

# Circular Economy: Part of the Solution to Water Scarcity in the Arab Region

Capacity Building Workshop on Circular Economy in Agriculture and Water Sectors  
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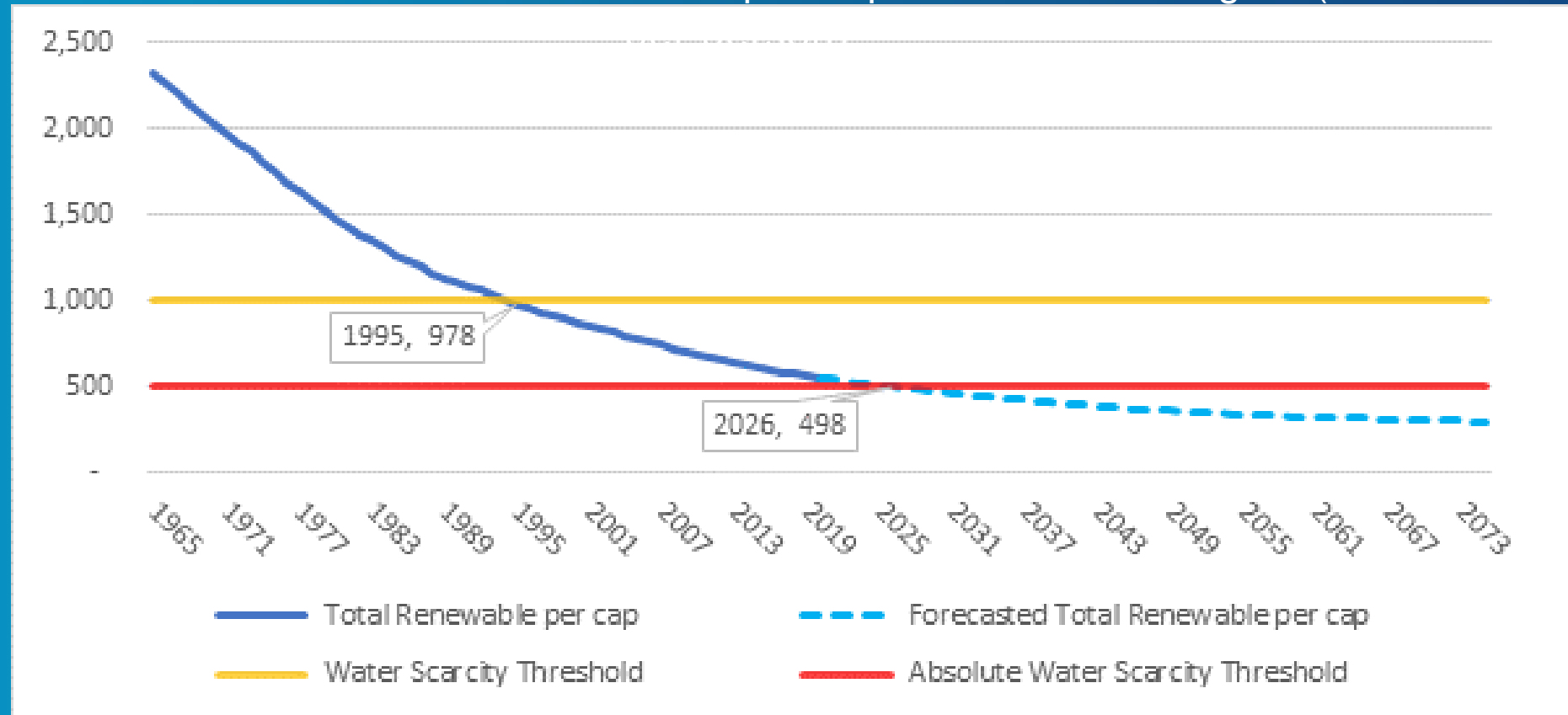
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## Water Scarcity in the Arab Region

- More than 90% of the Arab population are in water scarce countries

Total renewable water resources per capita in the Arab region (m<sup>3</sup>)



