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Climate impacts on water, sanitation & health

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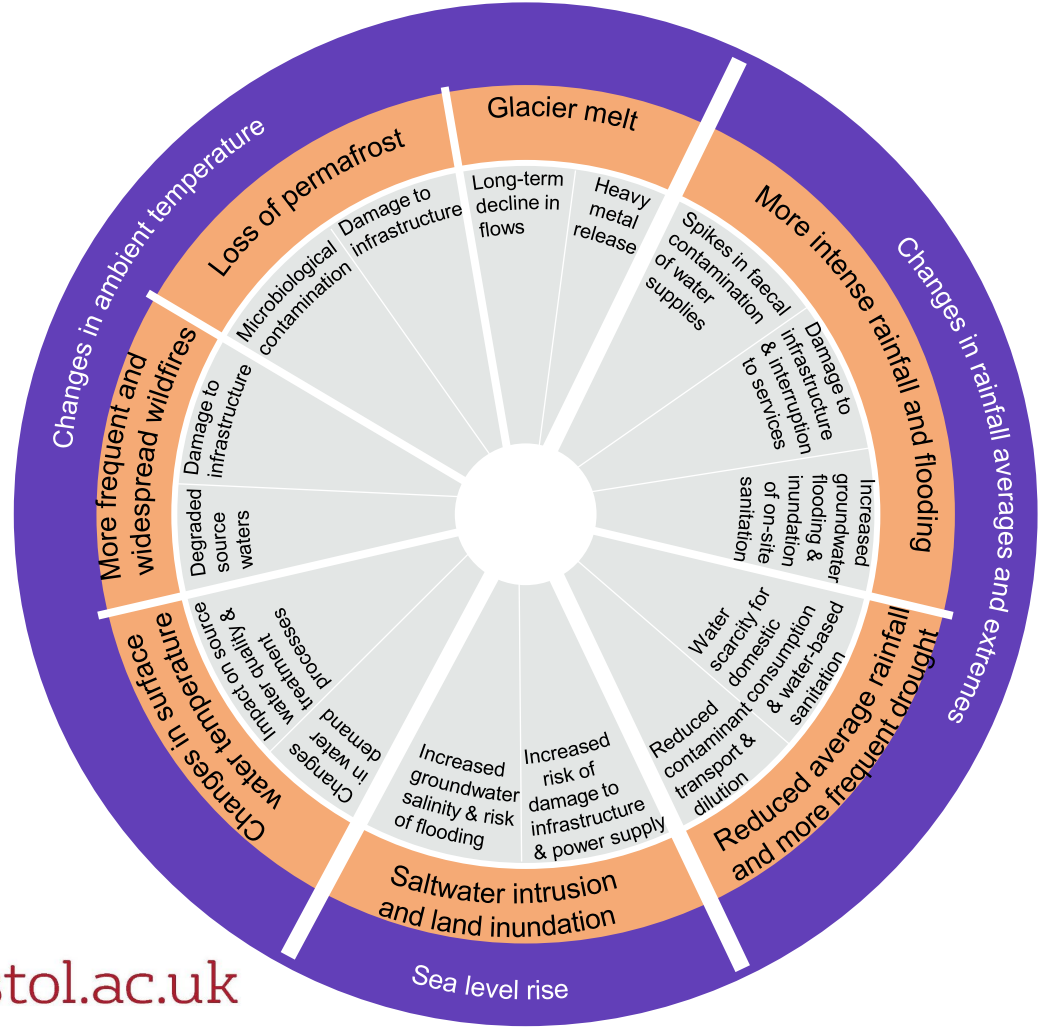
Climate threats to water and sanitation services

- Changes in climate will pose both water quantity and quality threats
- This may be combined – increased water scarcity both means less available water (quantity) and decreased dilution of pollutants (impacting on drinking water sources and receiving waters)
- Interruption of services is a key problem and maybe a result of cascading multiple hazards
- The impacts of climate on water and sanitation services have important implications for water-related infectious and non-communicable disease



The climate wheel of impacts

Examples of climate impacts on water supplies

RAIN AND FLOODING

- Increased upstream erosion and run-off
- Damage to assets and infrastructure
- Overwhelmed water treatment and distribution facilities

DROUGHT

- Intermittent supply and associated ingress
- Increased concentration of pollutants
- Increased competition for scarce water resources
- Release of contaminants from reservoir sediments

INCREASED TEMPERATURE

- Higher water demand
- Increase in algae blooms (± toxigenic)
- More favourable growth conditions for pathogens
- Reduced stability of residual chlorine

SEA-LEVEL RISE

- Saltwater intrusion into distribution networks
- Saltwater intrusion into aquifers
- Inundation of critical assets and infrastructure

Examples of climate impacts on sanitation

RAIN AND FLOODING

- Damage to sanitation assets and infrastructure
- Flooding and/or collapse of on-site systems
- Overflow of overwhelmed storm- and wastewater containment systems
- Spillage from bypassed wastewater treatment plants

