Economic and Social Commission for Western Asia

Regional assessment and knowledge sharing in the Arab region

The Inventory of Shared Water Resources in Western Asia and the Arab Groundwater Knowledge Platform

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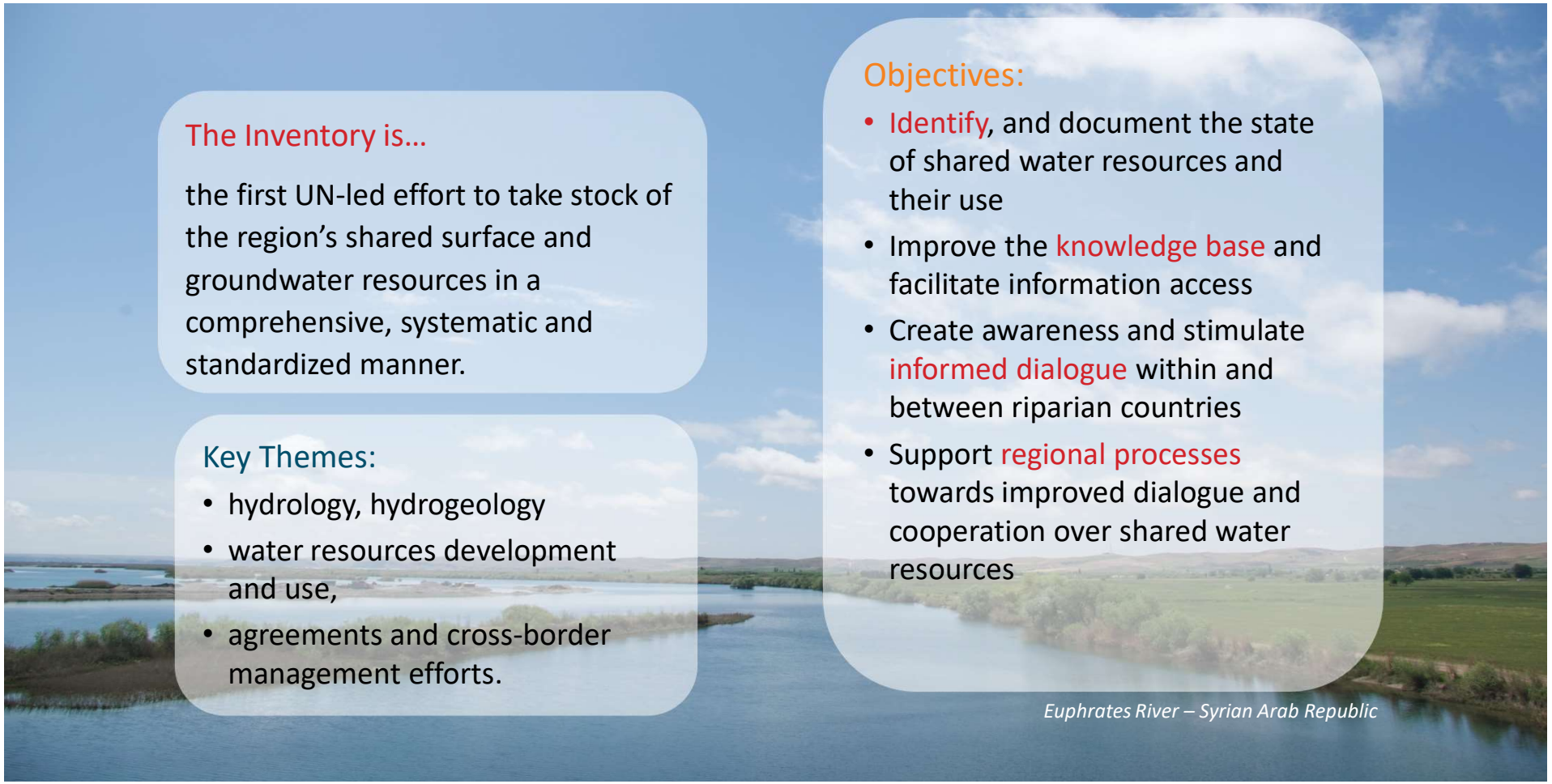
BGR Bundesanstalt für Geowissenschaften und Rohstoffe

INVENTORY OF SHARED WATER RESOURCES IN WESTERN ASIA

Overview

Introduction



The Inventory is…

the first UN-led effort to take stock of the region's shared surface and groundwater resources in a comprehensive, systematic and standardized manner.

Key Themes:

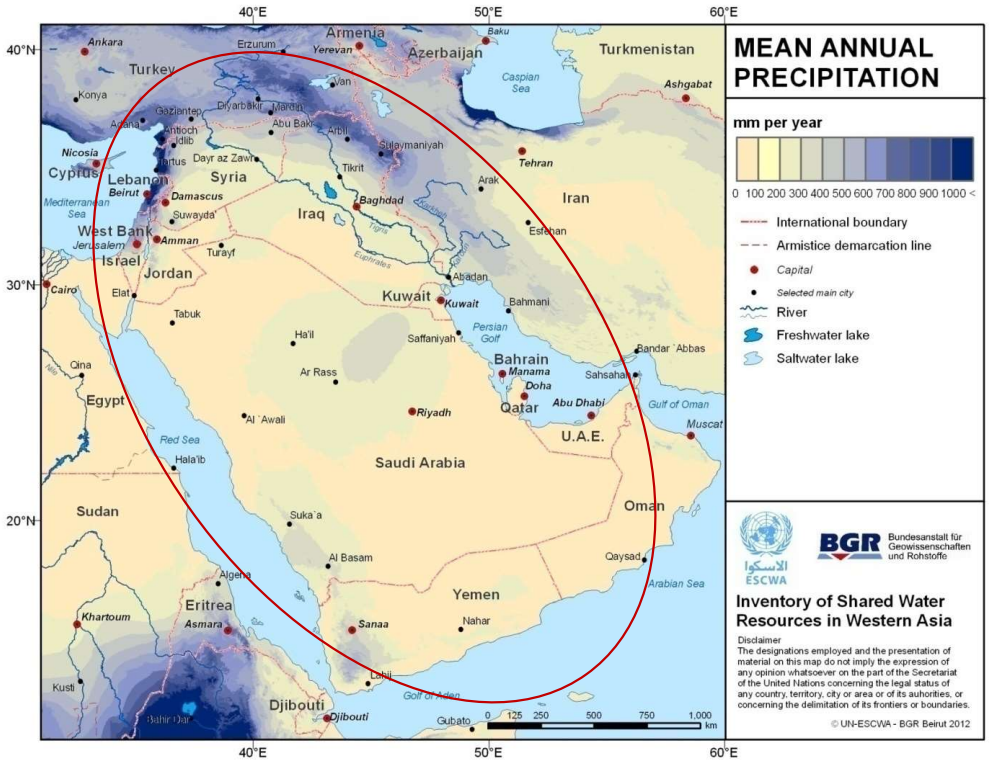
- hydrology, hydrogeology
- water resources development and use,
- agreements and cross-border management efforts.

Objectives:

- Identify, and document the state of shared water resources and their use
- Improve the knowledge base and facilitate information access
- Create awareness and stimulate informed dialogue within and between riparian countries
- Support regional processes towards improved dialogue and cooperation over shared water resources

Euphrates River – Syrian Arab Republic

Introduction



Geographical Scope:

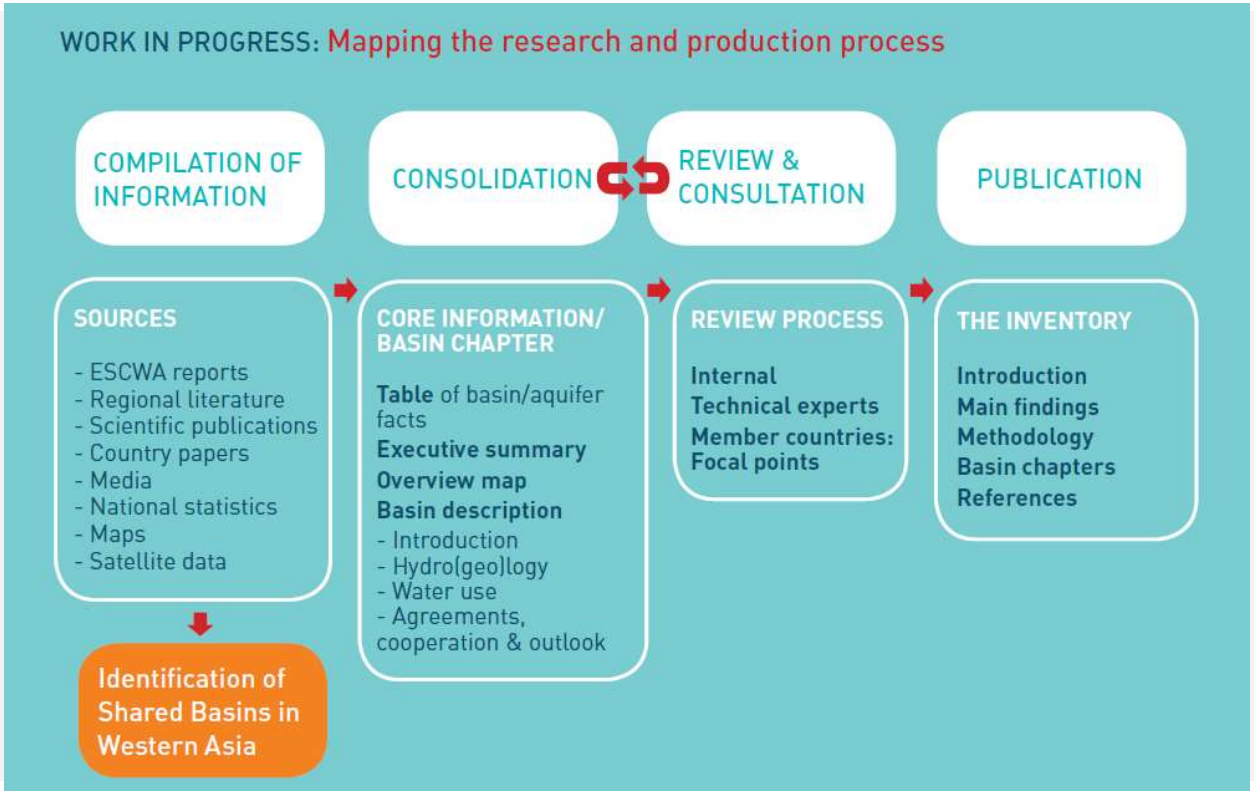
covers all identified surface and groundwater resources shared between Arab Countries of Western Asia and other riparian states

- Arabian Peninsula
- Mashreq
- Mesopotamia

Key Findings

1. There's more shared water resources than is generally assumed.
2. The dominance of water quantity and its allocation on the discourse on shared water resources in a water-scarce region.
3. Water quality has deteriorated rapidly, a largely neglected fact.
4. Lack of accurate data hinders joint management of water resources.
5. The scarcity of cooperation on shared water across the basin.
6. Only one agreement on groundwater resources in the Western Asia.
7. Most of the groundwater is non-renewable in the region, so aquifers are quickly depleted.
8. Ignoring the important role that groundwater plays in surface water basins.
9. A new way to approach the large regional aquifers must be thought of from a common perspective.
10. It's already too late to save some shared water.

