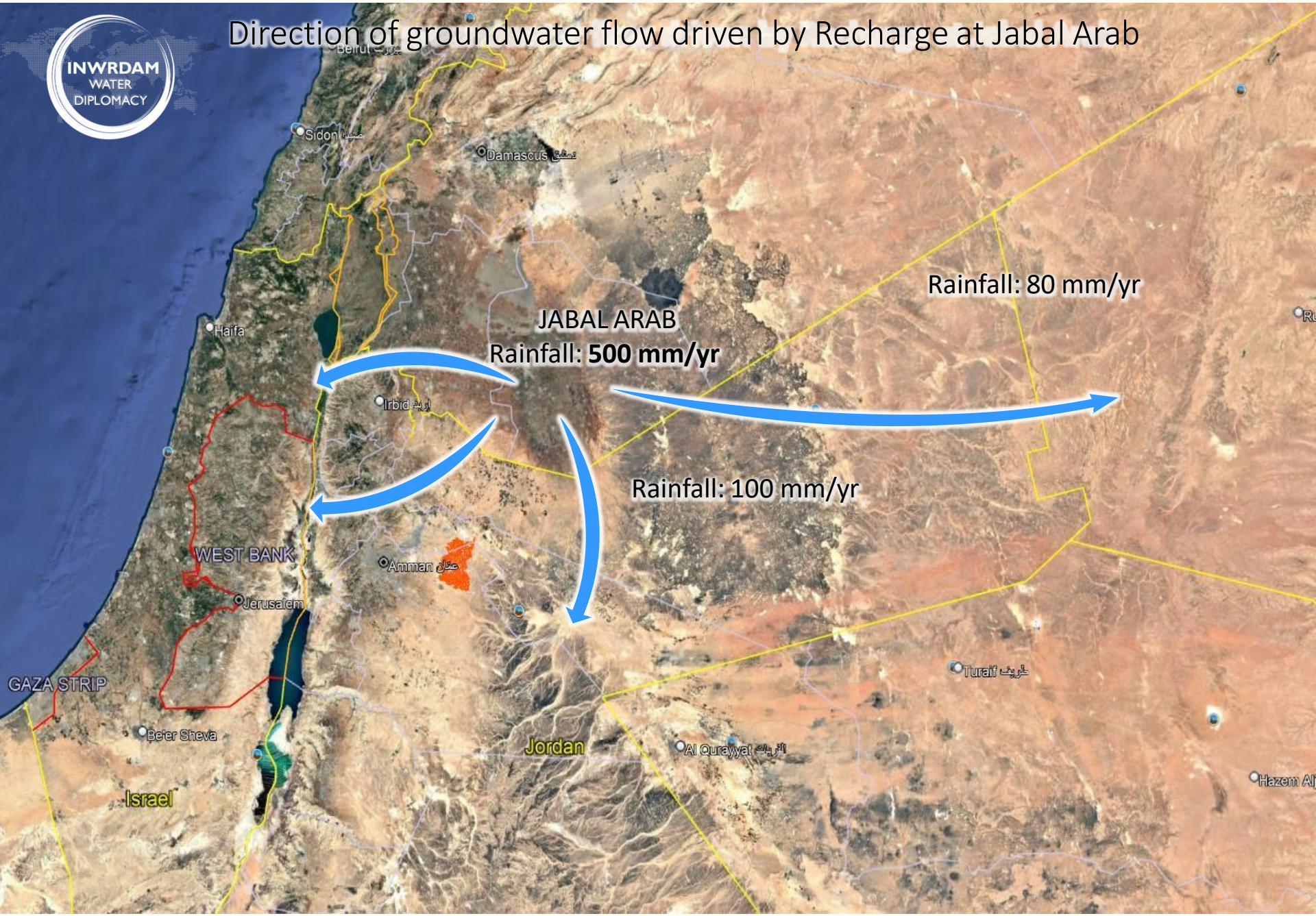
IRAQ
Iraq
Rutba
Ramadi
WEST BANK
Amman
Jerusalem
Saudi Arabia
Be'er Sheva
Israel
Jordan
Hazem Aljalamid
Arar
Tubarjal
Ma'an
Al Uwayqilah
Aqaba
Sakaka
Dumat al Jandal
Meegowa
Data SIO, NOAA, U.S. Navy, NGA, GEBCO
Image Landsat / Copernicus
Google


Rainfall map (mm/yr)
500 mm
80 mm
500
300
100
N
km
0
100
200
300


Direction of groundwater flow driven by Recharge at Jabal Arab
INWRDAM
WATER
DIPLOMACY
Beirut
Sidon
Damascus
Haifa
JABAL ARAB
Rainfall: 500 mm/yr
Rainfall: 80 mm/yr
Irbid
Rainfall: 100 mm/yr
WEST BANK
Amman
Jerusalem
GAZA STRIP
Turaif
Beer Sheva
Jordan
Al Qurayyat
Israel
Hazem Al

