

# Water in the balance

## Review of key economic findings

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Tuesday, 1 December 2020

Workshop on Economic Implications  
of Climate Change and Water  
Scarcity in the Mashreq Region



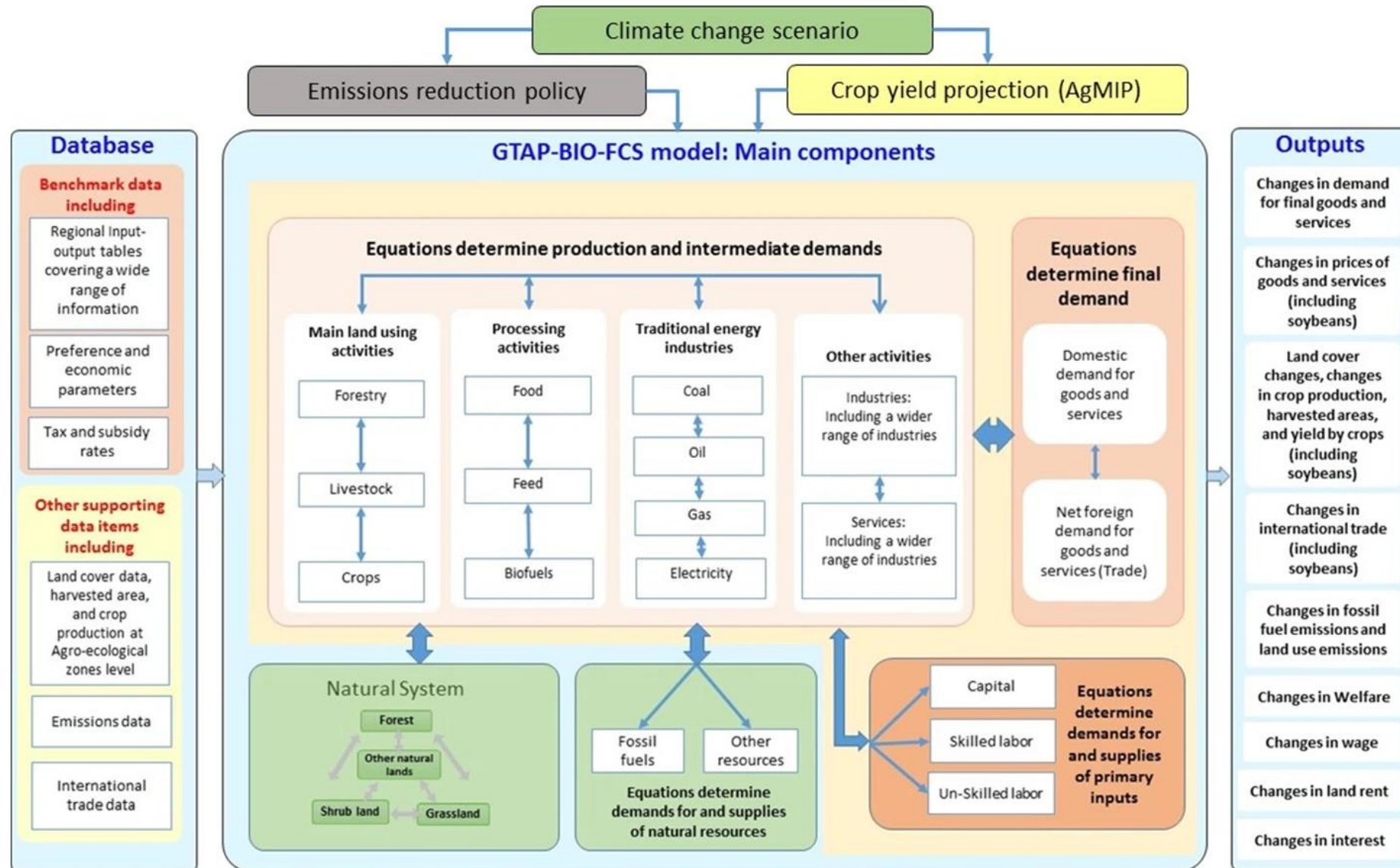
WORLD BANK GROUP



**GWSP**

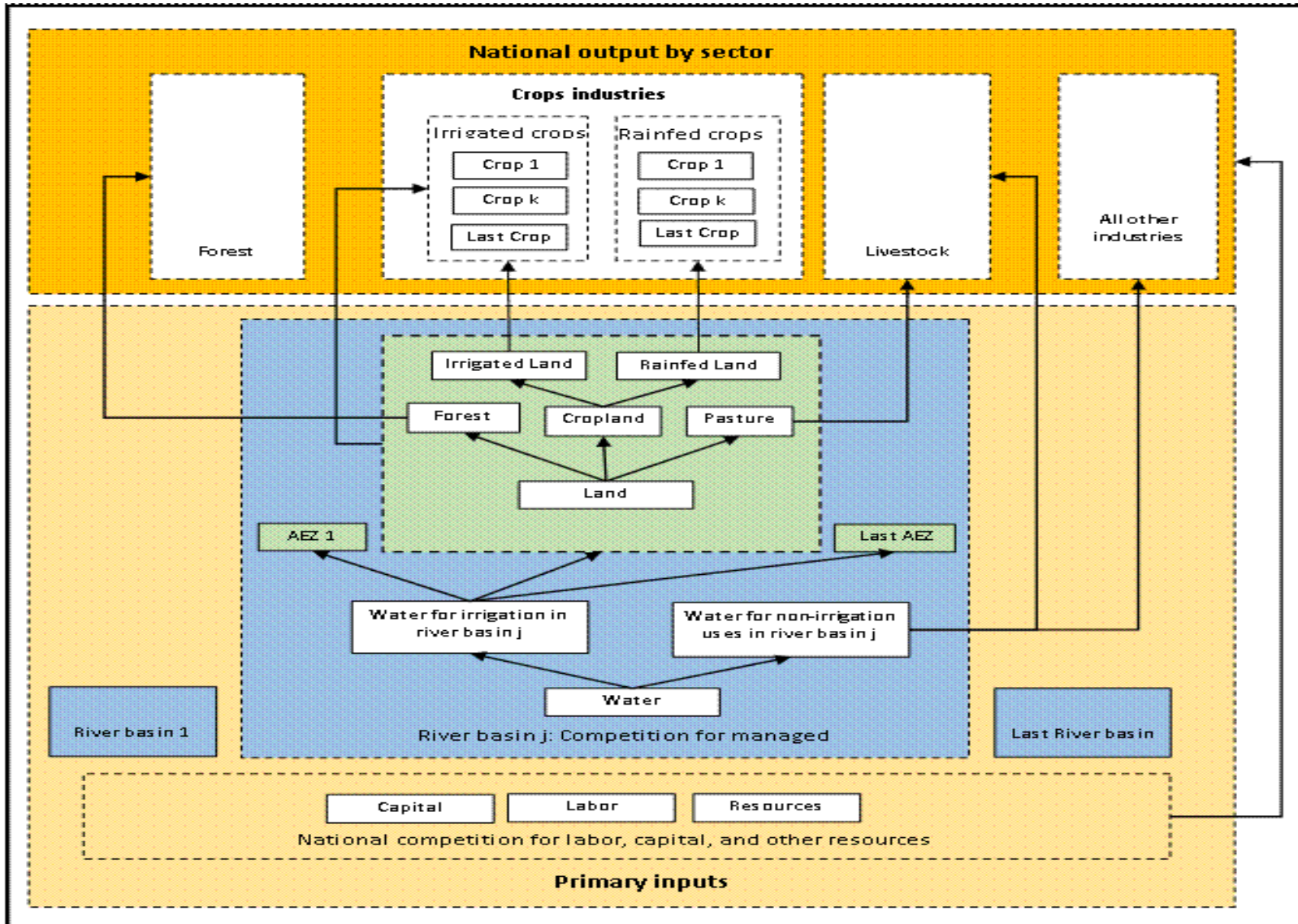
GLOBAL WATER  
