



معهد الدراسات العليا والبحوث

مركز الدراسات والبحوث

# Economics of water under climate change in Arab Countries: a policy perspective

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# Contents

- Economic value of water resources
- Water situation in Arab countries
- Water situation under climate change
- Managing water resources under climate change



# **1. Introduction: Economic value of water resources**

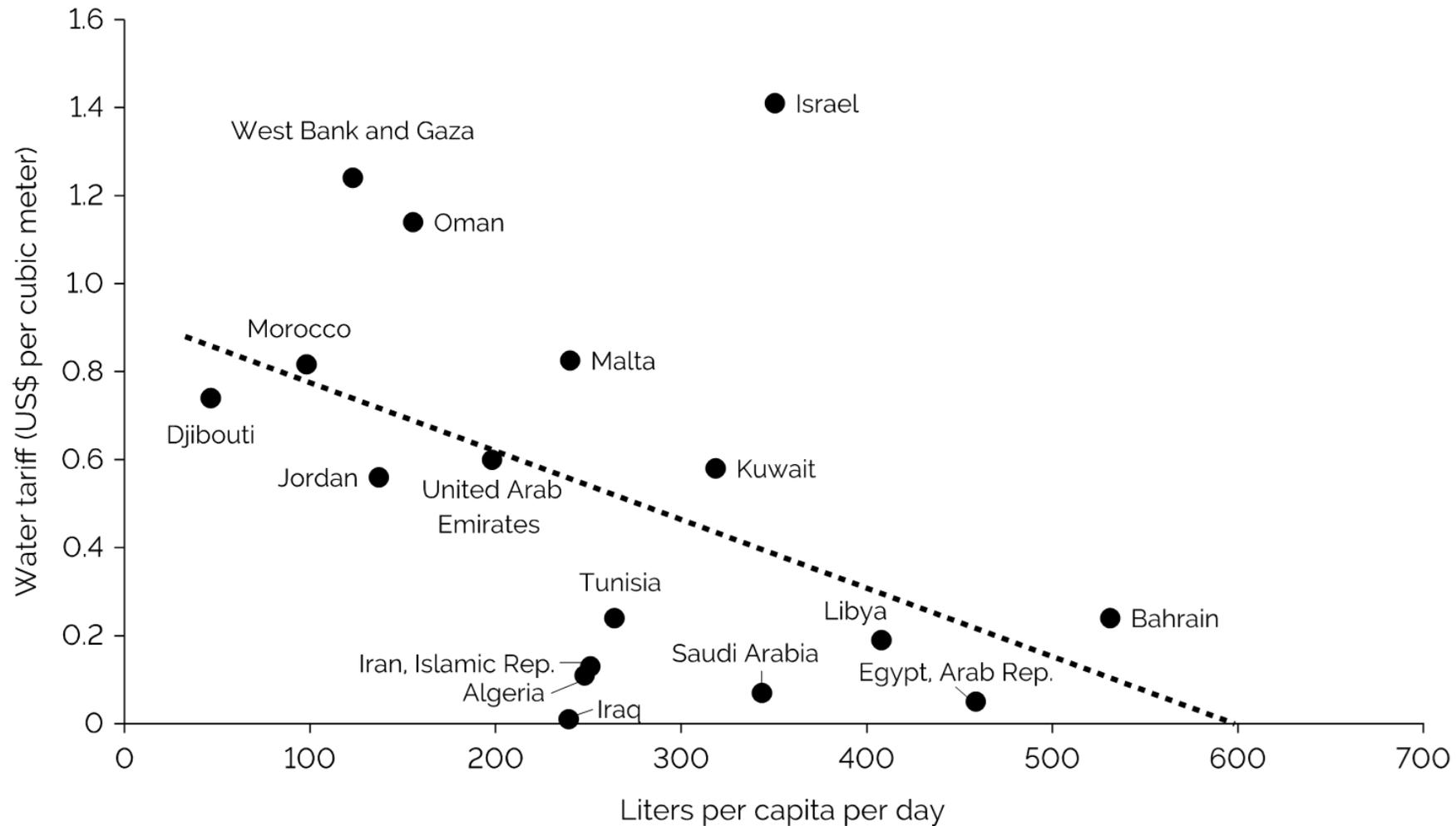
# Economics and resources scarcity

- Economics is a social science concerned with questions of how to think about the “optimal” allocation of scarce resources by individuals and society across competing needs, and what role governments could play in improving such allocations.
- A standard economic tool for thinking about optimality “which reflects the notion of efficiency” is whether any given allocation of resources could be changed to bring greater net benefits

# Market system, price signals & economic value of water

- The allocation of resources in an economy is achieved through price signals, with producers and consumers deciding how much of a good to produce, and to consume, using prices.
- Still, most water resources are not traded in free markets and thus there is no clear relationship between their price and their value, as water prices often reflect attempts for cost recovery and not value delivered.
- Valuing water is critical because it helps us recognize its true worth.
- Meanwhile, the value of water varies, depending on who is using it, and why, and the absence of water may lead to adverse consequences.