Work Process



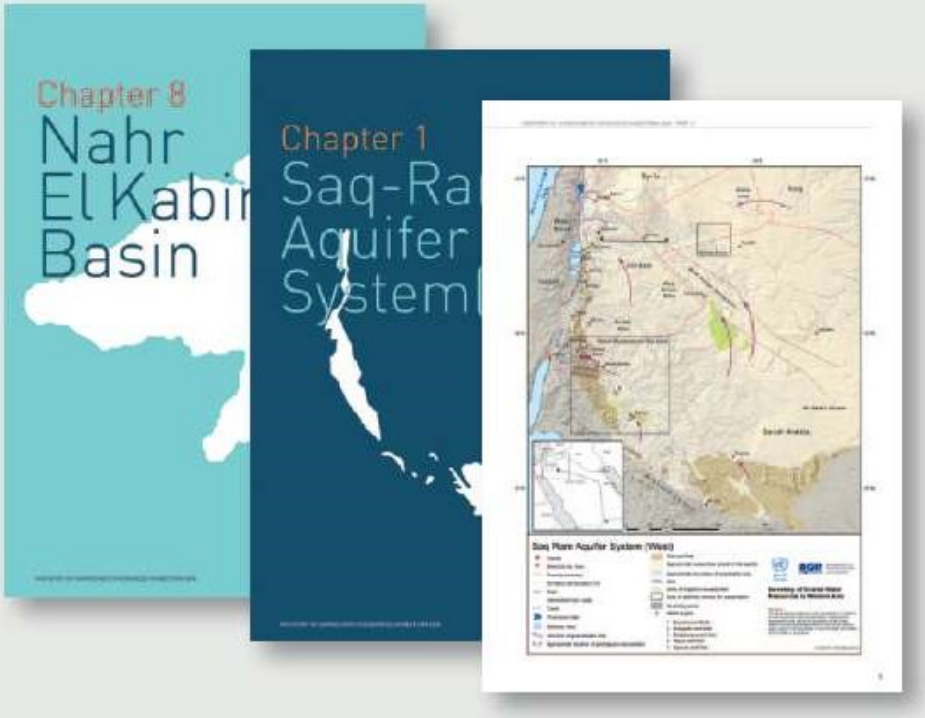
Work Process: Main Challenges

- Data and information available to the public often outdated, obsolete, contradictory or of different nature and scale.
- Some information (especially recent data) classified in national databases and unpublished reports
- Country submissions varied significantly in terms of scope, level of detail and format
- Difficulties in receiving country data in a timely manner, modifications directly incorporated on layouted version

Where differing or contradictory information was obtained from different sources, the different data sets and arguments were all included to reflect a range of findings and viewpoints

The Lesser Zab – Iraq

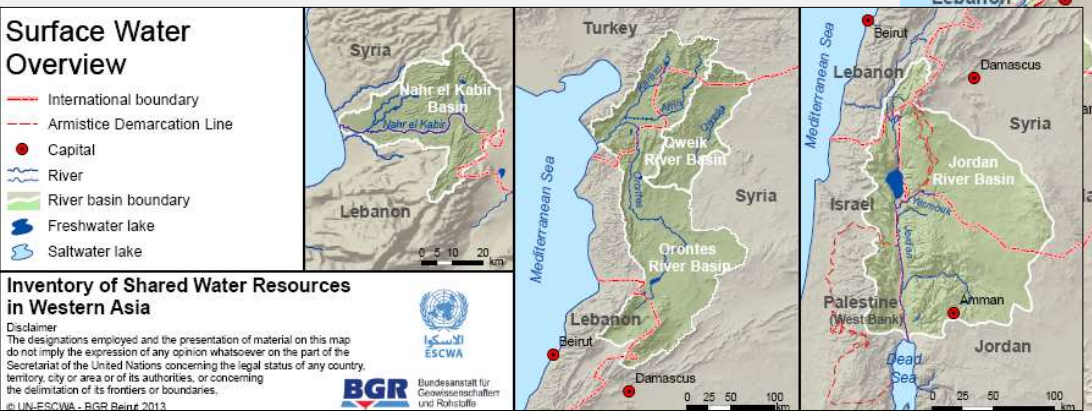
Inventory Features

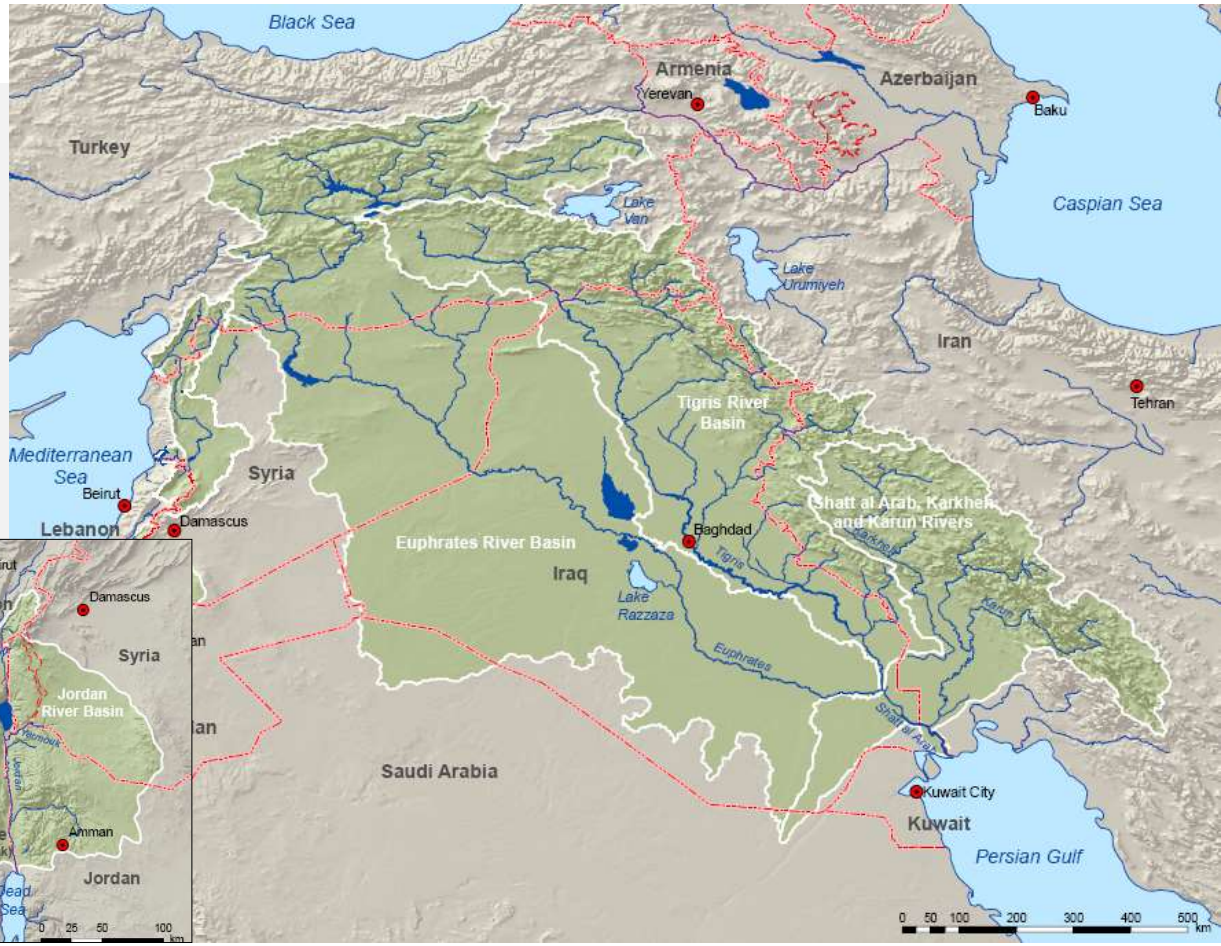


- A total of **22** shared aquifer systems and **6** shared river basins were identified.
- 9 chapters on shared surface waters and 17 chapters on shared aquifer systems, each following a standardized structure and methodology.
- 624 pages of detailed information with 60 maps and over 200 figures, tables and boxes.