SECURITY & SANITATION  
PARTNERSHIP

# An overview of GTAP-BIO-W



Peña-Lévano L., Taheripour F., and Tyner W. (2019) "Climate change interactions with agriculture, forestry sequestration, and food security," *Environmental and Resource Economics*, 74, pp 653–675.

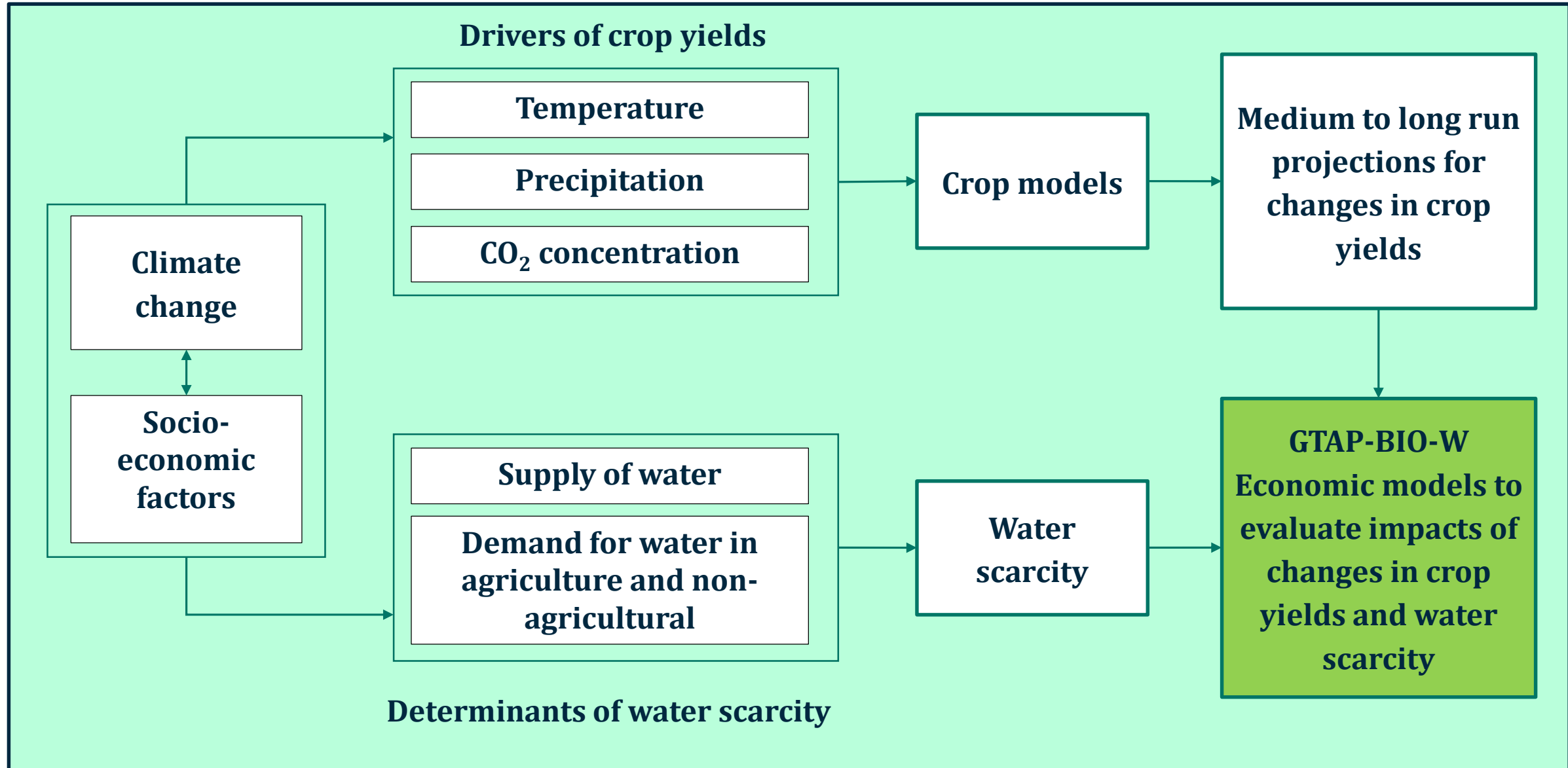
# Water allocation and water-related sectors