# Tariffs & water withdrawal per capita

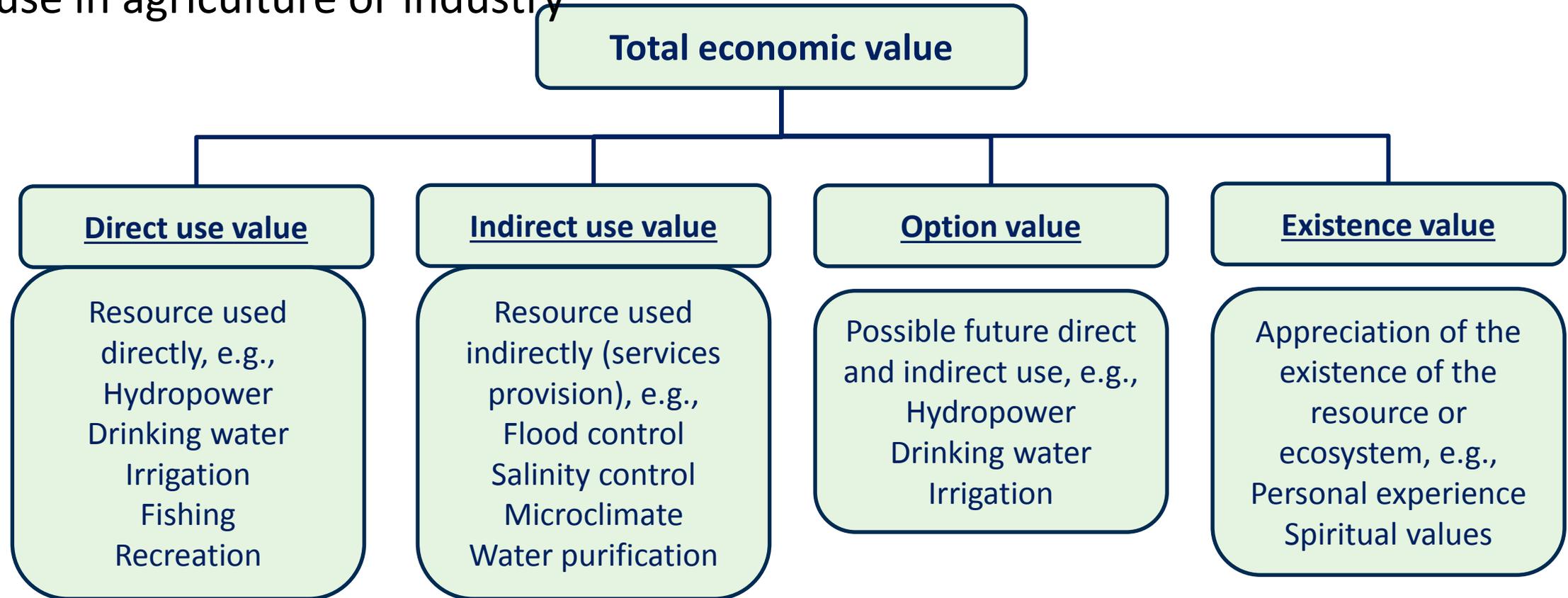


Source: World Bank staff calculations.

Note: Tariffs are for the equivalent of 100 liters per capita per day.

# Need for economics of water resources

The economic value of water resources goes beyond the direct benefits derived from its use in agriculture or industry



- Incorporating economic valuation into water-related decision-making is fundamental to attaining efficiency.



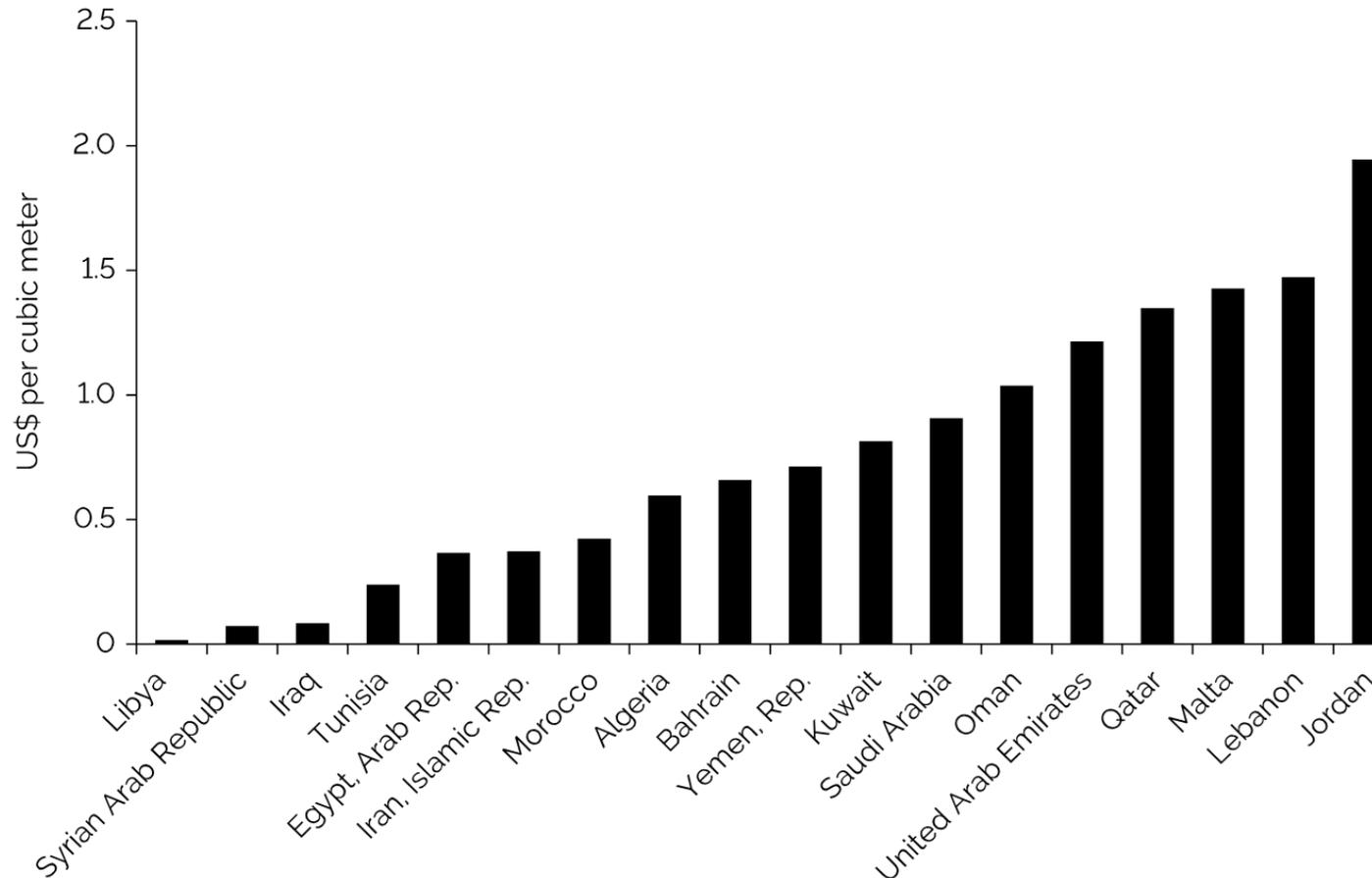
## **2. Water situation in Arab countries**

