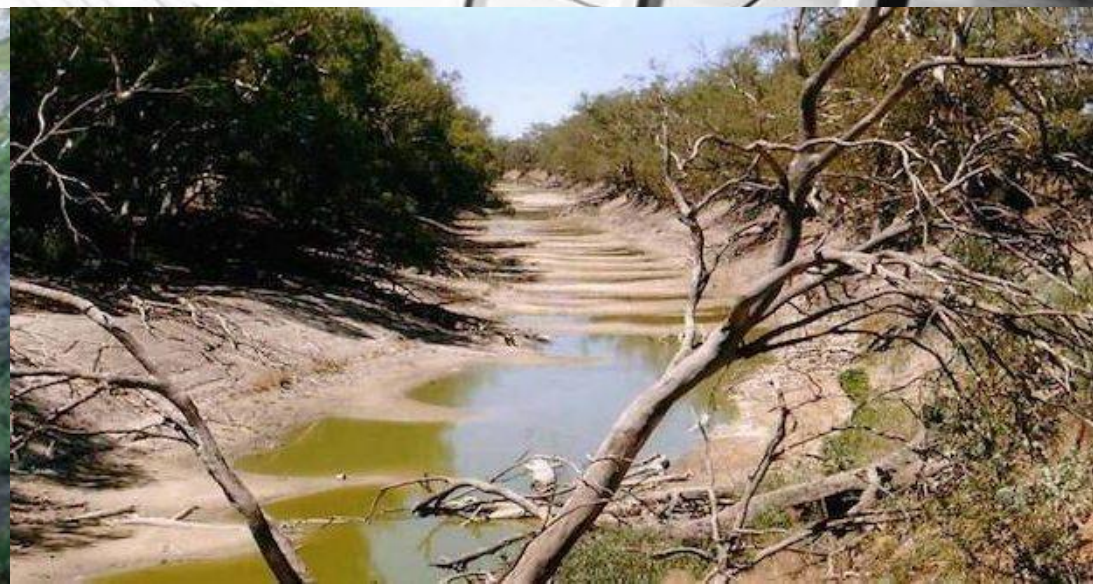
Water Scarcity in the Arab Region: The Case of Jordan

June 28, 2026

Khaldoun Shatanawi, PhD

Director of Water, Energy and Environment Center

The University of Jordan

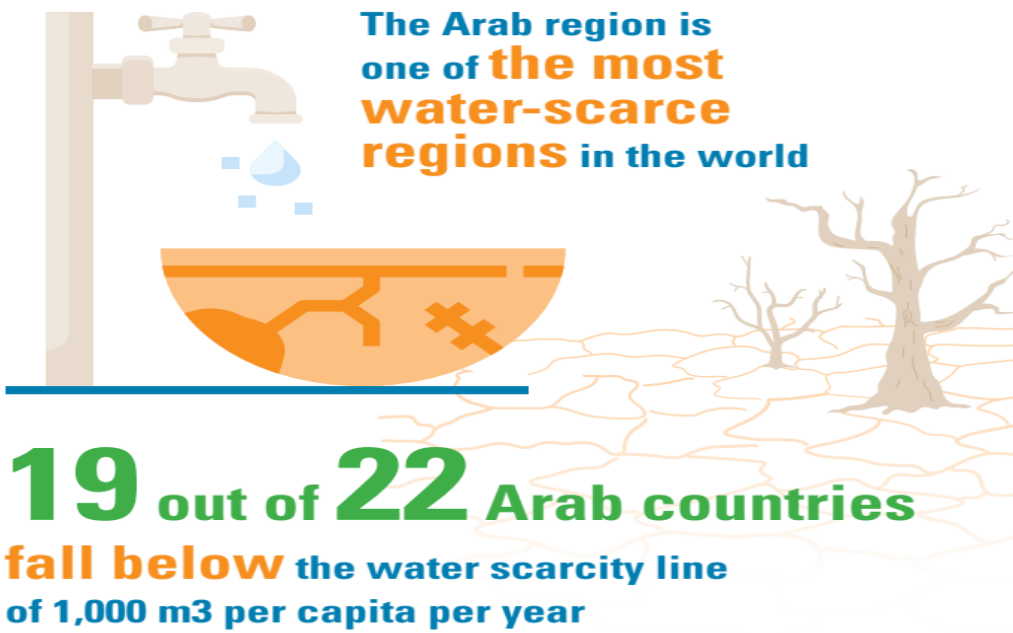


The Arab Region

- **Expansive Geography:** approximately 13 million square kilometers across two continents (Asia and Africa), an area larger than the United States or Europe.
- **Rapid Population Growth:** The region is home to over 470 million people (double the population since 1990).
- **Accelerated Urbanization:** Over 60% of the population lives in cities, many of which are located in hyper-arid zones, concentrating water demand and putting immense pressure on municipal supply systems.

The Arab Region

- **Regional Average Below 500 m³:** The Arab region's average annual per capita water availability has hit approximately **480 m³**, officially crossing the threshold into absolute scarcity.
- **The "Water Bankruptcy" Era:** In January 2026, UN researchers warned that the planet has entered an era of "water bankruptcy," with the Arab world at the forefront due to extreme climate pressures.
- **Widespread Scarcity:** 19 of the 22 Arab countries are now classified as water-scarce, and **13 have fallen well below** the absolute scarcity line.
- **A Shift to Survival Engineering:** Because natural resources are depleted, the conversation in 2026 has shifted from "conservation" to "engineering sovereignty," with massive reliance on **desalination** and regional projects.