3D Model for main Hydrogeological units

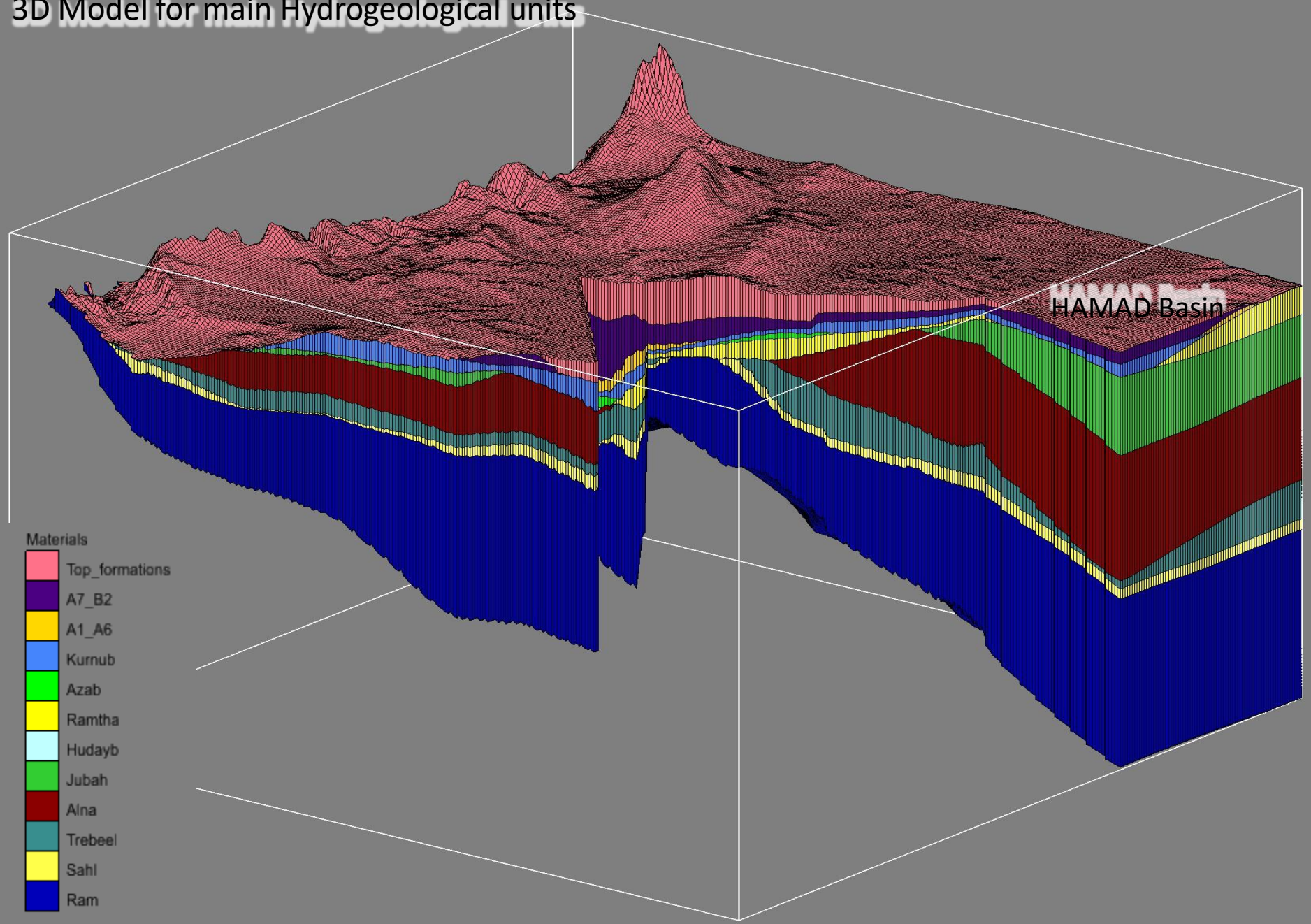
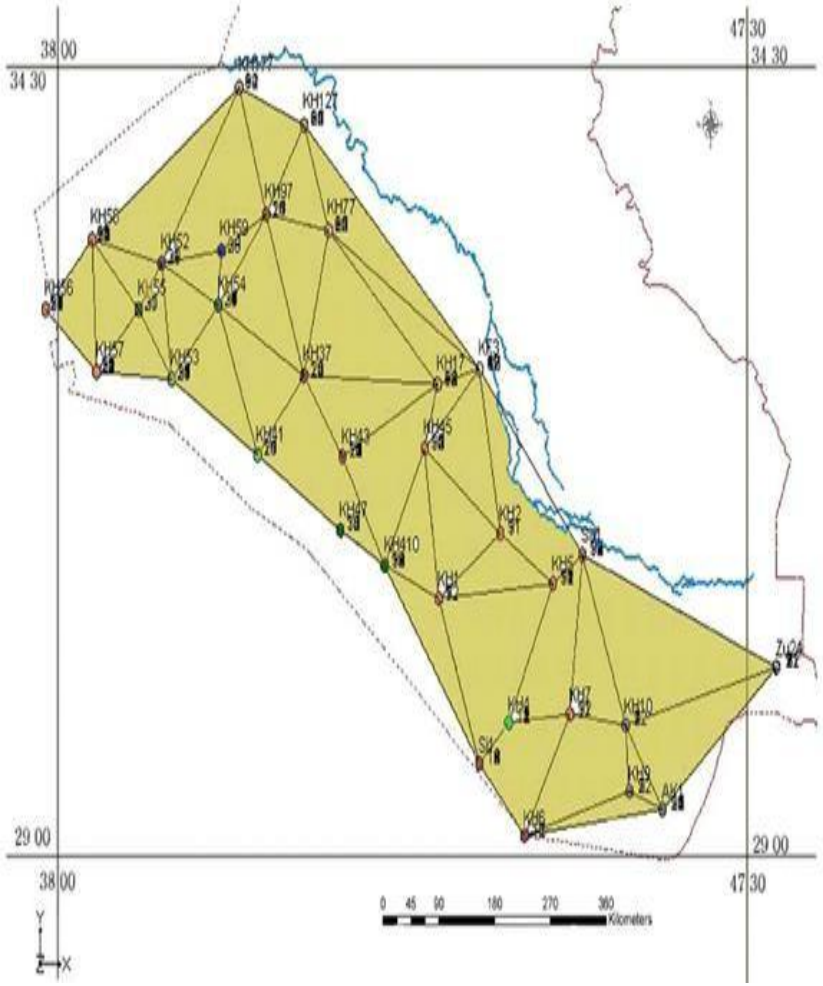
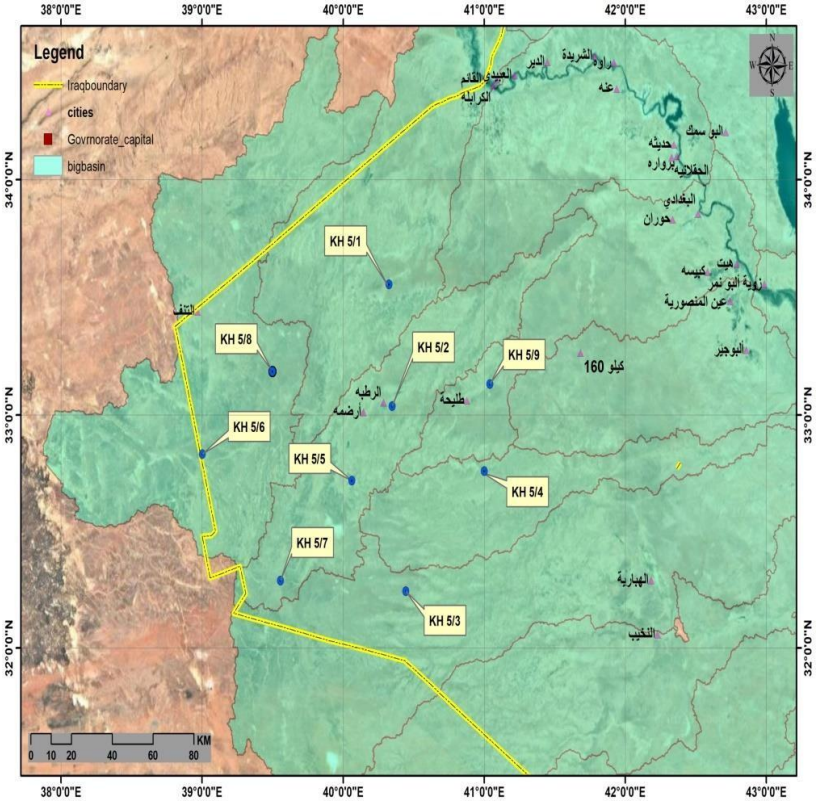


