BEYOND THE TECHNOLOGY FIX:
WHAT DEVELOPMENT PRACTITIONERS ARE LEARNING ABOUT CLIMATE ADAPTATION IN THE MENA REGION

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WHAT THIS PRESENTATION IS ABOUT

Technology as the dominant adaptation pathway to address water insecurity and climate impacts

Two case studies, Jordan and Yemen, reveal practical implications for equity and sustainability

The need for a radical change

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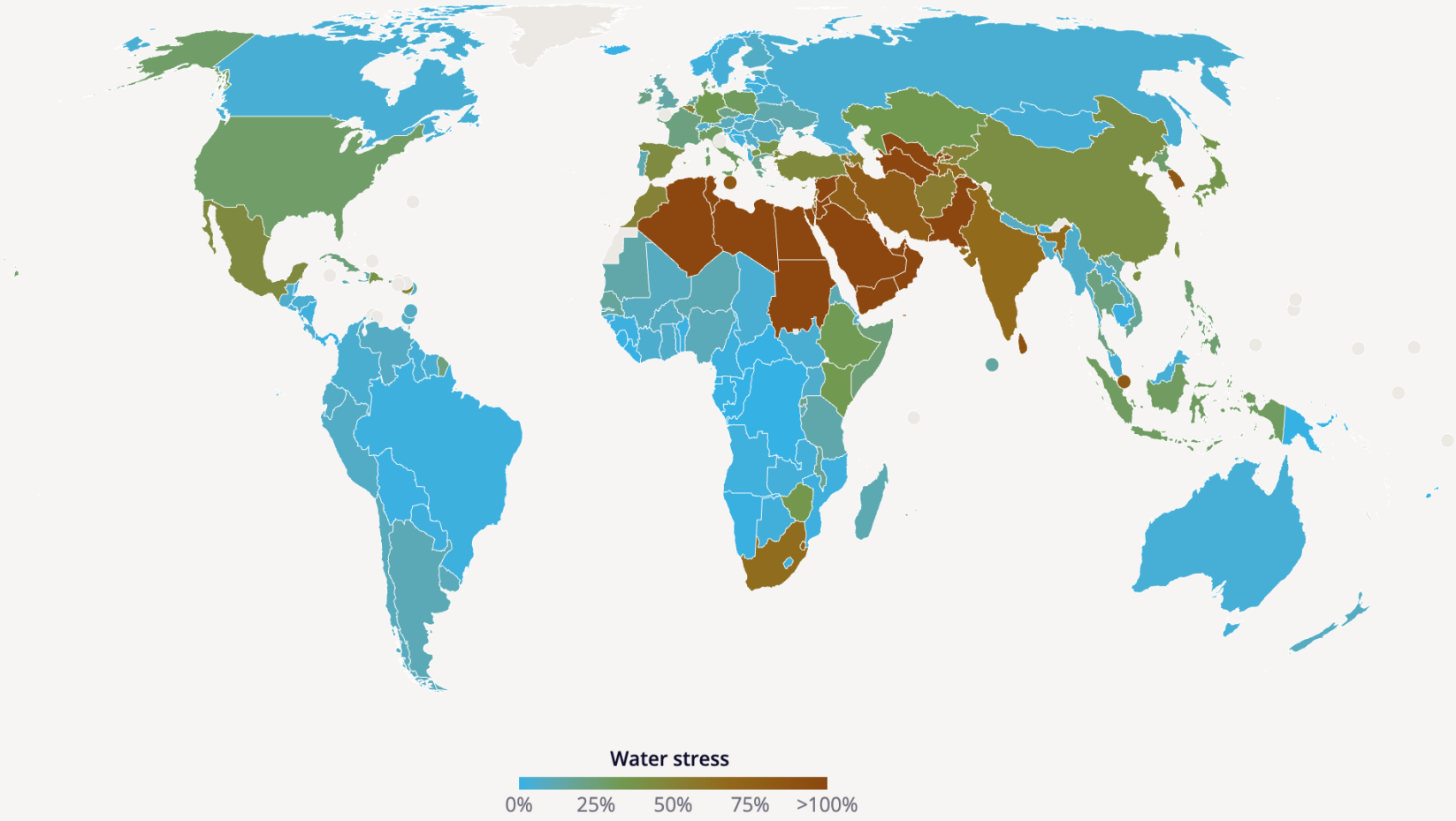
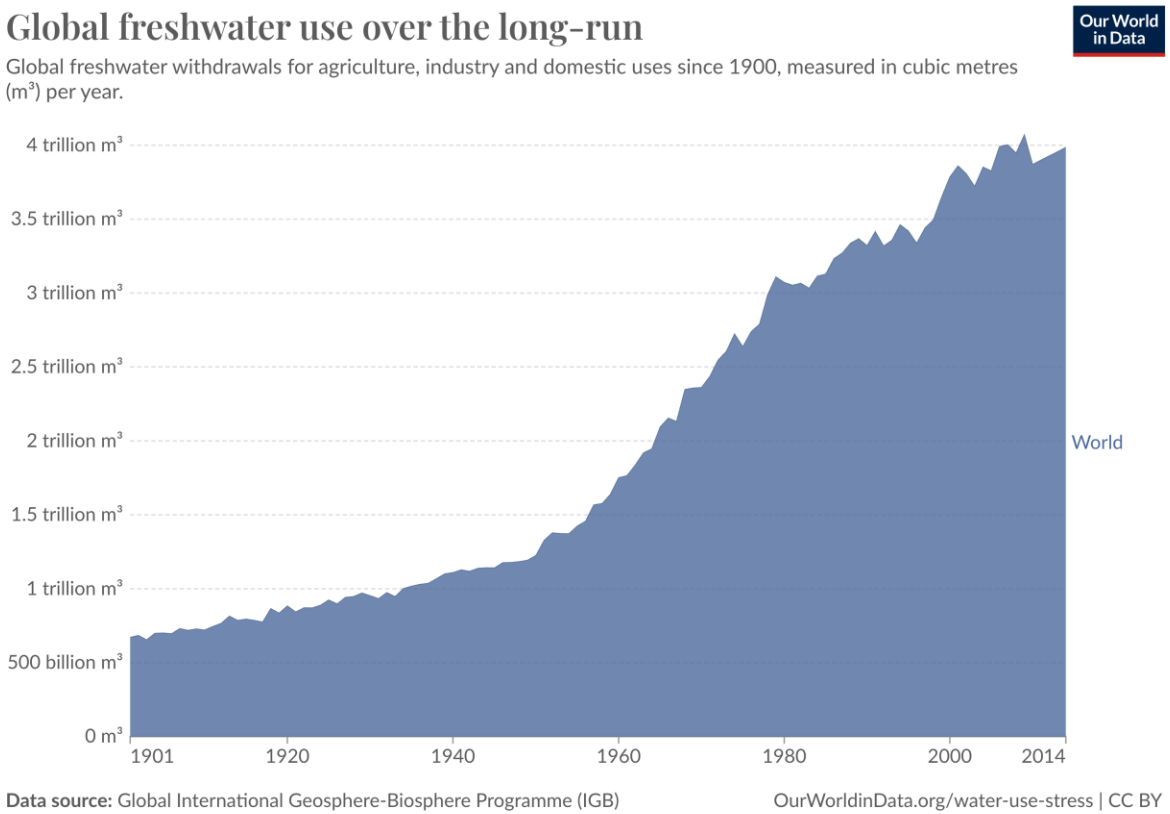
RISING WATER STRESS ACROSS THE WORLD AND IN MENA