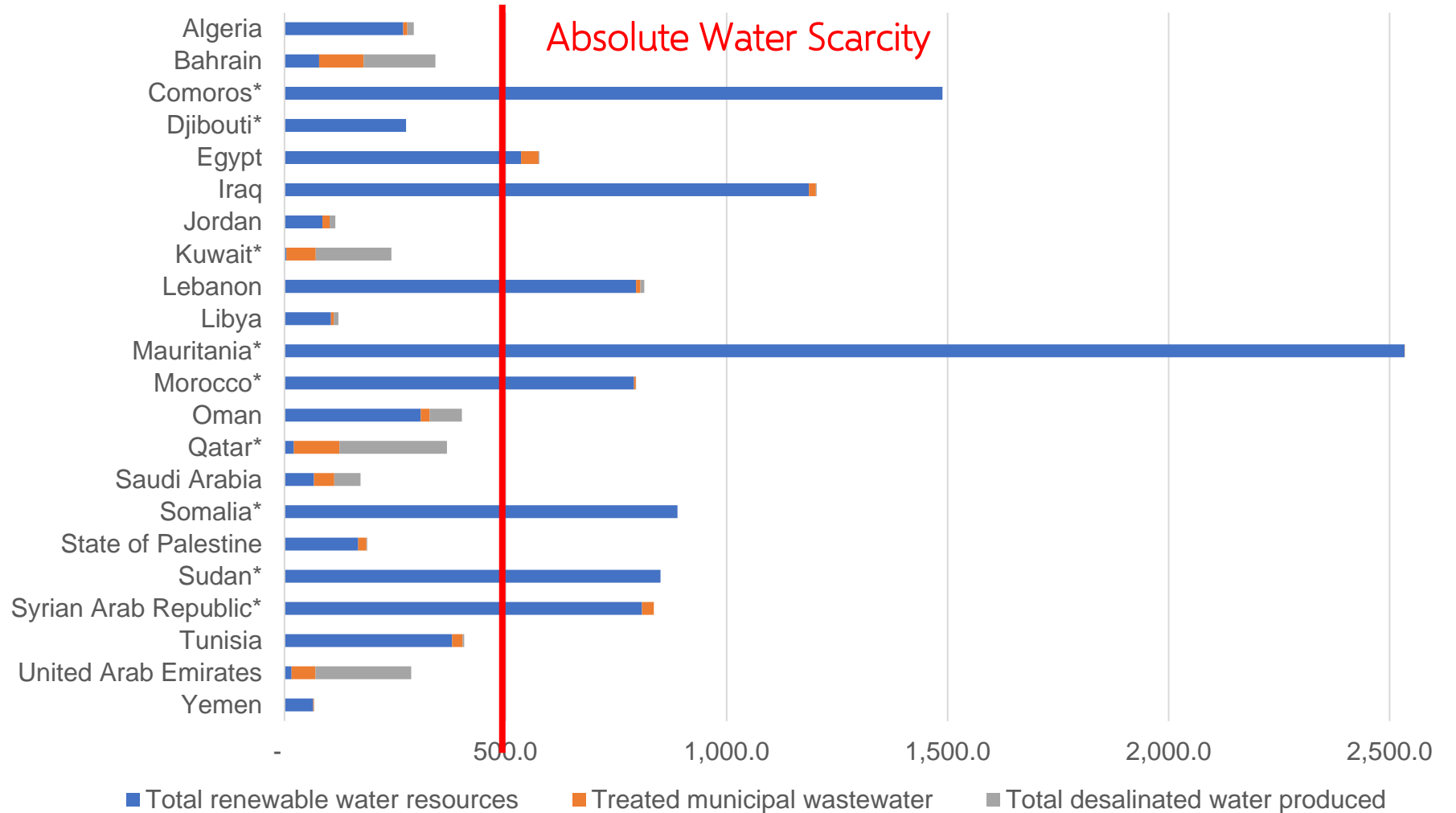


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Linear Water Strategies:  
Supply driven water  
strategies with high energy  
and environmental cost

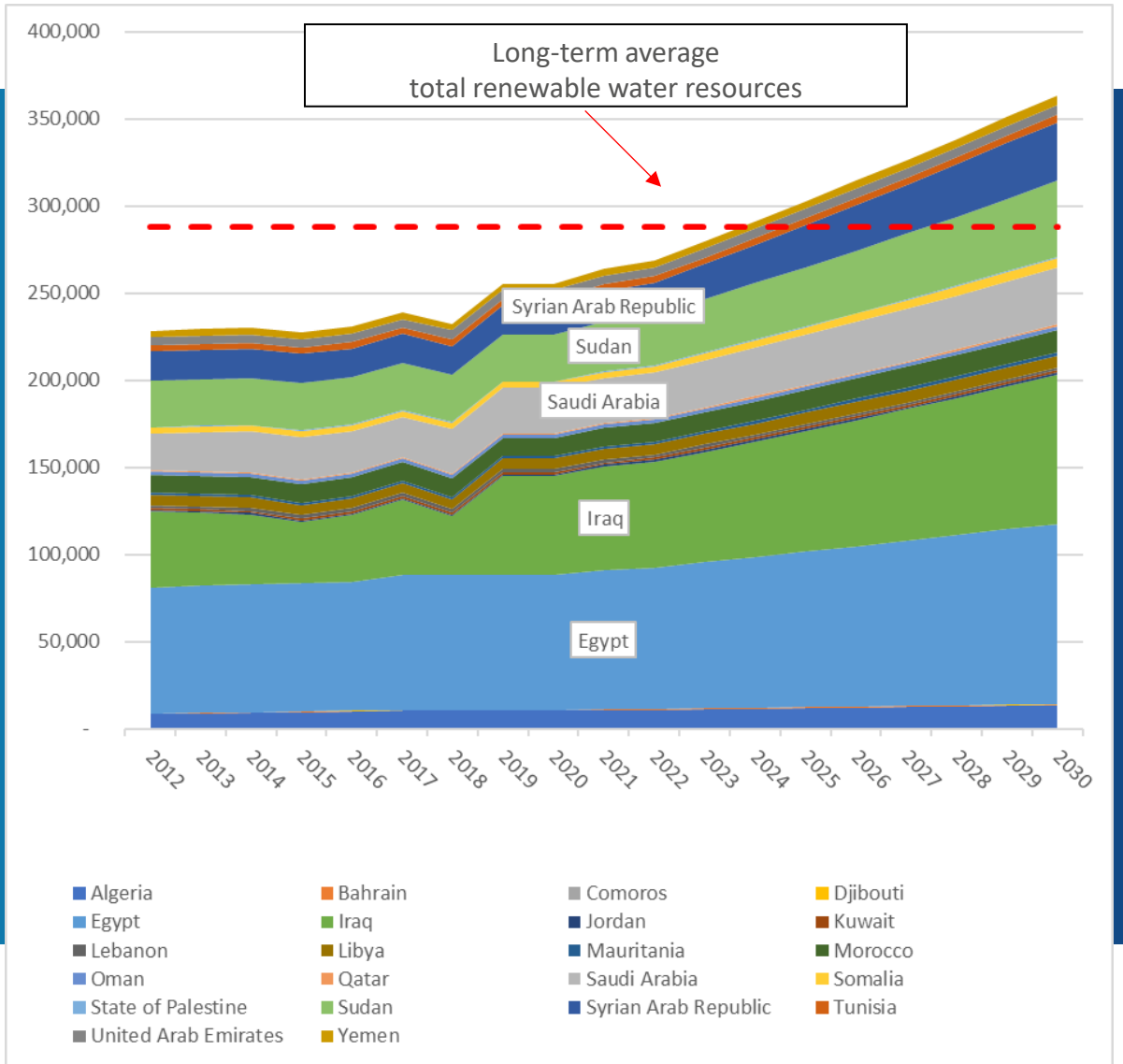
Renewable and nonconventional water resources per capita by country (m<sup>3</sup> per person), 2020





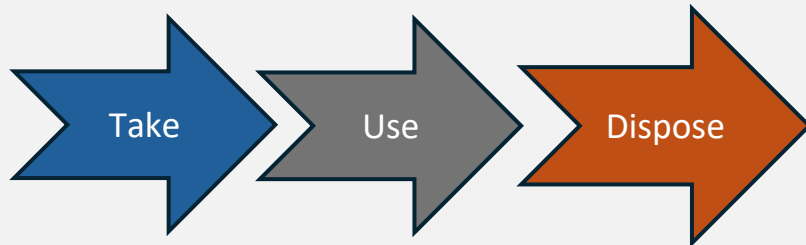
- Based on current water usage and population projections, by 2030, total water withdrawal across all the Arab countries is forecast to increase by approximately 42 per cent compared to the 2020 level.
- Alarmingly, as early as 2024, total water withdrawals are expected to surpass the total available renewable water resources, marking a critical threshold.

