Climate resilient water safety planning

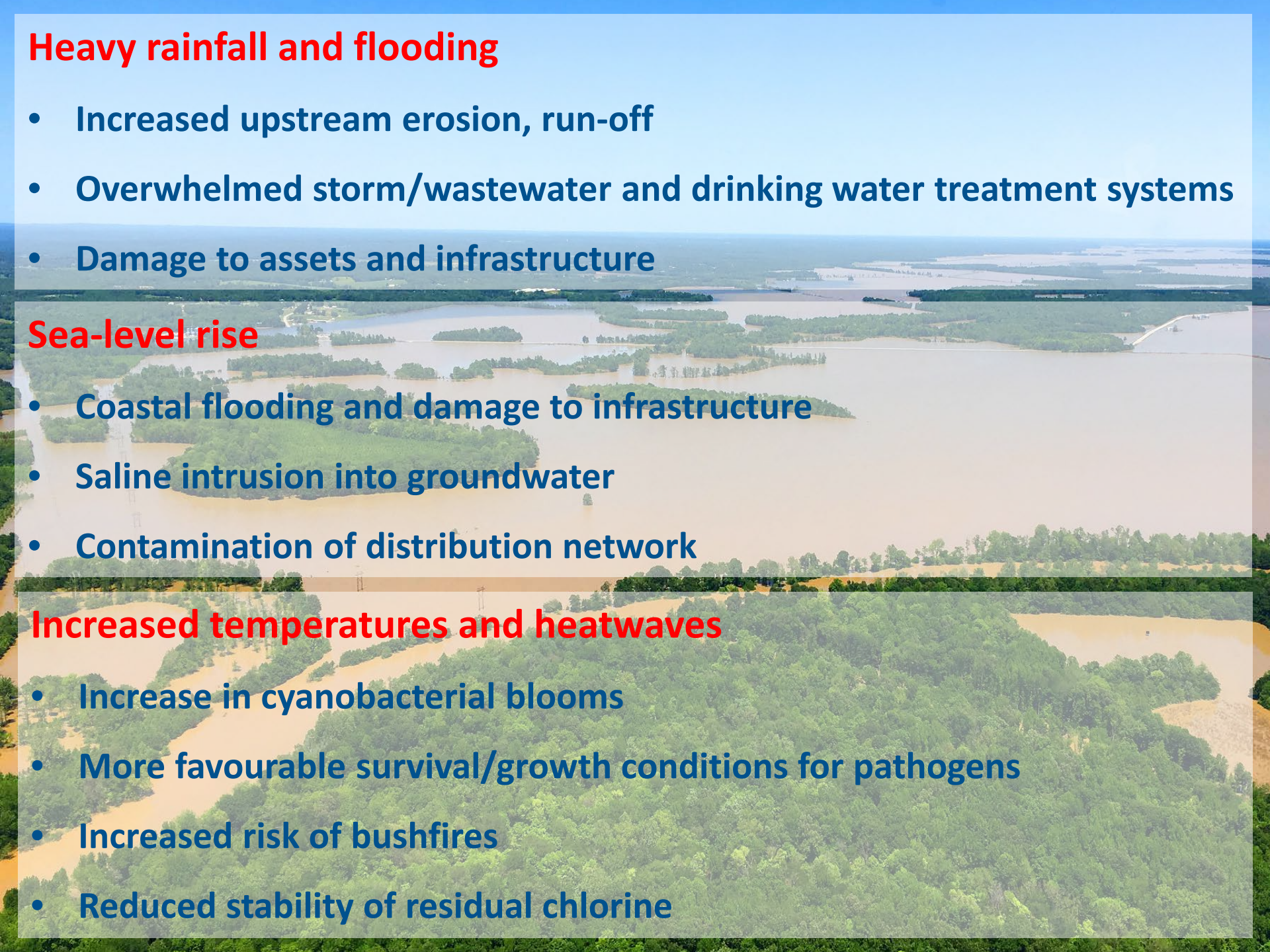
Michael Hammond
WHO, Switzerland

UNECE Global Workshop on Water Scarcity

Geneva, Switzerland, 11-12 December 2017

World Health Organization


Climate change is expected to alter the frequency & intensity of weather events...
...expected to increase existing stresses on water resources...
...further impacting the safety and security of drinking-water supplies.
Credit: Ian Paterson/flicker.com



