

## UN Water security definition:

“The capacity of a population to safeguard sustainable access to adequate quantities of and acceptable quality water for sustaining livelihoods, human well-being, and socio-economic development, for ensuring protection against water-borne pollution and water-related disasters, and for preserving ecosystems in a climate of peace and political stability”

[1]

# AQUA ABSENCE

## the MEDITERRANEAN WATER CRISIS

### causes, effects and solution strategies

## the diversity of mediterranean countries

**European countries:** water policies are more in line with “EU-Water framework Directive” whose target it is to protect / achieve a good status of the environment

**Others** with no such regional binding documents as there are in the EU:

- measures are taken mostly case specific
- curative rather than preventive

[5]

farmers adapt to dry contitions for different reasons, e.g.:

[13]

### Spain / Portugal

- soil erosion
- aim to sustainably manage resources

### North-West Africa

- desertification
- salinization
- unstable management of water resources

### Greece / Turkey / Balkan

- mostly driven by socio-economic changes
- aim to increase cost efficiency
- improve livelihood

## the mediterranean region is a

### Climate Change “hot spot”

[15]



- less snow more rain
- earlier snow melting
- less river discharge in spring / summer
- increased lake evaporation

[4, 8, 12, 18]

- **temperatures** are rising 20% faster than the global average
- increased annual mean temperature (already at 1.5°C above preindustrial levels)
- decreased annual mean **precipitation** (- 20 mm/K over the 21st century)

[15]

## Population Growth

- a growing population demands more water
- upgraded **standart of living, economic & social development**
- **tourist** water consumption is about three times higher than local demand

[14]

## Food System

- **terminal drought stress** on yield - water deficit in early phenological stages reduces leaf photosynthesis and photosynthetic assimilates → strongly reduced number of grains per spike and reduced grain weight
- possible **geographical shift** of cropping areas and farming systems
- increased **food prices**
- additional **irrigation needs** → could increase by 25 % in the northern and two-fold in south-eastern mediterranean

[3, 10, 11]

## Environment

- increase of **heat waves** and **dry spells**
- reduced **water quality** as result of accelerating **groundwater depletion**
- **salinization of aquifers** due to overuse of freshwater
- shallow **mediterranean lakes** may face severe risk of **drying out**
- decreased supply of ecosystem services
- forest fires

[4, 15, 16]