## Past and projected total water withdrawal compared to total renewable water resources by country (Million cubic metres (MCM))

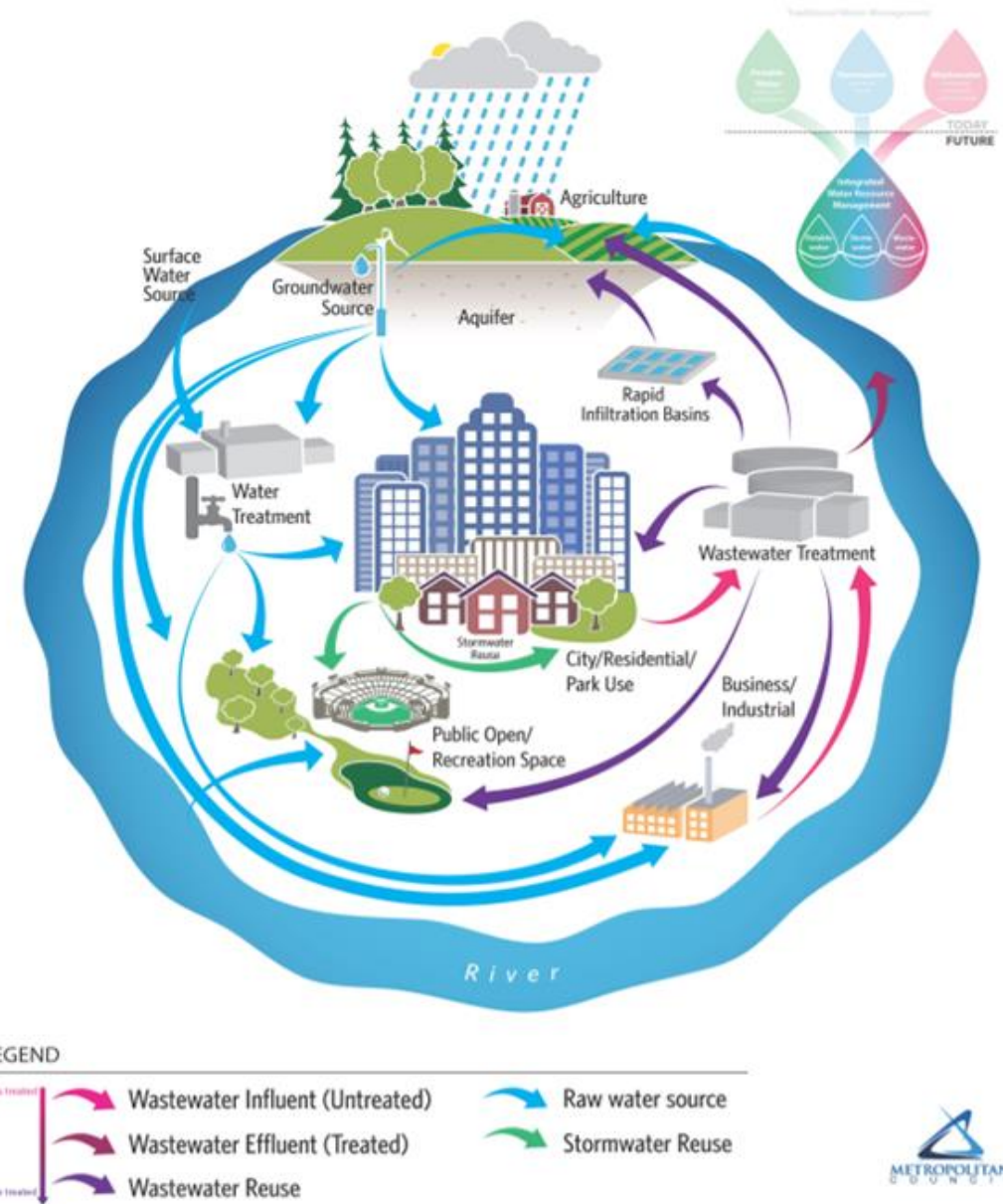


# Reconnecting the Water Cycle

The linear model of water consumption cannot be sustained in a water Scarce region



The aim is to design consumption models/ approach that reduce pressure on water resources and minimize waste



<https://metro council.org/Wastewater-Water/Planning/Water-Supply-Planning/Basics/Water-Cycle.aspx>

# Operationalizing circularity concept in water

- **Reducing** water consumption (e.g. water use efficiencies, demand management, reduction in non-revenue water etc.)
- **Reusing** products - Embedded/ virtual water- and/or their **extending use**
- **Recycling** water through treatment - Wastewater treatment and stormwater harvesting
- **Restoring** water systems -Replenishing groundwater aquifers
- **Regenerating** natural systems – Preserving ecosystems, e.g. improving stream health through restoring (NBS)



# Other potential avenues for better water circularity

## Greywater reuse

Wastewater resulting from activities such as bathing, laundry and dishwashing;

Lower pollutant load and hence lower treatment requirements;

Largest of obstacles include the cost of treatment & ambiguity regarding health and safety;

Pilots of grey water projects in Lebanon and Jordan have shown promising outcomes, specially for irrigation purposes.





# Other potential avenues for better water circularity

**Managed aquifer recharge:** Artificially increasing the infiltration of water into underlying aquifers.

Aims is to:

- ✓ Replenish groundwater resources;
- ✓ Mitigate seasonal fluctuations;
- ✓ Provide a buffer against droughts and floods and enhance climate resilience;
- ✓ Reduce salt and brackish water intrusion.