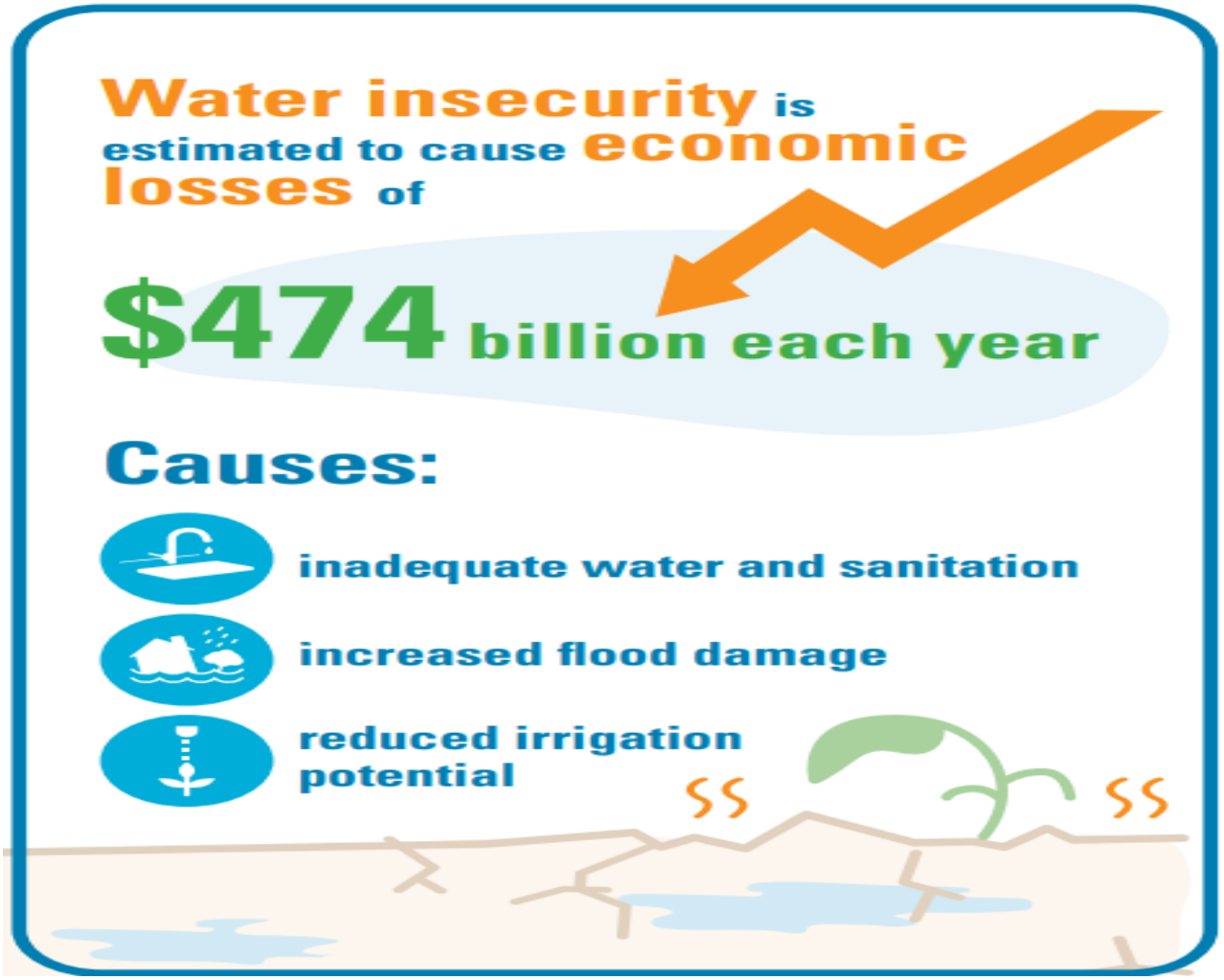
The Arab Region

- **Absolute Scarcity:** Average freshwater availability has fallen below the absolute scarcity threshold of 500 m^3 per capita as of 2026 (a fraction of the 7,000 m^3 global average).
- **World's Most Water-Stressed Region:** The Arab world is the driest region on Earth, home to 15 of the 20 most water-scarce countries globally.
- **The 2% Disconnect:** While the region houses roughly 6% of the global population, it possesses less than 2% of the world's renewable freshwater resources.
- **Climate Change "Hotspot":** Temperatures in the region are rising at twice the global average, which could reduce freshwater availability by an additional 75% if warming reaches 4°C (World Bank, 2014; CSIS, 2021; WMO, 2023).
- **Transboundary Fragility:** Roughly two-thirds of the freshwater used in the Arab world originates from outside the region (e.g., the Nile starts in Ethiopia/Uganda).

The Scarcity Leaderboard (Top 10 Water-Poorest Countries)

Rank	Country	Annual Renewable Water per Person	The "Survival" Method
1	Kuwait	~5 m^3	100% Desalination
2	Jordan	~61 m^3	Mining Aquifers / Wastewater Reuse
3	UAE	~70 m^3	Desalination / Cloud Seeding
4	Bahrain	~75 m^3	Desalination
5	Qatar	~80 m^3	Desalination
6	Libya	~95 m^3	"Great Man-Made River" (Fossil Water)
7	Saudi Arabia	~98 m^3	Desalination / Fossil Aquifers
8	Yemen	~120 m^3	Traditional Cisterns / Groundwater
9	Malta	~125 m^3	Desalination (The only non-Arab country)
10	Oman	~300 m^3	Desalination / Aflaj (Ancient irrigation)