# Water situation Arab countries: an economic perspective

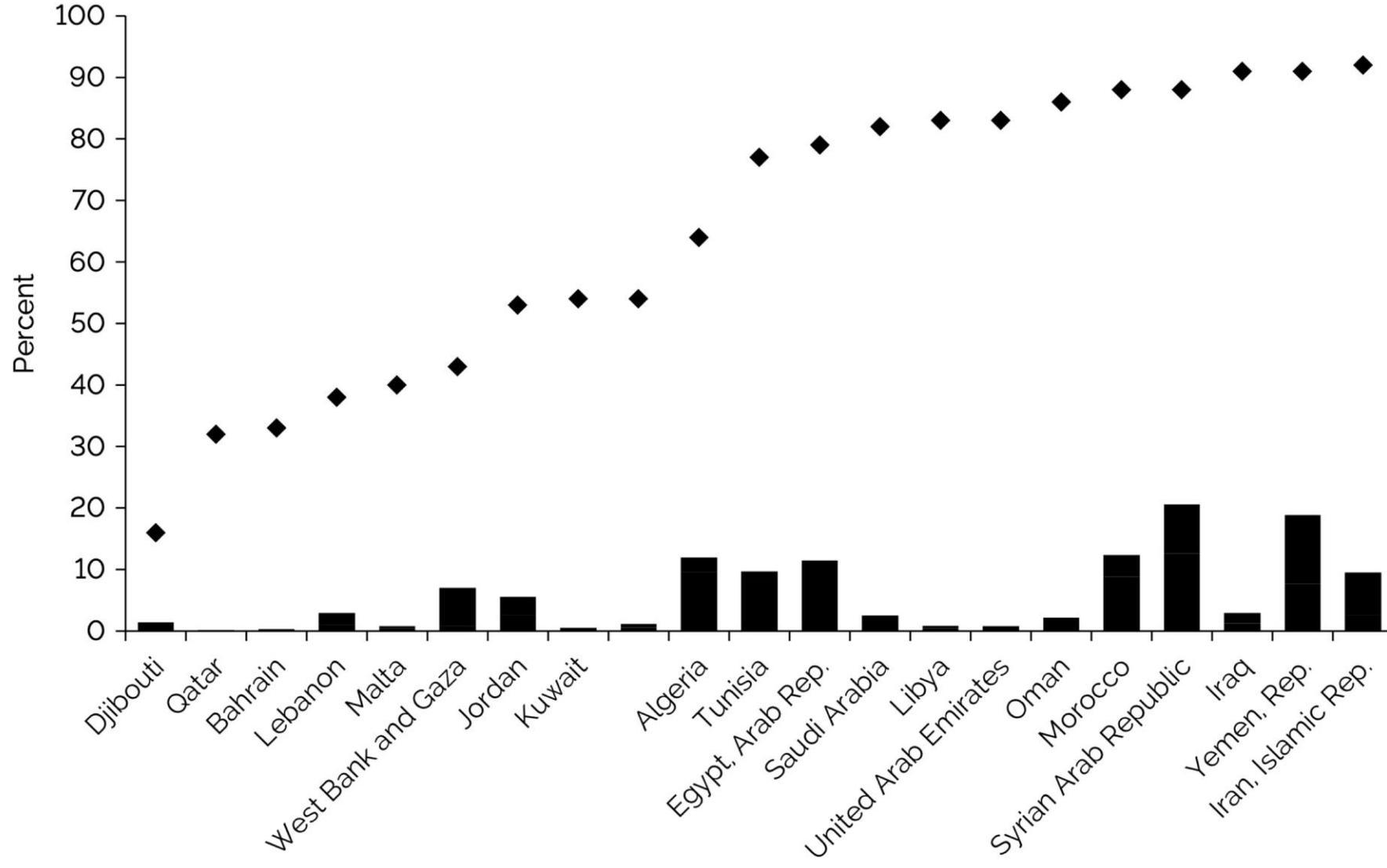
- Often, policies focus on developing supply rather than integrated management of the resource.
- Lack of water demand management led to reduced water use efficiency in some uses, most notably in agriculture, where self-sufficiency policies promoted food production with negative impacts on land and water resources.
- Allocations to agriculture now are more like acquired rights, and there is no real mechanism for reallocating water to growing urban and industrial centers.
- Even within the agriculture sector, such policies undermined the diversification and production of high-value crops, with an opportunity cost to the economy.

# Agriculture Contribution to GDP

- By 2018, total water withdrawals consumed by agriculture contributed only a modest 3% to regional GDP. Additionally, water withdrawals per unit of GDP in the agrarian middle-income countries of MENA are among the highest in the world.



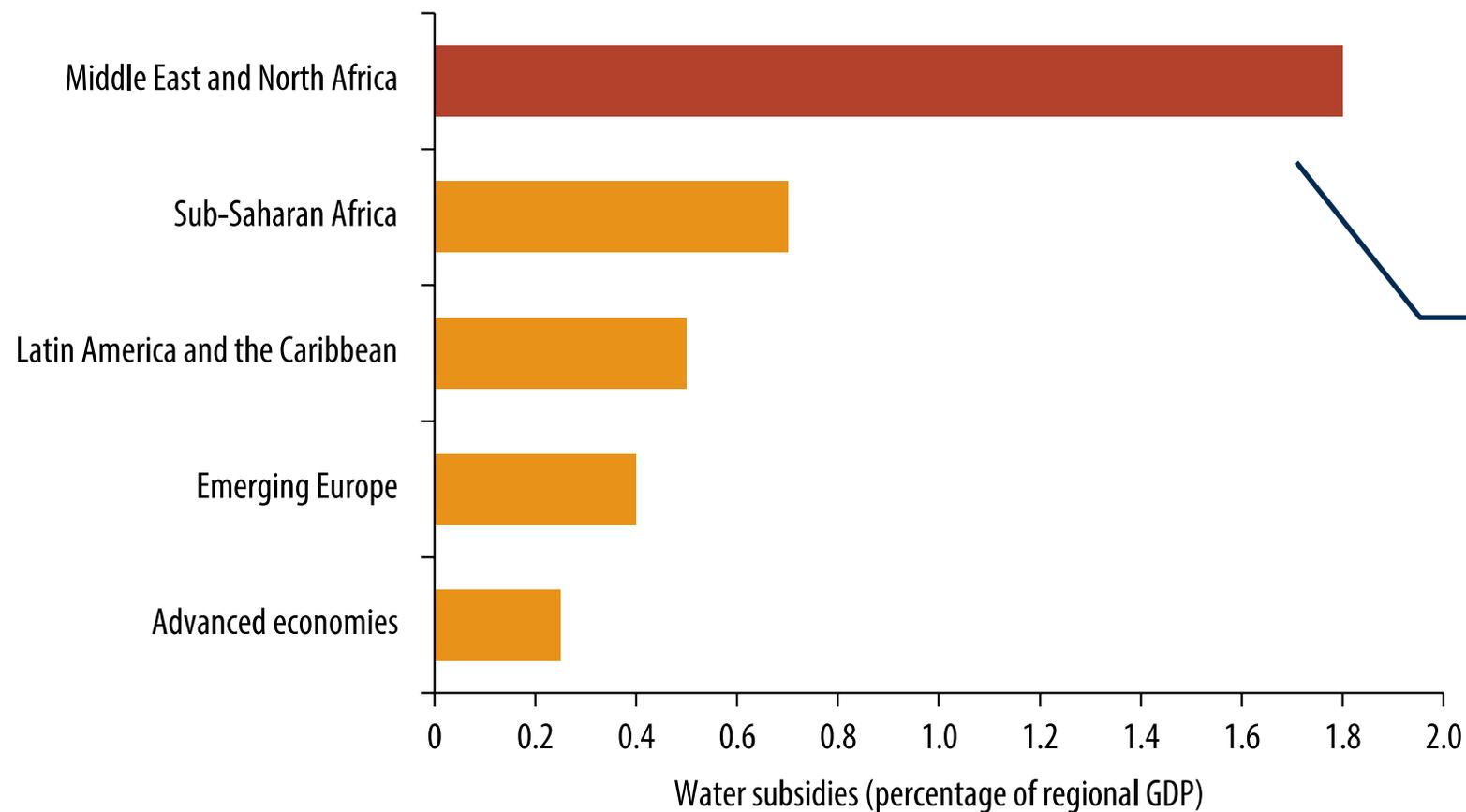
# % of total water allocated to agriculture & its contribution to GDP