## Human Health

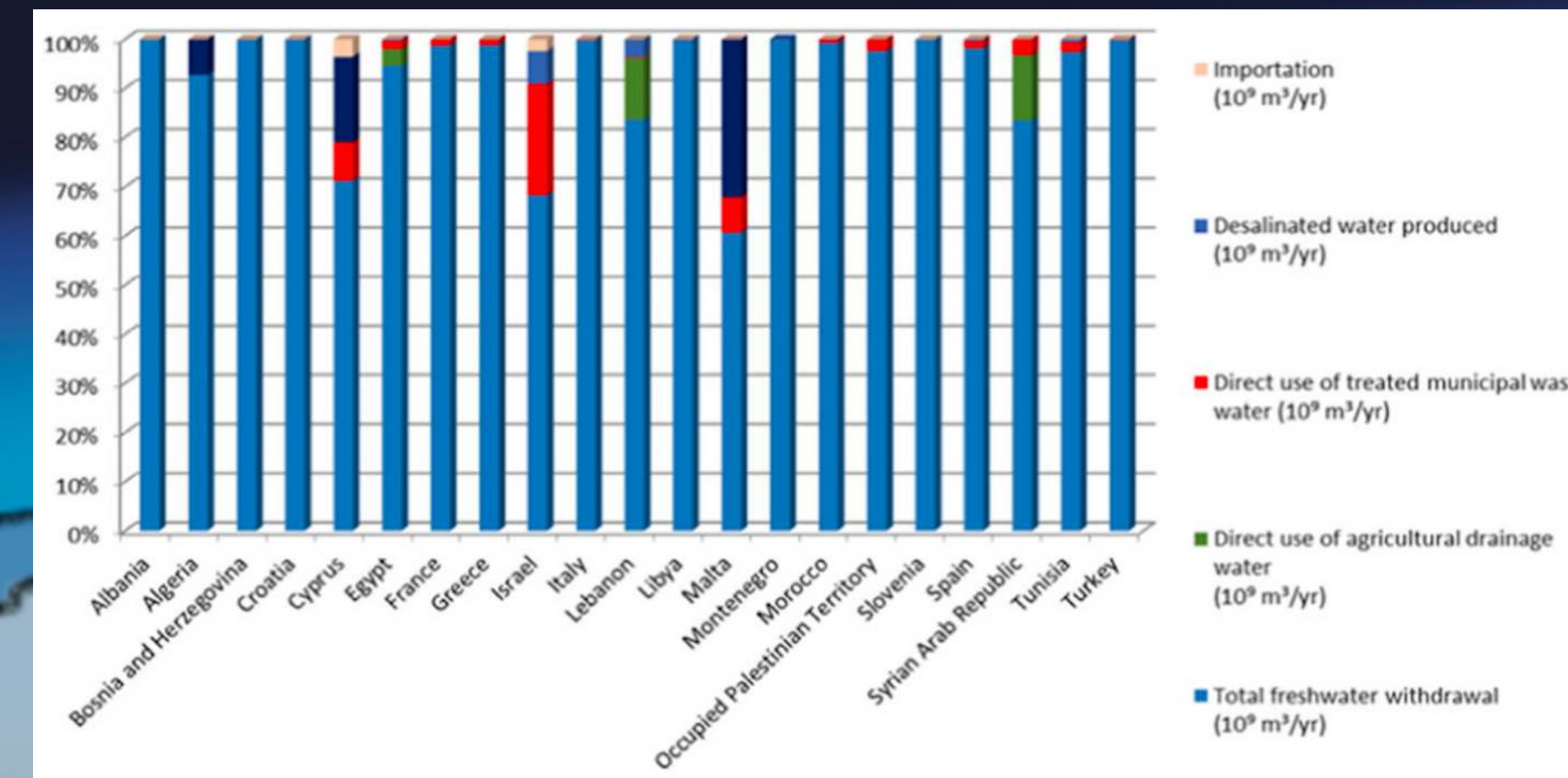
- **vector-borne diseases**, **air-borne diseases**
- infectious diseases more likely to break out if more people use the same water source
- **dust circulation** promotes pathogen carriage, possible particle inhalation
- **health care system** impact
- mental health / emotional stress
- loss of **drinking water**

[3]