Water and land allocation modules operate at river basin by Agro-Ecological zones

Crops, livestock, and several industries use water in their production function

# Research methodology: a schematic representation



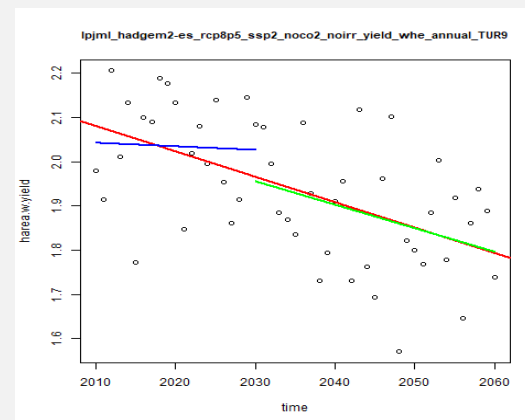
# Projected changes in crop yields

Climate change is expected reduce yields

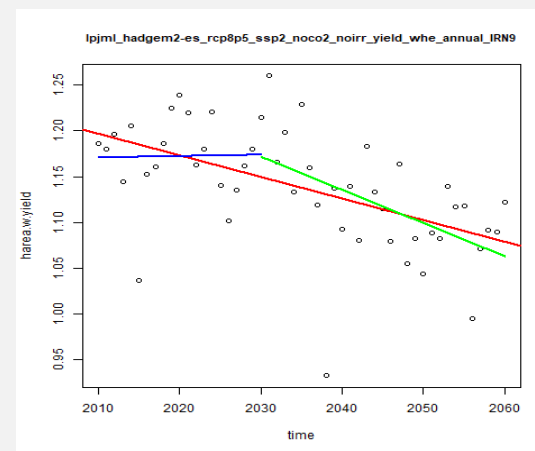
Changes in crop yields due 5% increase temperature in the Middle East

Country	Rice	Wheat	Coarse grains	Oil crops	Sugar crops	Fibers	Vegetables and fruits	Other crops
Iran	-20.3	-56.8	-41.6	24.5	10.1	-20.5	3.2	6.1
Iraq	0.0	-71.6	-60.2	12.9	10.1	0.0	4.0	-1.7
Jordan	0.0	-53.3	-28.6	13.8	0.0	0.0	2.4	2.4
Lebanon	0.0	-43.6	-38.7	13.7	10.4	0.0	3.3	8.2
Syria	0.0	-44.0	-37.3	13.7	10.3	1.1	2.8	4.7
Turkey	-30.9	-49.1	-37.8	13.9	10.2	-8.3	3.2	2.2
RME	-2.6	-59.9	-20.9	13.7	10.7	1.7	5.0	3.6