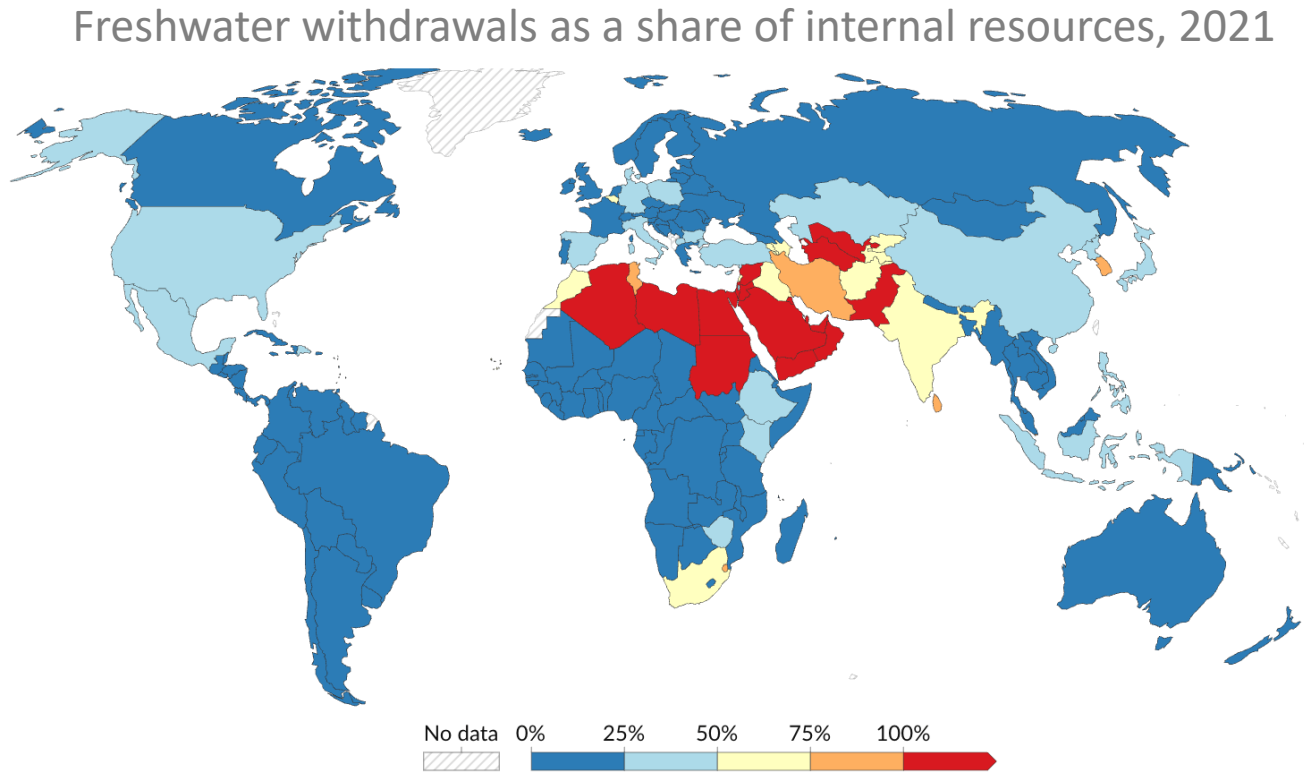
Level of water stress (%) by countries, 2020, and by major river basin, 2018



Data: FAO Aquastat database. Retrieved from World Development Indicators (ER.H2O.FWST.ZS).FAO. Level of Water Stress (SDG 6.4.2) by Major River Basin.

AGGRAVETED AGRICULTURAL WATER USE





HARNESSING TECHNOLOGIES FOR CLIMATE ADAPTATION AND WATER SECURITY

- Solar-Powered Irrigation System
- Drip & micro-sprinkler irrigation
- Variable-rate irrigation & low-pressure nozzles
- Soil-moisture sensors and IoT
- Remote-sensing based irrigation schedulers
- Smart meters, automated pressure valves
- SCADA and leak detection in networks
- Greenhouses;
- Hydroponics and aquaponics
- Water reuse and brackish-water desal/RO
- Rainwater harvesting & on-farm storage;
- Managed aquifer recharge infrastructure
- Stress-tolerant crop varieties

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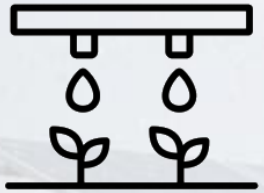
RELIANCE ON TECHNOLOGIES FOR CLIMATE ADAPTATION

The uptake of technologies for water security and climate resilience has been increasing worldwide.



Global smart irrigation market projected to grow at a compound annual rate of 15.8%.

Global solar water pump market grew by 12.1% from 2023 to 2024 and is projected to grow by 57% by 2028.

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DEVELOPMENT PRACTITIONERS IN MENA RELY ON CLIMATE-SMART TECHNOLOGIES TO ADAPT TO WATER INSECURITY AND CLIMATE IMPACTS

FAO	Promotes Solar-Powered Irrigation Systems
IFAD	Invests in irrigation modernization, drip irrigation
WFP	Implement innovation pilots including solar irrigation
World Bank	Advances irrigation modernization including drip, solar pumping, canal & on-farm upgrades
ICARDA	Uses ultra-low energy drip irrigation systems
GIZ	Promotes climate friendly, water- and energy efficient solar-powered irrigation systems
USAID	Promotes ultra-low pressure drip irrigation systems
Mercy Corps	Employs market approaches to increase uptake of water saving technologies