Overview: Shared River Basins

- Jordan River
- Orontes River
- Euphrates-Tigris-Shatt Al Arab
- El Kabir River
- Qweik River



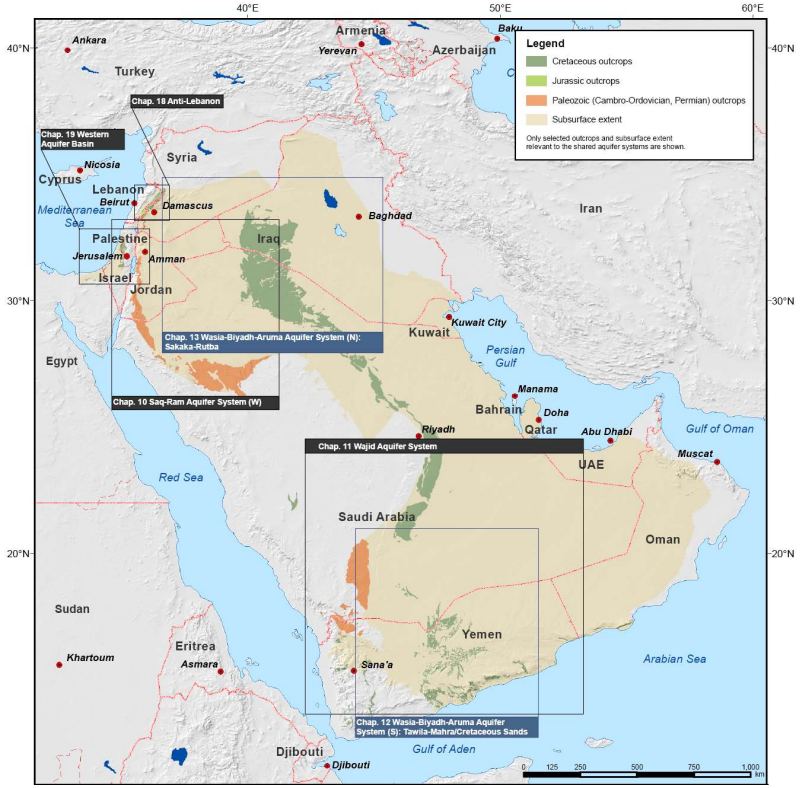


Overview: Shared River Basins in the Inventory

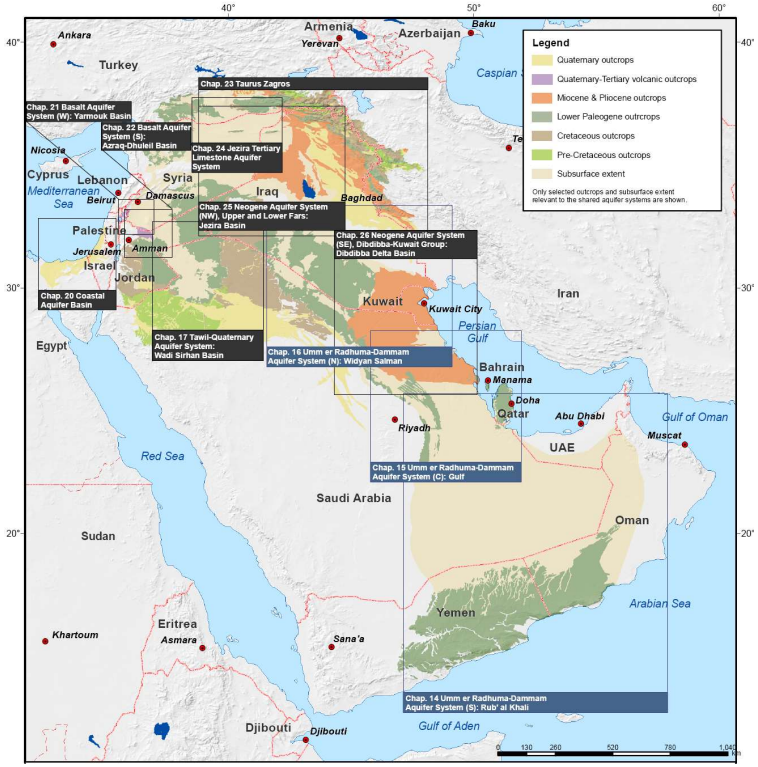
	SHARED RIVER		COUNTRIES	MAIN SHARED TRIBUTARIES[b]
MESOPOTAMIA	Euphrates-Tigris-Shatt al Arab	Euphrates River	Iraq, Jordan,[a] Saudi Arabia,[a] Syria, Turkey	Sajur River Jallab/Balikh River Khabour River
		Tigris River	Iran, Iraq, Syria, Turkey	Feesh Khabour River Greater Zab River Lesser Zab River Diyala River
		Shatt al Arab River	Iran,[c] Iraq[c]	Karkheh River Karun River[d]
MASHREK	Jordan River		Israel, Jordan, Lebanon, Palestine, Syria	Hasbani River Banias River --- Yarmouk River
	Orontes River		Lebanon, Syria, Turkey	Afrin River Karasu River
	Nahr el Kabir		Lebanon, Syria	-
	Qweik River		Syria, Turkey	-

Overview: Shared Aquifer Systems

Mesozoic and Paleozoic Era



Cenozoic Era



Overview: Shared aquifer systems in the Inventory

	Shared Aquifer Systems	ESCWA member countries													Non-ESCWA		
		BH	EG	IQ	JO	KW	LB	OM	PS	QA	SA	SY	UAE	YE	IR	IL	TR
ARABIAN PENINSULA	SaqRam Aquifer System (West)				●						●						
	Wajid Aquifer System										●			●			
	Wasia-Biyadh-Aruma Aquifer System (South)										●			●			
	Wasia-Biyadh-Aruma Aquifer System (North)			●							●						
	U er R' Dammam Aquifer System (South)							●			●		●	●			
	U er R' Dammam Aquifer System (Centre)	●								●	●						
	U er R' Dammam Aquifer System (North)			●		●					●						
	Tawil-Quaternary Aquifer System				●						●						
MASHREK	Anti-Lebanon						●					●					
	Western Aquifer Basin		●						●							●	
	Coastal Aquifer Basin		●						●							●	
	Basalt Aquifer System (West)				●							●					
	Basalt Aquifer System (South)				●							●					
MESOPOTAMIA incl. Tauros-Zagros	Taurus-Zagros			●											●		●
	Jezira Tertiary Limestone Aquifer System											●					●
	Neogene Aquifer System (North-West)			●								●					
	Neogene Aquifer System (South-East)			●		●						●					

Overview: Shared aquifer systems without basin chapter

NAME	LITHOLOGY	RIPARIAN COUNTRIES
Central Hammad Basin	Basalt, carbonates and marl	Jordan, Syria
Eastern Aquifer Basin	Limestone	Israel, Palestine
Ga'ara Aquifer System	Sandstones/ carbonates	Iraq, Jordan, Saudi Arabia, Syria
North-Eastern Aquifer Basin	Predominantly limestone	Israel, Palestine
Western Galilee Basin	Limestone and dolomite	Israel, Lebanon

Criteria:

- Limited size / Scale of Inventory
- Limited shared portion
- Limited exploitability (i.e. depth, salinity, oil-bearing, facies change)

Chapter Features

GROUNDWATER CHAPTER

INTRODUCTION

Location
Area
Climate
Population
Other aquifers in the area
Information sources

HYDROGEOLOGY

Aquifer configuration
Stratigraphy
Aquifer thickness
Aquifer type
Aquifer parameters

Recharge
Flow regime
Storage
Discharge
Water quality
Exploitability

SURFACE WATER CHAPTER

GEOGRAPHY

River course
Climate
Population

HYDROLOGICAL CHARACTERISTICS

Annual discharge variability
Flow regime
Groundwater linkages

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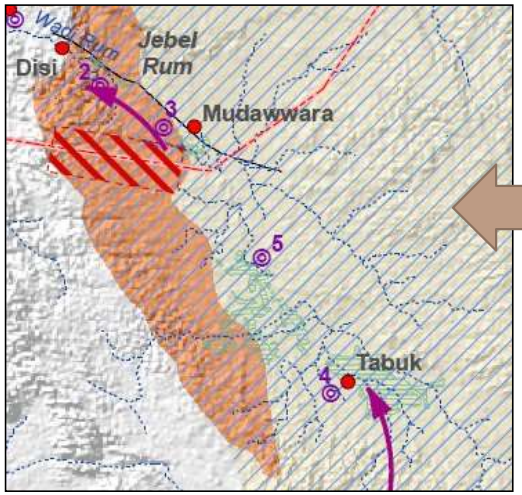
Chapter Features II

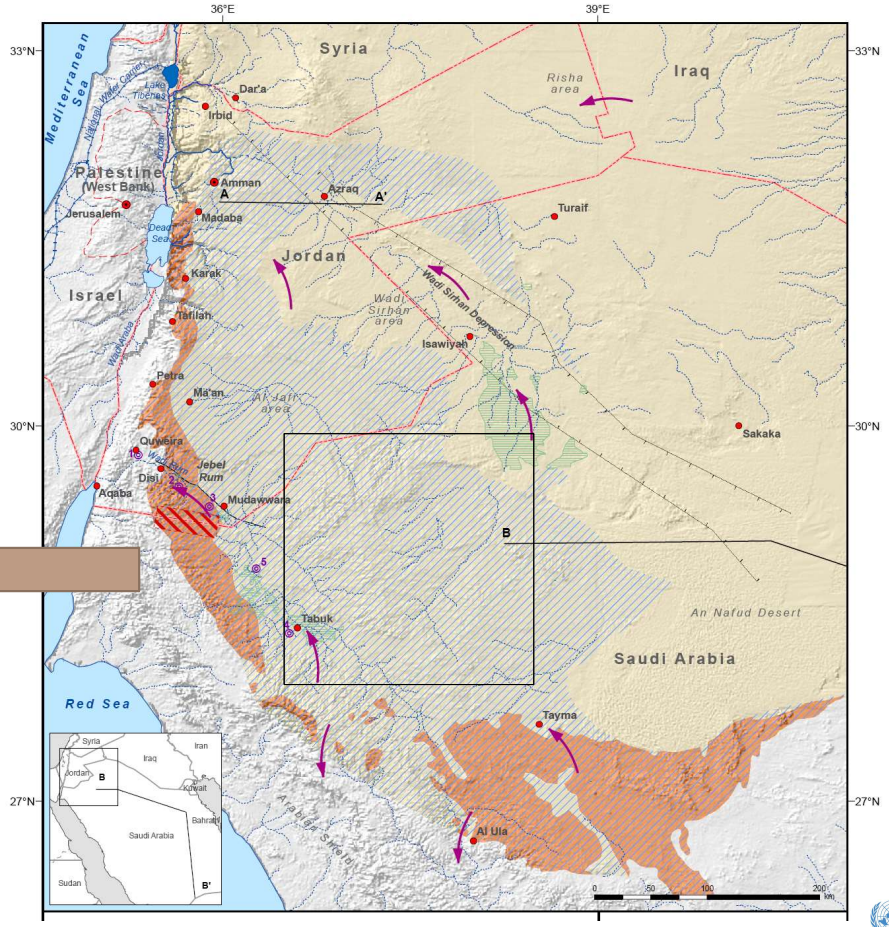
GROUNDWATER CHAPTER	SURFACE WATER CHAPTER
GROUNDWATER USE	**WATER RESOURCES MANAGEMENT**
Abstraction and use Quality issues Sustainability issues	Development and use Water quality & environmental issues
AGREEMENTS, COOPERATION & OUTLOOK	**AGREEMENTS, COOPERATION & OUTLOOK**
List of agreements Cooperation between riparian countries Outlook	List of agreements Cooperation between riparian countries Outlook
NOTES	**NOTES**
BIBLIOGRAPHY	**BIBLIOGRAPHY**