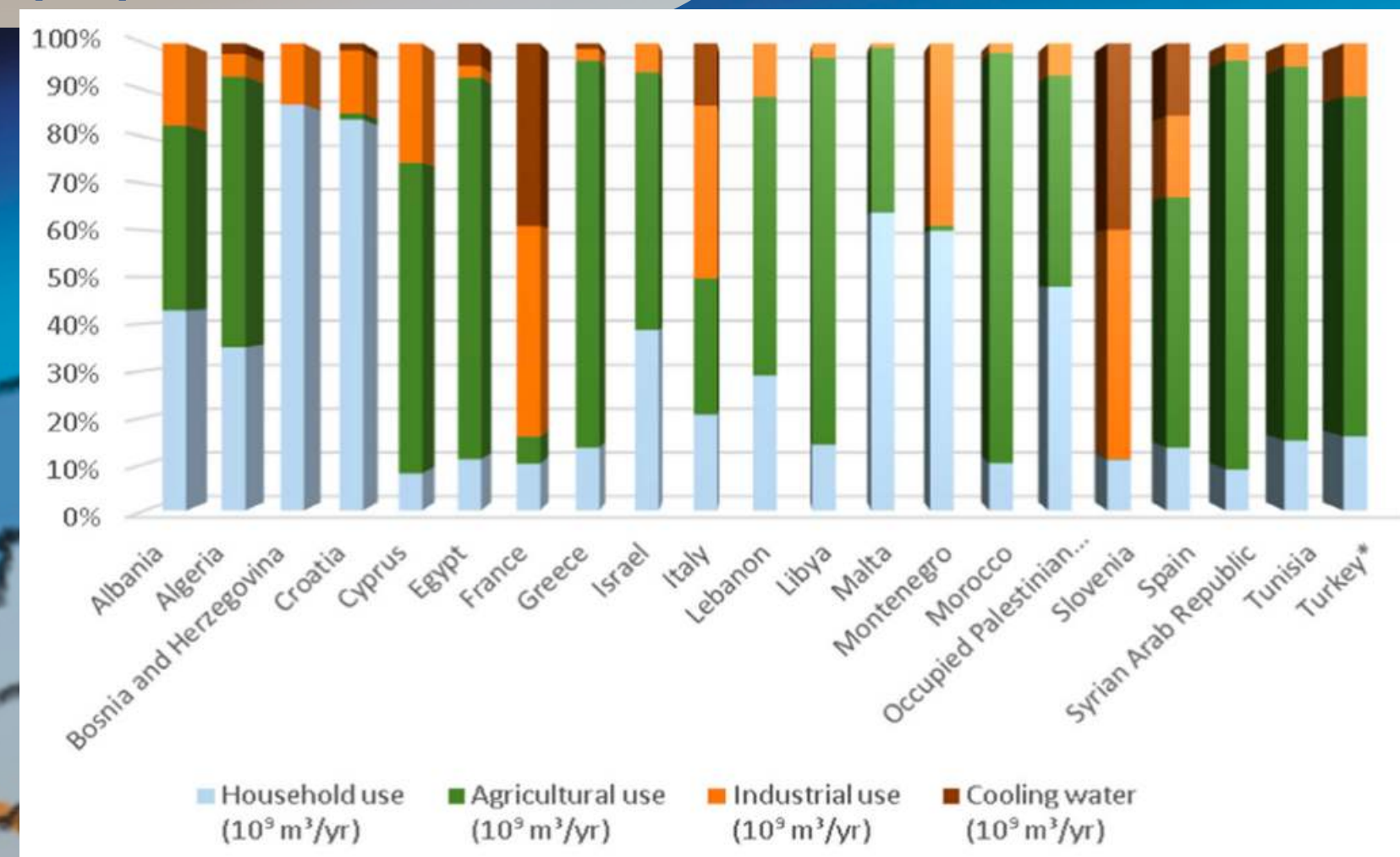
## Improved Management

- **watershed management**
- **coastal aquifer management** → to defend freshwater resources in presence of climate change and the related sea-level-rise
- **outflow management** → is vital to sustain lake ecosystems

[4, 9, 16]



sources of water supply [5]



water demand per sectoral use [5]

## Adaptations in irrigated agriculture

- **water management:** improving irrigation efficiency, changing water source (could save up to 35 % of water resources in the region)
- **sustainable resource management:** lower impact of farming on the environment
- **technological developments:** adaptions to climate change and extreme weather
- **farm productions pratices:** adjustments to existing practices (e.g. crop choice, harvesting, mulching, pruning, reduced tillage → to increase water retention capacity of soils)
- **farm management:** financial and administrative practices

[13]

## Working Together

- governments working together
- implementing new policies to reduce greenhouse gases & emissions and to save water
- inclusion and participation of NGO's and local citizens
- rising awareness

[5, 12]

## Technical options

- developing **new cultivars** with high potential and better adaption to water limiting conditions
- **desalinization plants:** already existing in places with a hot climate and unpredictable rainfall - require a lot of energy and are almost always powered by fossil fuels, **shift to renewable energies** is required
- alternative methods: e.g. water harvesting (cloud fishers Morocco)
- reduction of losses in water distribution networks

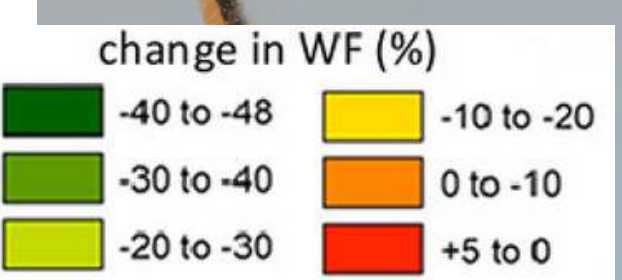
[2, 5, 10, 11, 13]

## Idividual Water Footprint

Food consumption makes up the largest proportion in an individuals total water footprint (exceeding the amount of water used at home).

The **largest reduction in the change of the individuals waster footprint would be a shift towards consuming less animal products** (e.g. shifting towards the EAT-lanchet diet would improve the mediterranean countries water footprint by 17-48 %)

[19]



change in water footprint [5]