Table 2. List of shared aquifer systems in Western Asia

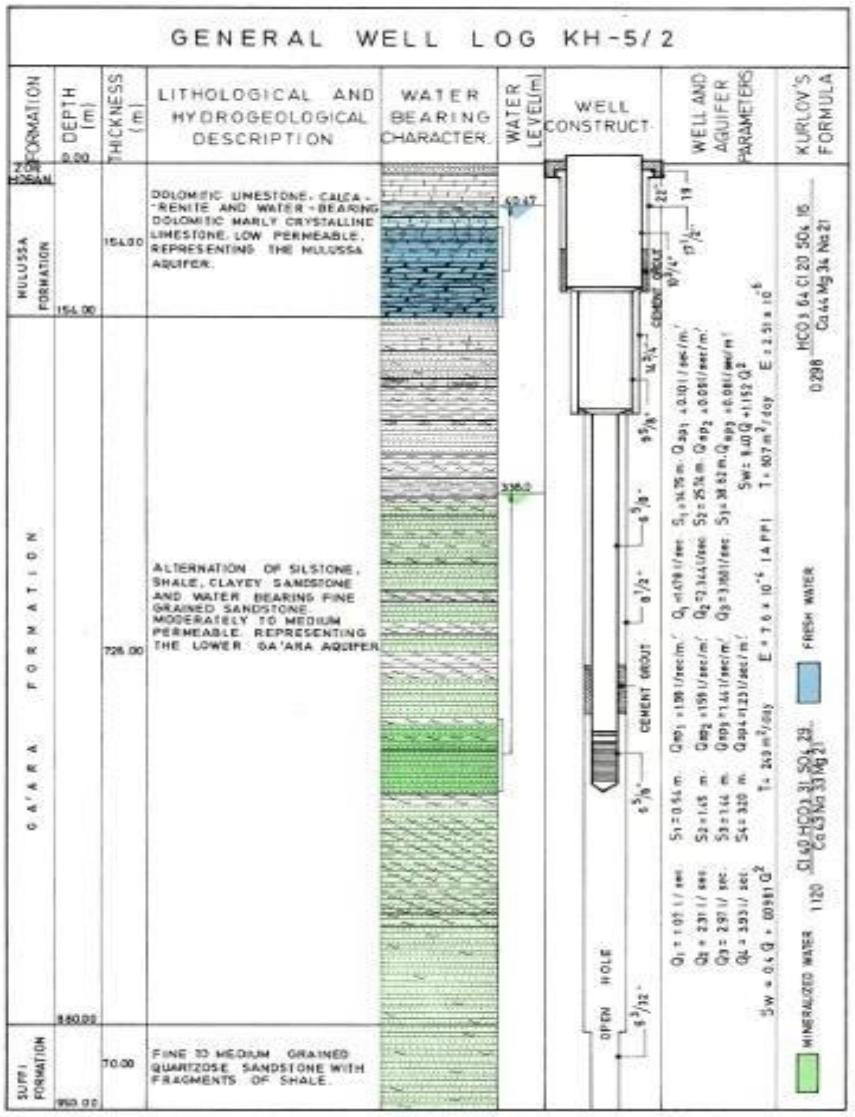
	SHARED AQUIFER SYSTEM	RIPARIAN COUNTRIES
ARABIAN PENINSULA	Saq-Ram Aquifer System (West)	Jordan, Saudi Arabia
	Wajid Aquifer System	Saudi Arabia, Yemen
	Wasia-Biyadh-Aruma Aquifer System (South): Tawila-Mahra/Cretaceous Sands	Saudi Arabia, Yemen
	Wasia-Biyadh-Aruma Aquifer System (North): Sakaka-Rutba	Iraq, Saudi Arabia
	Umm er Radhuma-Dammam Aquifer System (South): Rub' al Khali	Oman, Saudi Arabia, United Arab Emirates, Yemen
	Umm er Radhuma-Dammam Aquifer System (Centre): Gulf	Bahrain, Qatar, Saudi Arabia
	Umm er Radhuma-Dammam Aquifer System (North): Widyan-Salman	Iraq, Kuwait, Saudi Arabia
	Tawil-Quaternary Aquifer System: Wadi Sirhan Basin	Jordan, Saudi Arabia
MASHREK	Ga'ara Aquifer System[a]	Iraq, Jordan, Saudi Arabia, Syria
	Anti-Lebanon[b]	Lebanon, Syria
	Western Aquifer Basin	Egypt, Israel, Palestine
	Central Hammad Basin[a]	Jordan, Syria
	Eastern Aquifer Basin[a]	Israel, Palestine
	Coastal Aquifer Basin	Egypt, Israel, Palestine
	North-Eastern Aquifer Basin[a]	Israel, Palestine
	Basalt Aquifer System (West): Yarmouk Basin	Jordan, Syria
	Basalt Aquifer System (South): Azraq-Dhuleil Basin	Jordan, Syria
	Western Galilee Basin[a]	Israel, Lebanon