DROUGHT

- Ground movement leading to broken pipes
- Increased corrosion of sewer pipes
- Impeded function and use of water-reliant sanitation systems
- Reduced capacity of receiving water bodies to dilute wastewater

INCREASED TEMPERATURE

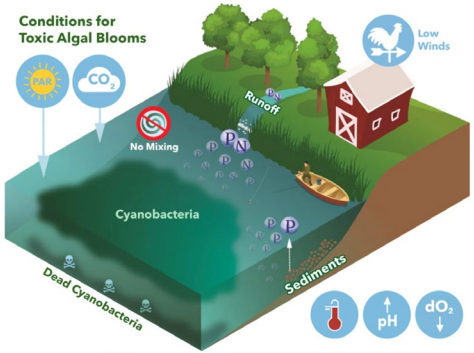
- Higher water demand
- Increase in algae blooms (± toxigenic)
- Reduced efficiency of biological wastewater treatment
- Quicker drying of faecal sludge in waterless latrines

SEA-LEVEL RISE

- Reduced efficiency of biological treatment processes due to saltwater
- Damage to underground infrastructure from rising groundwater levels
- Damage to wastewater treatment works in low-lying/coastal areas

Important to look beyond the obvious

- Floods and droughts are the most common threats – or at least most commonly considered
- But emerging issues are important:
  - **Wildfires:** increasing occurring in previously unaffected areas (e.g. Scandinavia, Scotland): catchment damage, loss of yield, short and medium term water quality changes
  - **Melting permafrost:** damages infrastructure, evidence from North America and artic circle that increasing risks for pathogen transport in groundwater
  - **Algal blooms:** challenges these pose for water treatment



What action is needed?

- Making sure services are more resilient – i.e. can withstand the effects of climate change threats
- This is crucial as access to these services is fundamental to wider societal resilience
- Resilience may require adaptation:
  - Possibly changes in infrastructure or technology
  - Probably more important is adaptive management extending to economic and regulatory instruments, infrastructure, environment, end-user behaviour
- Resilience is increasingly understood as being both adaptation and use of low-carbon energy

What are the approaches and challenges?

- Need strong risk management approaches
  - WSPs+ (IWRM/catchment management)
  - Protocol programme of work basis for action on risk management and to build capacity
- Monitoring and reporting on resilience remains challenging:
  - Some good examples, but lack of consensus making comparison difficult (esp for small systems)
  - Experience-sharing and shared learning is important

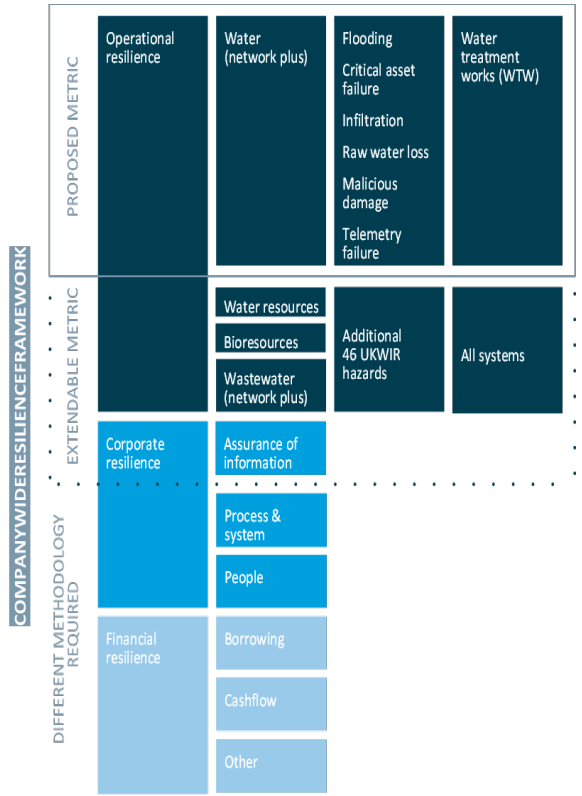


Figure A: Scope of the metric

GHG emissions

- Water and sanitation – significant contributor to emissions (estimated 1.6% of global total emissions in 2010)
- Multiple sources – but largest is wastewater/sanitation
- Methane is a particular issue – COP26 raised the profile
- Efforts required to work at sector level accepting that some GHGs unavoidable if we are to protect public health
- Examples include: catchment interventions to create carbon sinks, as well as obvious aspects such as methane capture
- Important to capture water and sanitation actions in future NDCs

Key future needs

- Support actions by utilities for action through regulatory reform and incentives
- Knowledge sharing and dissemination of experience
- Establish common method for resilience assessment and reporting
- More attention to modelling climate impacts on water-related disease – using risk assessment models
- The Protocol provides a sound platform for addressing these issue across countries
- Integrate water and sanitation in NDCs and NAPs

Thank you

(http://www.bristol.ac.uk/engineering/research/water-and-sanitation/)