# Water situation in Arab countries: (Water, Sanitation and Hygiene) (WASH)

- Fees in the urban water and sanitation service sector are not dependent on free markets that provide price signals.
- In most cases, only part of the operational costs are recovered (10% to 70% of such cost).
- This means that the sector is typically subsidized. But is this good? This depends on:
  - Cost recovery means the value of water is equal to zero.
  - Water subsidies can benefit those with existing connections to sewerage or water networks, many are non-poor.
  - Subsidies send the wrong signal, that water is of a low value, leading to over-consumption.
  - Encourage activities with excessive use of water, with crops in agriculture and/or industrial activities.

# Urban water utilities subsidies (% of regional GDP, by world region)



Part of the problem is that WASH sector is expected to incur losses meaning less focus on efficiency

Source: Kochhar et al. 2015.

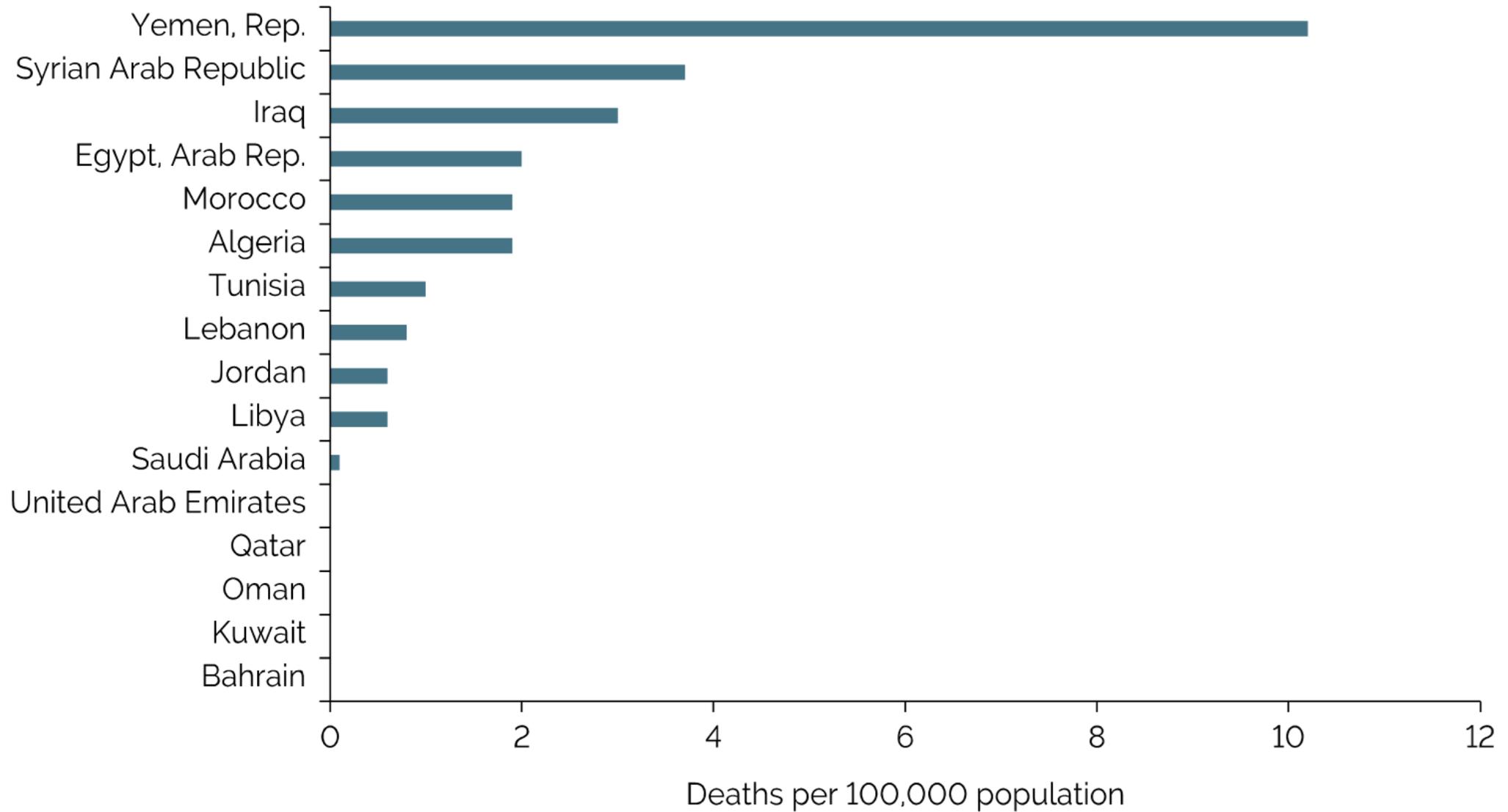
Note: Subsidies are defined as the difference between actual water charges to water users and a reference price that would cover all costs associated with supplying that water.