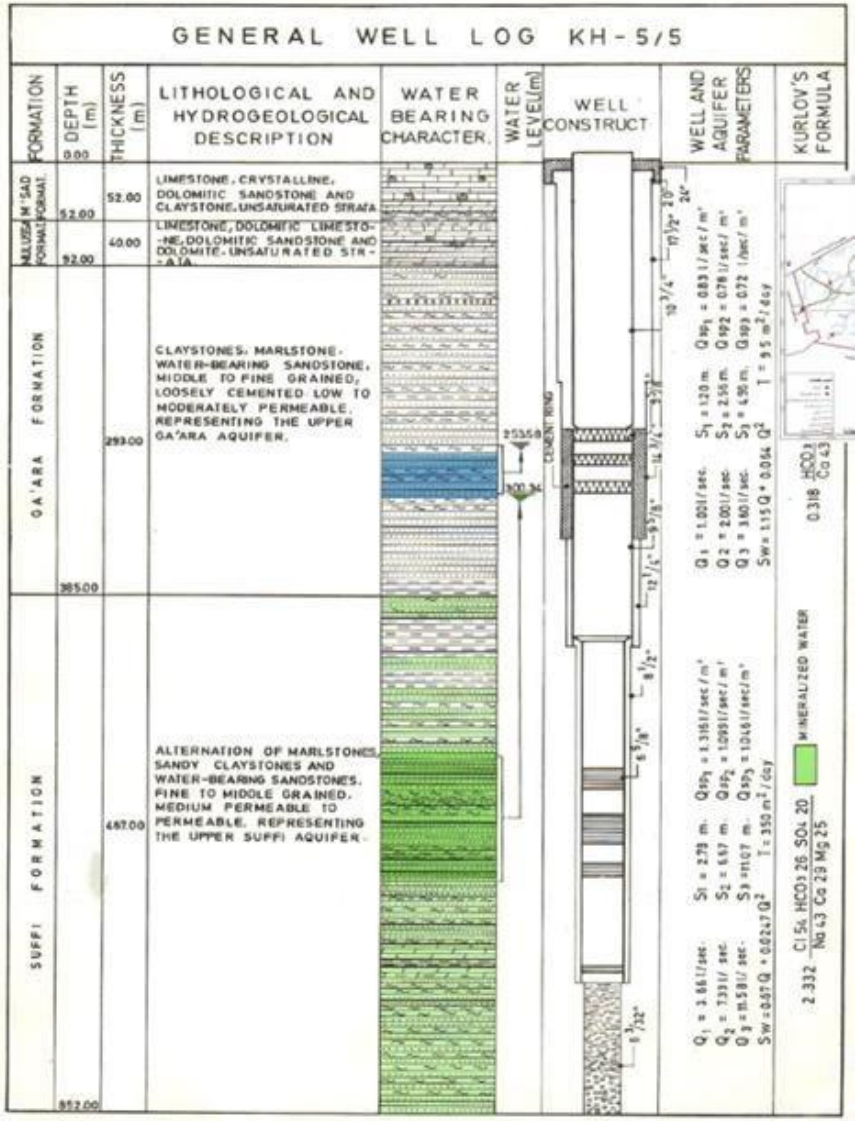
Selected wells for Geological correlation