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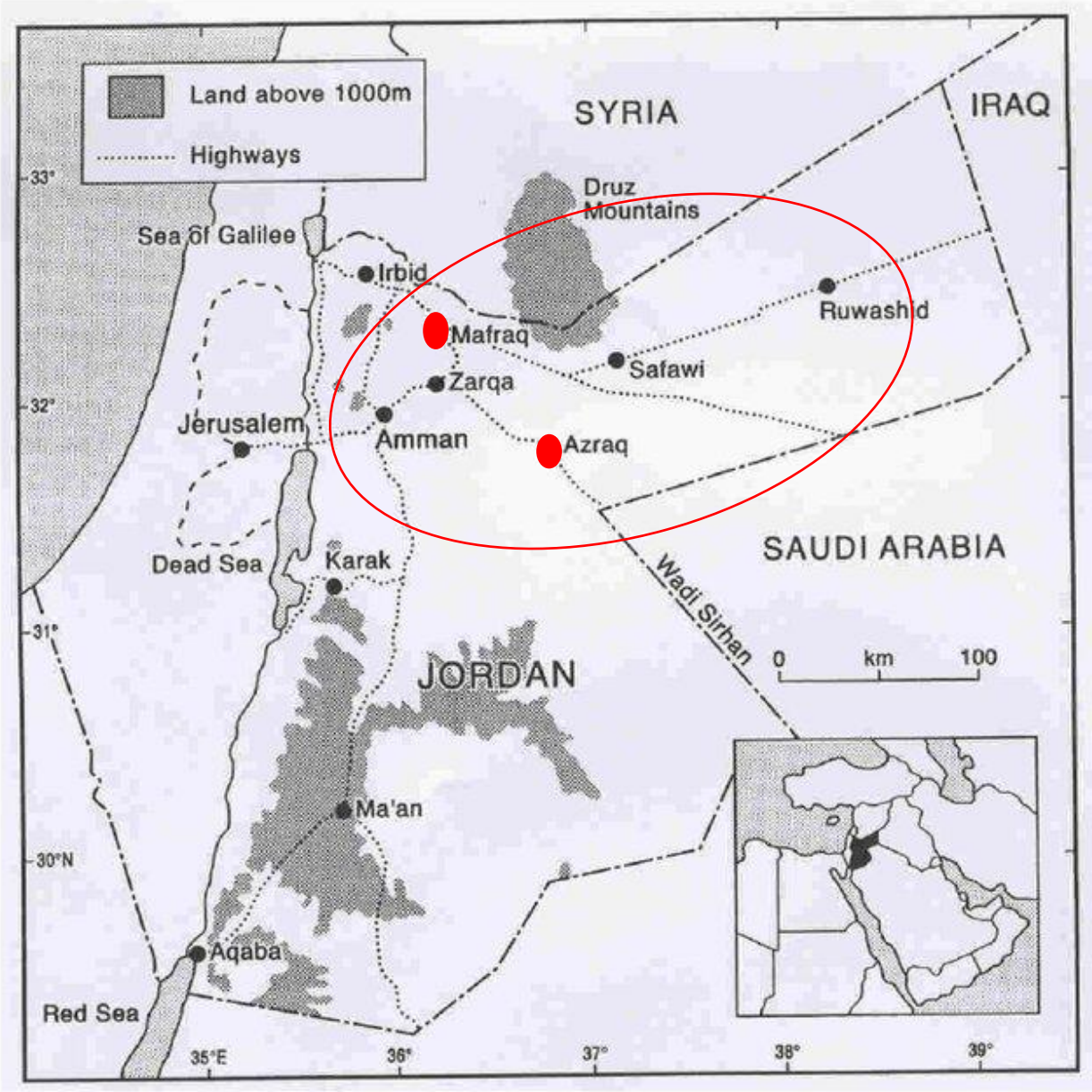
CLIMATE SMART TECHNOLOGIES AS AN EFFECTIVE METHOD TO CONSERVE WATER, ADAPT TO CLIMATE IMPACT AND EXPAND THE ECONOMY

The risk is that farmers will consume more water than they did before introducing the technology:

- applying more water in the field overall;
- expanding the area of land under irrigation;
- growing higher-value, but often more water-intensive, crops;
- selling water to neighbouring farmers and communities.

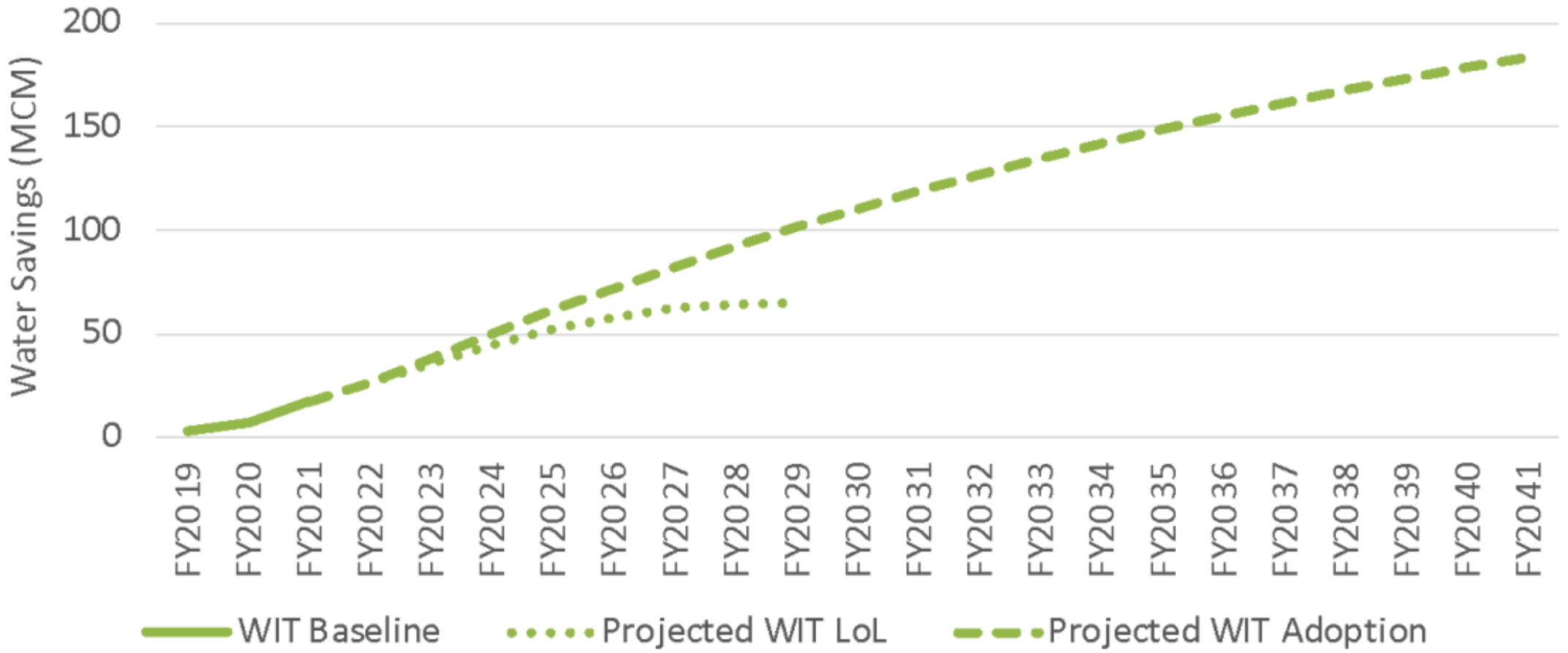
<u>Technologies require governance and monitoring measures.</u>

I. MERCY CORPS' WATER INNOVATION TECHNOLOGIES PROGRAM



MARKET BASED APPROACH: The program worked with market actors and financial services to facilitate supply and demand of water savings technologies and services by building the capacity to sell and use water savings technologies.

THE WIT PROGRAM OPTIMIZED IRRIGATION ON 2024 HECTARES OF FARMLAND



(AMP Insight, 2022)

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THE WIT PROGRAM ACHIEVED IMPRESSING WATER SAVINGS

- Saved 24 million cubic meters of water (9600 Olympic-sized swimming pools).
- Demonstrated the effectiveness of the market-based approach in water conservation
- Improved farmers' irrigation practices.