Economic Loss Due to Water Scarcity

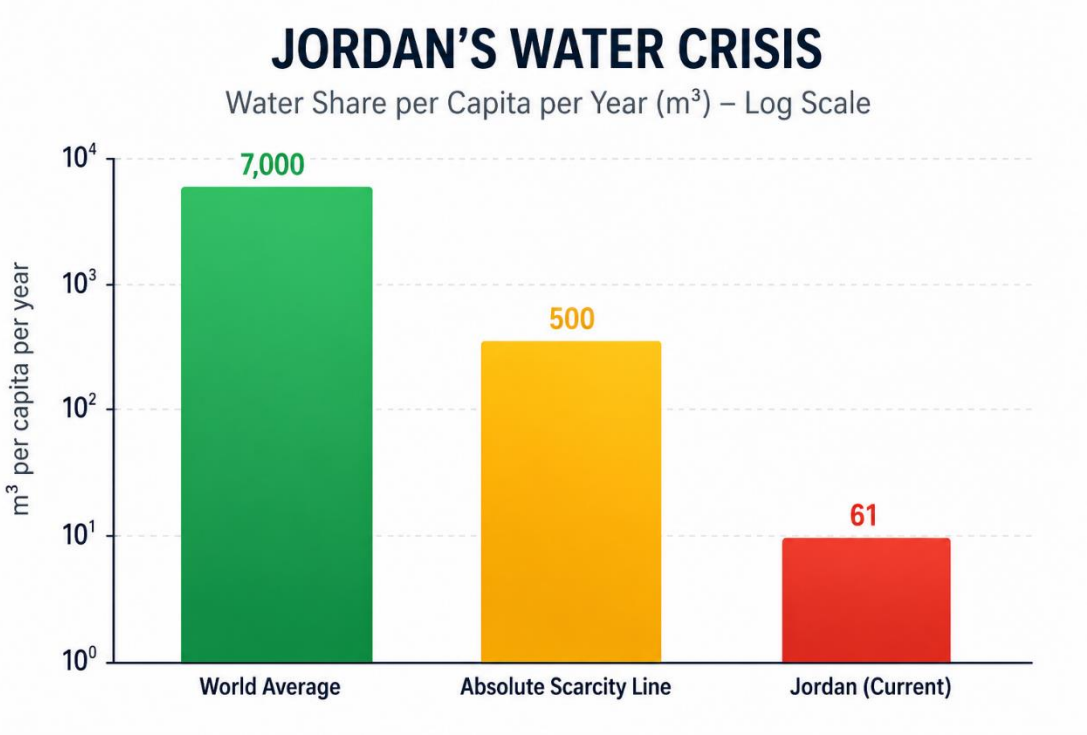


Jordan

- Population: 11.5 million (Largest refugee host in the world ~ 35%)
- 80% arid and semi arid areas

Jordan

- **One of the World's Poorest Courtiers:** Jordan is officially ranked in the top 10 most water-poor country in the world.
- **A "Critical" Per Capita Share:** While the global "absolute scarcity" line is 500 m³ per person per year, the average Jordanian's share has plummeted to roughly 61 m³ annually, nearly eight times lower than the regional average.
- **Dwindling Resources:** Ministry officials expect this share to drop even further, to less than 30 m³ per year in the coming decade, due to climate change and demographic pressure.
- **Intermittent Supply:** Because of this deficit, water in many urban areas (including Amman) is only available once a week, and even less frequently in rural regions.