Example well logs



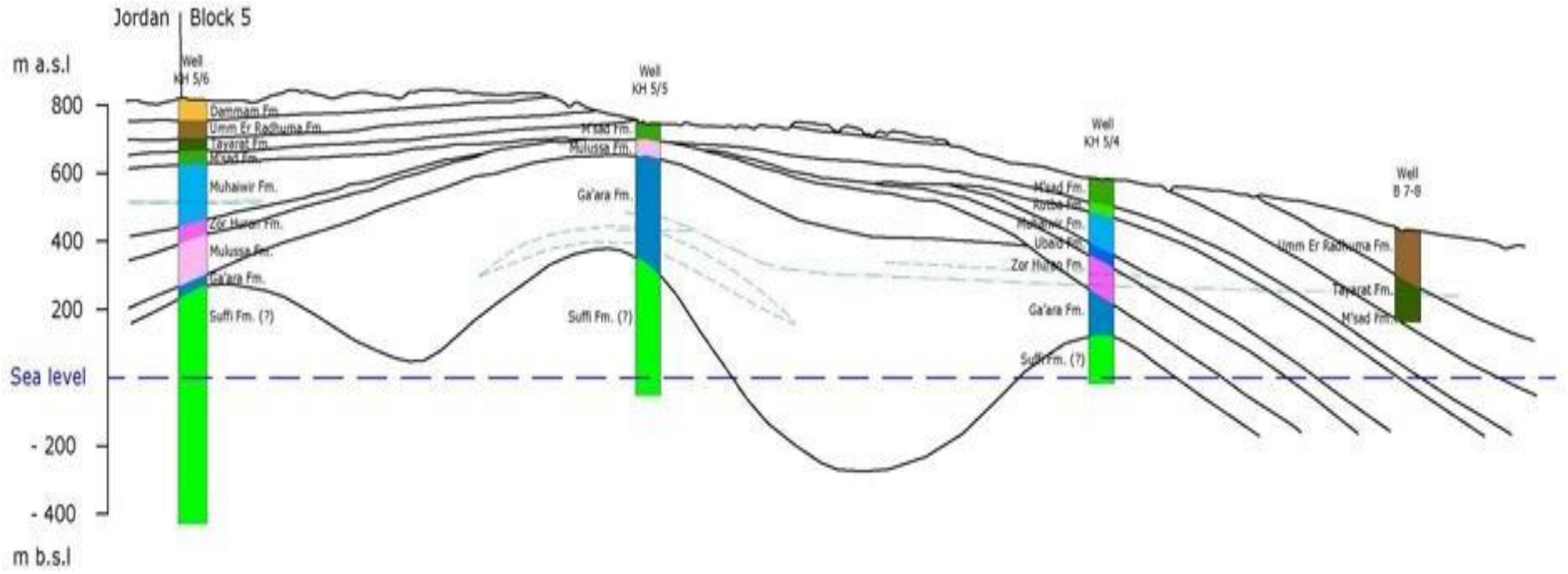


Groundwater Aquifer Formation in Iraq	Equivalent in Neighboring Countries	Neighboring Country
Ka'rah	Al-Jouf - Anzah	Saudi Arabia
Malasi	Hill	Syria
Mahyur	Sudair	Saudi Arabia
Rutbah	Abu Rwais	Jordan
Rutbah	Al-Dhahab	Jordan
Hartha	Sakaka / Al-Wusay' Group	Saudi Arabia
Tiyarat	Kurnub, Wadi Seer	Jordan
Tiyarat	Al-Wusay'	Saudi Arabia
Umm Ardhuma	Al-Balqa 2, Al-'Urmah	Jordan, Saudi Arabia
Umm Ardhuma	Al-Balqa 3, Hibr	Jordan, Saudi Arabia
Umm Ardhuma	Al-Balqa 4, Hibr	Jordan, Saudi Arabia
Umm Ardhuma	Al-Balqa 5	Jordan
Umm Ardhuma	Dammam	Kuwait

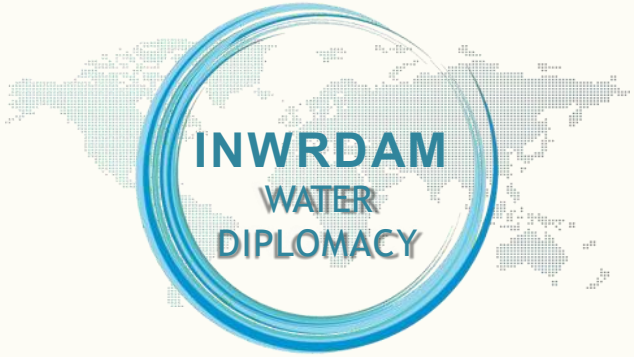
راوجلا ف	راوجلا نلاب ف ئفلملا	قارعلا ف تيفوجلا هيملا تقطنوت
تيوعسلا	فوجلا -تزنع	ترعْ كَ لا
ابرو س	ل يه	يصلملا
تيوعسلا	ري د س	روـي حم
ندرأ لا	سبور وأ	قبطر لا
ندرأ لا	بهذ لا	قبطر لا
تيوعسلا	اكاكس/عيولا ةعومجم	تتزلـه لا
ندرأ لا	ريس يداو ،بنرك	تارايطلا
تيوعسلا	عيول	تارايطلا

Result: Lithological continuation

Question: Hydrological continuation?