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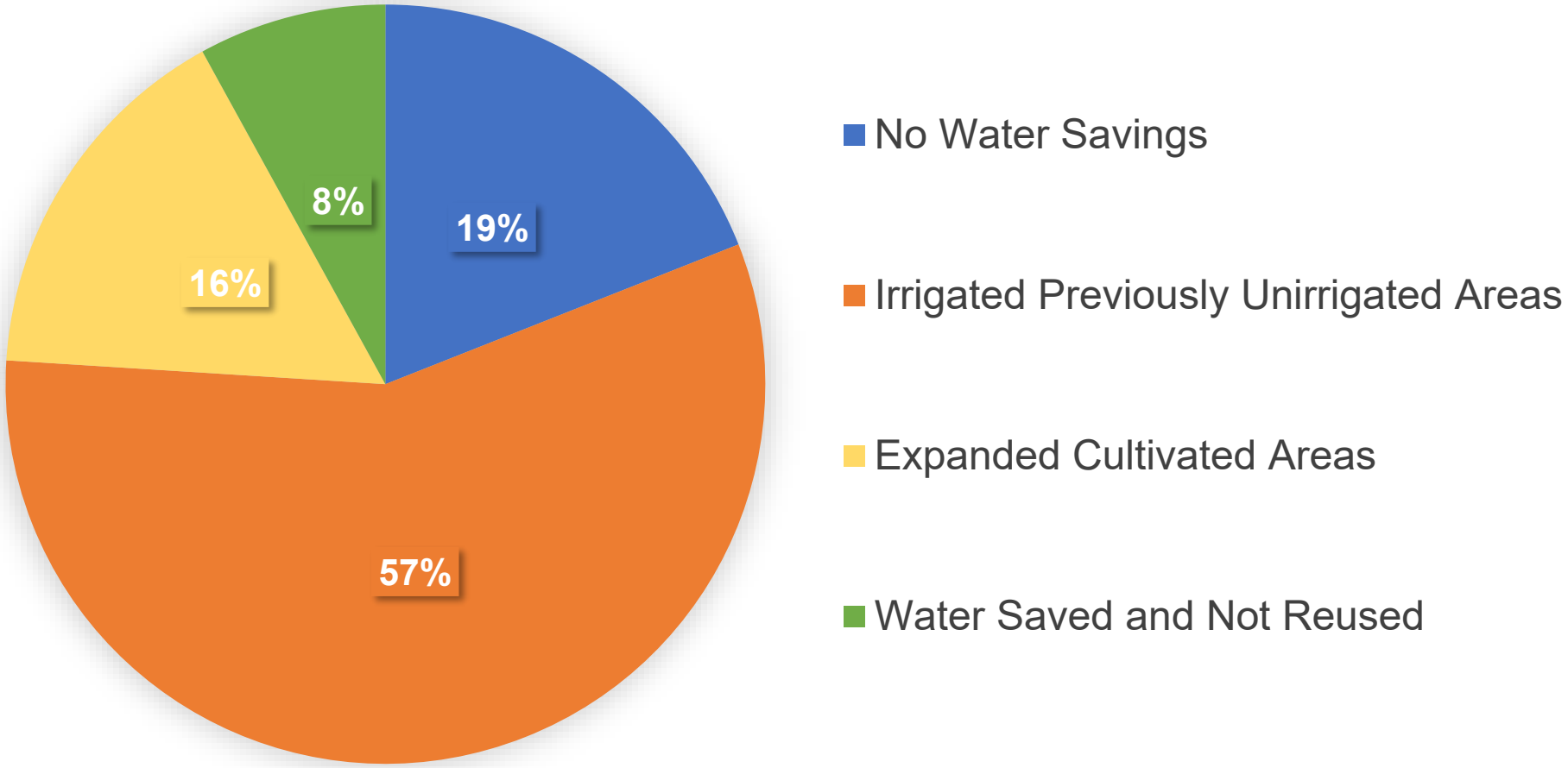
THE WIT PROGRAM RESHAPED FARMERS' BEHAVIOUR