Added Value: Focus discussion on shared aquifer systems

Example:
Saq-Ram Aquifer System (West) – 'Disi' Aquifer

- approximate exploitability
- groundwater development





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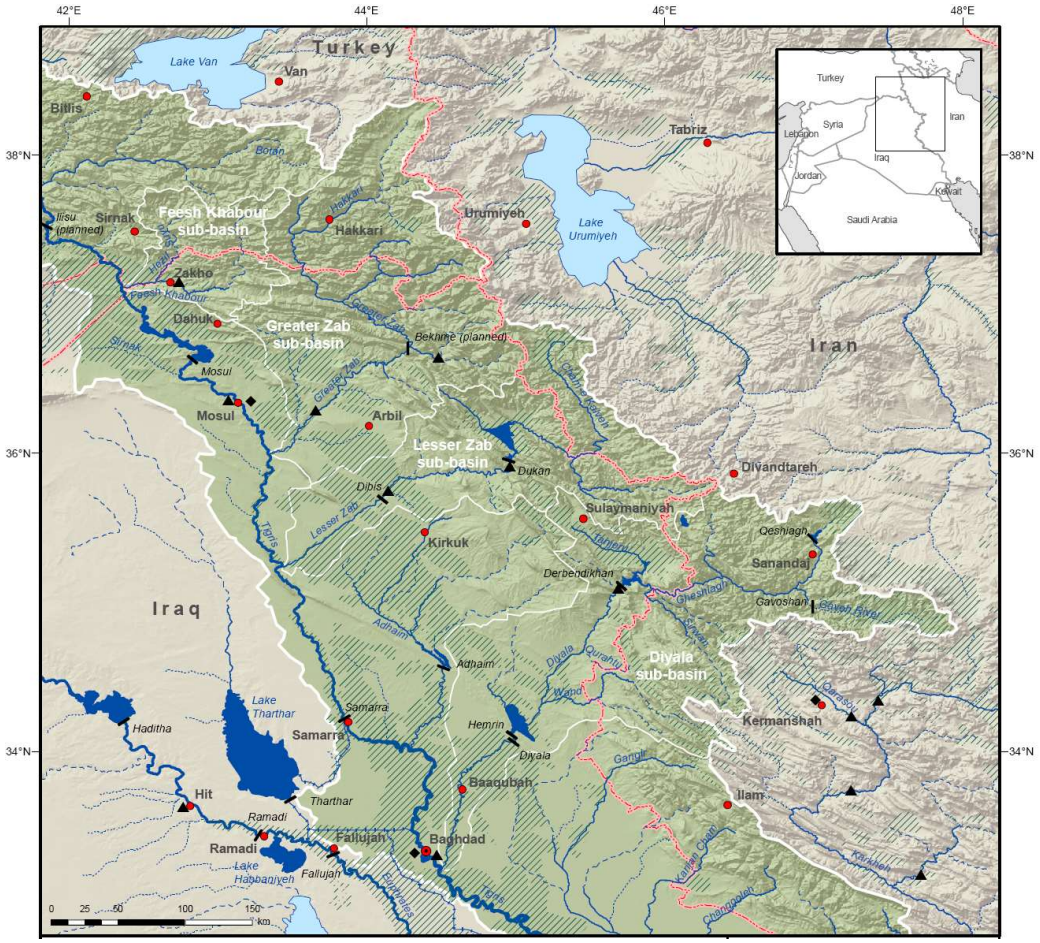
Added Value: Visualization in new maps



Example:

Map of shared tributaries of the Tigris River

- Sub-basin delineation
- Infrastructure
- agricultural development

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Added Value: Hydrological baseline and trends

Example:
Discharge Variability: Orontes River
- visualize trend, drought years

Example:
Flow Regime: Euphrates River
- effect of river regulation

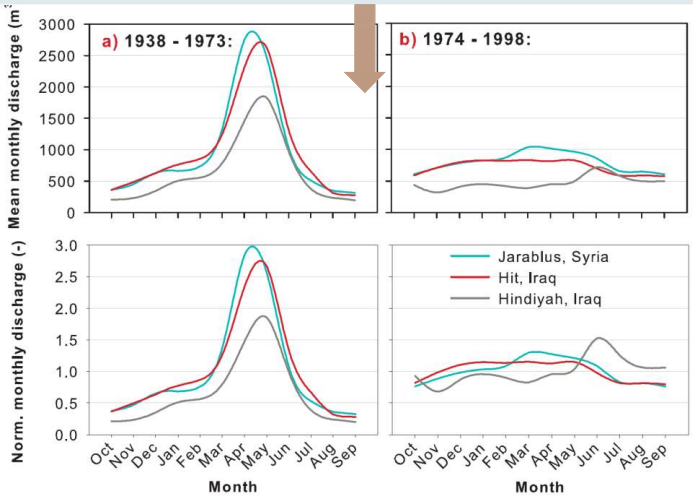


Figure 6. Mean monthly flow regime of the Euphrates River at different gauging stations for different time periods

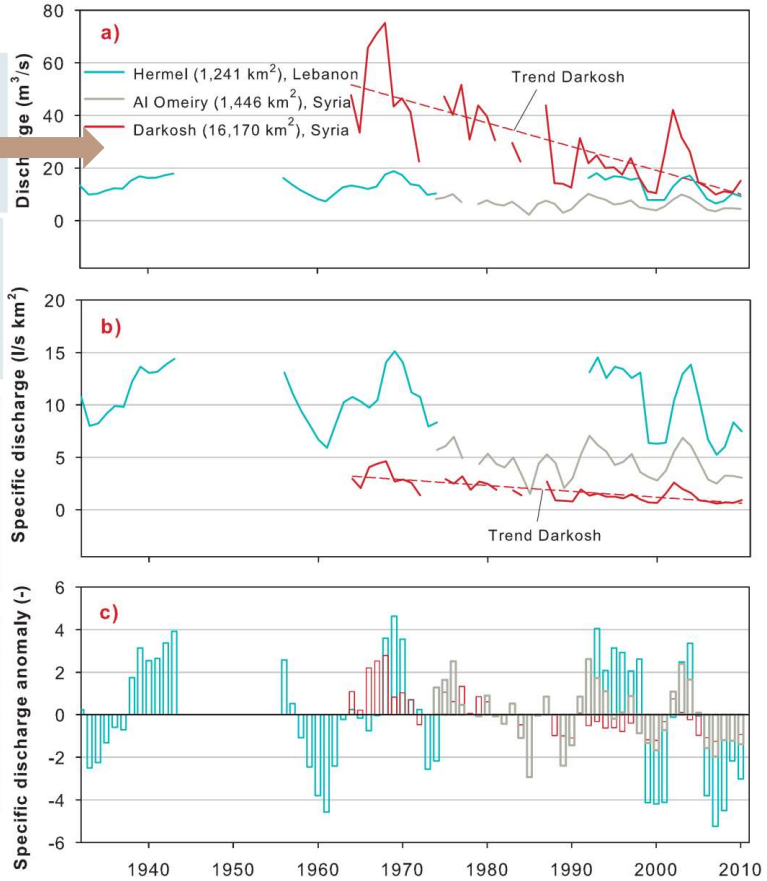
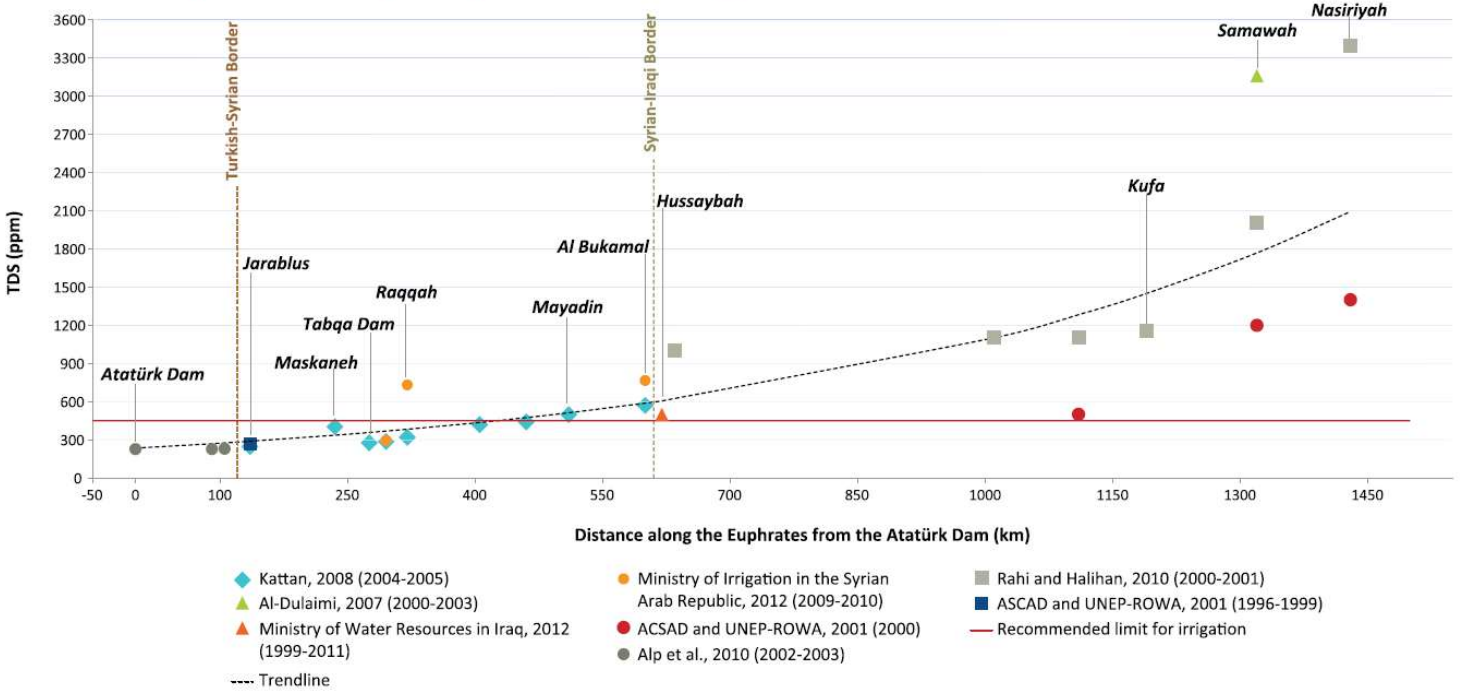