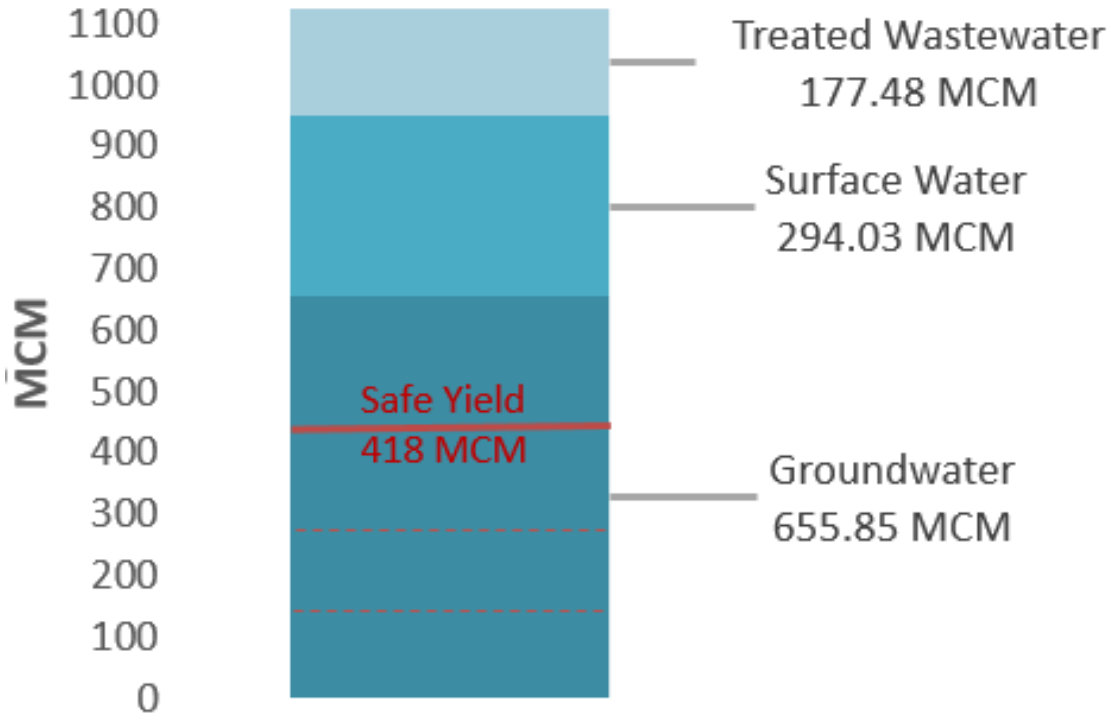


Facts and Numbers

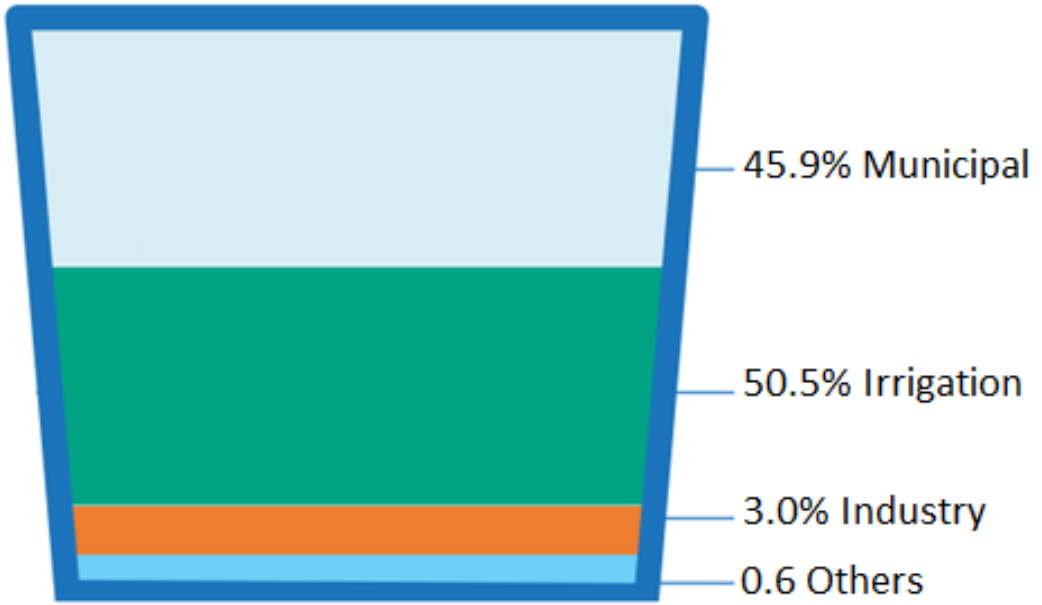
- Low precipitation and high evaporation
  - 8.18 BCM over 90,000 km^2
  - 82% Evaporation
  - 12% Green water
  - 6% Runoff and groundwater recharge
  - Average annual precipitation is 92 mm/year
  - Rainy season (October – May)
- Renewable water 900 MCM/year
- Demand > 1500 MCM/year
- Supply 1127 MCM/year
- 48% NRW

Facts and Numbers

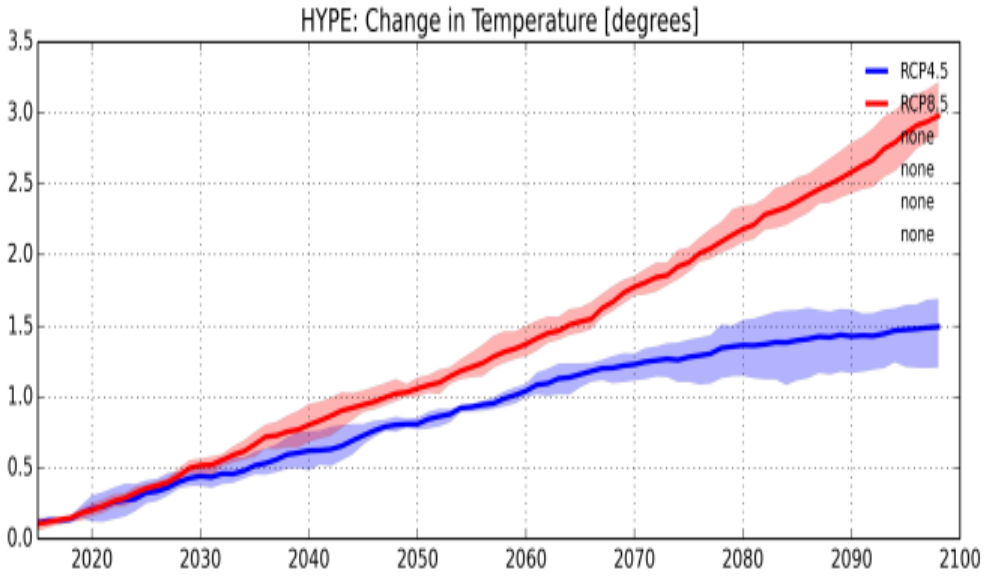
Supply Sources



Supply Distribution



Climate Change: Local Level



Temperature change for the Jordan River basin for two different climate change scenarios (RICCAR models)

- Mean and maximum temperatures will be 2-4 degrees higher
- Precipitation will be 15-20% lower
- Runoff will be 20-30% lower

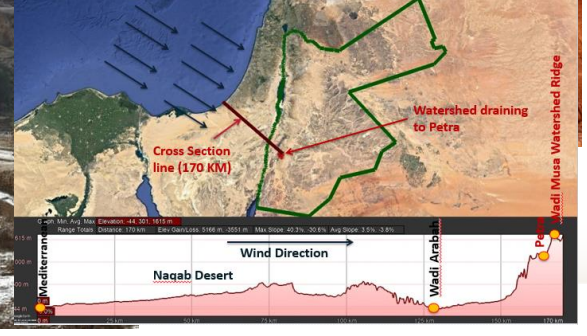
High uncertainty in climate change projections of IPCC at regional level

Impacts on ground

- Decrease in groundwater recharge
- Soil erosion + sediments in dams
- Deterioration of water quality
- Decrease in surface runoff
- Increase in water consumption
- Increase in water prices
- Slowdown achieving the Millennium Development Goals
- Increased frequency of drought events
- Desertification
- Plant cover reduction
- Increased frequency of floods

Amman

Petra



Current Situation

Negatives

- Less than 100 m^3 of annual renewable water resources available per person.
- 12 main aquifers, 10 of which are being depleted beyond their recharge volume.
- Over-pumping from groundwater exceeds renewable resources by 238 MCM per year.
- Groundwater levels drop by 2 meters per year, reaching 5-20 meters in some depleted areas.
- Non-revenue water (NRW) reached 50% in 2022.
- 90% of drinking water supplied to Amman comes from sources 125-325 km away.
- 15% of electricity consumption in Jordan is used for water pumping and services.
- Transboundary water issues (around 26% of the total water resources).