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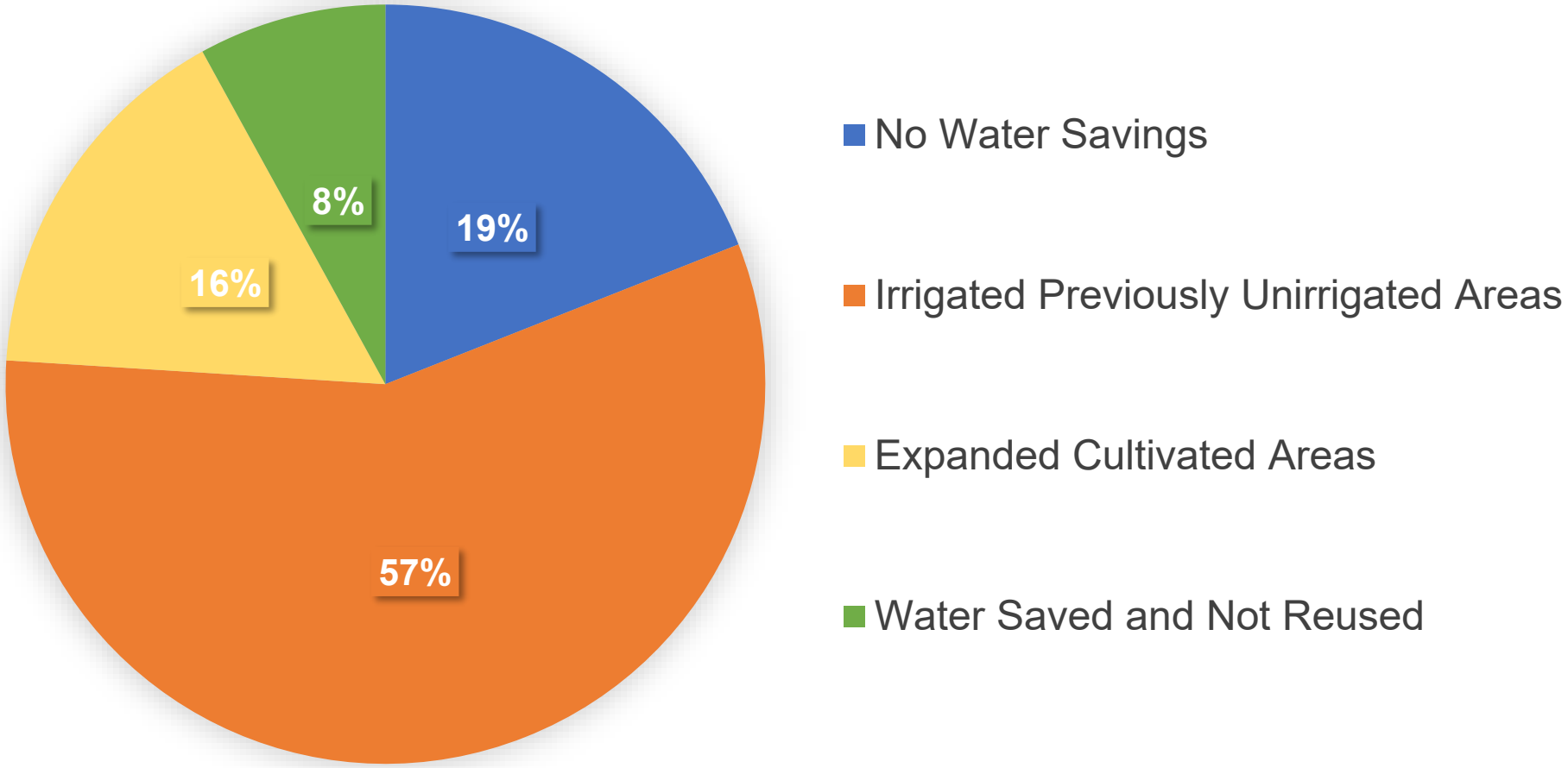
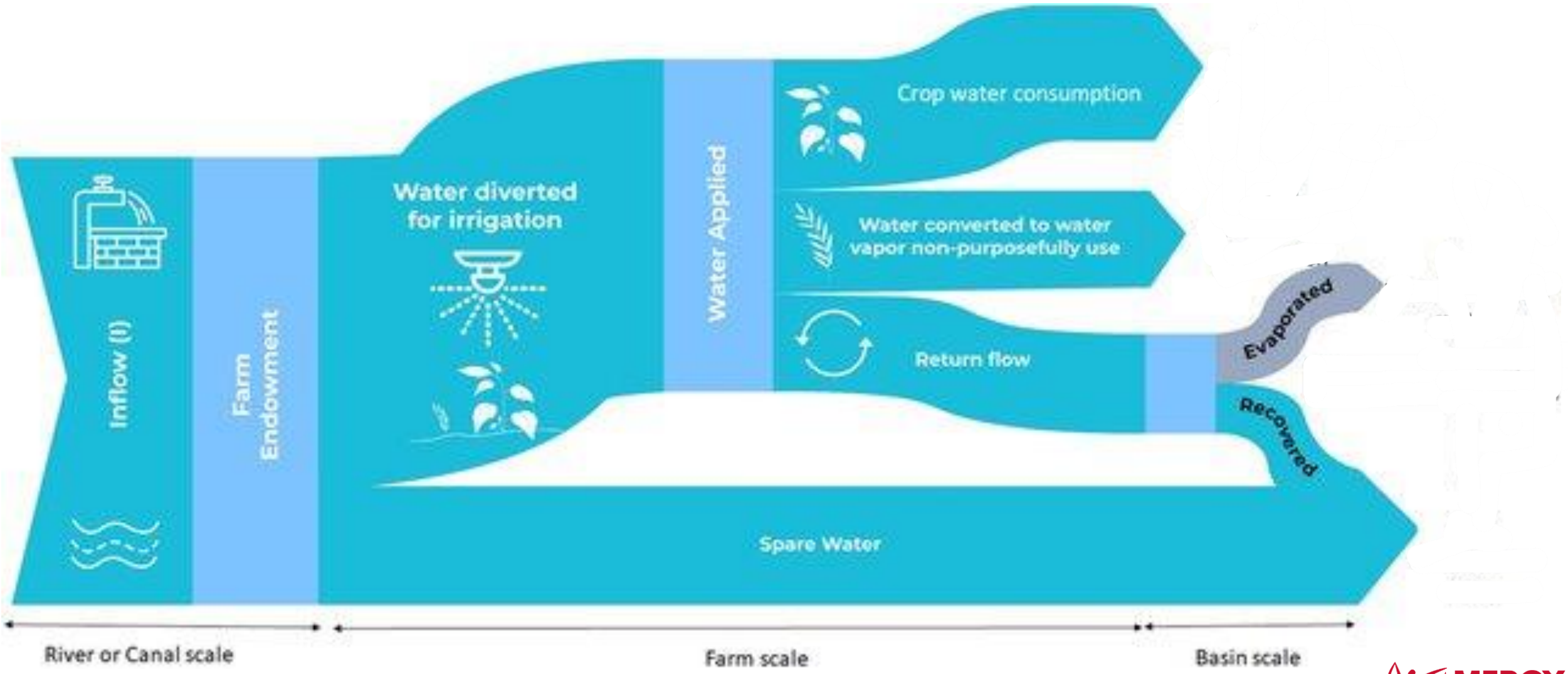


92% OF THE FARMERS DID NOT SAVE WATER

WATER BALANCE IN AN AGRICULTURAL SYSTEM



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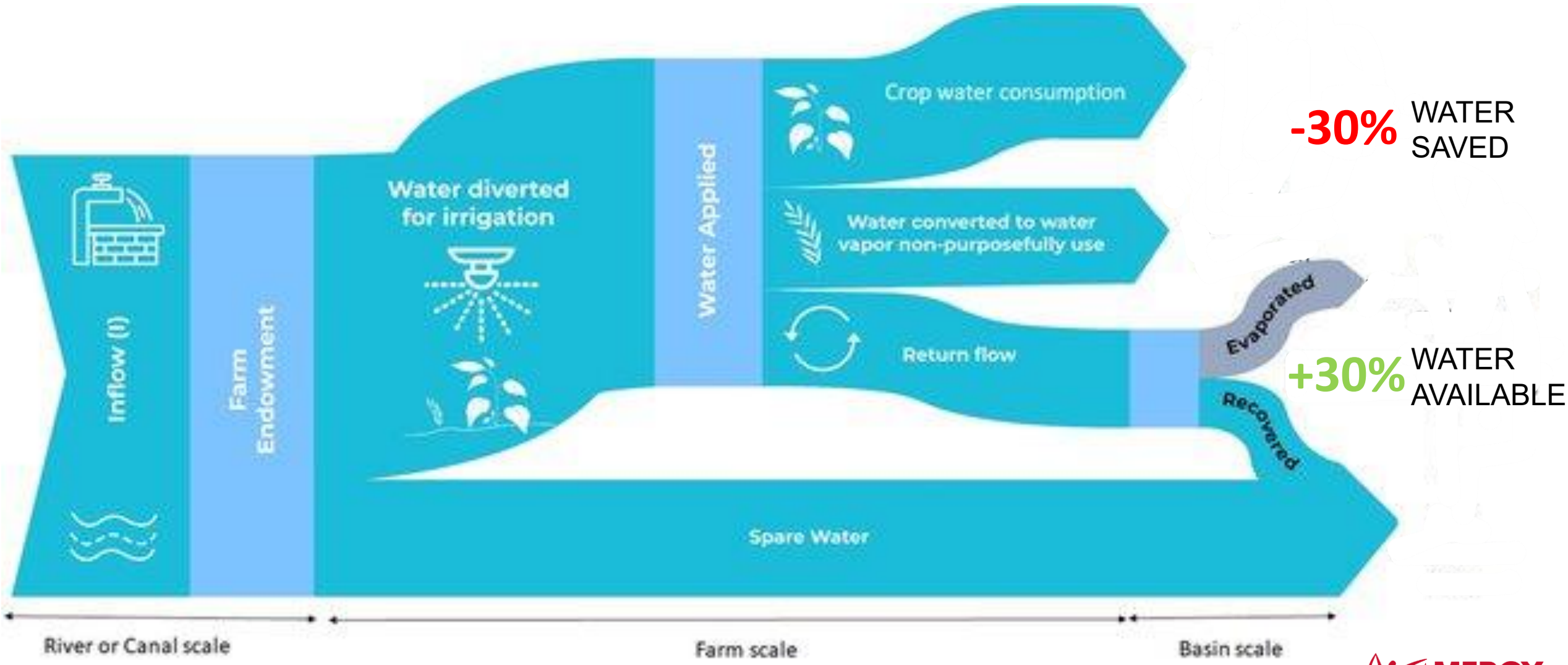