# Water-related externalities

- Typically, the market deals with two parties (producers & consumers)
- External effects: External effect (+ or -) occurs when the production or consumption of market parties affects a third party.

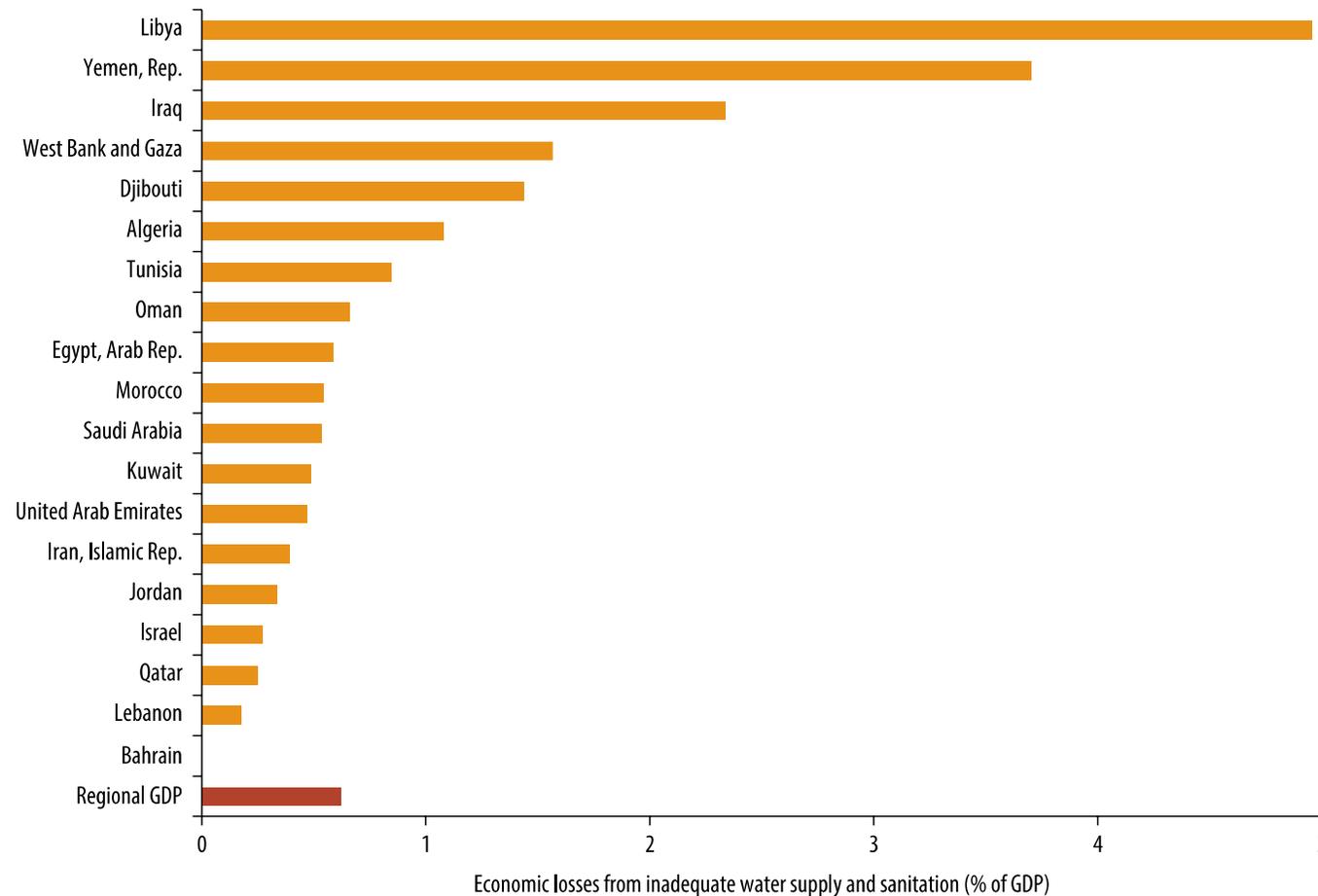
Type of water use effect	Type of negative externalities	Examples of externalities involved
Sink	Water pollution	<ul style="list-style-type: none"><li>• Burden of waterborne diseases.</li><li>• Declining crop yields because of salinity</li></ul>
Resource	Water depletion	<ul style="list-style-type: none"><li>• Disappearing aquatic ecosystems and fisheries</li><li>• Increasing cost of groundwater withdrawal.</li></ul>