## Successful applications

➤ MAR in Abu Dhabi Emirates (2017) storing excess desalination water produced during non-peak hours or off-season, the equivalent of a **90-day supply** for the Emirate







# Challenges facing the implementation of circular water approaches

- **Valuation of the resources:** result in costs that do not effectively reflect the cost incurred for water supply as the resource is perceived as a public good;
- **Revenue raising** levels hurdle cost recovery and consequently **private sector engagement** in water management for service delivery;
- **Regulatory framework:** remains insufficient for adequate wastewater treatment and reuse standards, water bylaws controlling abstraction quantities,..etc;
- **Enforcement of rules:** is not properly implemented resulting in misuse of treated wastewater, unregulated well drilling, over pumping of wells...etc;
- **Human resources & capacities:** are not sufficiently aligned on circular economy application in the water sector;



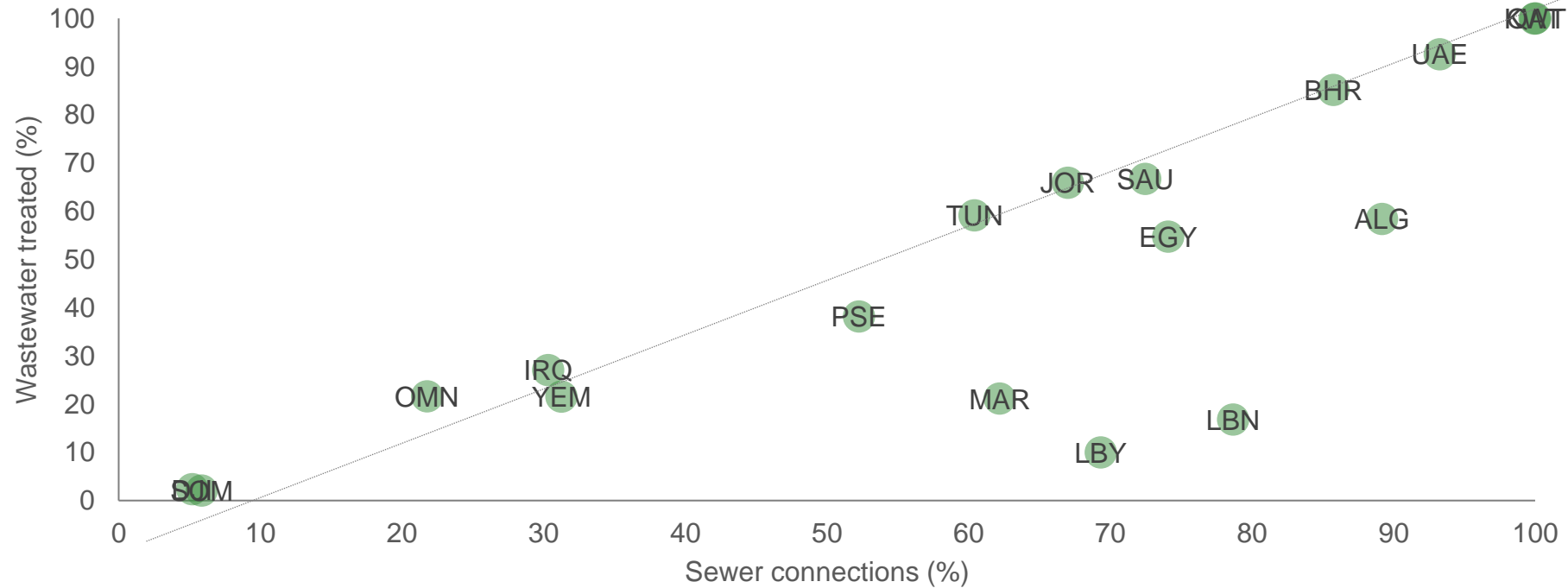
# Challenges facing the implementation of circular water approaches

- **Technological capacities:** Most of the wastewater treatment & desalination technologies are imported from other parts of the world with different conditions and wastewater characteristics –localization of technologies to the Arab regional context is needed;
- **Cross sectoral coordination:** for effective circularity across sectors remains below the needed levels;
- **Geographical disconnect:** Areas where greatest volumes of wastewater- Agricultural- are generated do not coincide with regions where they are needed- this complicates its treatment and reuse;
- **Demographic pressure:** Rapidly growing population resulting in growing volumes of waste generated putting pressure on wastewater treatment plants;
- **Industrial waste:** involves complicated and particularly costly technology.
- **Energy efficiency:** water is one of the largest consumers of energy, from mobilization, treatment and distribution



In most of the Arab region, treated wastewater, which could be a vital resource for the most water-scarce region in the world, is being underutilized.

Percentage of the population using sewer connections vs. wastewater treated by country, 2022



Source: JMP, n.d.