Two examples for wheat



AEZg in Turkey

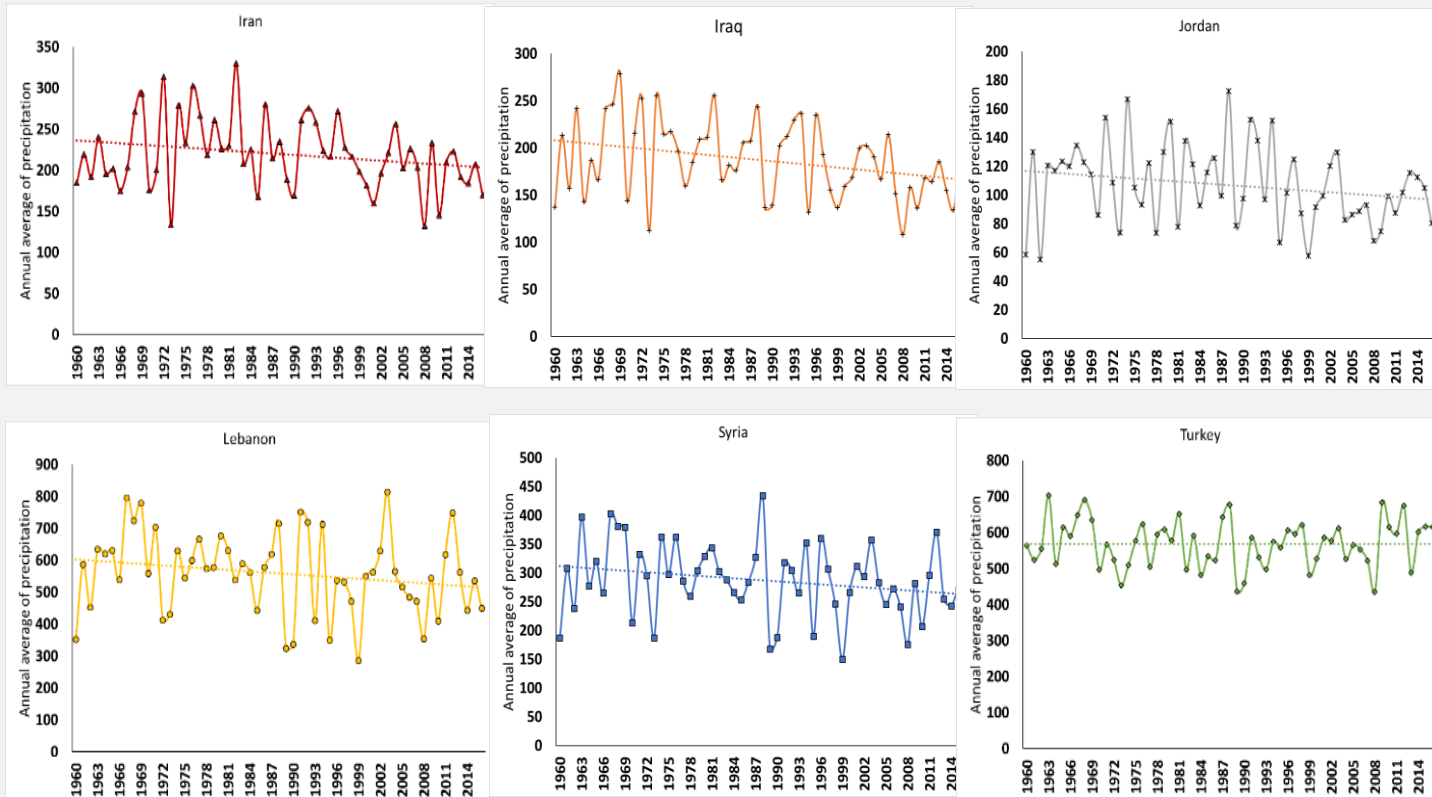


AEZg in Iran

# Projected changes in water supply

Water supply is projected to fall in the Middle East

## Changes in rainfall: Historical observations



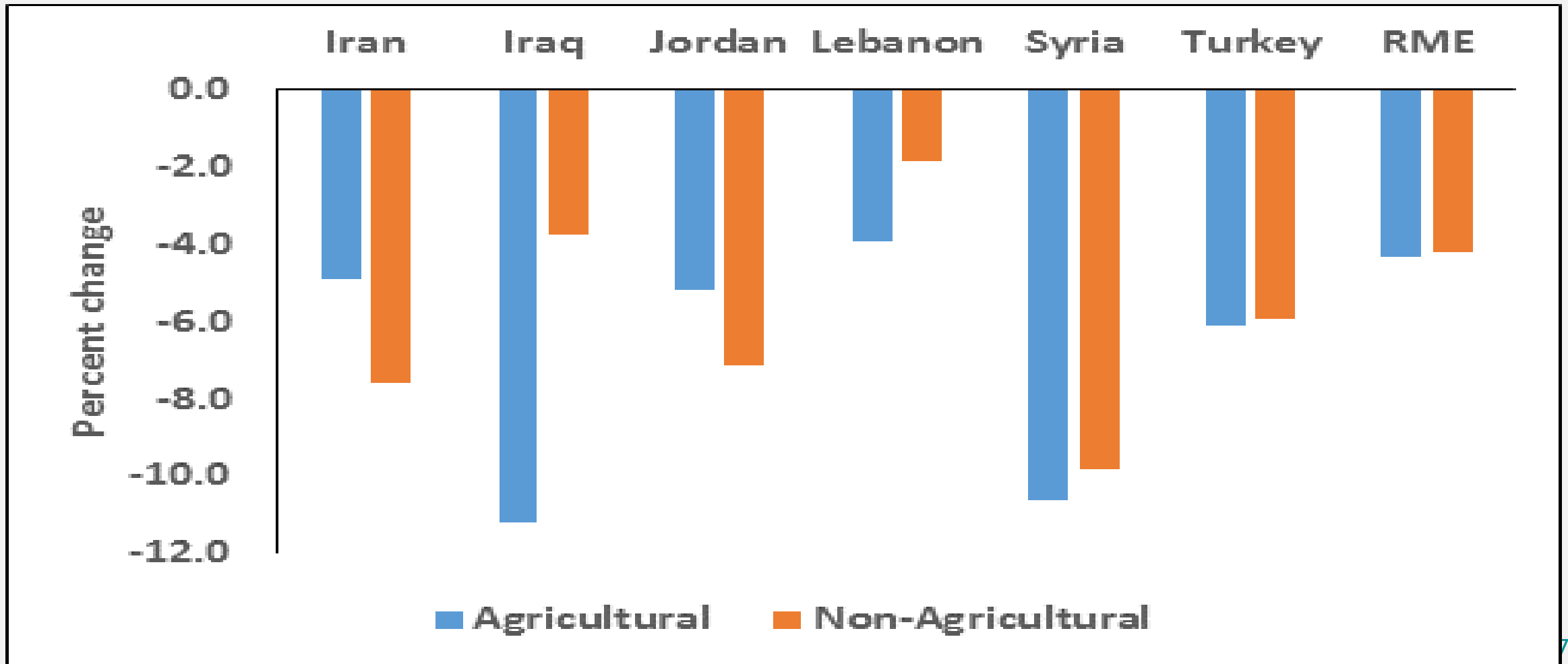
## Future projections

Many key papers have addressed the issue of water scarcity in the Middle East.