-30% WATER SAVED

+30% WATER AVAILABLE

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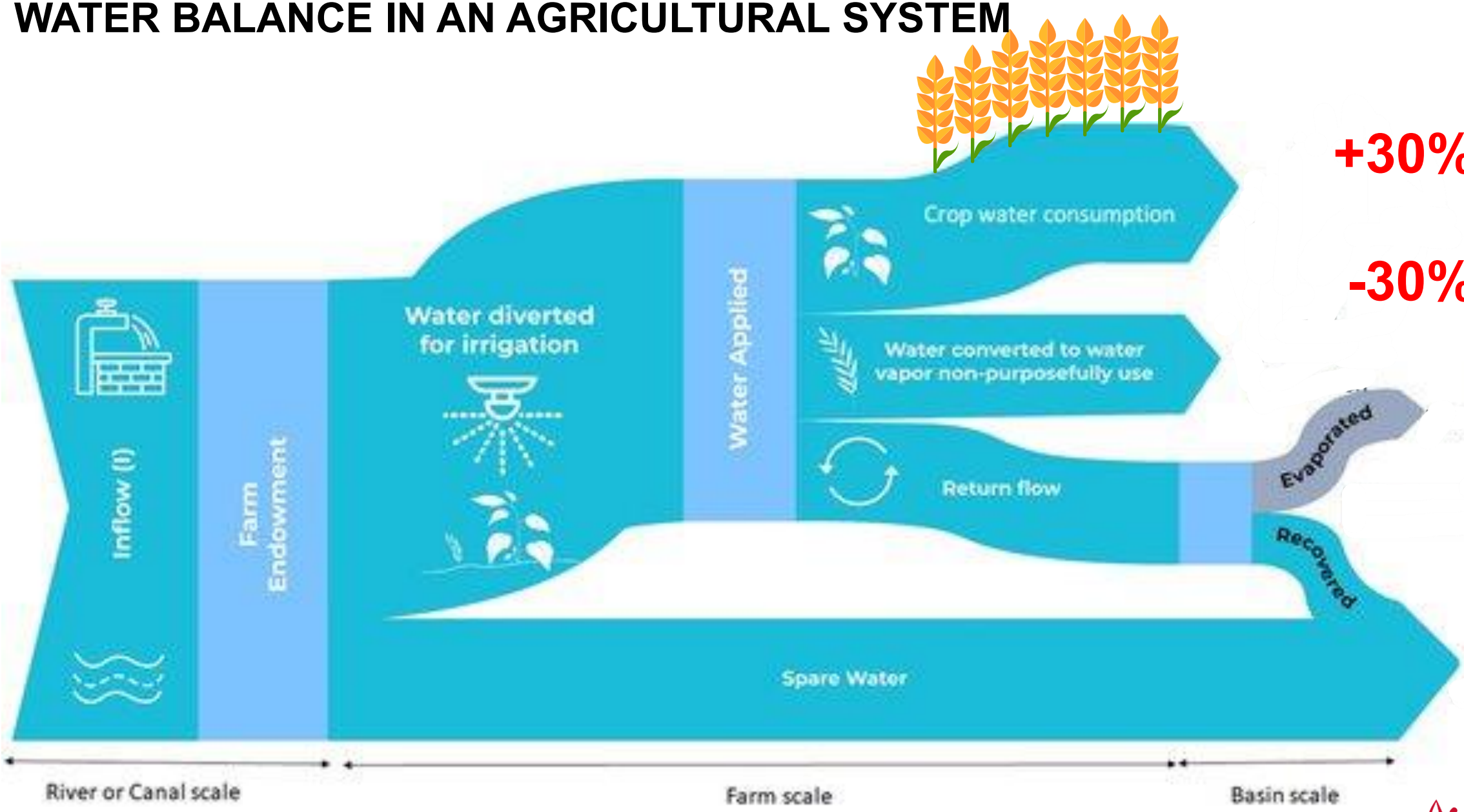
WATER BALANCE IN AN AGRICULTURAL SYSTEM



+30% WATER REUSED

-30% WATER SAVED

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WATER SAVINGS TECHNOLOGIES ALONE CAN LEAD TO MALADAPTATION

- Water-Saving Technologies improved water use efficiency at the farm level.
- The water saved at the farm scale has been redirected for expanded irrigation or more water-intensive crops.
- Water-Saving Technologies have reduced the availability of water for other users and ecosystems.
- The benefits of Water-Saving Technologies favour wealthier and medium-sized farmers who were involved in the project and could afford the technologies.

(Dumont et al., 2013; Grafton et al., 2018; Perry et al., 2017; Batchelor et al., 2014).

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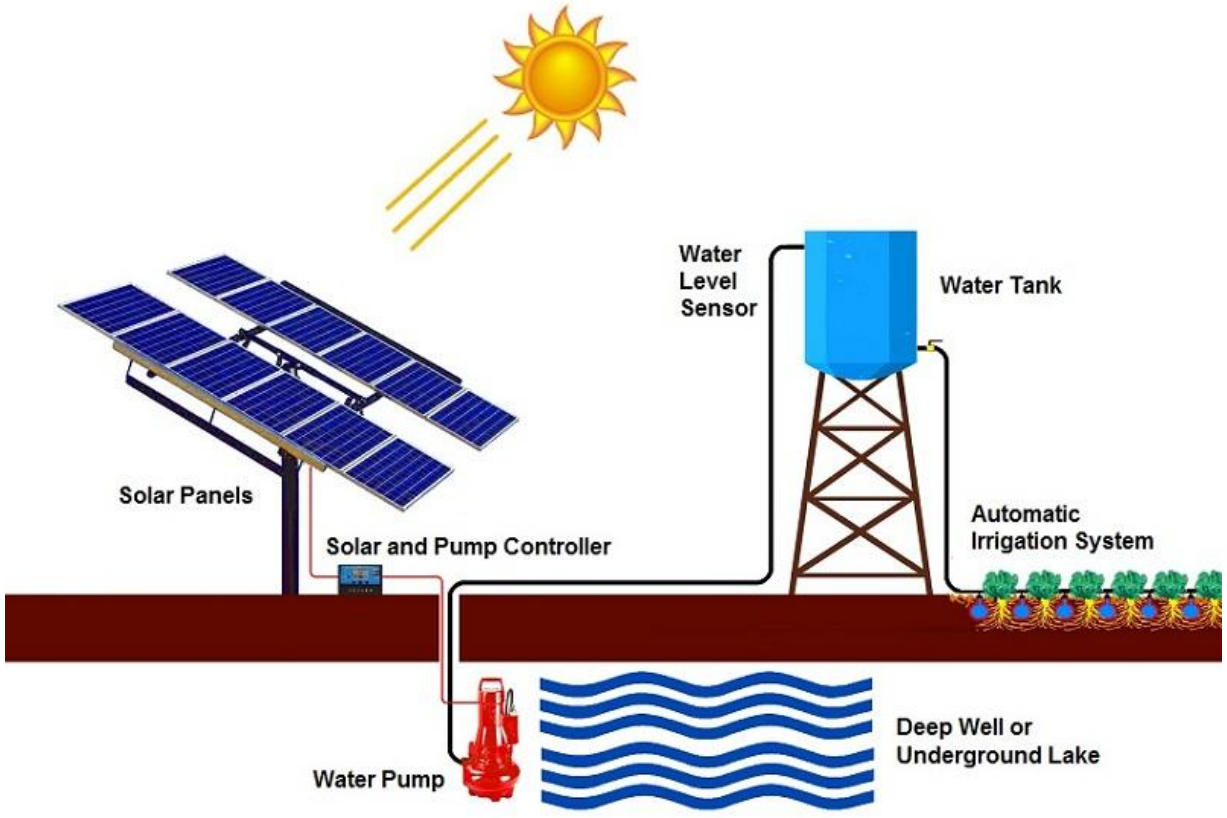
II. YEMENI SOLAR POWERED IRRIGATION SYSTEMS

