

Water scarcity and health

Oliver Schmoll
Vladimir Kendrovski
Ali Al-Luaibi

WHO European Centre for Environment and Health
Water and Climate Programme



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Italy drought: Water cuts pose Rome 'health risk'

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Source: Wantedinrome, 2017

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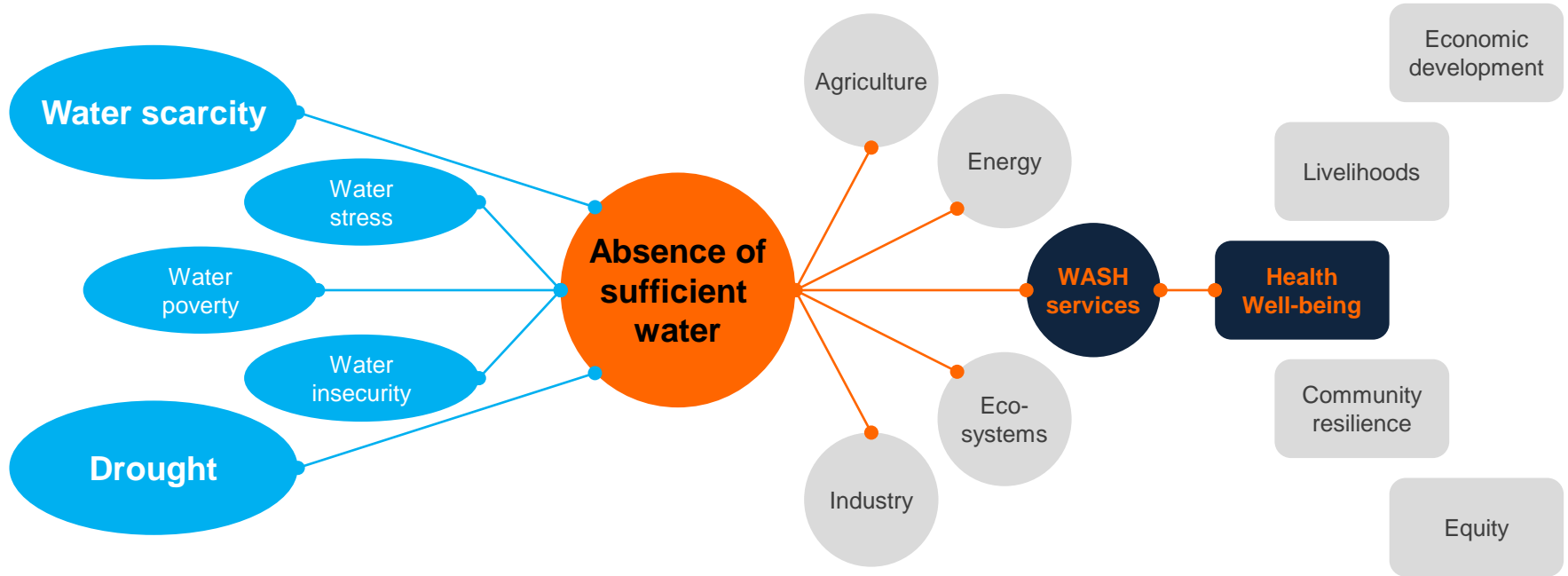
Barcelona forced to import emergency water

- Southern regions say move politically biased
- Catalonia's reservoirs three-quarters empty