Figure 4. a) Mean annual discharge, b) specific mean annual discharge and c) discharge anomaly time series of the Orontes (1932-2010)

Added Value: Compilation of various data sources I

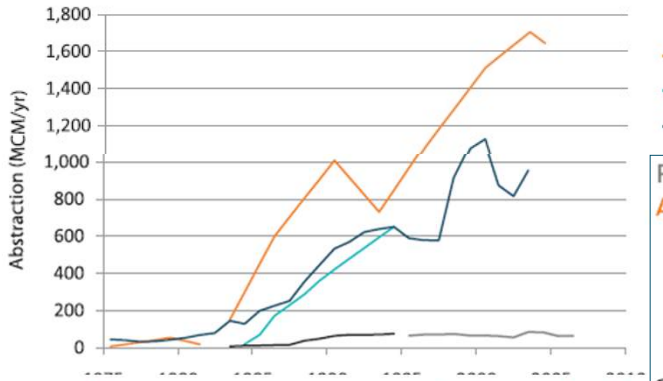
Example:
Water Quality Euphrates River
- National Data sets
- Scientific publications

Figure 9. Salinity variations along the Euphrates River since 1996



Added Value: Compilation of various data sources

Figure 2. Historical abstraction from the Saq-Ram Aquifer System (West) (1975-2007)



Example: Water Use
Remote Sensing Studies

Agricultural Statistics (proxy)

Figure 3. Development of total crop area in the Tabuk region of Saudi Arabia (1977-2009)

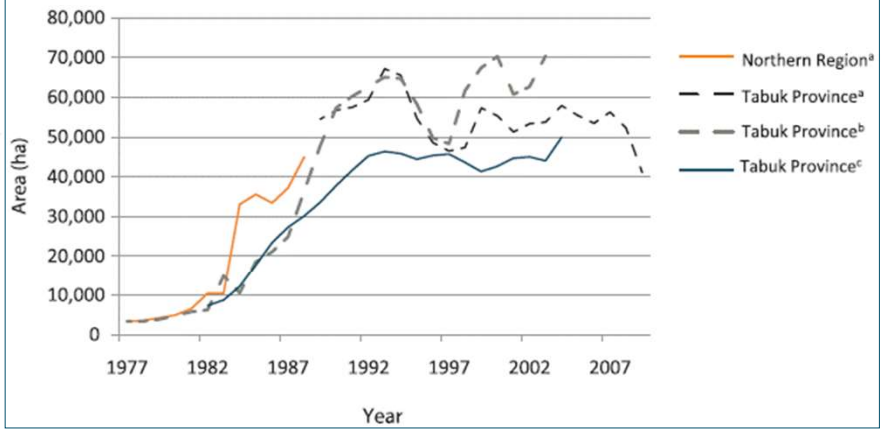
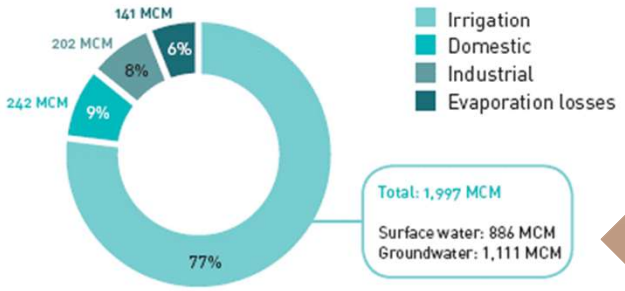


Figure 7. Mean water use across sectors in the Orontes Basin in Syria (1992-2009)



National Sector data

Source: Compiled by ESCWA-BGR based on data provided by Ministry of Irrigation in the Syrian Arab Republic, 2012.

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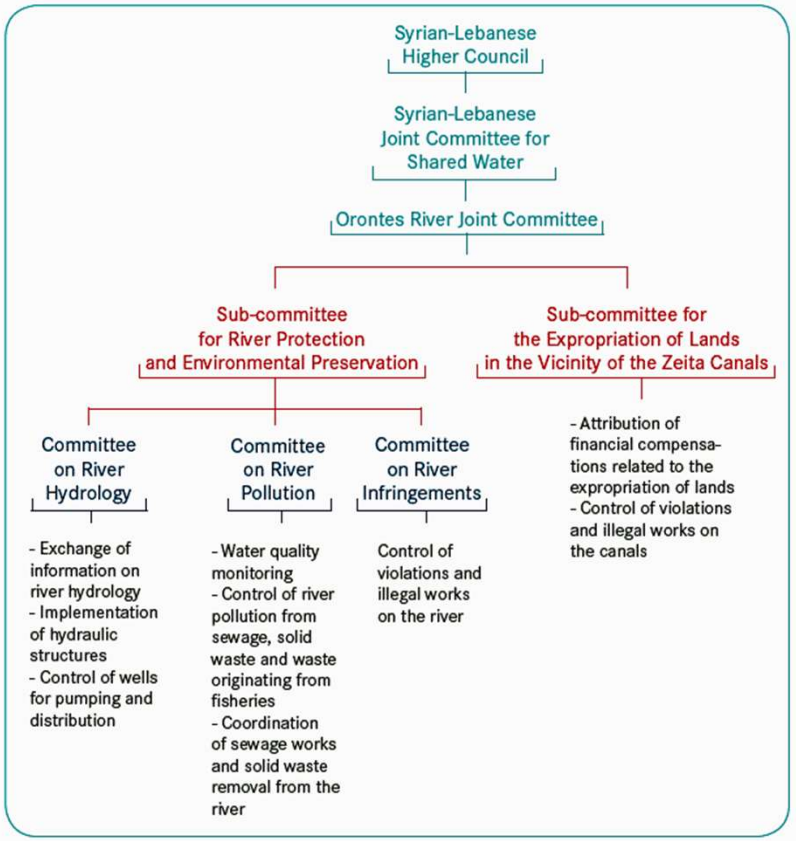
Added Value: Understanding existing cooperation

Figure 9. Organizational structure and roles of the Orontes River joint subcommittees



Source: Compiled by ESCWA-BGR based on data provided by Ministry of Energy and Water in Lebanon, 2011.

Example: Orontes River

Table 8. Water agreements on the Orontes River

YEAR	NAME	SIGNIFICANCE
1939	Final Protocol to Determine the Syria-Hatay Border Delimitation	The protocol spe and Afrin Rivers Although water u that water is to b
1972	Agreement on Water Use	First bilateral ag
1991	Fraternity, Cooperation and Coordination Treaty	The treaty provid two countries in joint entities wer Committee for Sl
1994	Agreement on the Distribution of the Orontes River Water Originating in Lebanese Territory	The agreement s resources of the on an annual dis to receive 80 MC
1997	Annex to the Agreement on the Distribution of Orontes River Water Originating in Lebanese Territory	The annex identi to be excluded fr agreement.
2001	Amendment to the Agreement on the Distribution of Orontes River Water Originating in Lebanese Territory	This amendment on the river.
2009	Turkish-Syrian Strategic Cooperation Council Agreement	At the High-Leve two countries ag cooperation with quality, the const as well as the de meeting, Syria ar related to the cor

Source: Compiled by ESCWA-BGR based by Scheumann et al., 2011; Comair, 2009.