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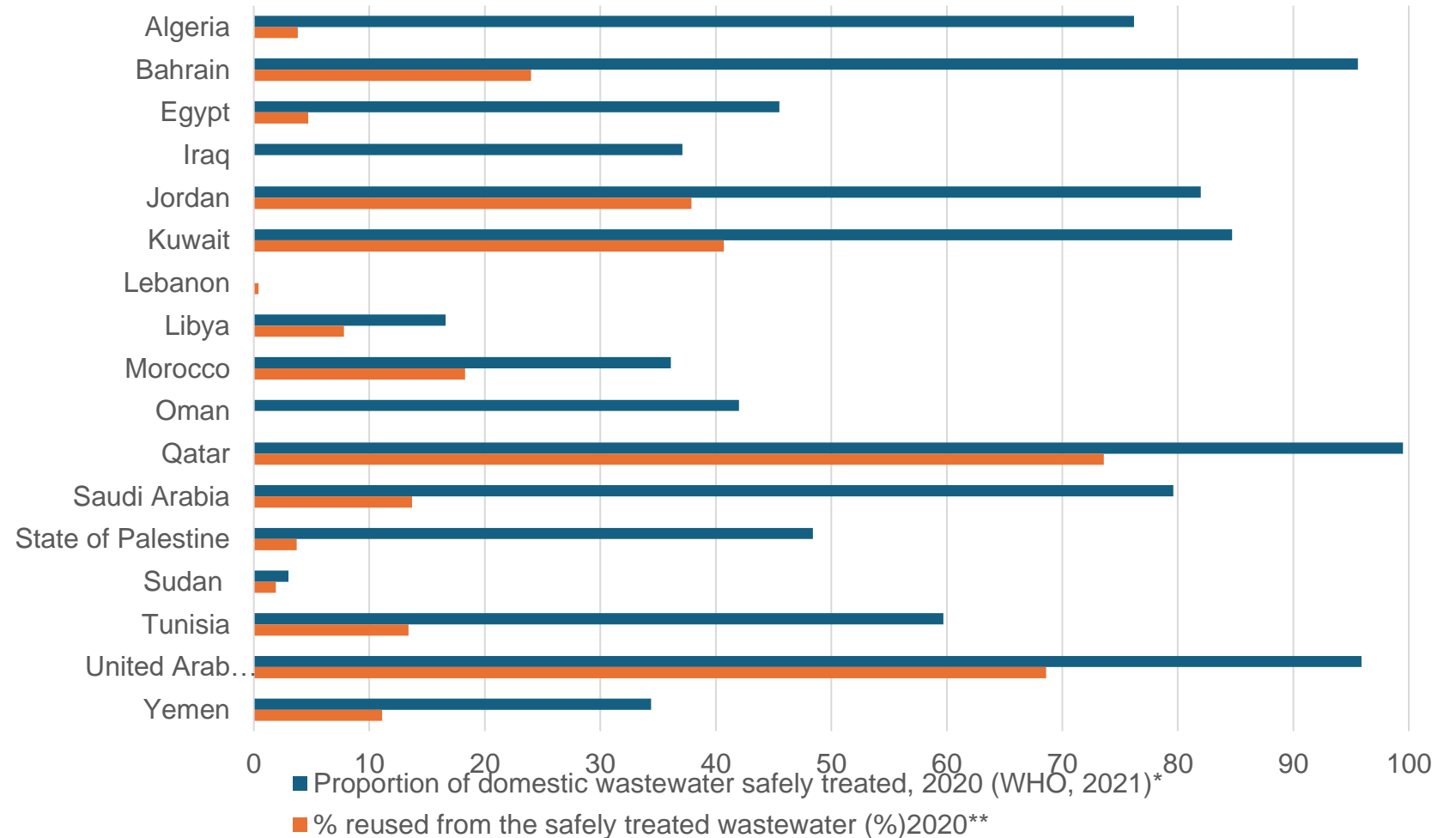
# Status of treated wastewater reuse in the Arab region

- The amount of municipal wastewater that is treated and directly reused for beneficial purposes is still very limited in the region
- About two-thirds (2/3) of safely treated wastewater in the Arab region is discharged to surface water

## Why?

- Economics
- Geographic Constraints
- Lack of required legislations

Percentage of the population using sewer connections vs. wastewater treated by country, 2022



Sources:

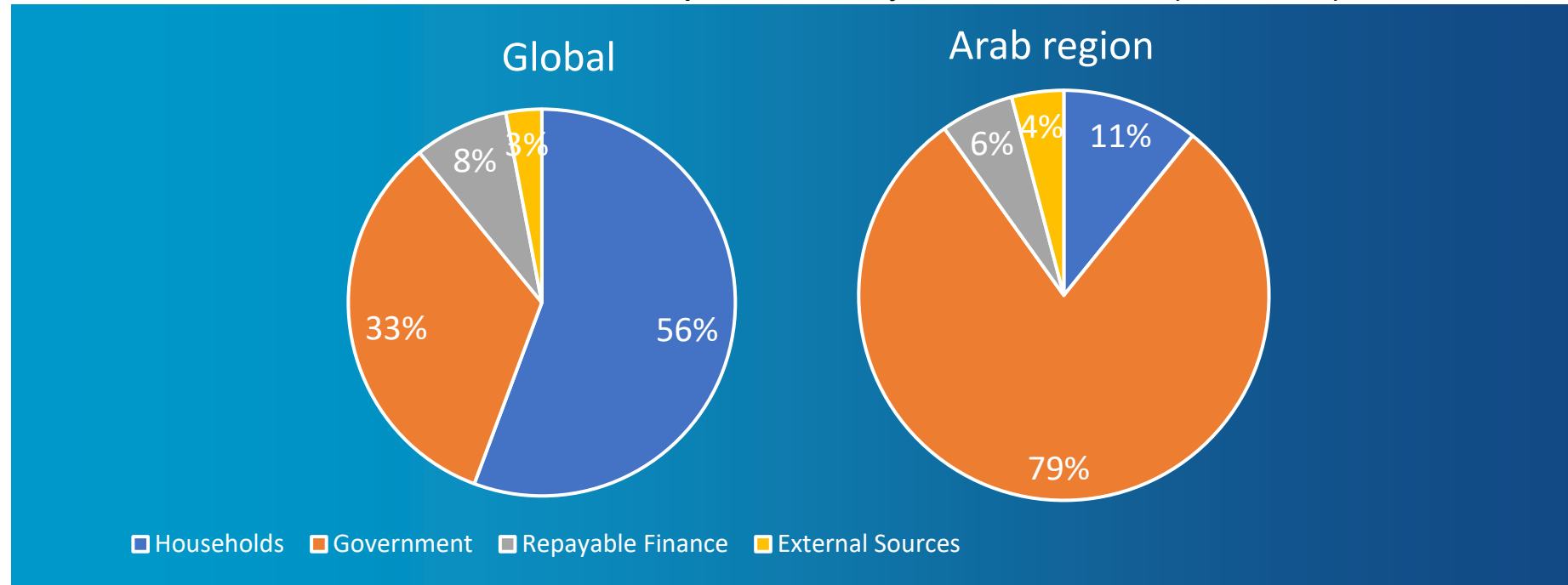
\*WHO (World Health Organization). 2021. Country files for SDG 6.3.1. Proportion of wastewater safely treated

\*\* Expanding water reuse in Arab countries of MENA, Draft report to the High-Level Joint Water and Agriculture Technical Committee