Positives

- 96 % of the urban population has access to piped water.
- 88% of the rural population has access to piped water.
- 70% of the population are connected to sewerage networks
- More than 90% of the treated wastewater is being utilized in irrigated agriculture.
- 50.3% of the population receives water supply 24 hours per week or less.
- 49.7% receive between 24-48 hours/week of water supply.
- 94% of water sources are classified as “safely managed” (SDGs).
- Jordan had commercialized its water utilities.

Ancient Water Harvesting

Roman Ponds - Jarash

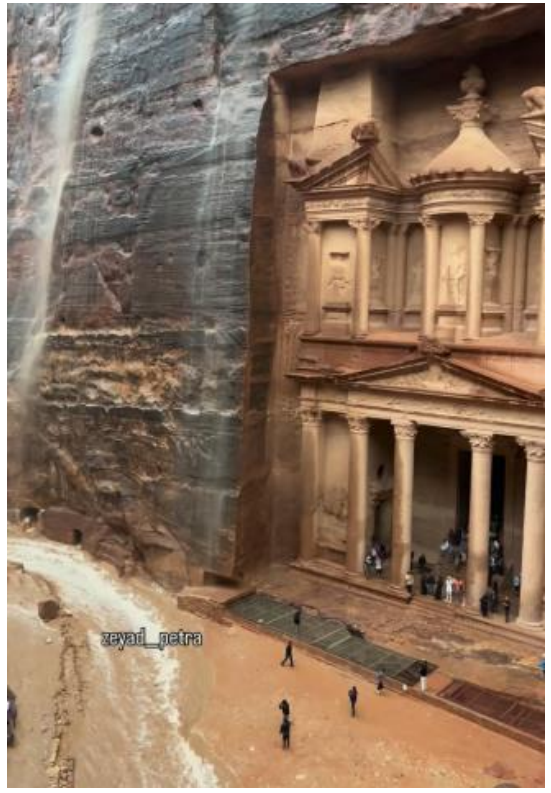
Roman Ponds - Mafraq

Roman Ponds - Jiza

Ancient Nabataeans Used Sophisticated Water Technologies To Create a Thriving Desert City

Nabatean Hydraulic System

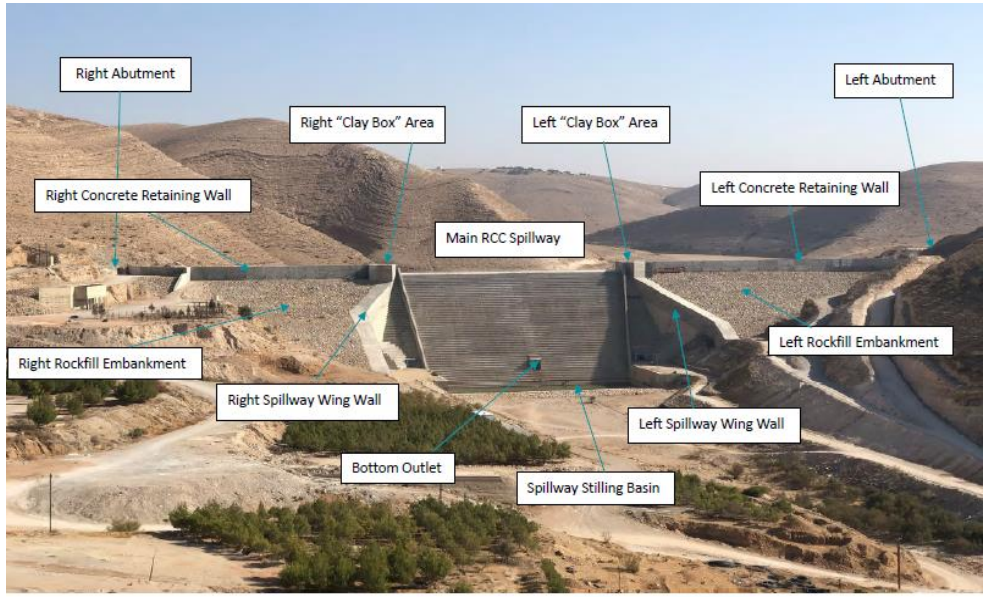
- Petra's ancient urban hydrology network consists of 8 springs for fresh drinking water, 36 dams to protect the city from flash floods, over 1000 km of pipeline to manifold all of the water systems, and over 100 small reservoirs and cisterns to store water supply.
- This complex hydrology system can provide a per capita share of 40 liters of water per day which is thought to be luxurious during that period.
- The Nabateans had to come up with a way to control flash floods and sudden water surges that may potentially ruin the carved structure.
  - They did that by constructing a series of dams made from stone blocks mortared together and anchored to carved out canyon groves.
  - This design allows the dams to withstand extreme pressures from large volumes of water that are stored behind it.