SOLAR PUMPED IRRIGATION SYSTEMS



- Provide free and continuous access to water throughout the day making irrigation more affordable.
- Replace costly and carbon-intensive diesel and grid electricity systems, reducing emissions.
- Ensure access to water during prolonged droughts or erratic rainfall patterns.
- Enables cultivation in arid and semi-arid regions, mitigating the impacts of climate change on crop yields.

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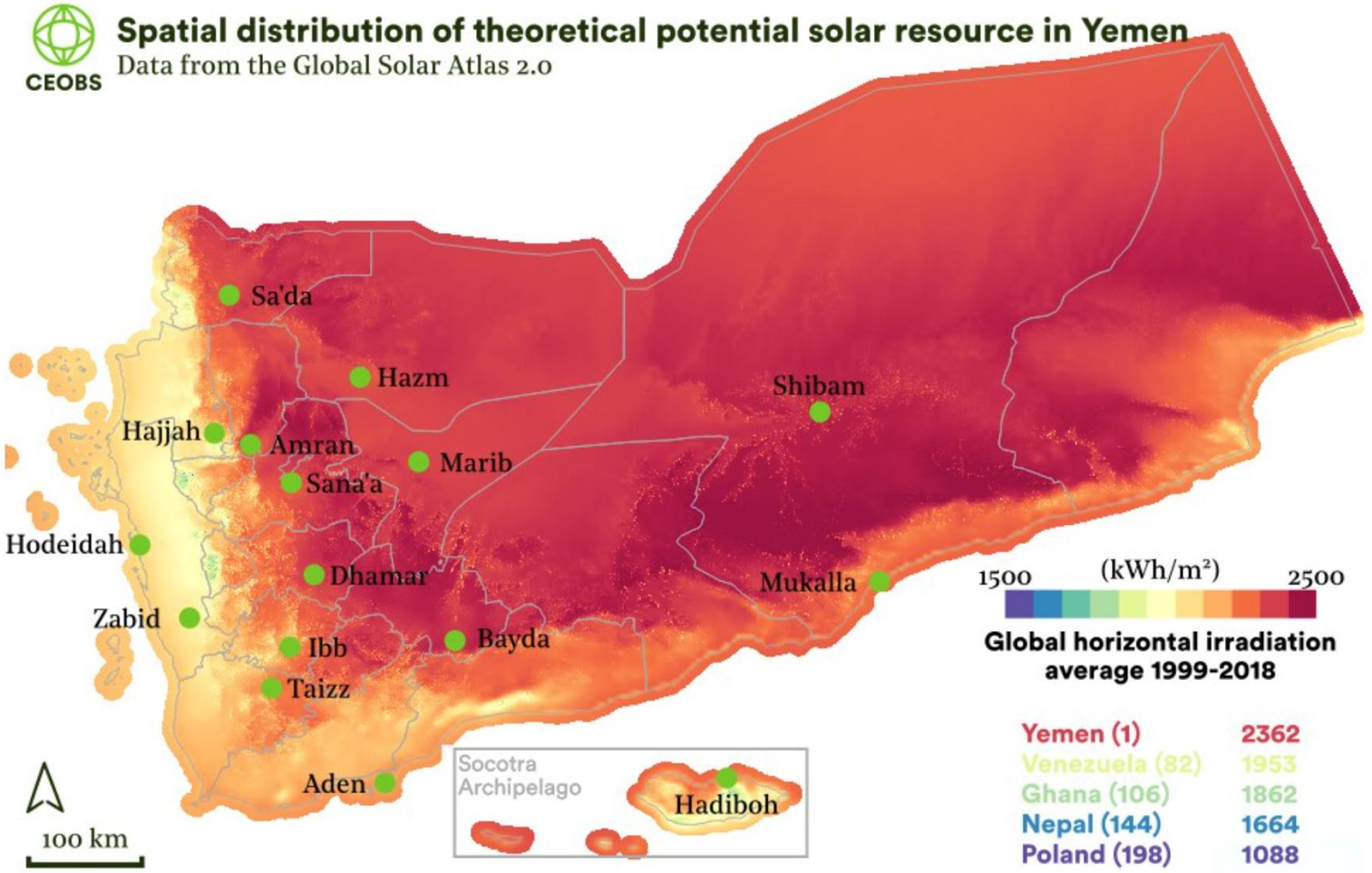
WITH THE BEGINNING OF THE WAR, YEMEN HAS LOST MOST OF ITS OPERABLE POWER PLANT CAPACITIES.

Operable electricity generation capacities of the Yemeni public grid in MW

THE FAILURE OF PUBLIC SERVICES LAID THE FOUNDATION FOR AN UNPRECEDENTED RISE IN SOLAR ENERGY



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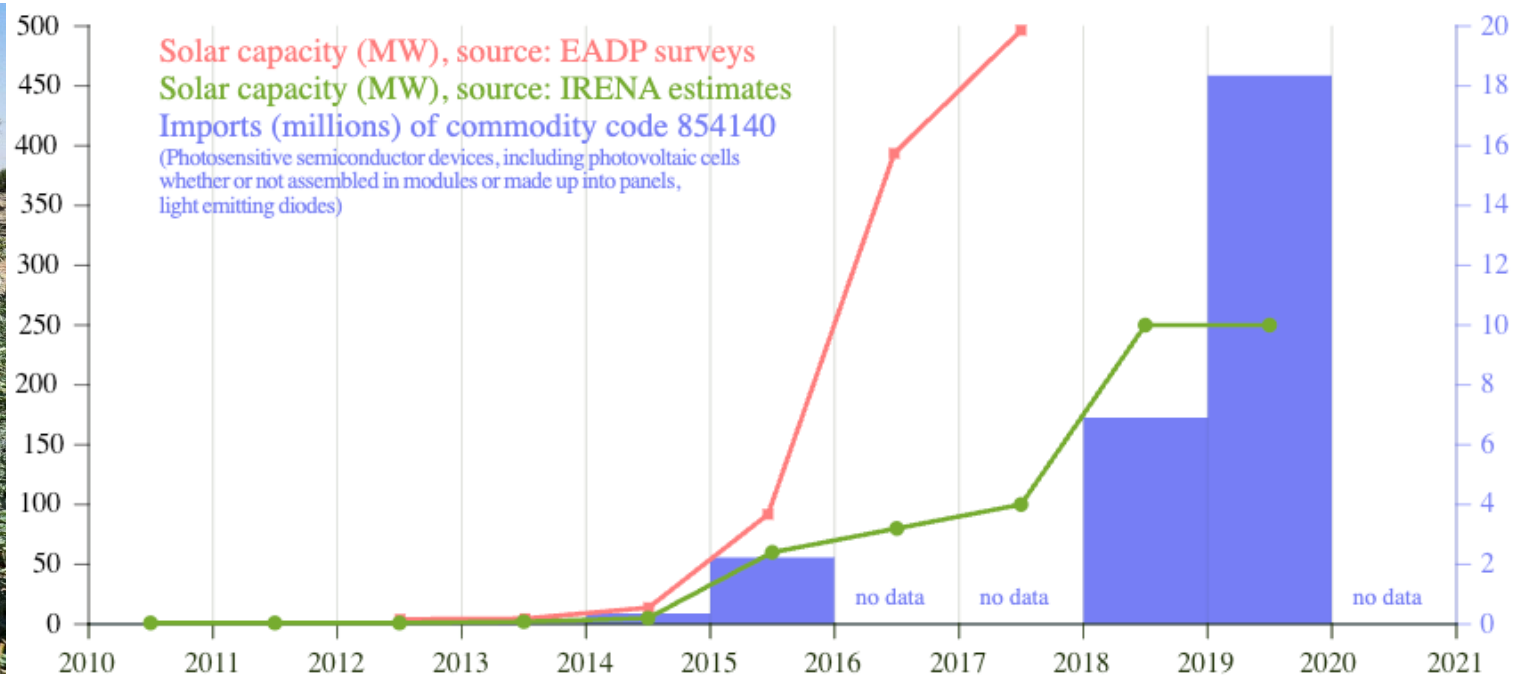
THE SOLAR REVOLUTION IN YEMEN