A recent research developed at Purdue University using a hydrology model (Water Balance Model) projects declines in water supply in the Middle East ranging from 13% to 28% by 2050.

# Idled capacity

Water scarcity generates idled capacities in agricultural and non agricultural activities

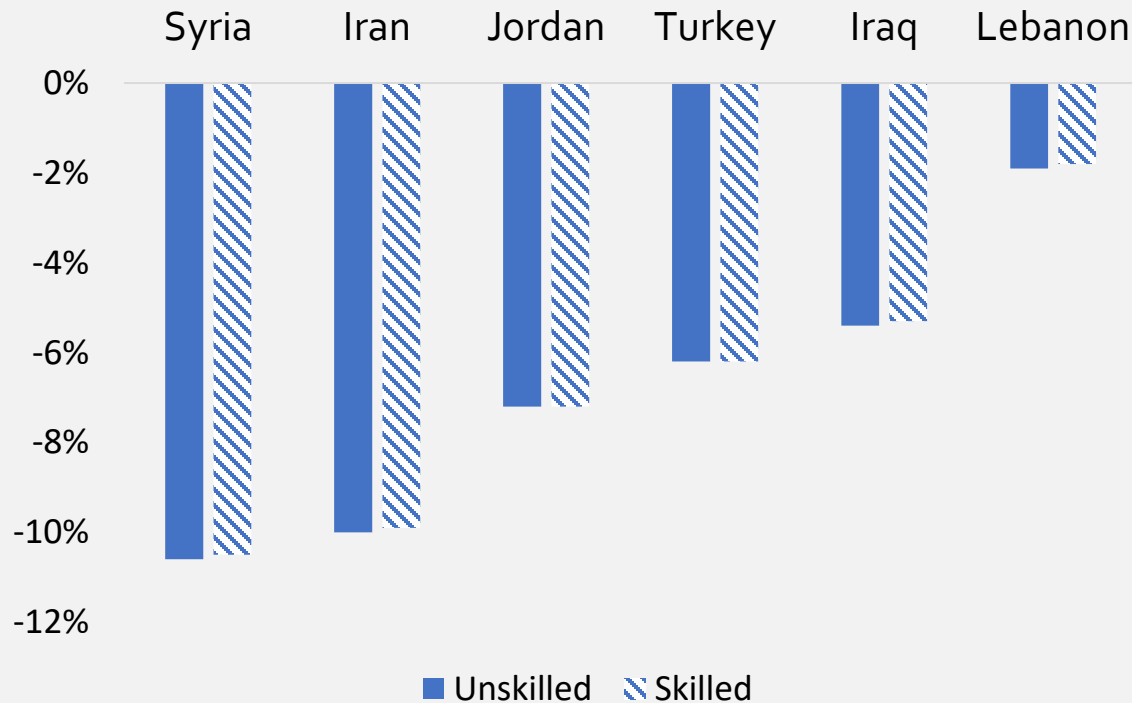


# Drained employment

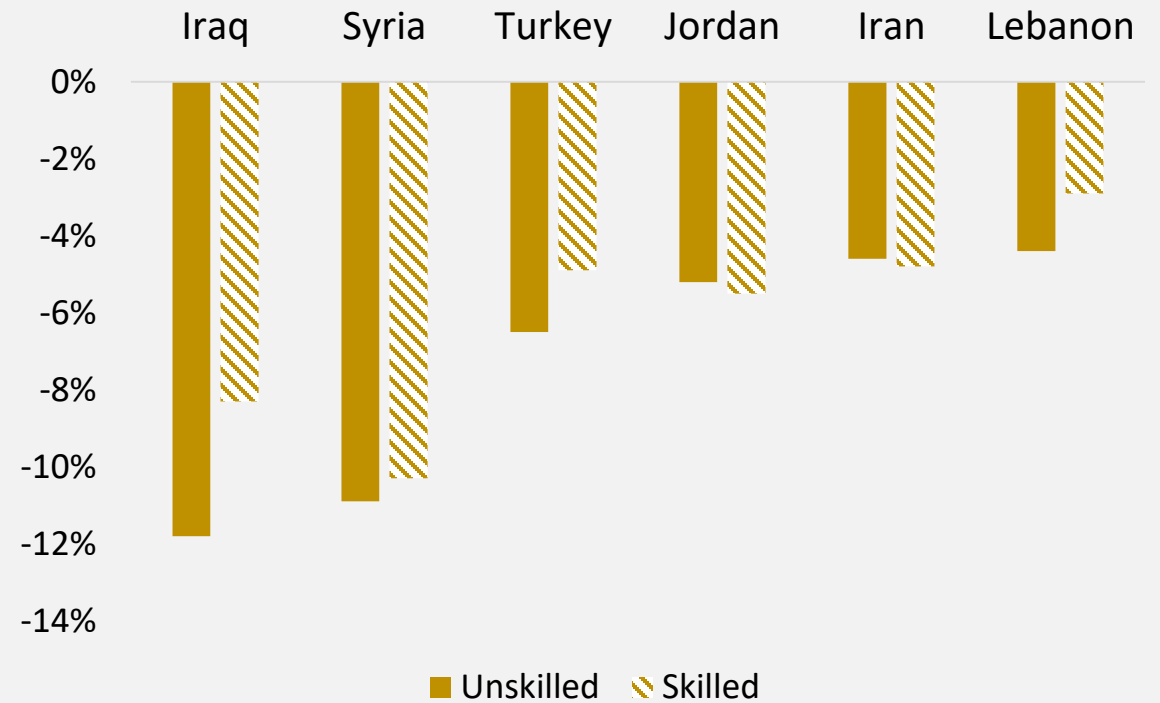
Water scarcity **reduces** labor demand.