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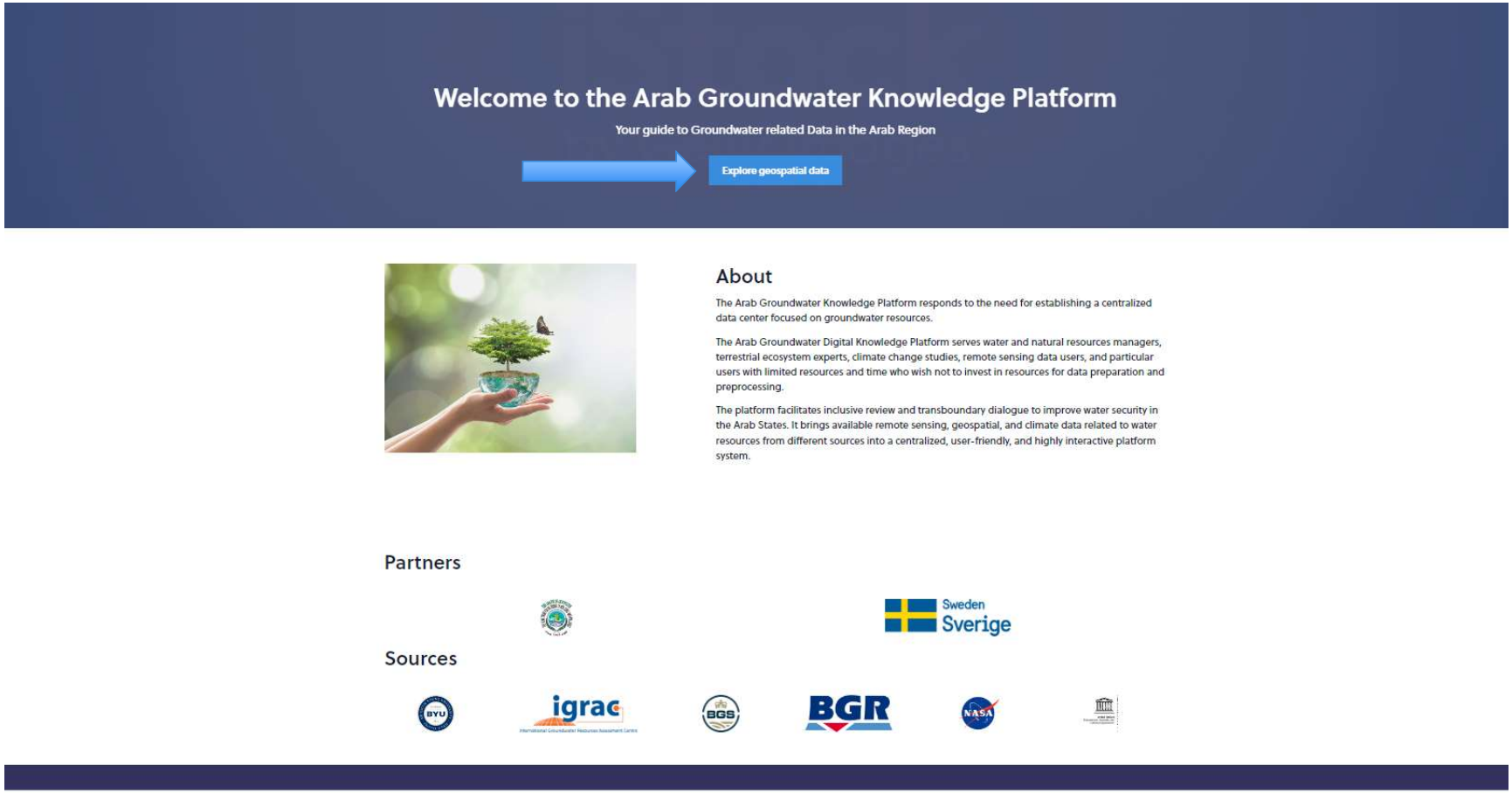
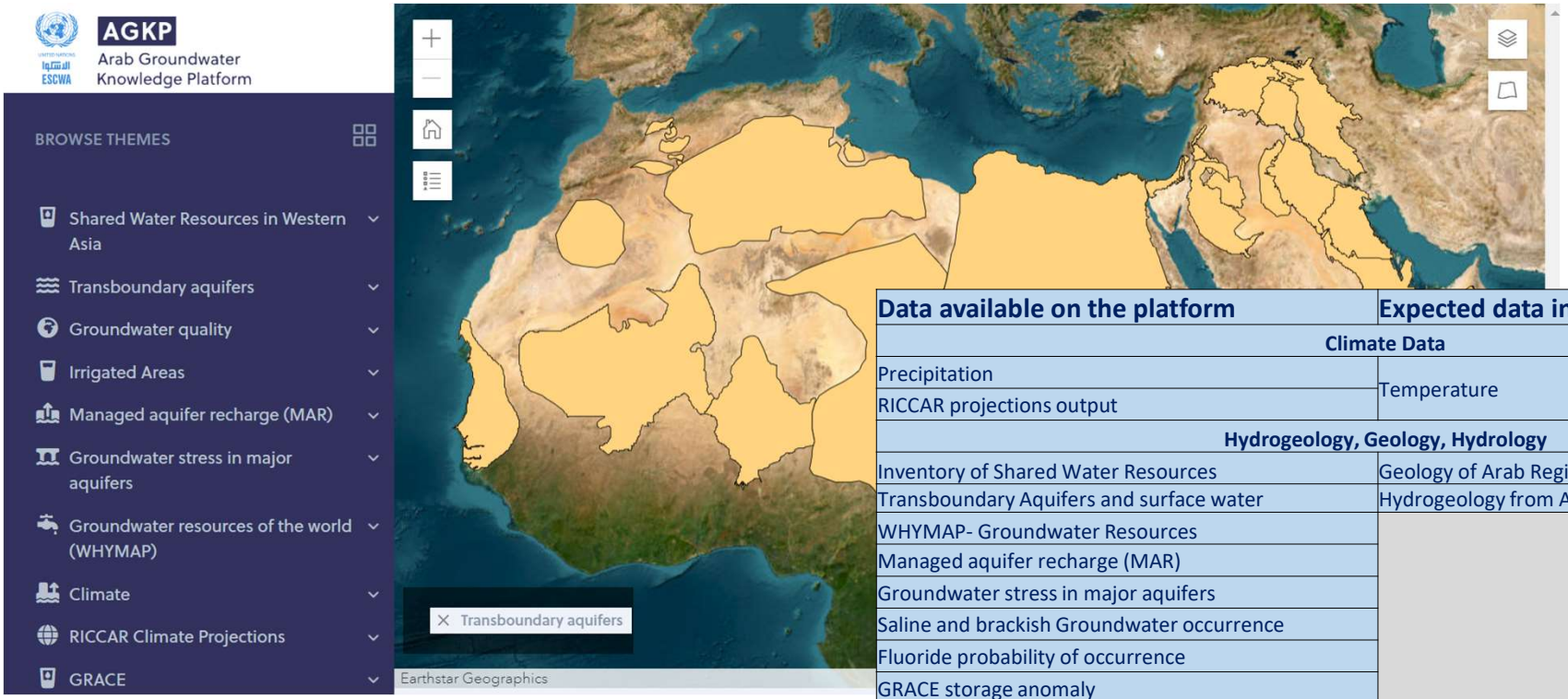


Arab Groundwater Knowledge Platform



Data available on the platform	Expected data in 2023
Climate Data	
Precipitation	Temperature
RICCAR projections output	
Hydrogeology, Geology, Hydrology	
Inventory of Shared Water Resources	Geology of Arab Region (USGS)
Transboundary Aquifers and surface water	Hydrogeology from Africa Groundwater Atlas
WHYMAP- Groundwater Resources	
Managed aquifer recharge (MAR)	
Groundwater stress in major aquifers	
Saline and brackish Groundwater occurrence	
Fluoride probability of occurrence	
GRACE storage anomaly	
Biophysical data	
Areas irrigated with groundwater	NDVI
	Land cover/Land Use
Socio-economic data	
	Population & Urban Agglomeration

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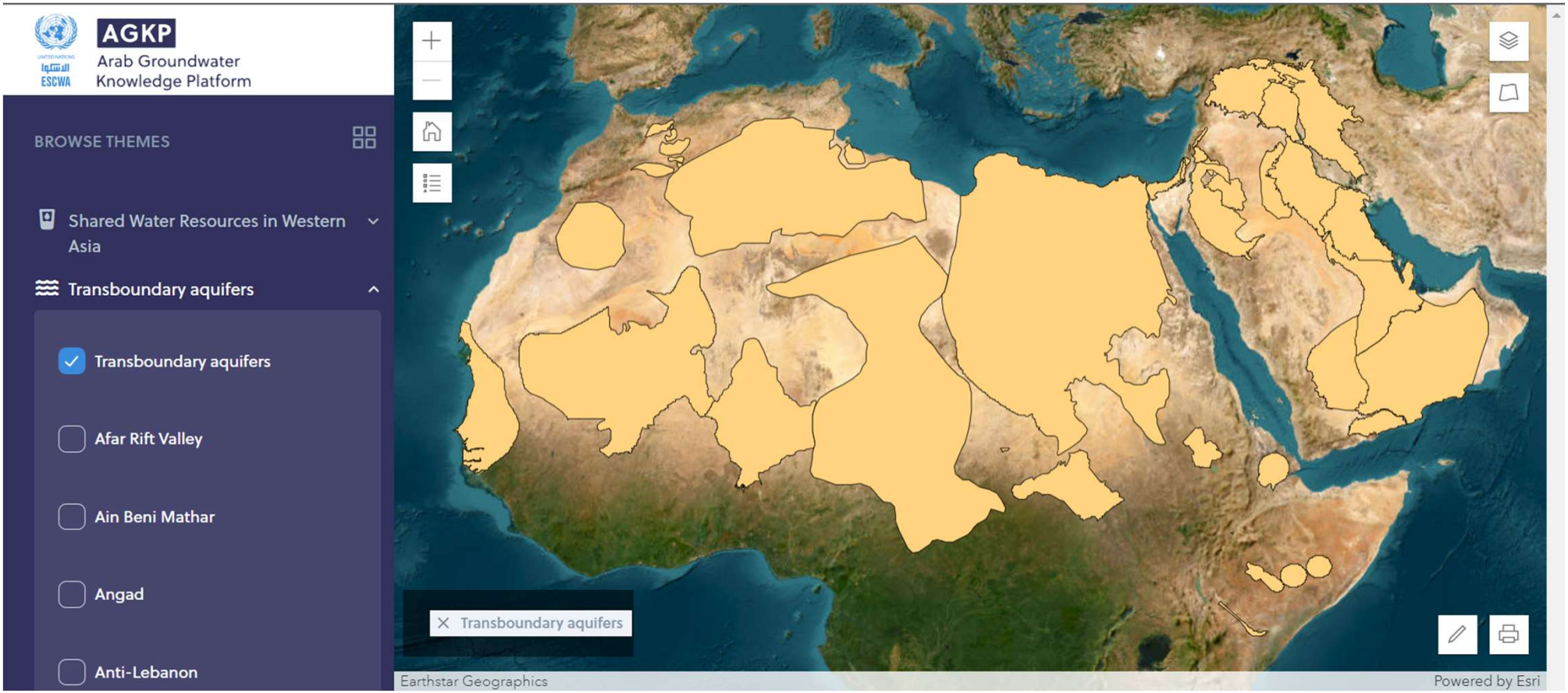
Transboundary aquifers