Thank You



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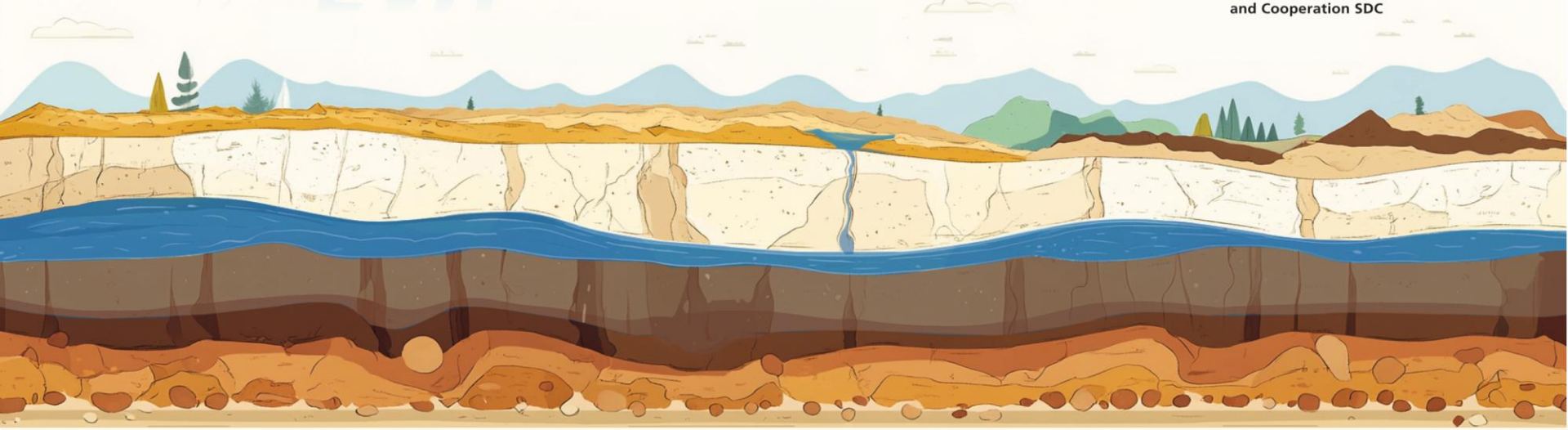


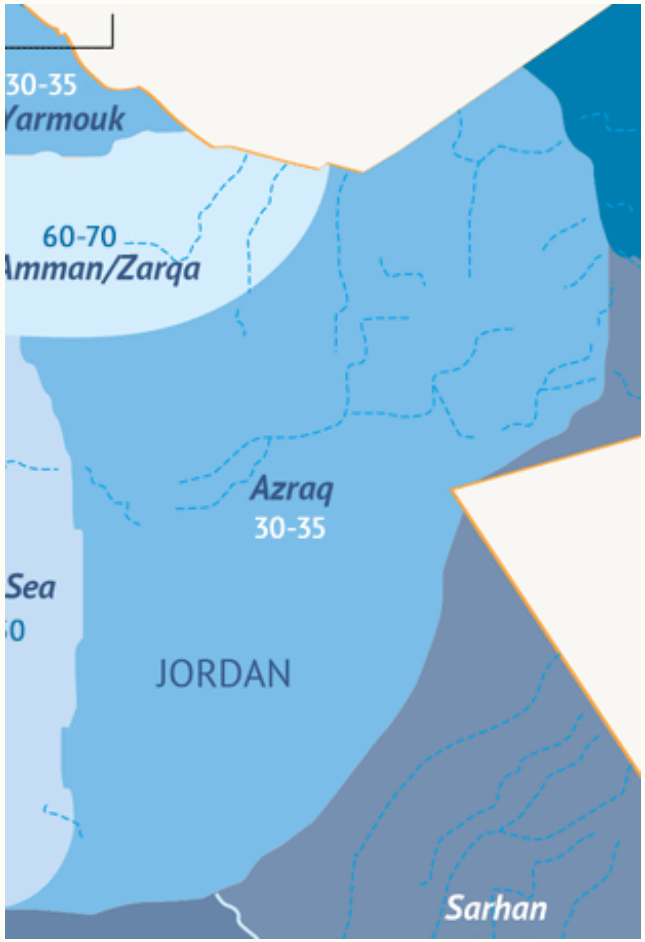
The transboundary Azraq basalt Aquifer

Appraisal and cross-border cooperation

Mutawakil Obeidat,Water Diplomacy Center,
Jordan University of Science and Technology

Overview

- Location: East-central Jordan
- Area: ~12,710 km²
- 94% of this area located within Jordan; 5% in Syria and 1% in Saudi Arabia
- The Azraq Wetland Reserve, a Ramsar site



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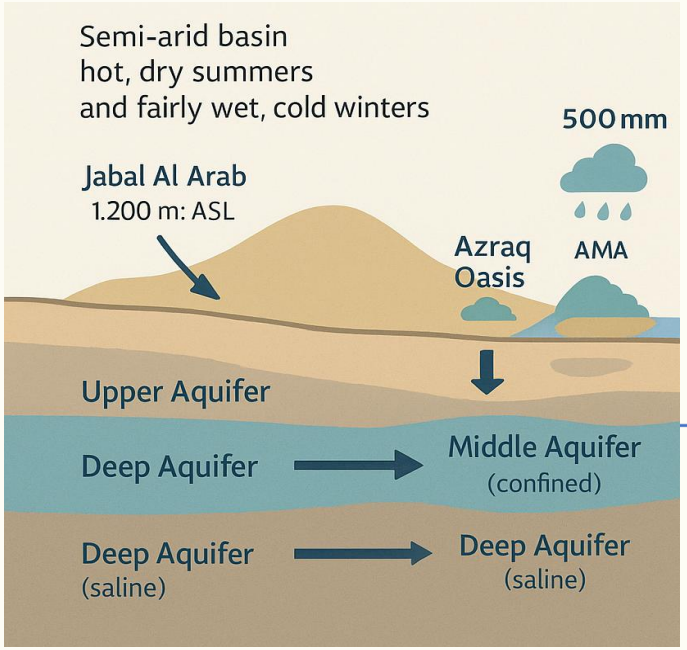
Hydrology of Azraq Basin