## LABOUR DEMAND

### Non-agricultural activities



### Agricultural activities





# Impact on individuals

Lower incomes

Higher food prices

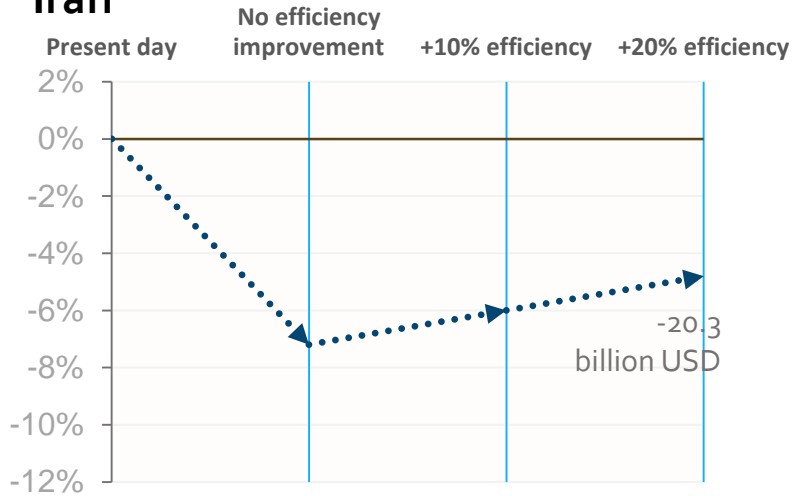
**High political and social costs** beyond food security and poverty



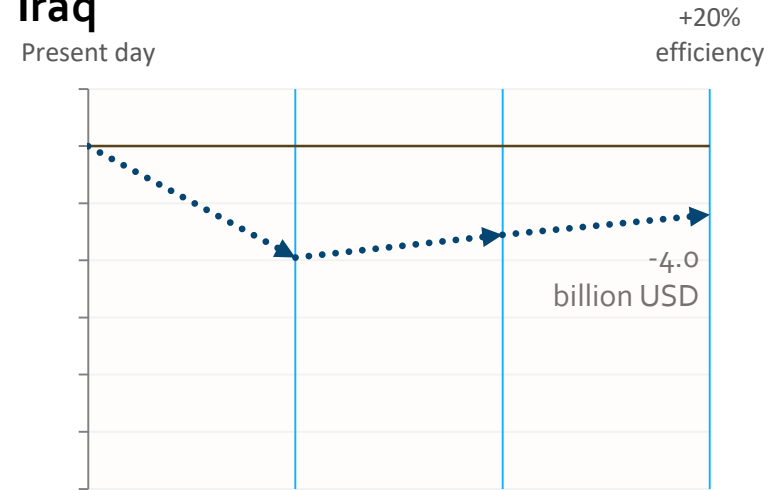
# Water-use efficiency: benefits and limits