Current Water Harvesting

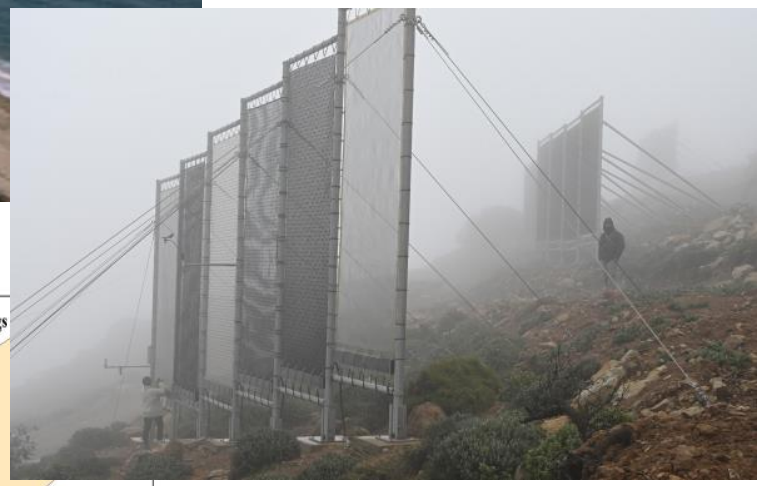
Category	Capacity (MCM)
Existing Dams	336*
Desert Dams	32
Hafir and Lagoons	2
Dams (Planned)	19
Potential Dams	31
Total	420

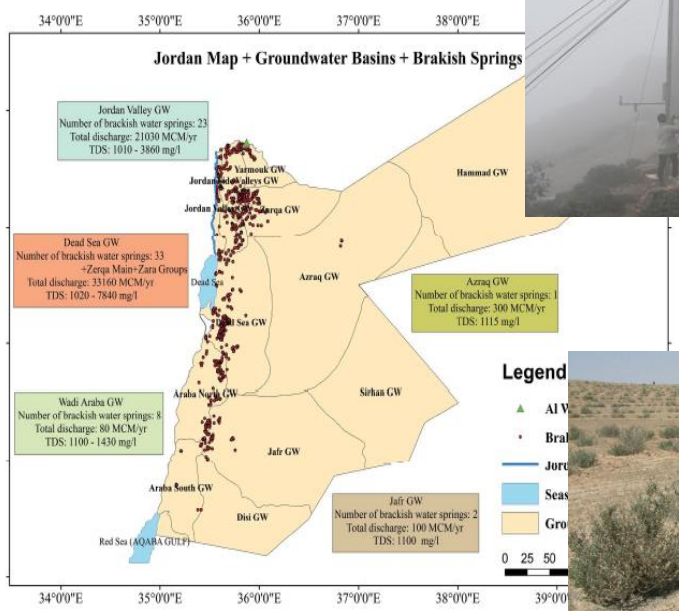
** With Karama Dam*



Current Initiatives

- Reduce NRW by 2% annually
- Explore non-conventional water resources
- Conduct desalination projects
  - Sea water
  - Brackish water (24 BCM, JICA 2014)
- Launch public awareness campaigns
- Promote scientific research
- Adapt Integrated Water Resources Management concept
- Conduct Short and long term Projects





Main Projects

- Short-Term Plans:
  - Projects to improve the efficiency of wastewater treatment plants (*Currently in progress*).
  - Projects for the rehabilitation of water networks (*Currently in progress*).
  - Projects for desalination of saline groundwater (*Currently in progress*).
  - Projects for deep groundwater wells (*Currently in progress*).

- Medium-Term Plans:
  - Water transfer project from the Disi Basin to Amman (*Completed in 2013*).
  - Aqaba-Amman water desalination and transfer project *(National Carrier) (*Scheduled in 2026*).

- Long-Term Plans:
  - Red Sea-Dead Sea Water Conveyance Project (*Project canceled*).

Quick wins

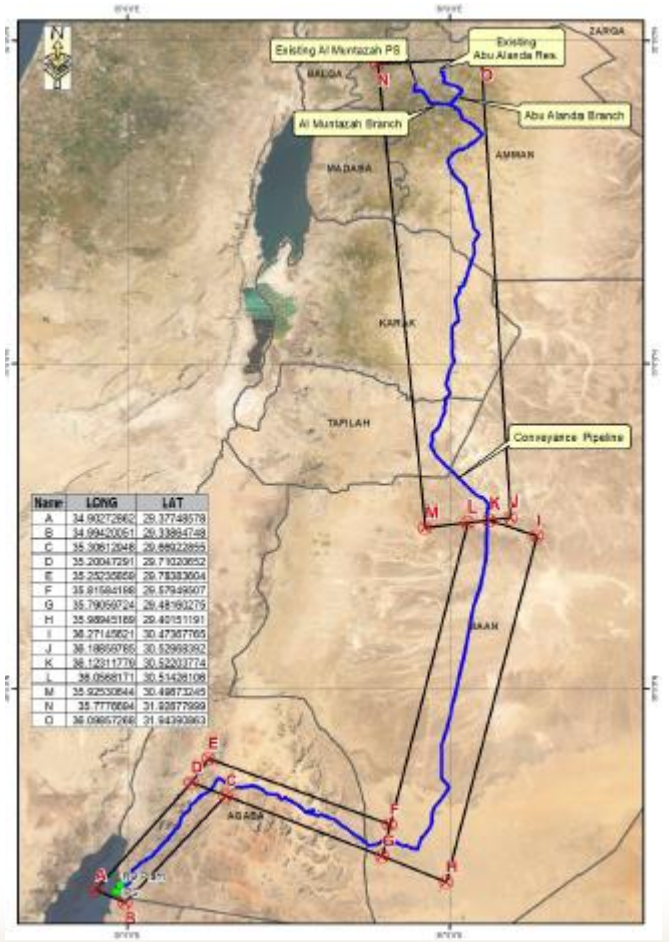
Expand Disi Water Conveyer Project

Constructed 2009 - 2013
Pump 100 MCM/yr from Disi Aquifer from 55 wells
Pipeline length is 325 km (1600 mm)
Quick win: additional 20 MCM/yr