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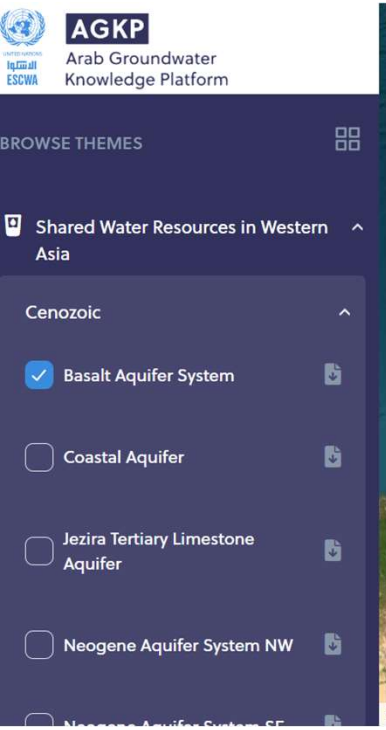

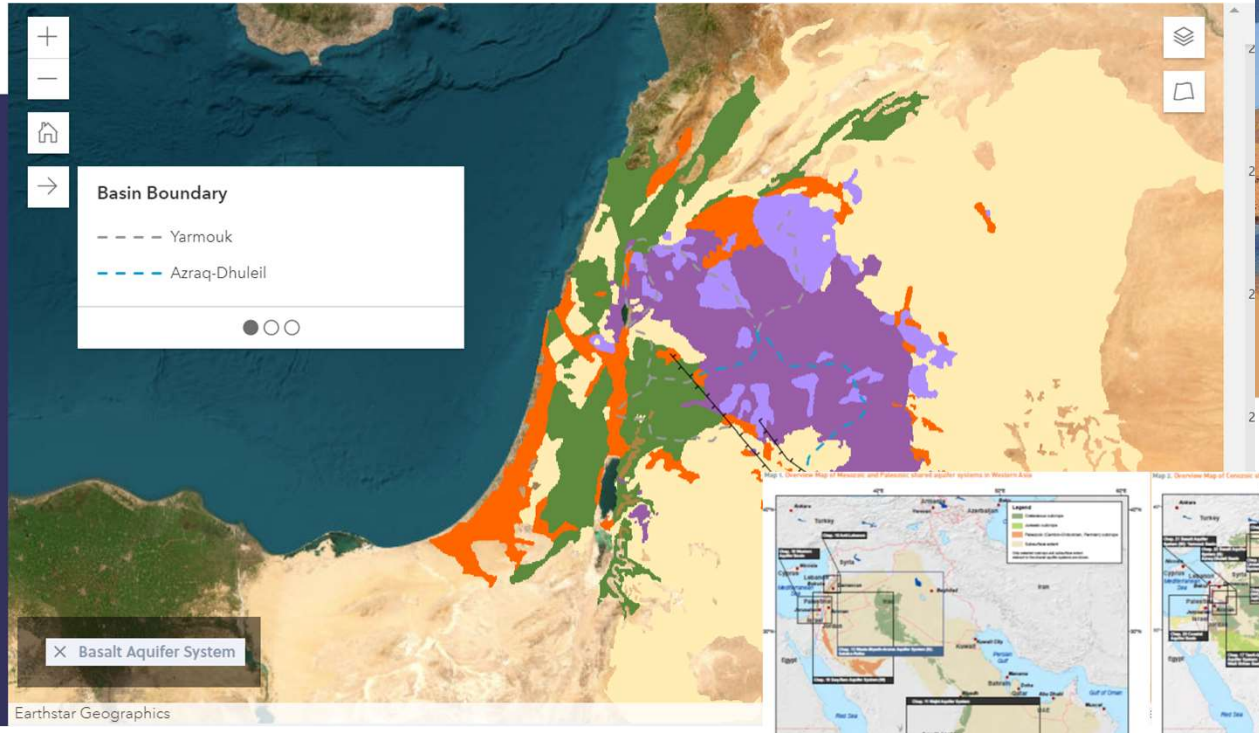

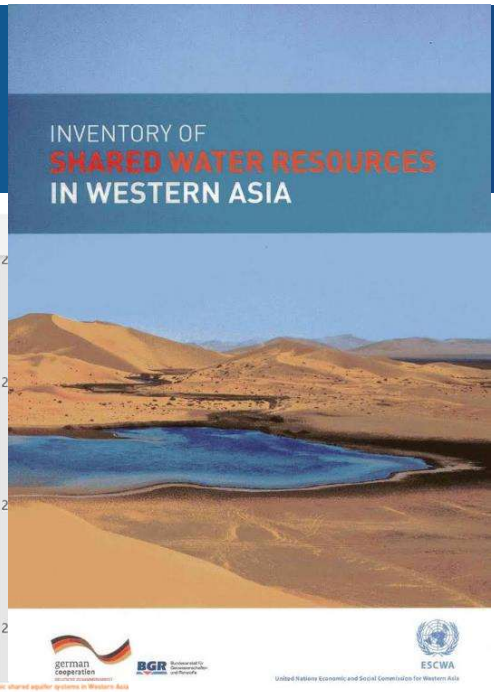

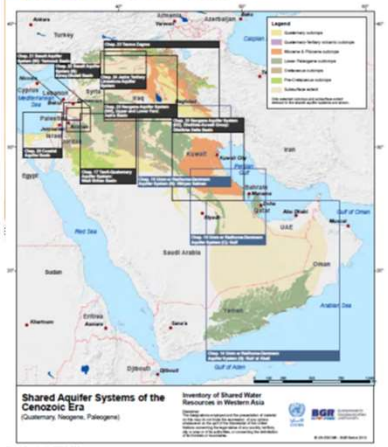

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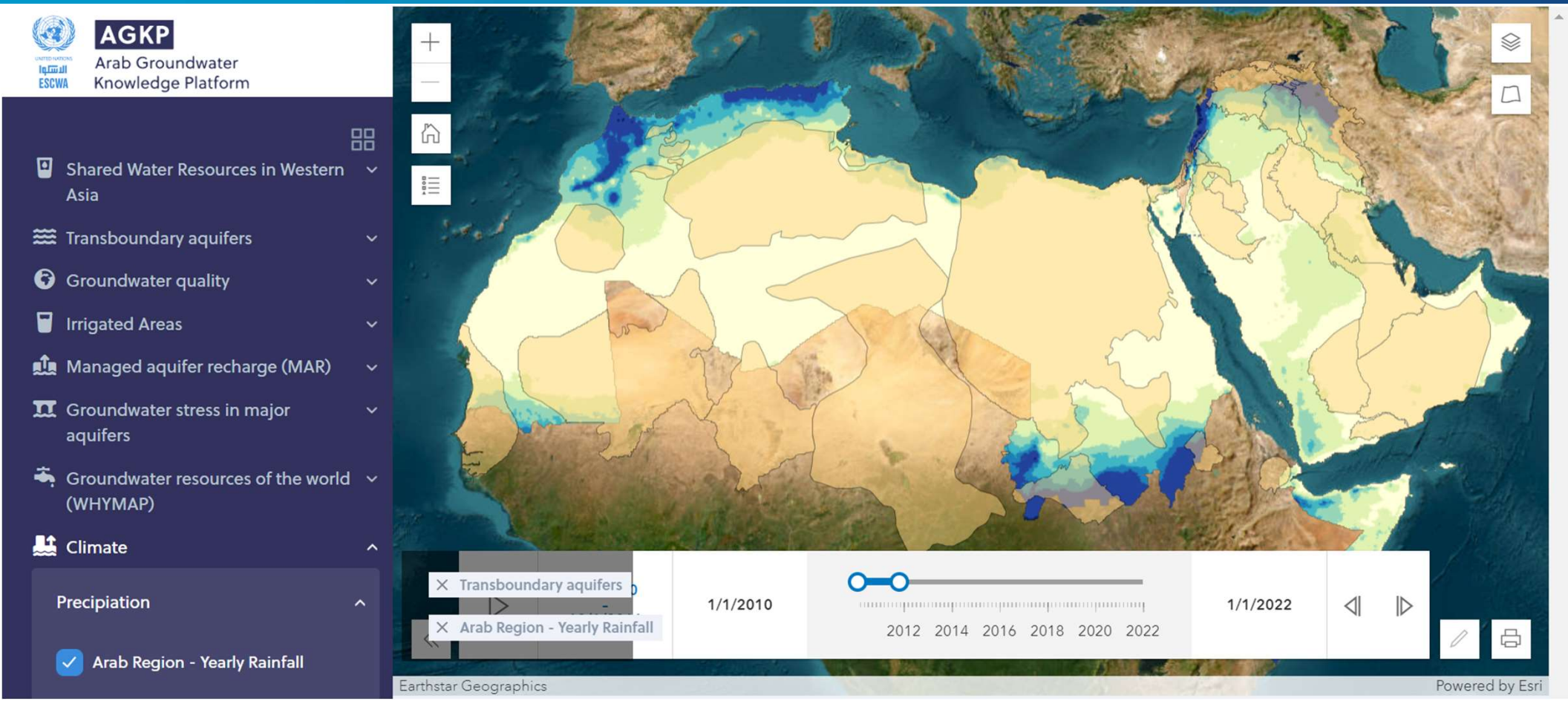
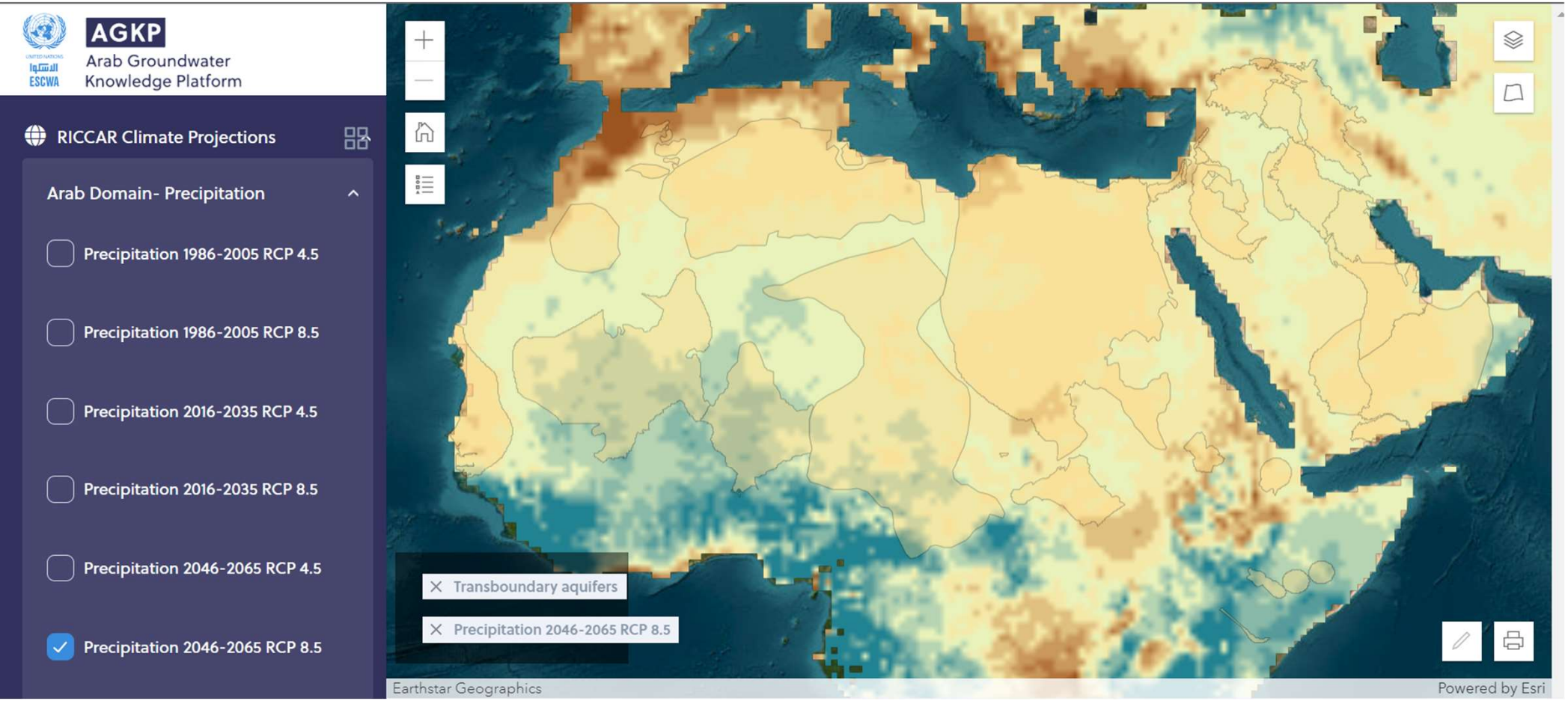