## Water scarcity scenarios

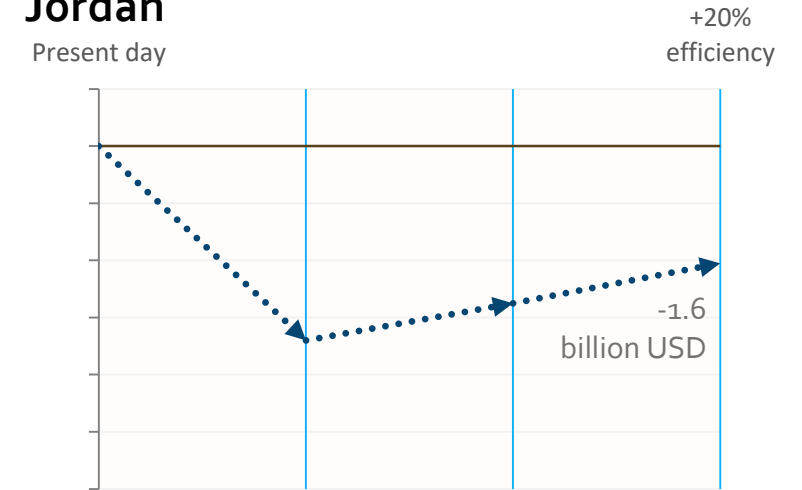
### Iran



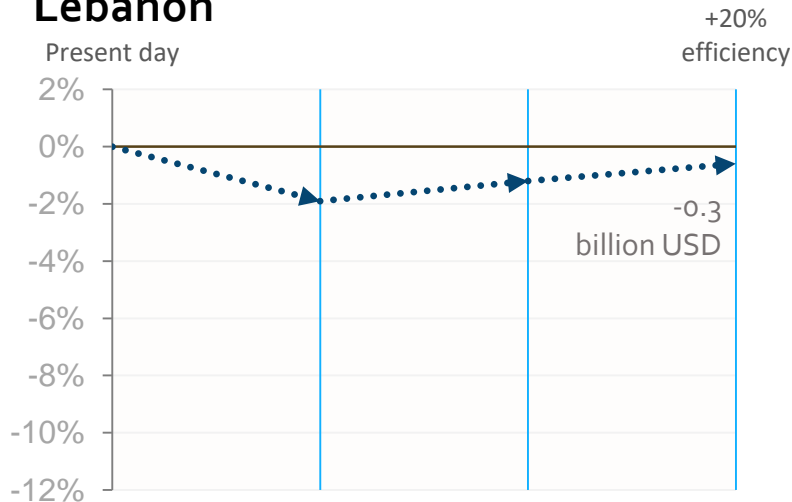
### Iraq



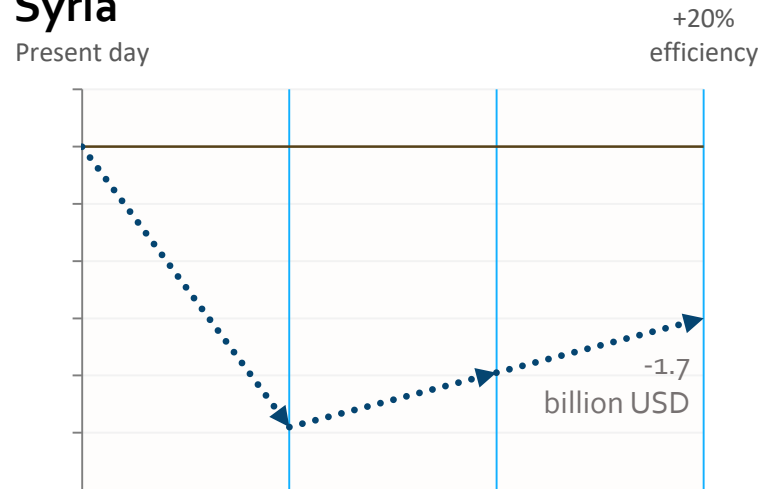
### Jordan



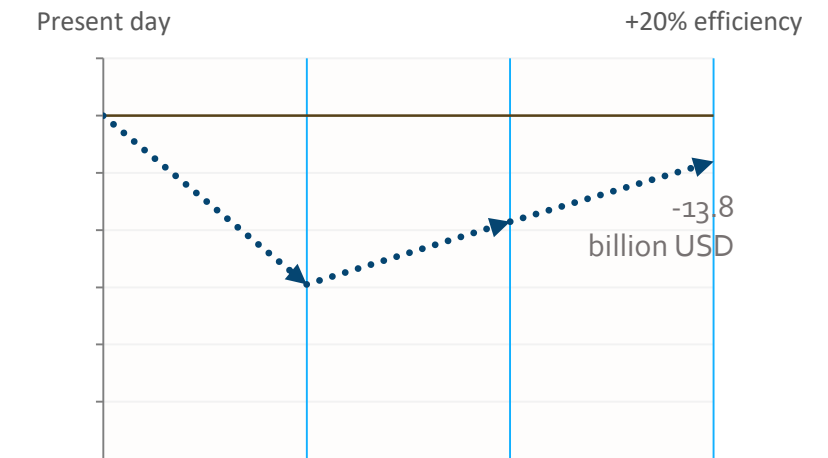
### Lebanon



### Syria



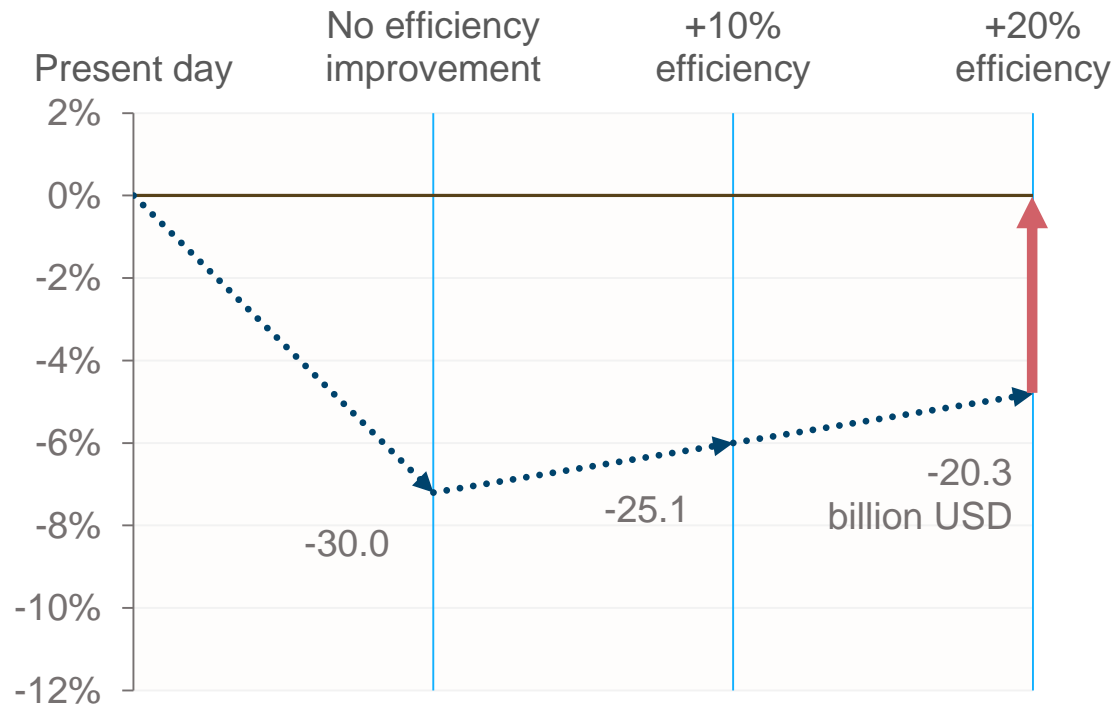
### Turkey



# Water-use efficiency: benefits and limits

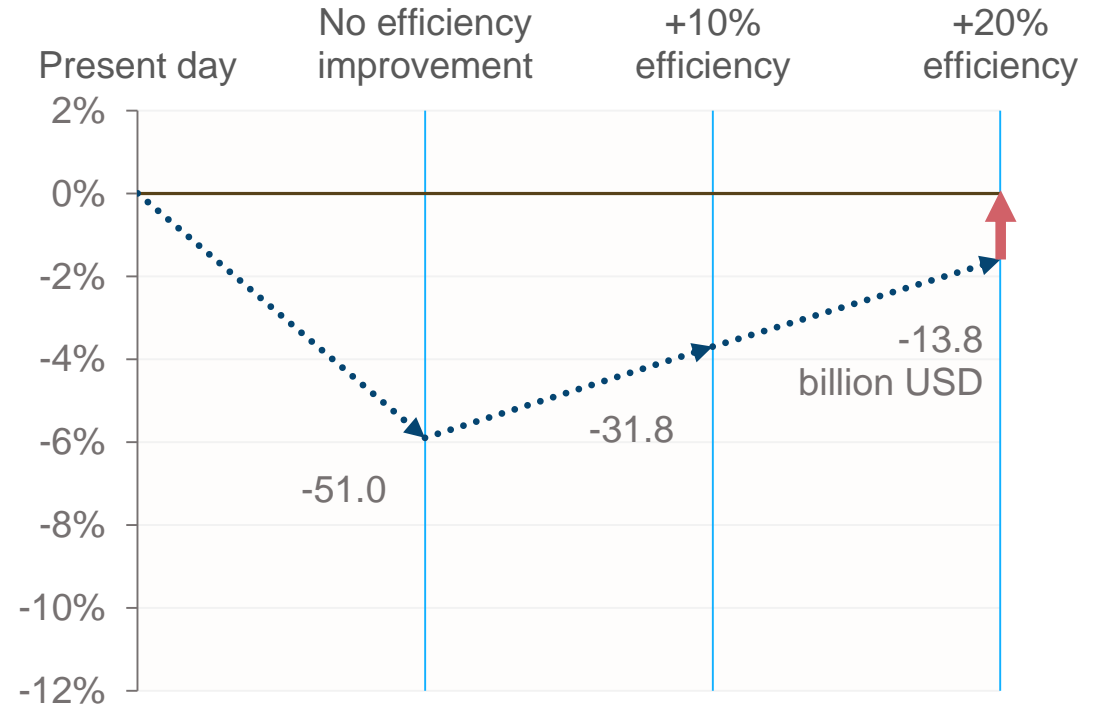