Mega Project

Water Desalination National Project (National Carrier Project)

Will start in 2026
Largest project implemented in Jordan
Cost 5.8 billion USD
Desalinate and pump 300 MCM/year from the Red Sea



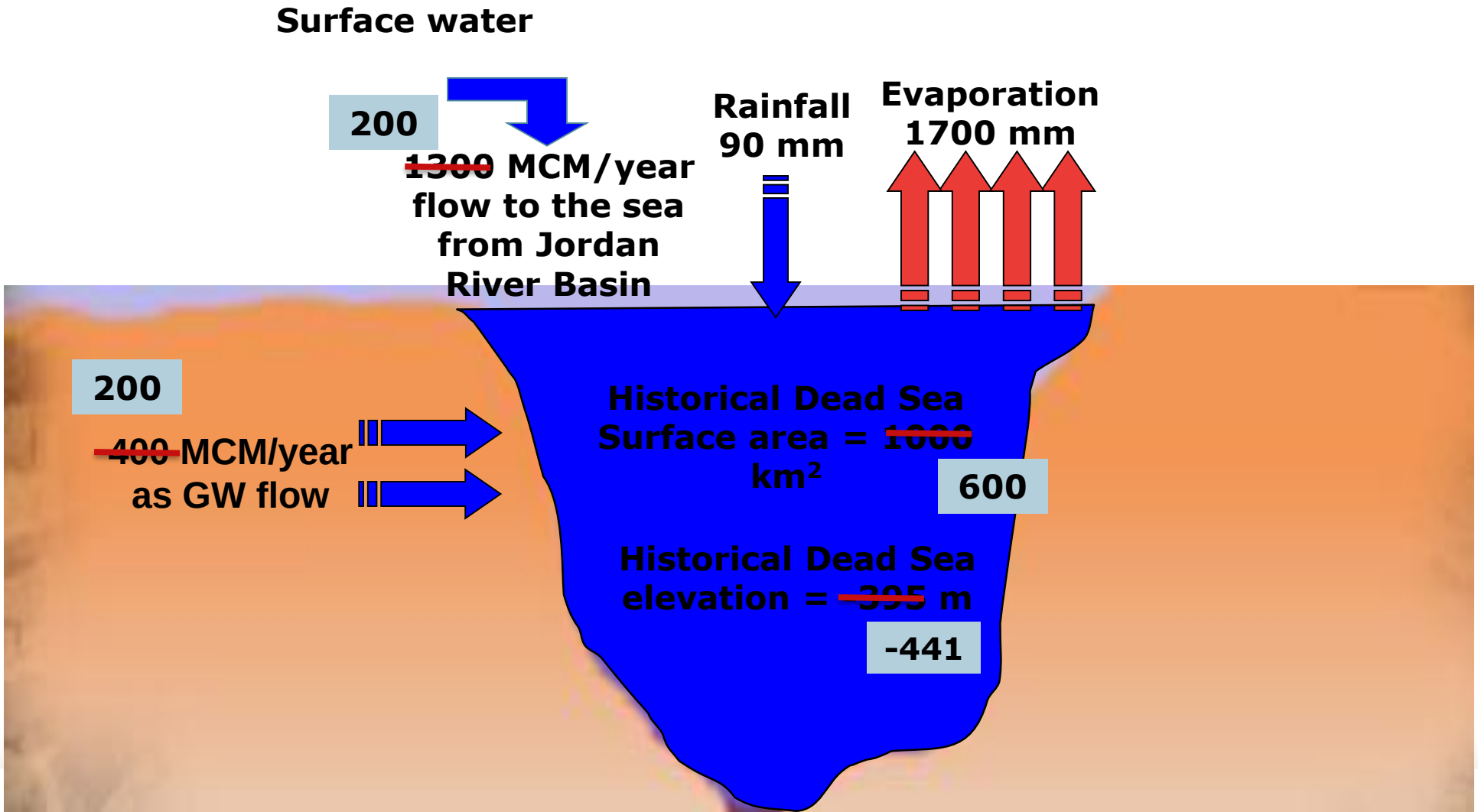
Long term Project

Red-Dead Sea Conveyer Project - Cancelled

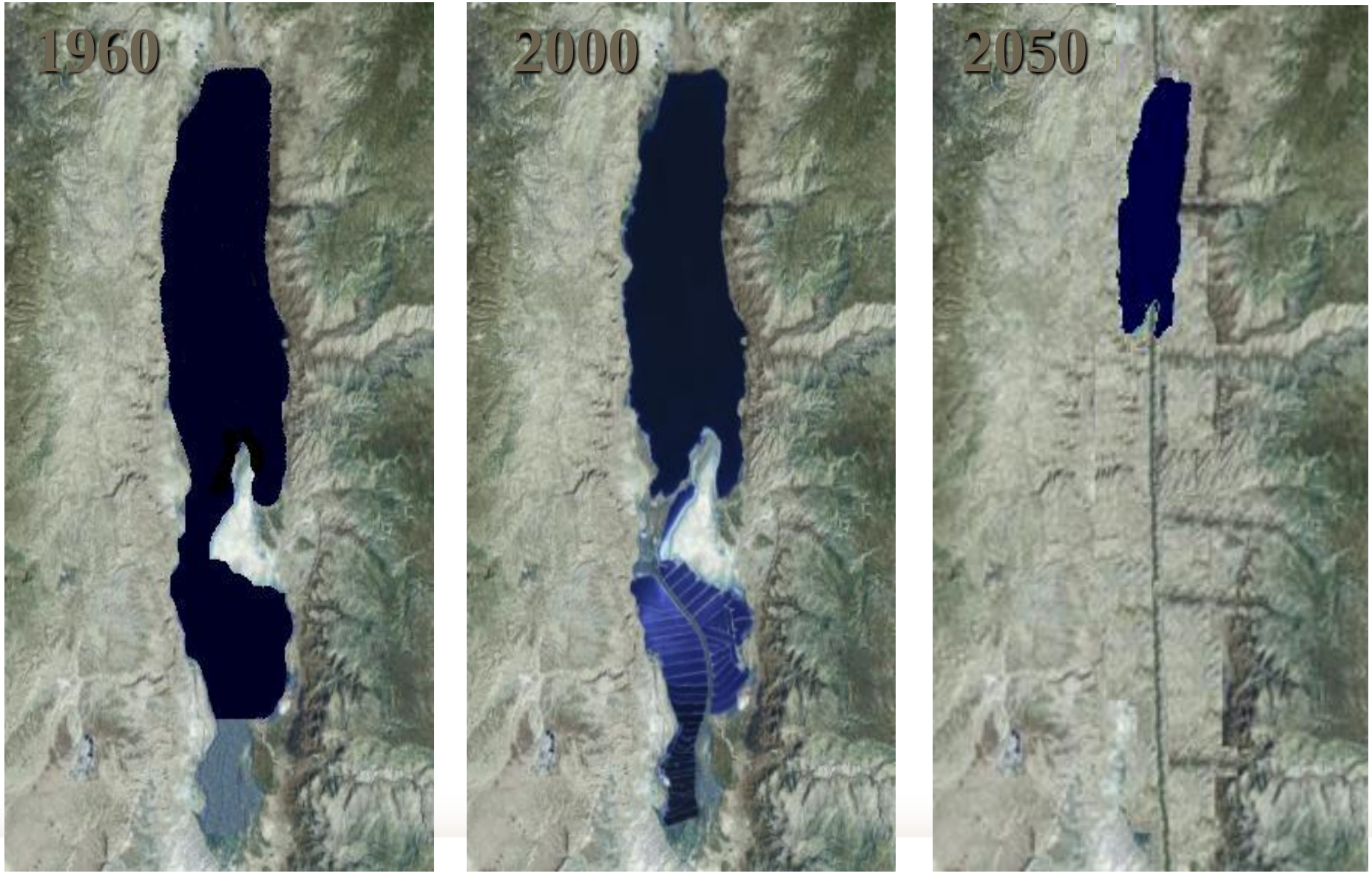
- The project should be revived to be one of the key alternatives.
- Extraction of 2,150 MCM annually from the Red Sea.
- Desalination of 930 MCM annually for consumption purposes.
- Transfer of 1,220 MCM annually to the Dead Sea.
- Generation of 180 megawatts of electricity.
- Utilization of nuclear energy for electricity production and water desalination