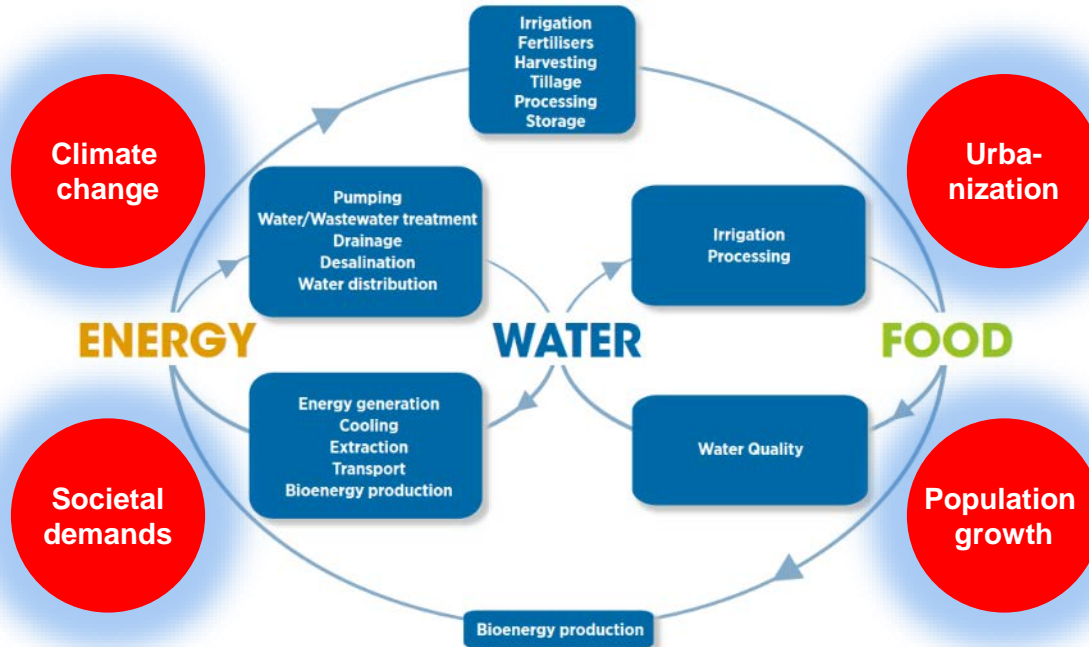


Source: Manu Fernandez, 2008

Babylonian scoping



Global pressures & water-energy-food nexus



- Each 1°C increase caused by global warming is to result in a 20% reduction in renewable water resources
- By 2025, 1/3 of the world's population is estimated to live in water-stressed areas
- EU areas under water stress are to increase from 19-35% (by 2070s), with an additional 16-44 million people affected

Source: Adapted from International Renewable Energy Agency, 2015: Renewable Energy in the Water, Energy & Food Nexus

Water scarcity impacts

QUANTITY

Dehydration

Poor hygiene practices

Physical harms

Intermittent water supply services

QUALITY

Impacts of low flows

Algal blooms

Salinization

RESPONSES

Reuse of water

Food security
Nutrition

Use of alternative sources

Increasing water storage

Improving water efficiency

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Hydration and hygiene

Service level	Distance/time	Likely volumes of water collected	Needs met
No access	More than 1 km and/or more than 30 min round trip	Quantity collected often below 5 l/c/d	<ul style="list-style-type: none"> Consumption – cannot be assured Hygiene – not possible (unless practised at source)
Basic access	Within 1 km and 30 min round trip	Average quantity unlikely to exceed approximately 20 l/c/d	<ul style="list-style-type: none"> Consumption – should be assured Hygiene – handwashing and basic food hygiene possible; laundry/bathing may occur off-plot
Intermediate access	Water provided on-plot through at least one tap (yard level)	Average quantity of approximately 50 l/c/d	<ul style="list-style-type: none"> Consumption – assured Hygiene – all basic personal and food hygiene assured; laundry/bathing likely to occur on-plot
Optimal access	Supply of water through multiple taps within the house	Average quantity of 100-200 l/c/d	<ul style="list-style-type: none"> Consumption – all needs met Hygiene – all needs should be met

Source: Howard & Bartram 2003

Hydration and hygiene

Dehydration and physiological effects

Compromised personal, domestic and food hygiene

HEALTH CARE FACILITIES

- Safe childbirth
- Maternal and new born health
- Infection prevention control
- Operation theatre
- General hospital hygiene



Carrying the weight of water

- Common among the rural poor
- Longer distances to (alternative) sources
- Carrying heavy containers causes pain, physical injury, and contributes to musculoskeletal disorders
- Impacts on children's school attendance
- Woman and girls may be subject to harassment



Source: NRC, 2015

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Impacts on water quality

- Lack of dilution of chemical and microbiological pollution during low flows:
 - Wastewater and land management
 - Intense rainfall after long dry spells leading to rapid runoff of chemicals and faecal matter
 - Algae proliferation, including cyanobacteria
- Accelerated demands on source water and drinking-water management and treatment