## Valuing Water

Total water and sanitation-related expenditure by source, 2021 (Per cent)

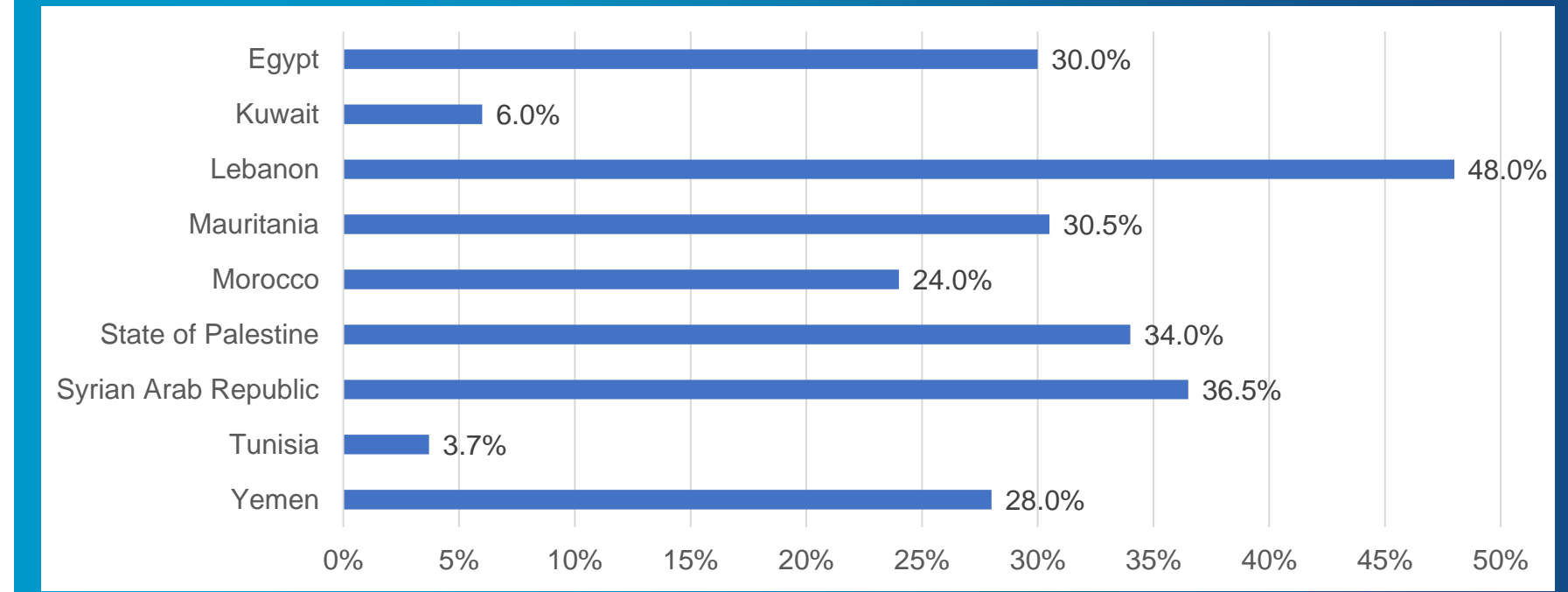


- Arab region is most water-subsidized region globally
- Government expenditure account for an average of 79% of total water and sanitation-related expenditure,
- Over 2x global average.
- Implementing tariff reforms
  - could effectively reduce water overuse
  - increase proportion of costs covered by households,
  - decrease burden on governments.
  - Must be balanced with ensuring the right to water.



# Water Inefficiencies

Average non-revenue water in selected Arab States, 2021 (Per cent)



Source: WHO, n.d.

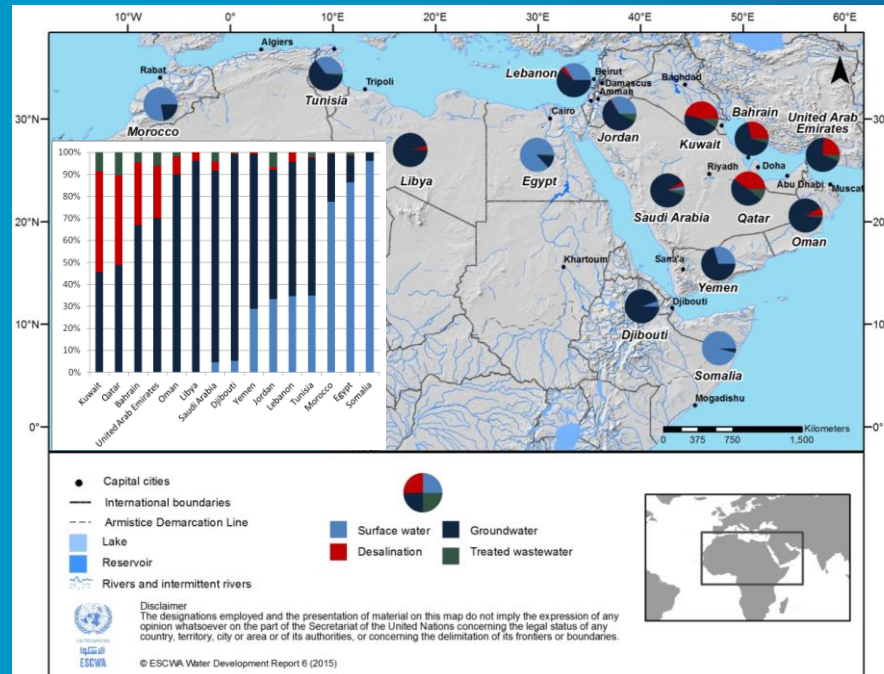
- An important component of improving water use efficiency is the control and reduction of non-revenue water.
- Non-revenue water is both water and energy lost
- Kuwait's estimated cost of non-revenue water in 2021 exceeded \$29 million



# Energy Inefficiencies

- Jordanian water sector accounts for **~15%** of total annual electricity generated
- Saudi Arabia: Groundwater pumping accounts for **10%** of total fuel consumption
- Libya: Groundwater pumping accounts for **14%** of total fuel consumption
- Bahrain: **30%** of total energy use is for desalination

## High Energy Demand Water Sources in the Arab Region



Source: WHO, n.d.