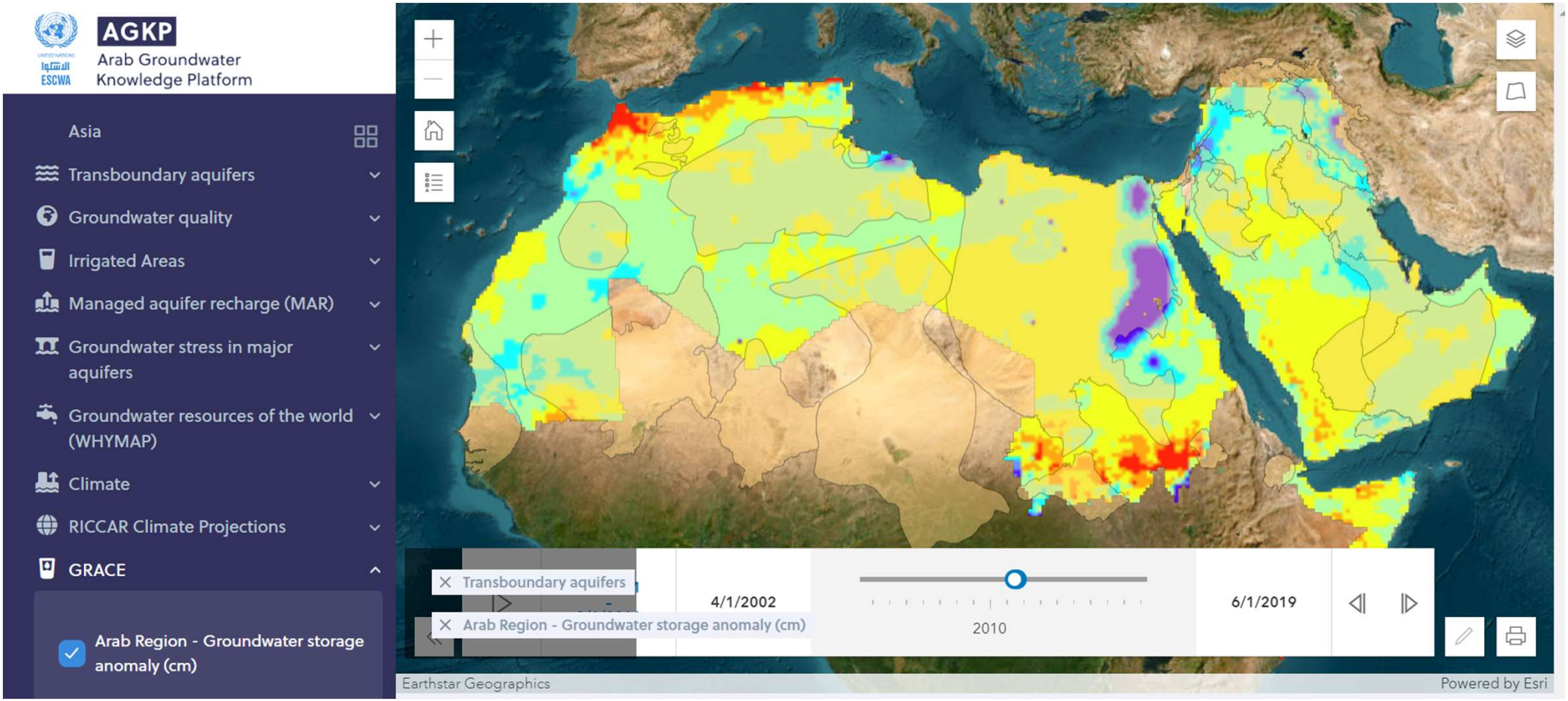
Precipitation



Arab Groundwater Knowledge Platform
RICCAR Climate Projections



Arab Groundwater Knowledge Platform
GRACE



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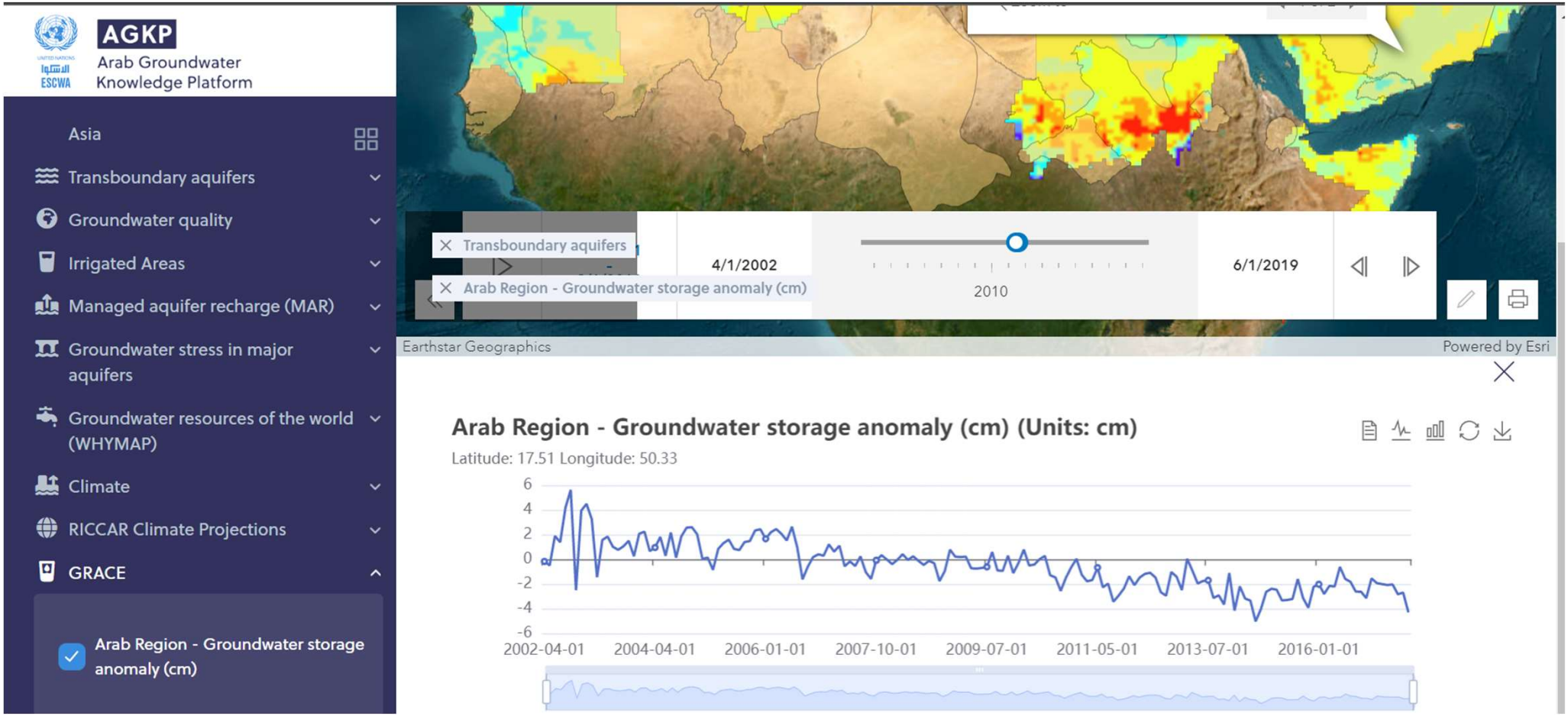

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ACTION DECADE
2018-2028

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