



Environment Center
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Global water resources & water scarcity in Jordan

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Water – an essential element for survival

- one of the fundamental requirements for human physical survival
- According to the UN Human Rights Council, "the human right to safe drinking water and sanitation is derived from the right to an adequate standard of living and inextricably related to the right to the highest attainable standard of physical and mental health, as well as the right to life and human dignity".

Human requirements

- 2 – 5 litres per day
- For basic washing and cooking:
 - Bedouin tribe 20-30l per day
 - Sedentary populations 100l for adequate standard of living
 - Europeans 250-300l
 - North Americans 500l +

Water composition of the earth

- Humans are composed mainly of water: 75-80% babies, 50-65% adults, brains 85%
- Planet surface = 71% water
- BUT only 0.03% is available to us to drink
- 1.386 km³ of water on planet: 96.5% = oceans, 1% = saline ground water, fresh water = 2.5% → 68.7% polar ice caps, 30.1% groundwater, 1.2% surface water



Lungs: 90% water



Blood: 82%



Skin: 80%



Muscle: 75%



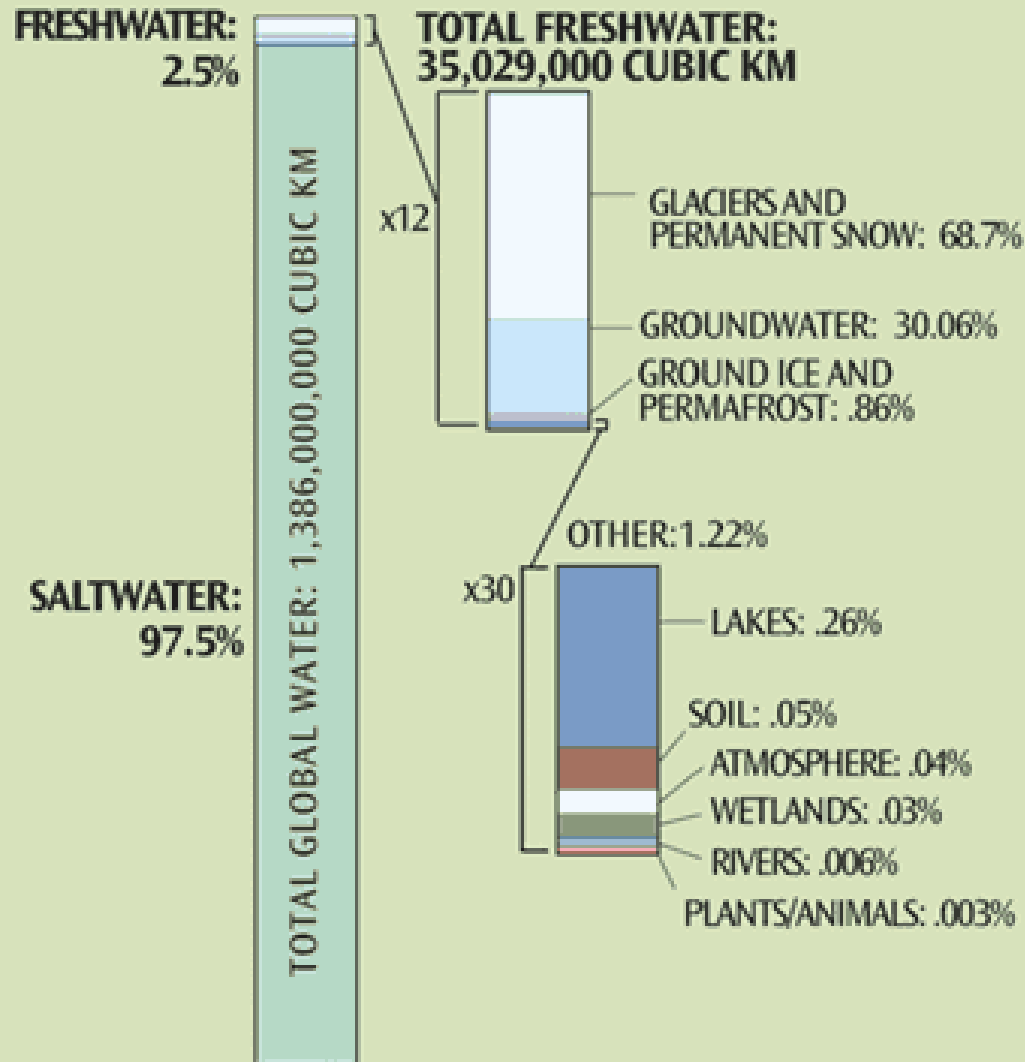
Brain: 70%



Bones: 22%

Source:
<http://smarterwater.net.au>

THE WORLD'S WATER



SOURCE: UNEP Global Environment Outlook 3, "Freshwater" www.grida.no/geo/geo3/

Water as economic resource

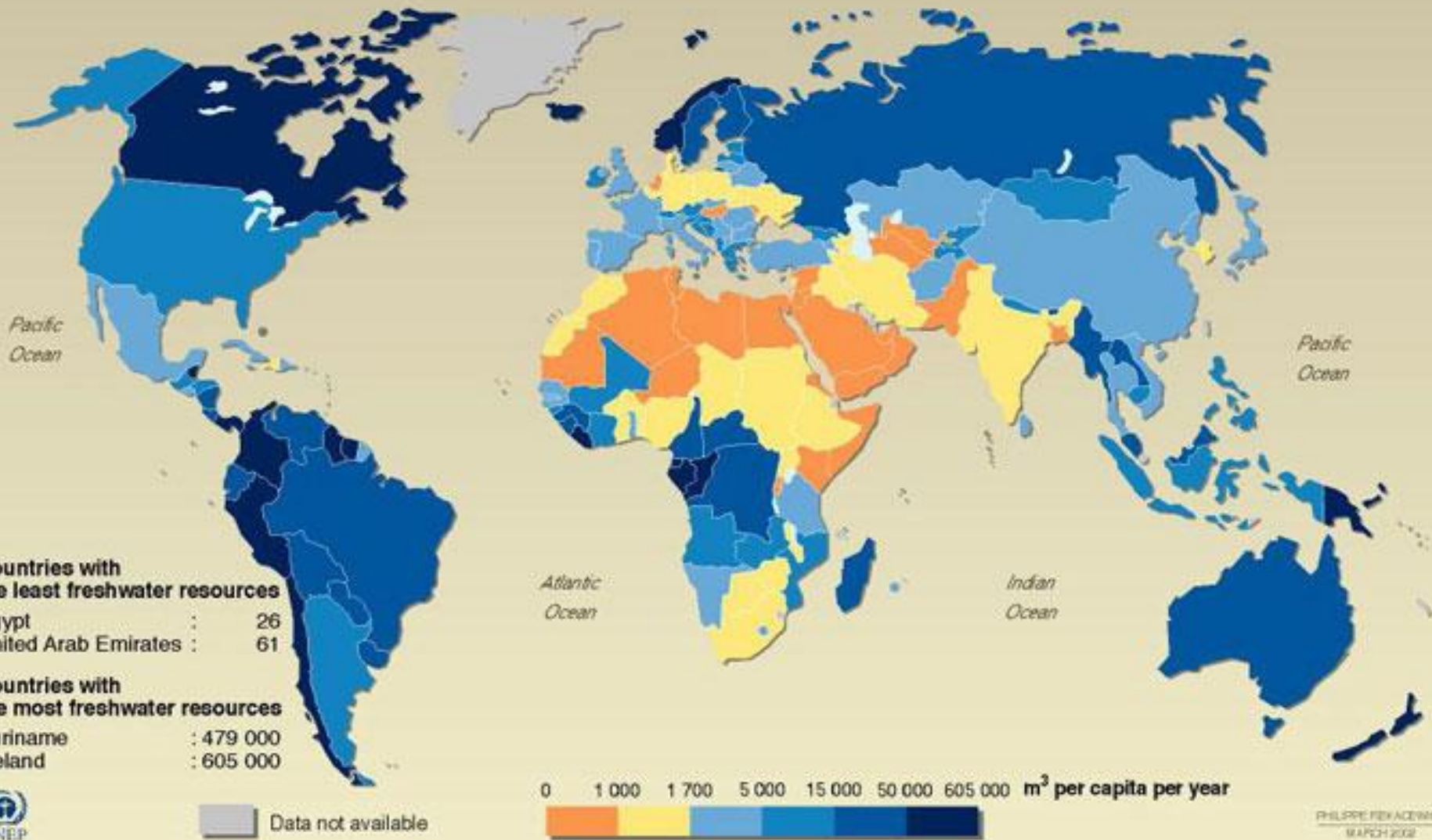
- up to 92% of water is used for non-household purposes, mostly in the agricultural sector.
- sufficient food for an adult requires 300 metric tons of water p.a., (nearly a ton a day)
- much farmland not sufficiently rain-fed; irrigation = 69% of global water consumption
- Industry: washing, diluting, cooling, steam.
- Energy, transport, food source, tourism, recreation