THE SOLAR REVOLUTION IN YEMEN

Solar power pumps are the only viable option to irrigate.

Tens of thousands solar panels are irrigating fields across Yemen

A "complete shift" to solar irrigation is predicted by 2028.

“If the cost of pumping is zero, then people will pump unless some restriction is put on them.”
World Bank Economist.

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THE SOLAR REVOLUTION IN YEMEN

Significant groundwater declines have occurred since 2018, despite above-average rainfall.

Water tables have dropped from 100 feet to 1,300 feet in central San’a basin

Ancient aquifers are being rapidly exhausted.

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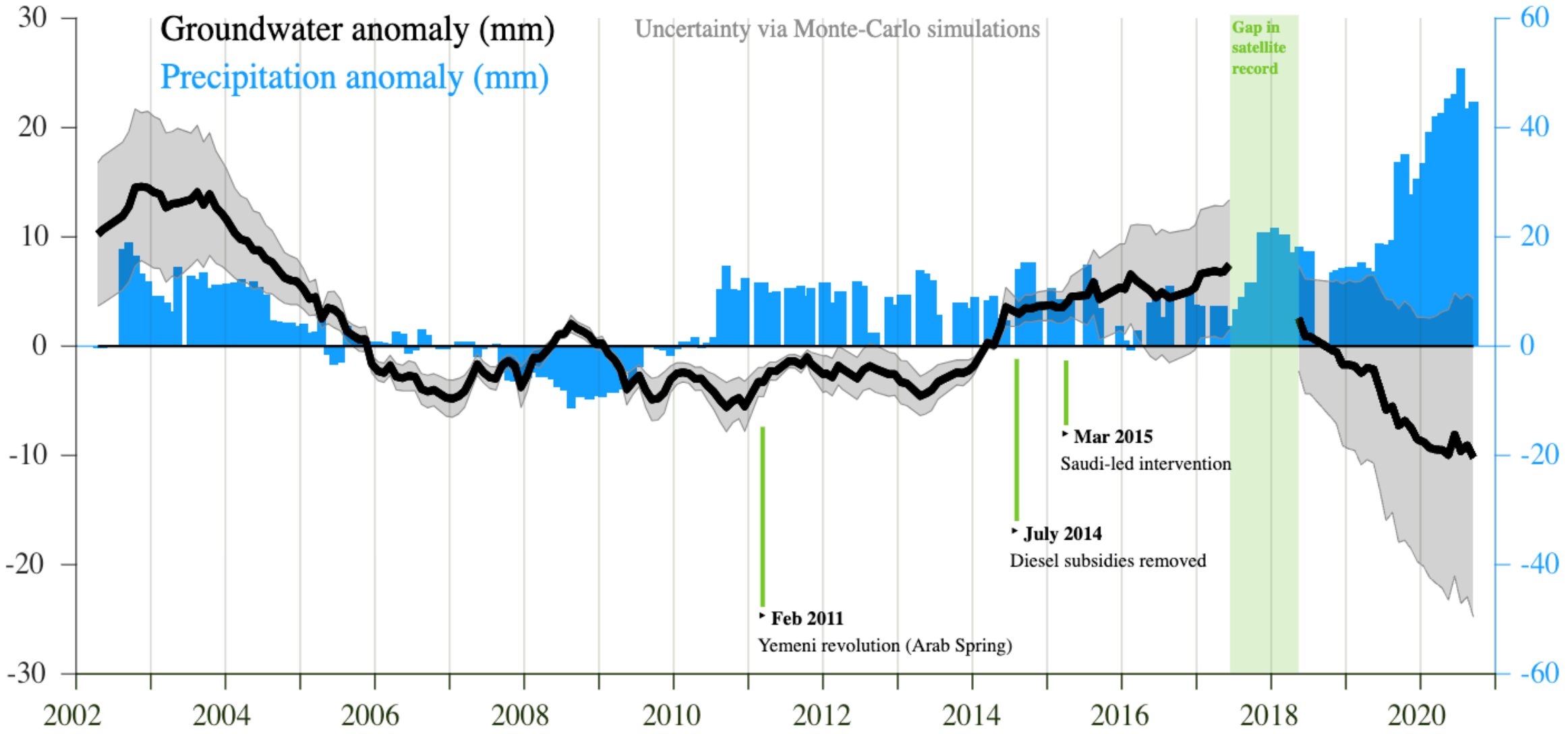
THE SOLAR REVOLUTION HAS LED TO GROUNDWATER DEPLETION IN YEMEN



Nimmo, 2021

SOLAR IRRIGATION ALONE CAN LEAD TO MALADAPTATION

Zero operational costs lead to over-pumping.

Farmers expand cultivation into previously unirrigated areas.

Farmers shift to water-intensive cash crops with high water demand become more viable.

Lack of monitoring encourages unlimited pumping.

TECHNOLOGY ALONE ISN'T ENOUGH, AND NEITHER ARE THE SOLUTIONS BELOW:

Water governance and regulation
Water extraction limits & reallocation policies
Monitoring and water accounting
Ensuring equitable access & targeting the most vulnerable
Foster collaborative governance

ADAPTATION IS INSUFFICIENT, WE NEED A RADICAL TRANSFORMATION

Across both cases changes is driven not by sustainability but the need to save costs and increased profit

In both cases technologies deliver short term gains yet over time they deepen water insecurity and inequalities.

Technologies address the symptoms not the root causes

With technologies alone, we enable the same economic system to proliferate and reinforce itself at the expense of the most vulnerable and the resources.

True resilience requires transformation, not just adaptation. A just transition that empowers local institutions and reshapes how land and water are governed and used.

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ANY QUESTIONS?

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