## Iran

### Water scarcity scenarios



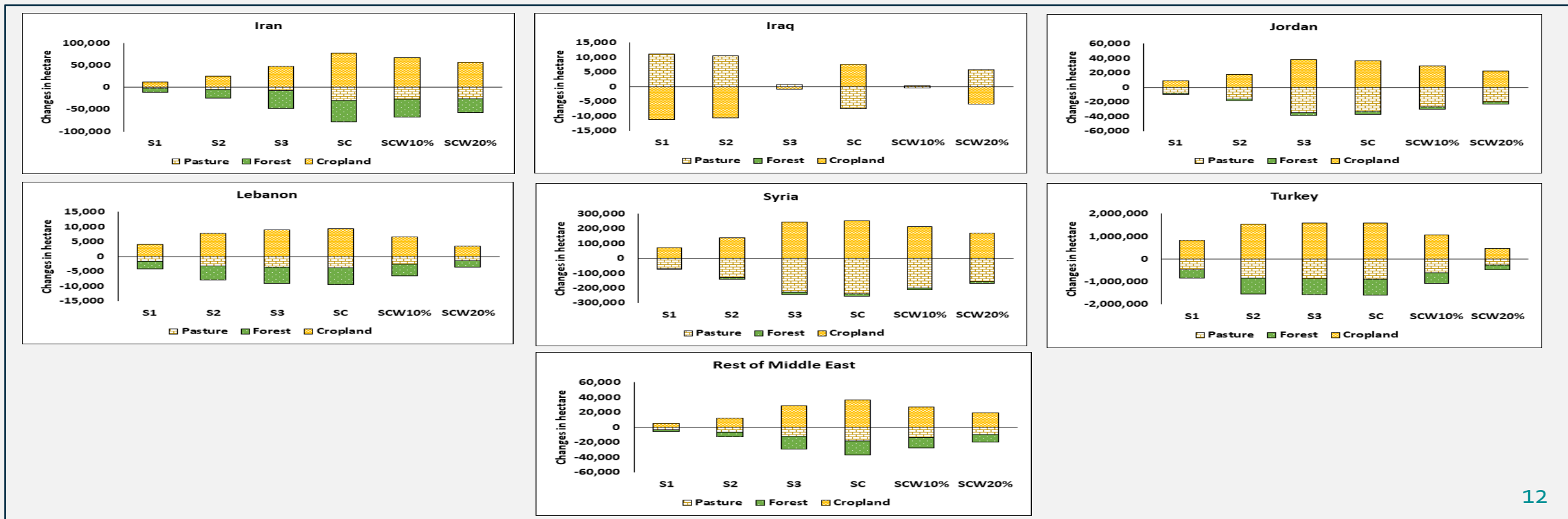
## Turkey

### Water scarcity scenarios



# Water scarcity contributes to deforestation and land degradation

Rainfed cropland expansion to make-up for lost irrigated area leads to deforestation



# Download the report

<https://bit.ly/399p3vE>