Pressure on water resources

- Increasing global population – 9b by 2050 (2.4b without access to sanitation & 1.2 billion lack potable water)
- Global economy e.g. SAPs, cash crops, expanded industrial production, tourism,
- Climate change – changing precipitation patterns, rising sea levels, high evaporation
- Agricultural practices

Availability of Freshwater in 2000

Average River Flows and Groundwater Recharge



Water resources in the Middle East



Characteristics of ME

- 'arid', low precipitation, high evapotranspiration, i.e. much of the region receives less than 200mm of rainfall p.a. and potential evaporation of surface water of over 2000mm
- very few rivers: Euphrates, Tigris, Jordan
- relative decline of water supply: high fertility rates, over-extraction of renewable water, political conflict

Water availability in Jordan

- “water poor”, no. 10 in world
- In 1996, Jordan had 175 m³/y per person, or 20% of the world’s water poverty level (1,000 m³/y); will fall to 91 m³ by 2025
- 80% of country receives annual rainfall of less than 100mm & only 1.3% receives more than 500mm per year (400mm required for ag.)
- 85-95% of rainfall evaporates; 3.9% recharges groundwater

Surface water resources

- Three main rivers: Jordan, Zarqa, Yarmouk – all highly undependable
- Jordan highly saline; discharge = 1,500 million m³ (65x less than Nile, 400x less than Mississippi); huge variability y-o-y; overpumped by Syria & Israel
- Zarqa & Yarmouk receive large amounts of municipal, industrial and agricultural effluent
- Few dams & reservoirs



Source:
http://e360.yale.edu/feature/will_the_jordan_river_keep_on_flow/2064/



- International boundary
- ★ National capital
- Governorate capital
- Railroad
- Expressway
- Road
- Track

SCALE 1:2,720,000
 0 25 50 75 Kilometers
 0 25 50 75 Miles
 Lambert Conformal Conic Projection,
 standard parallels 10°N and 34°N

Source: Central
 Intelligence
 Agency

Groundwater supplies

- Aquifers only source of water in some areas
- total long-term safe yield of all renewable groundwater resources is estimated at 275 MCM p.a. for 100 years
- salt levels vary from 170 to 3,000 ppm as a result of surrounding geological formations
- some non-renewable fossil water supplies
- wastewater supplies available for irrigation

Total supply & demand

- In 2010:
 - total water demand = 1,383 MCM
 - total supply all sources = 1,054 MCM
 - total deficit = 329 MCM.
- By 2040, estimated that population and economic growth will increase demand to 2,236 MCM, but supply will expand to only 1,549 MCM, leaving a deficit of 689 MCM

Water use practices, problems & consequences

- 77.5% of total water use is taken by ag, although it makes up only 3% of GDP
- Overemphasis on thirsty tree crops & outdated flood irrigation techniques
- Urban expansion encroaching on best rain-fed agricultural land
- Modern farming practices lead to leaching of chemicals into groundwater supplies

Water use practices, problems & consequences cont.

- Water regulation focused mostly on domestic & municipal use, leads to perverse incentives
- Poor municipal water infrastructure - 54% of the 105 MCM entering the system lost or unaccounted for in 2004
- Current use of groundwater is 161% above the safe yield limit; the greater the drawdown, the more saline the water becomes

Water use practices, problems & consequences cont.

- Overloaded wastewater systems – low investment, poor maintenance = overflow of effluent into natural water systems, contamination of food crops, build up of toxins in irrigated soils
- Industry often relies on water delivered by tankers at huge cost, or through own private wells that must go deeper at great cost as the water table falls

Impact on sustainable development?



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**Děkujeme Vám za
pozornost**