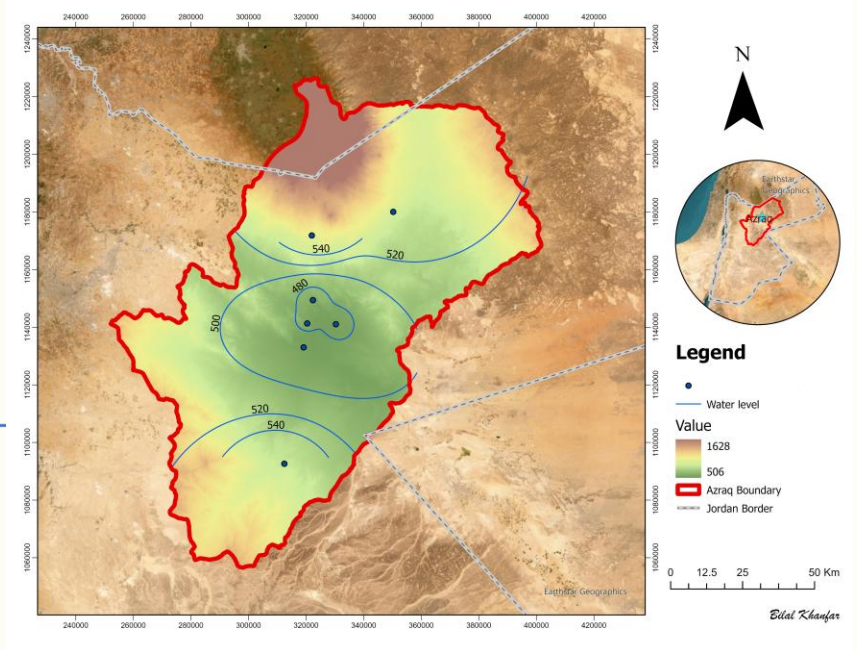
Climate & Precipitation

- Climate: Semi-arid area with hot, dry summers and fairly wet, cold winters
- Annual Rainfall: **50 mm/ year** in the Azraq Oasis and **500 mm/year** in the Jabal Al Arab area, mostly between January and March
- Evaporation: **2400 mm/year**

Aquifer System & Groundwater Flow

- 3 aquifers: Upper (main source), Middle (Confined), deep (Saline).
- Groundwater flow: North-South (From Syria to Azraq)
- Recharge to the upper aquifer: about 34 MCM/y, mainly via basalt infiltration/wadies

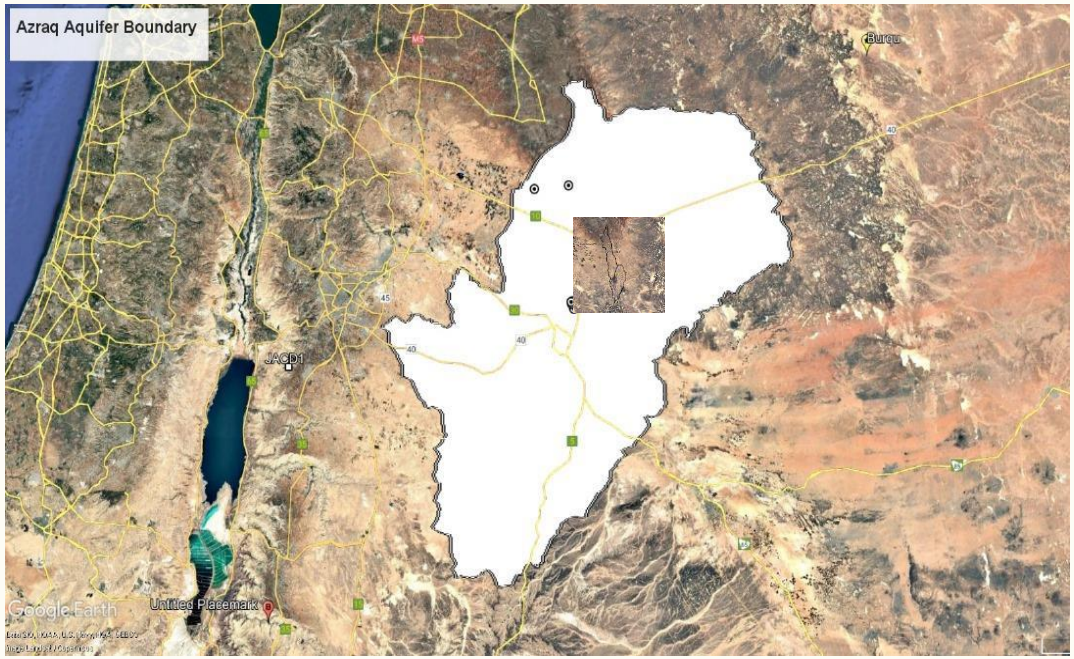




Objectives

- The project was set up to encourage collaboration on the transboundary Azraq basalt aquifer.
- Developing a **comprehensive protocol** for understanding terrain, evaluating the status of recharge, and implementing appropriate interventions for artificial recharge.
- Fostering strong collaboration between various national and regional entities.