# Mortality-rate attributed to exposure to unsafe WASH (2016)



# Water-related externalities

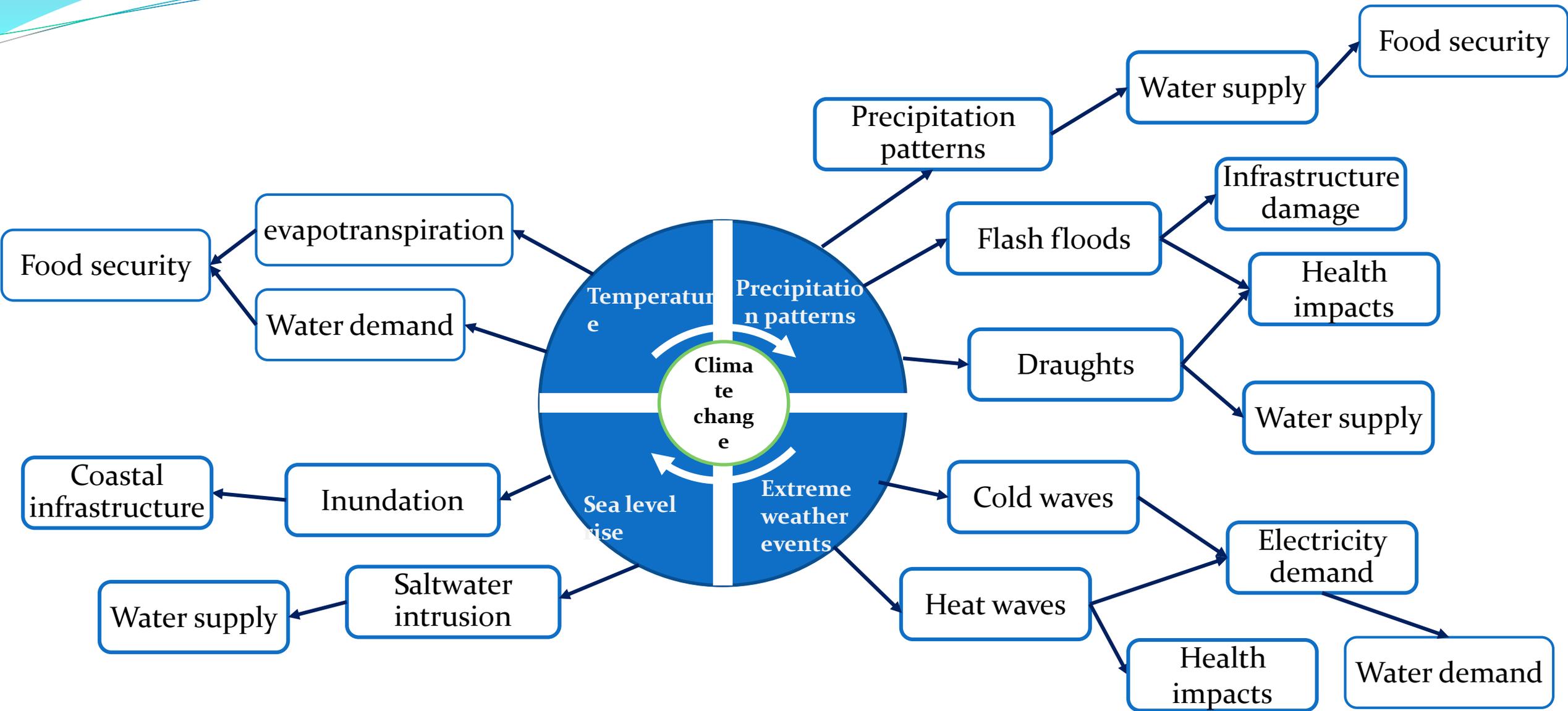
- The economic cost of negative externalities related to water pollution due to inadequate WASH is estimated at **US\$21 billion** annually (using Value of Statistical Life).
- This includes health care costs + lost productive time due to sickness + premature mortality + the value of time savings clean water and sanitary facilities were closer to home