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# Human resources and capacities

Annual sufficiency of the number of professionals trained as a percentage of need, 2021.

- Among the biggest challenges the Arab region's water-related progress faces is the shortage of skilled professionals in the water and sanitation sector.
- 10 out of 16 surveyed Arab States had less than 50% of their human resource needs met for sanitation in 2021.
- The labour shortage is not limited to water and sanitation-related technicians and engineers but also includes a lack of professionals with the latest knowledge and training in data collection and analysis, among other skills.

	Sanitation		Drinking water	
	Municipal wastewater and sewerage	On-site sanitation	Piped drinking-water	Small drinking-water systems
<b>Bahrain</b>	Between 75 to 94%	Between 75 to 94%	Between 75 to 94%	Between 75 to 94%
<b>Comoros</b>	Less than 50%	Less than 50%	Less than 50%	Less than 50%
<b>Egypt</b>	Between 50 to 74%	Between 50 to 74%	Less than 50%	Between 50 to 74%
<b>Iraq</b>	Between 50 to 74%	Between 50 to 74%	Between 50 to 74%	Between 50 to 74%
<b>Jordan</b>	Less than 50%	Less than 50%	Less than 50%	Less than 50%
<b>Kuwait</b>	-	-	Between 95 to 100%	Between 95 to 100%
<b>Lebanon</b>	Less than 50%	Less than 50%	Less than 50%	Less than 50%
<b>Mauritania</b>	Less than 50%	Less than 50%	Less than 50%	Less than 50%
<b>Morocco</b>	Between 95 to 100%	Less than 50%	Between 95 to 100%	Between 95 to 100%
<b>Oman</b>	Less than 50%	Less than 50%	Less than 50%	Less than 50%
<b>Somalia</b>	Less than 50%	Less than 50%	Less than 50%	Less than 50%
<b>State of Palestine</b>	Less than 50%	Less than 50%	Less than 50%	Less than 50%
<b>The Sudan</b>	Less than 50%	Less than 50%	Between 50 to 74%	Between 50 to 74%
<b>Syrian Arab Republic</b>	Less than 50%	Less than 50%	Less than 50%	Less than 50%
<b>Tunisia</b>	Between 95 to 100%	Between 95 to 100%	Between 95 to 100%	Between 95 to 100%
<b>Yemen</b>	Less than 50%	Less than 50%	Less than 50%	Less than 50%

Source: WHO, n.d.

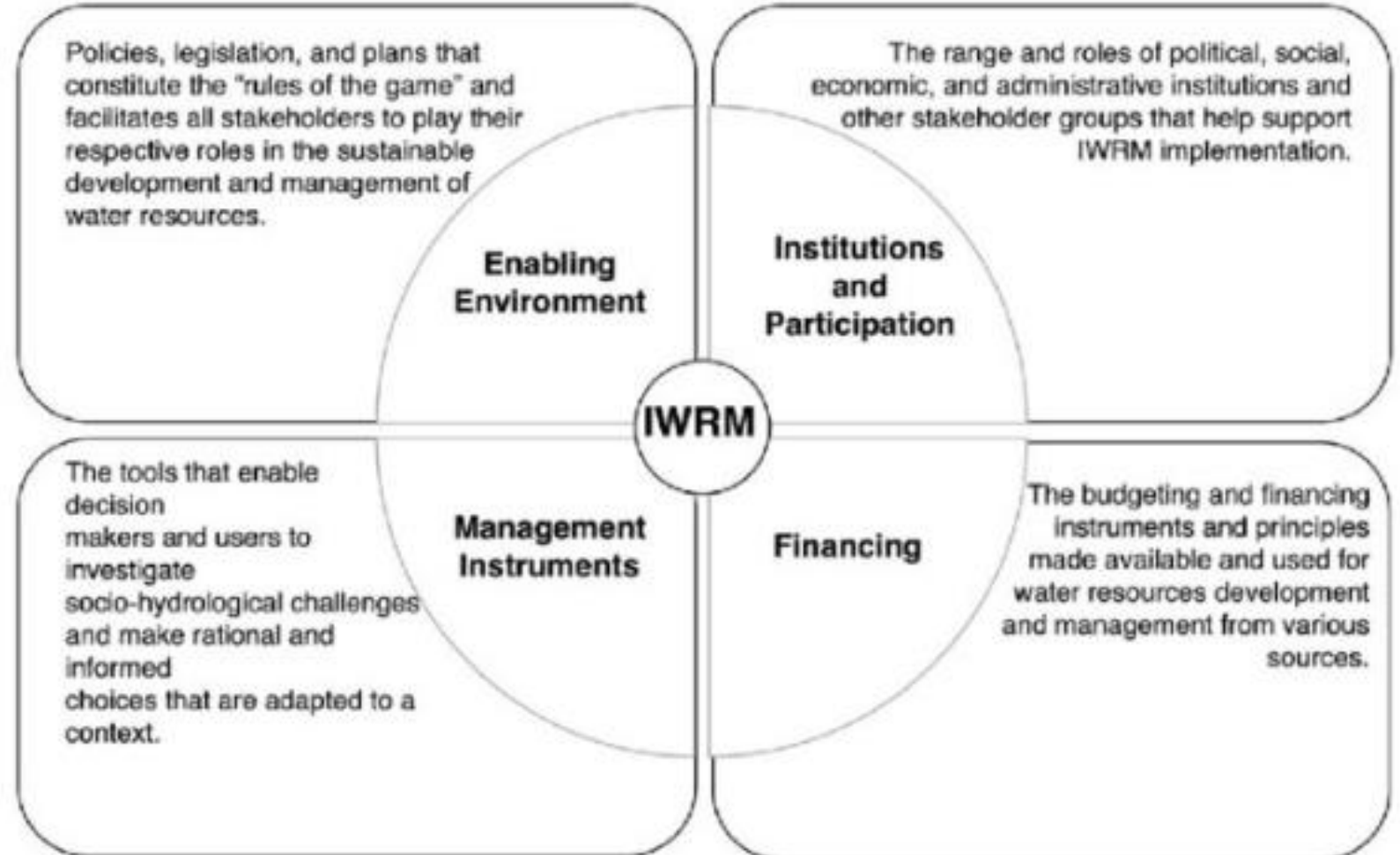
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# IWRM for improved water circularity

In addressing these concerns, Integrated water resource management (IWRM) can provide a framework for the application of a Circular Economy approach as it integrates the various dimensions of effective water governance.