Source: flickr, photograph: Stefe

Intermittent supply

- Major determinant of water quality
- Low water pressure increases risk of ingress of contaminated water into the system and backflow
- Increases risk of waterborne disease
- Household water storage
- Use of potentially unsafe alternative sources



Source: Andrewweiss 2006

WSP: Safely managed water services



Recreational aspects

- Recreational exposure
- Stagnation and water-based diseases:
 - Dracunculiasis (ingestion)
 - Schistosomiasis and leptospirosis (skin contact)
- Loss of health and well-being benefits of urban water environments



Source: ScienceX (<https://phys.org/news/2017-07-health-alarm-rationing-rome.html#nKIV>)

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Water storage and vectors

- Increased household water storage during periods of scarcity provide larval habitats and breeding sites for mosquitoes (malaria and dengue)
- Safe storage practices

Example: Warm winter increased the number of *Aedes aegypti* breeding sites in Brazil potentially supporting Zika virus spread during a typically low-transmission season.



Source: Oliver Scholl

Safe household water storage & treatment

The screenshot shows the WHO website page for the 'International Network to Promote Household Water Treatment and Safe Storage'. The page is in English and features a blue header with the WHO logo and navigation menu. The main content area includes a sidebar with a tree view of 'Water sanitation hygiene' topics, a main article with a photo of a woman, and a 'Related links' section.

Water sanitation hygiene

- Water sanitation hygiene
- Water safety and quality
 - Drinking-water quality guidelines
 - Water safety planning
 - Drinking-water quality regulation
 - Small water supply management
 - Household water treatment and safe storage**
 - Recreational waters
- Sanitation and wastewater
- Monitoring and evidence
- Diseases and risks

International Network to Promote Household Water Treatment and Safe Storage

Pureit/Mezi

The WHO/UNICEF International Network on Household Water Treatment and Safe Storage (HWTS Network) is an international forum to share and promote best practice as it relates to improvement in water safety through household water treatment and safe storage (HWTS) and protection of public health.

The Network's mission is: to contribute to a significant reduction in waterborne disease, especially among vulnerable populations, by promoting household water treatment and safe storage as a key component of water, sanitation and hygiene programmes.

Related links

- Policy and communications
- Research
- Implementation
- Resources

Most recent publications

- Boil Water

Use of alternative sources

- Increased reliance on poor quality sources, which are more yielding or closer:
 - Surface water (stream, dam, lake, pond, canal)
 - Unprotected springs or dug wells
- Increased risk of waterborne disease
- Rainwater harvesting at local scale
- Desalination as large scale augmentation



Source: SuSariA 2015

Water reuse

- Wastewater treated or processed to a certain standard suitable for reuse
- Quality requirements need to be tailored to the requirements of end usage
- Direct reuse and indirect reuse, including potable reuse
- Examples: Australia, Israel, Singapore, Spain and USA

Water reuse & treatment levels

Primary treatment	Secondary treatment	Tertiary treatment	Advanced treatment
<i>Increasing levels of human exposure, increasing levels of treatment</i>			
No uses recommended	Non-food crop irrigation	Food crop irrigation	Indirect potable reuse: Groundwater recharge of potable aquifer and augmentation of surface water reservoirs
	Restricted landscape usage	Landscape and golf course irrigation	
	Non-potable groundwater recharge	Toilet flushing	
	Wetlands and stream augmentation	Vehicle washing	
	Industrial cooling		

Source: Adapted from US EPA Guidelines for Water Reuse 2012

Reuse of wastewater in agriculture



Ingestion (unintentional)
after contact with wastewater



Ingestion of contaminated
water



Consumption of
contaminated produce



Dermal (skin) contact with
excreta and wastewater



Vector-borne with
flies/mosquitoes



Inhalation of aerosols and
particles

SSP: Safe management of reuse



Conclusions

- Ensure access to safe sources and allocate sufficient amounts of water for drinking-water supply, including for health systems
- Integrate “health needs” in bigger water management picture
- Build climate-resilient water & sanitation services in response to changing water quality and quantity patterns
- Promote WSPs and SSPs as public health benchmarks to ensure safely managed services, including in scarcity scenarios
- Establish health-based targets (regulations) guiding scarcity response strategies to prevent collateral health damages

Thank you



Source: Rod Shaw