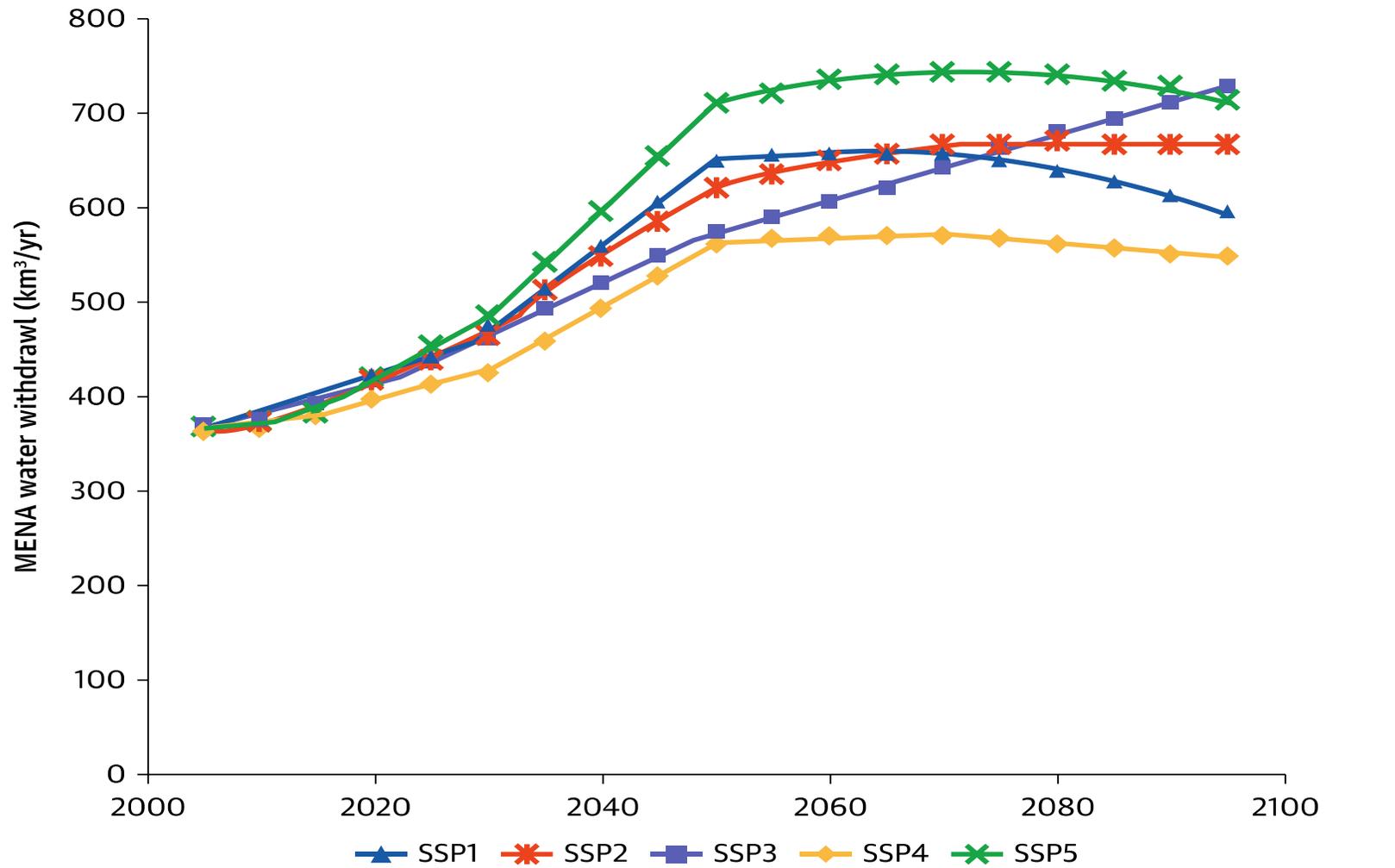


### **3. Water situation under climate change**

# Climate change impacts on water resources



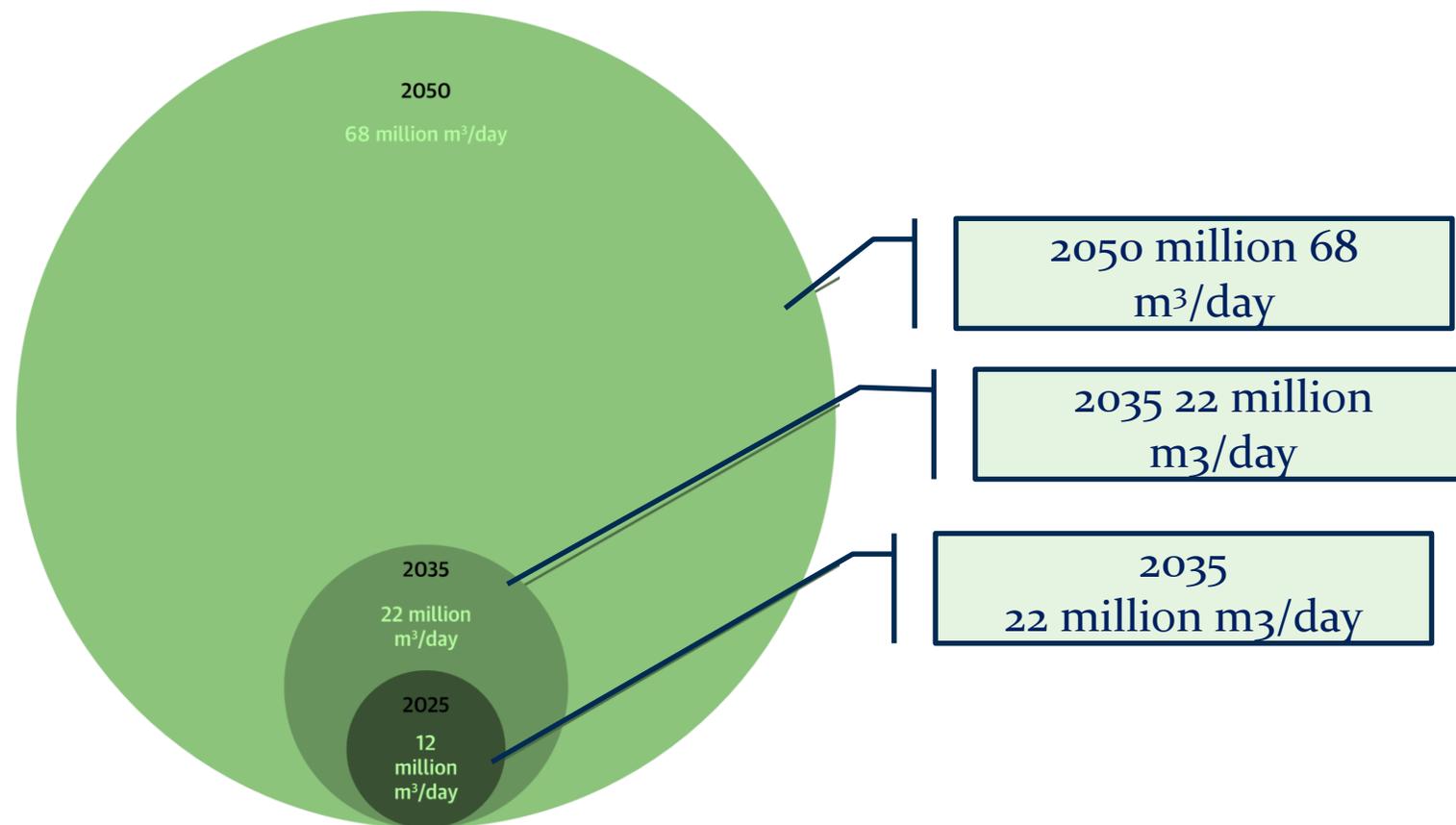
# Projected water demand in the MENA region (2000 - 2100)



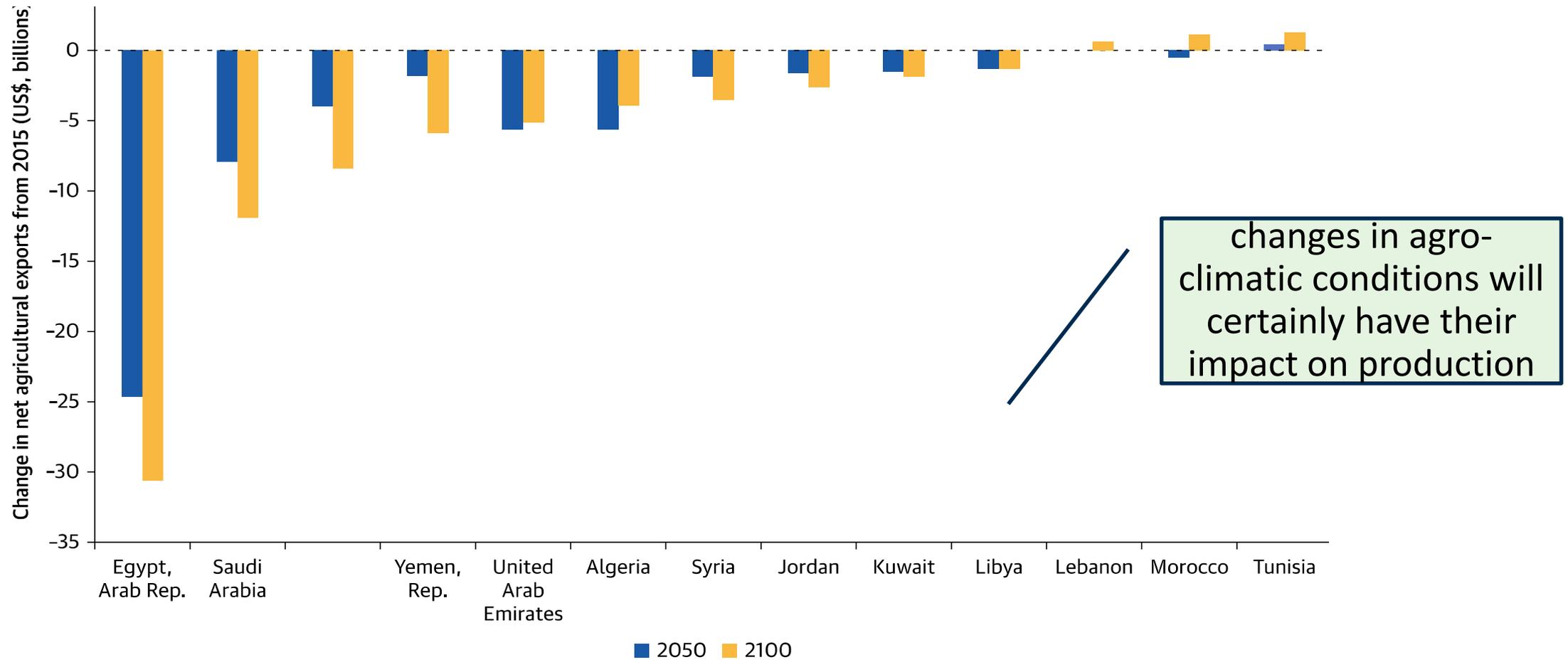
Source: University of Maryland calculations.  
Note: SSP = Shared Socioeconomic Pathway.