# IWRM principles can be drawn upon for circular water strategies

## Enabling environment

- Cross-sectorial integration
- Water quality Standards;
- Water abstraction guidelines
- Water safety Plans

## Institutions & participation

- Cross sectoral coordination for optimized resource allocation;
- Capacity development on technologies for recycling & reuse.

- Public sector participation
- Private sector engagement

## Management instruments

- Monitoring & data generation for informed decision making;
- Pollution control tools;
- Protection and regeneration of Ecosystems and biodiversity .

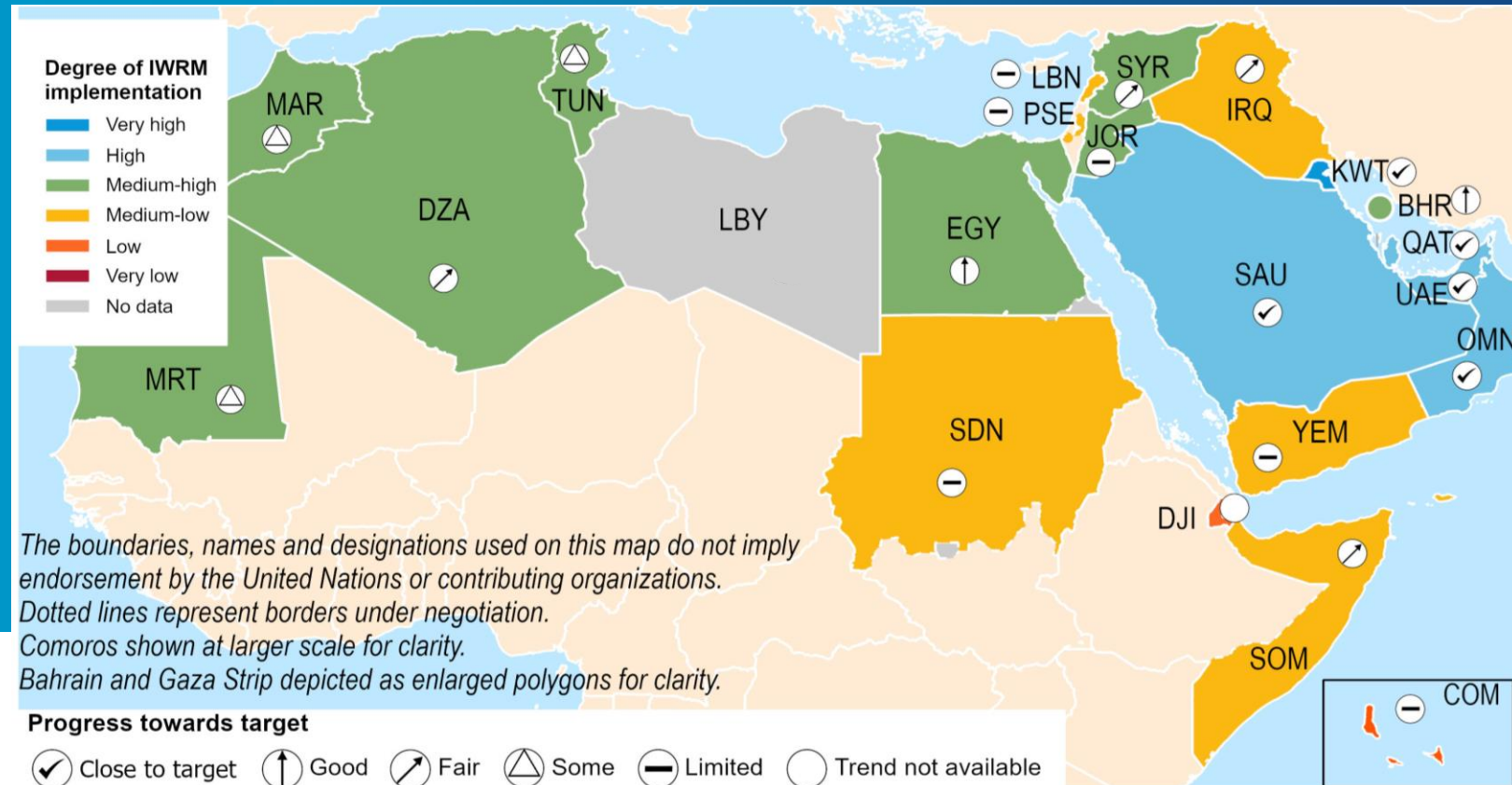
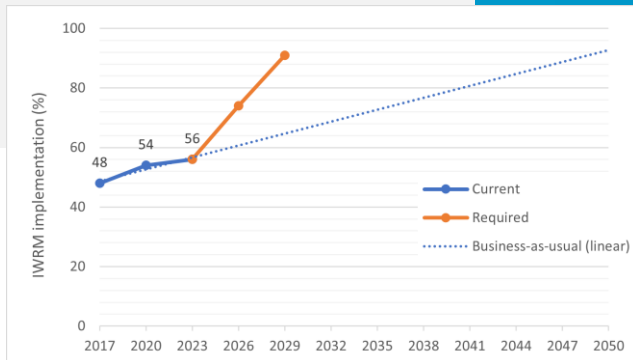
## Financing

- Mobilizing water finance;
- Valuation of resources for cost recovery;
- Revenue raising through innovative schemes
- Subsidies to drive towards circularity



## Implementation of IWRM in the Arab region SDG indicator 6.5.1

- The average implementation of IWRM in the Arab region is 56 out of 100 (medium-high implementation) for 2023
- A third (1/3) of the Arab countries are unlikely to meet the global IWRM target in 2030 unless progress is significantly accelerated





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Thank you