The Dead Sea

In late 2025, the river's flow hit a record low discharge of just **3.5 cubic meters per second (110 MCM)**, the lowest since records began in 1950.



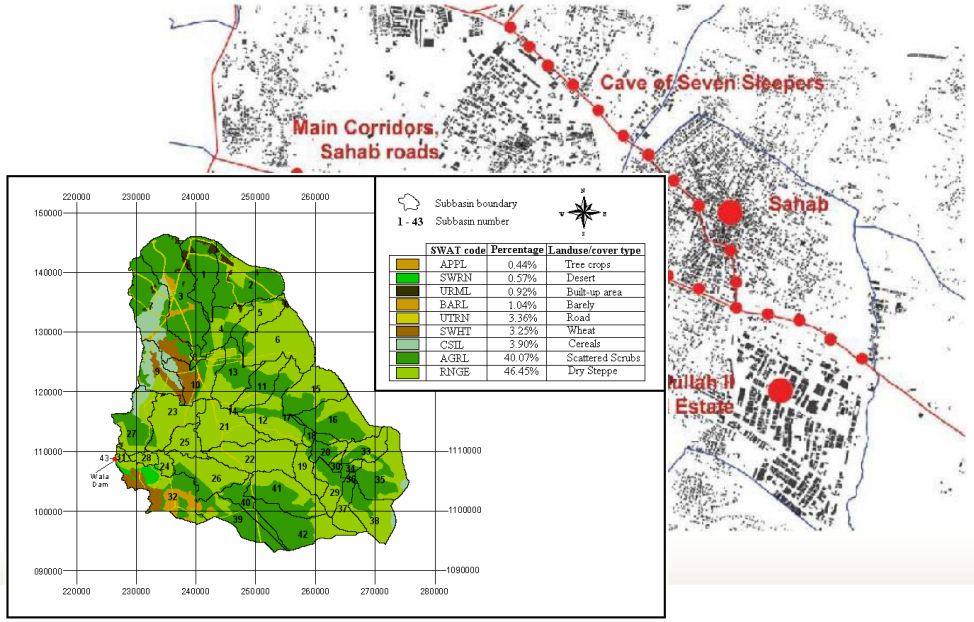
The Future of the Dead Sea



Example of Innovative Research Projects

- sustainable groundwater RESources managEment by integrating eaRth observation deriVed monitoring and flOw modelIng Results (RESERVOIR)
  - Funded by : EU (Prima)

- Innovative methodology to prevent and mitigate diffuse pollution from urban water runoff (WATERUN)
  - Funded by: EU (Zero pollution program)



The challenges of facing the water sector in Jordan are quite serious but we have to be prepared and optimistic

Thank you