Watershed of interest



*Length North to south approx. 65 km ; *Width: Max = 13 km

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Project components

Characterization of the surface flow

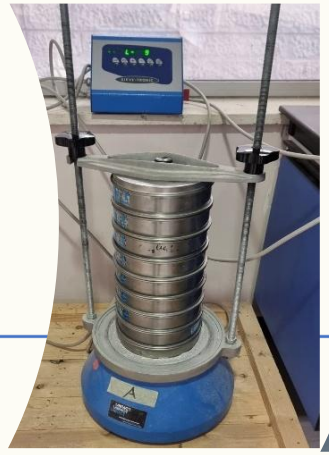
- DEM and field surveys
- Laser scanning
- High Resolution Drone survey
- Installation of monitoring systems
- Soil sampling
- Development of computer models

Characterization of the groundwater flow

- ✓ Collection of well data
- ✓ Sampling and analyzing for chemical and isotopic properties
- ✓ Investigation of existing computer models

Design and implementation of a Managed Aquifer Recharge dam

- Finding an appropriate site and conducting field investigations
- Geophysics and areal surveys
- Design and implementation of the intervention; Monitoring the outcomes.



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Design and implementation of a Managed Aquifer Recharge dam

- Finding an appropriate site and conducting field investigations
- Geophysics and areal surveys
- Design and implementation of the intervention
- Monitoring the outcomes.

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Partners and cross-border cooperation

Partners

Cross-border cooperation

- Communication with the Syrian Ministry of Energy - willingness to cooperate.
- Meeting/workshop at the WDC for Jordanian and Syrian partners.
- Data sharing/exchange.
- Knowledge and experience exchange.
- Water diplomacy trainings/trust building.
- Joint management of the aquifer.
- Replication of the methodology to similar settings in the region

Thank you

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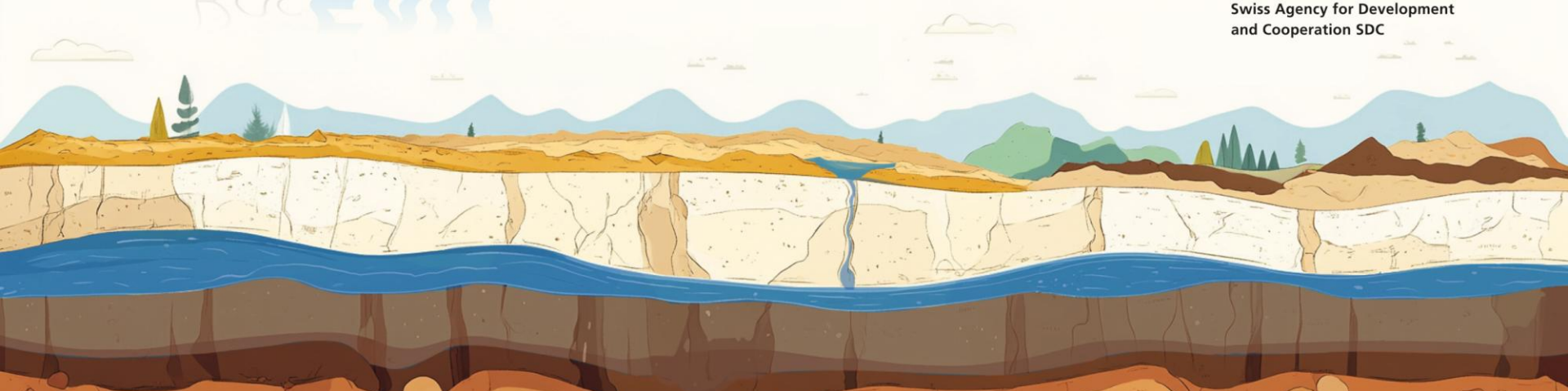

Q&A on case studies

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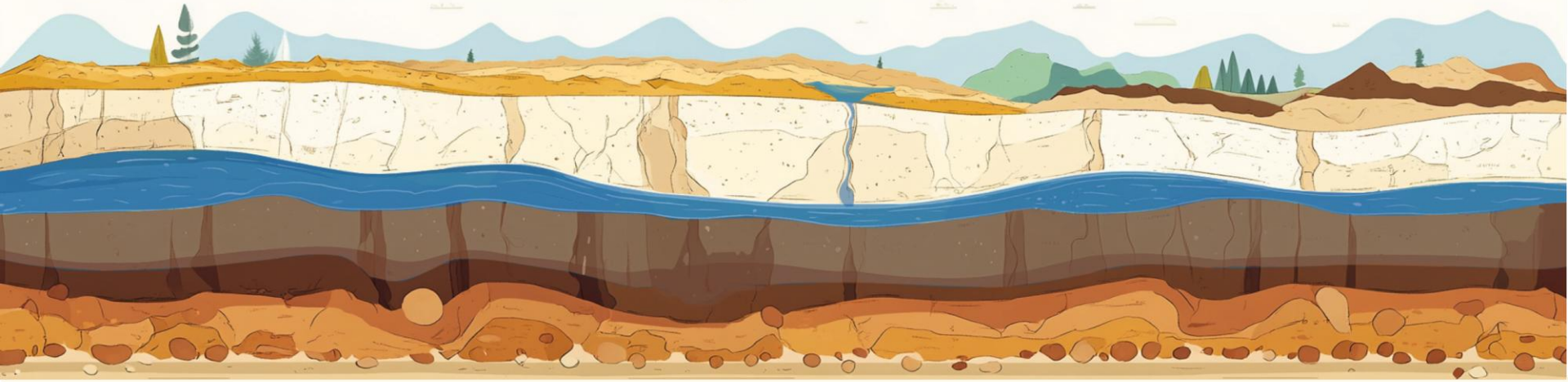

Closing Remarks

Prof. Mark Zeitoun, Director of the Geneva Water Hub

Thank you

For follow-up questions about this webinar, please contact frank.wiederkehr@skat.ch

Don‘t forget to join the RésEAU community to stay up to date about this Learning Journey and other news & activities: https://dgroups.org/sdc/reseau

This event has been recorded and will be made available on https://www.sdc-water.ch/

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