# Projected increase in water supply capacity needed in the MENA region by 2050

Even under moderate improvements in agricultural productivity and land use practices (“middle of the road” scenario), the region would still need to increase supplies by 35% by 2030 and by 60% by 2050 from current levels. This means significant additional volumes.



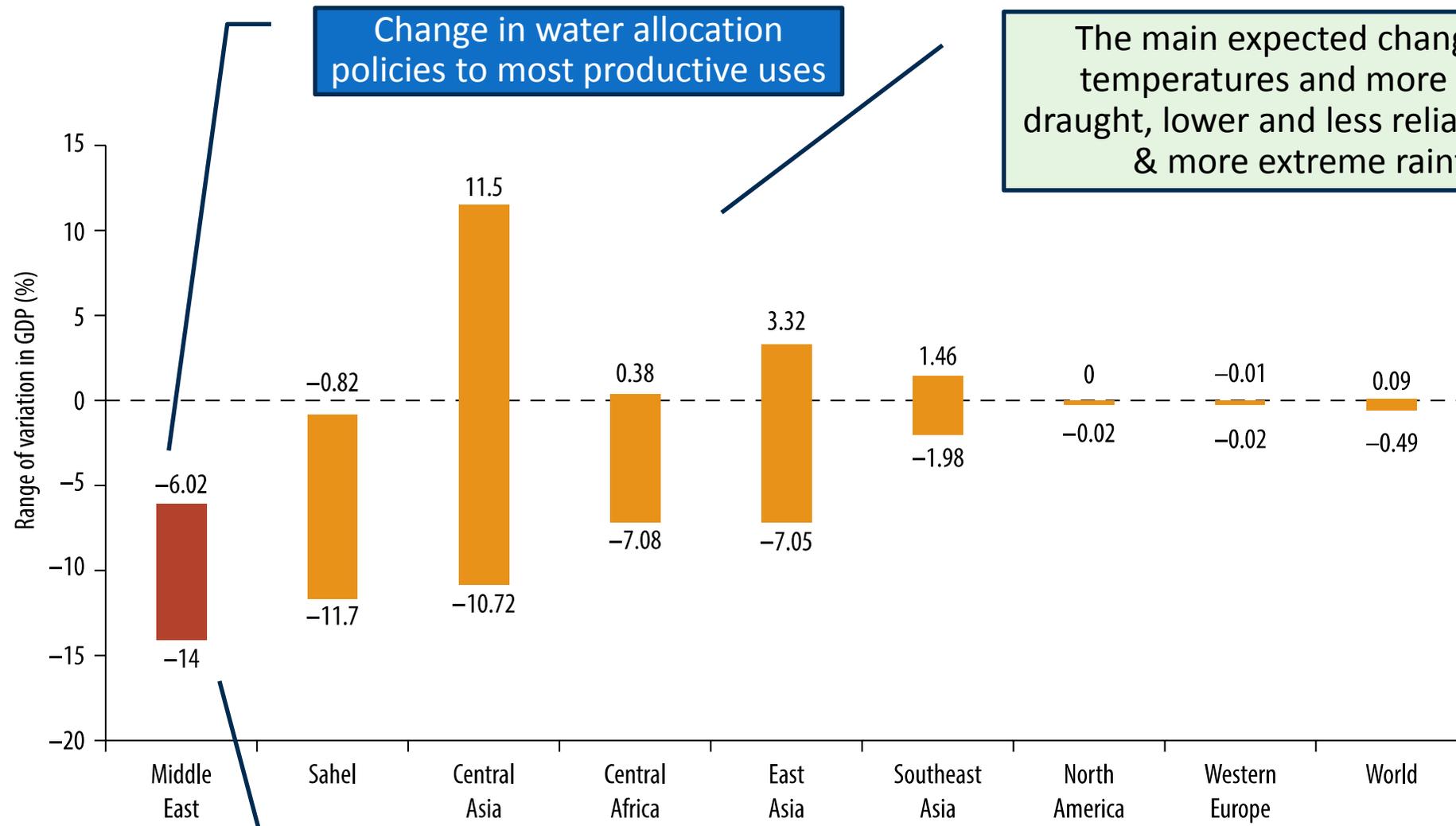
# Projected change in net agriculture exports MENA region (2050 - 2100)



Source: World Bank and University of Maryland calculations.

Net exports are calculated as the difference between consumption and production by prices in the Global Change Assessment Model under (RCP 6 scenario i.e., the moderate economic development scenario).

# Economic impacts of climate change-related water scarcity (2050)



Change in water allocation policies to most productive uses

The main expected changes are higher temperatures and more heat waves & draught, lower and less reliable precipitation, & more extreme rainfall events

Business as usual water allocation policies

Source: World Bank 2016.



## **4. Managing water resources under climate change: An economic perspective**

# What needs to be done

- Proper economic valuation of different water uses and integration of such values into decision-making.
- There is a need to integrate short-term, mostly reactive, livelihood and food security needs, with a balanced long-term approach to enhance resilience.
- Still, changing the incentive structure for water use requires careful consideration of the repercussions on food security & distributional effects.
- Invest in innovative policies and practices that encourage research, and technology development aiming to improve water efficiency. However, low pricing would limit the incentive for doing this.
- Nonconventional water supplies, including desalination and water recycling, offer opportunities to mitigate water scarcity, especially for high-value-added water uses.

## Reactive action vs. Proactive action

Not knowing the value of something can lead to mismanagement, poor investment, externalities, and ultimately loss and failure.



***Thank you***