Heavy rainfall and flooding

- Increased upstream erosion, run-off
- Overwhelmed storm/wastewater and drinking water treatment systems
- Damage to assets and infrastructure

Sea-level rise

- Coastal flooding and damage to infrastructure
- Saline intrusion into groundwater
- Contamination of distribution network

Increased temperatures and heatwaves

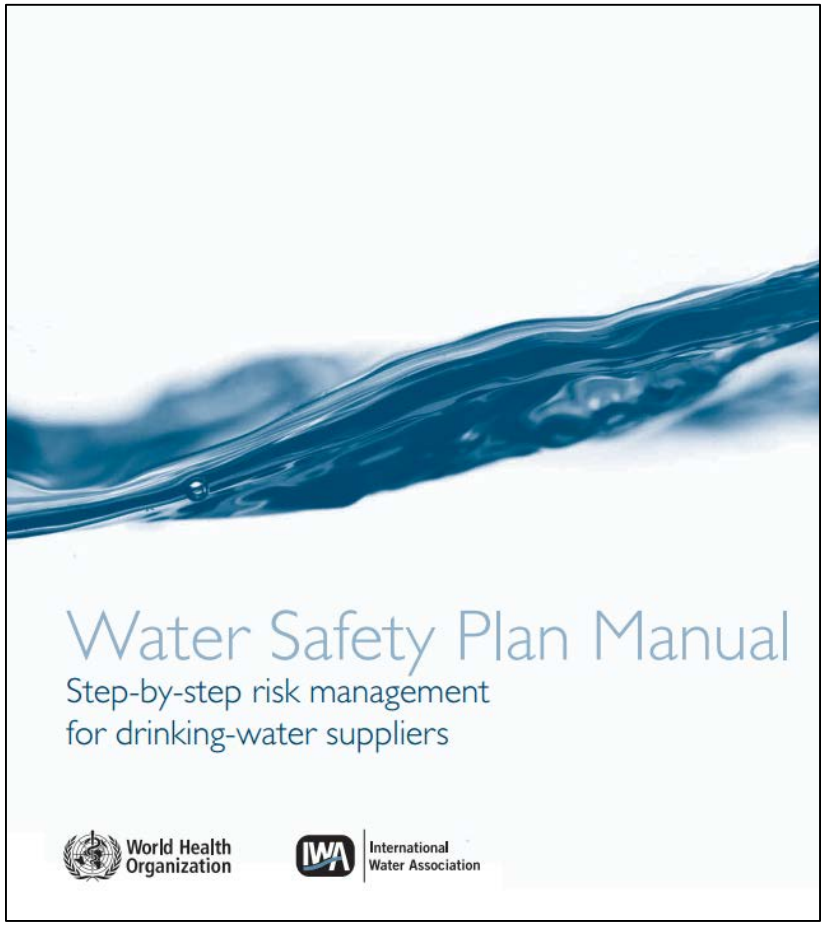
- Increase in cyanobacterial blooms
- More favourable survival/growth conditions for pathogens
- Increased risk of bushfires
- Reduced stability of residual chlorine

Droughts / scarcity

- Increased competition for scarce water resources
- Increased dependence on less-safe alternatives
- Diseases linked with inadequate water supply
  - Cholera, typhoid
- Reduced flows, increased concentration of pollutants (surface or point)
- Increased influence of groundwater inputs (salinity, nitrate)
- Reduced oxygen levels
- Increased cyanobacteria (cyanotoxins) and algal blooms
- Increased turbidity

Water Safety Planning

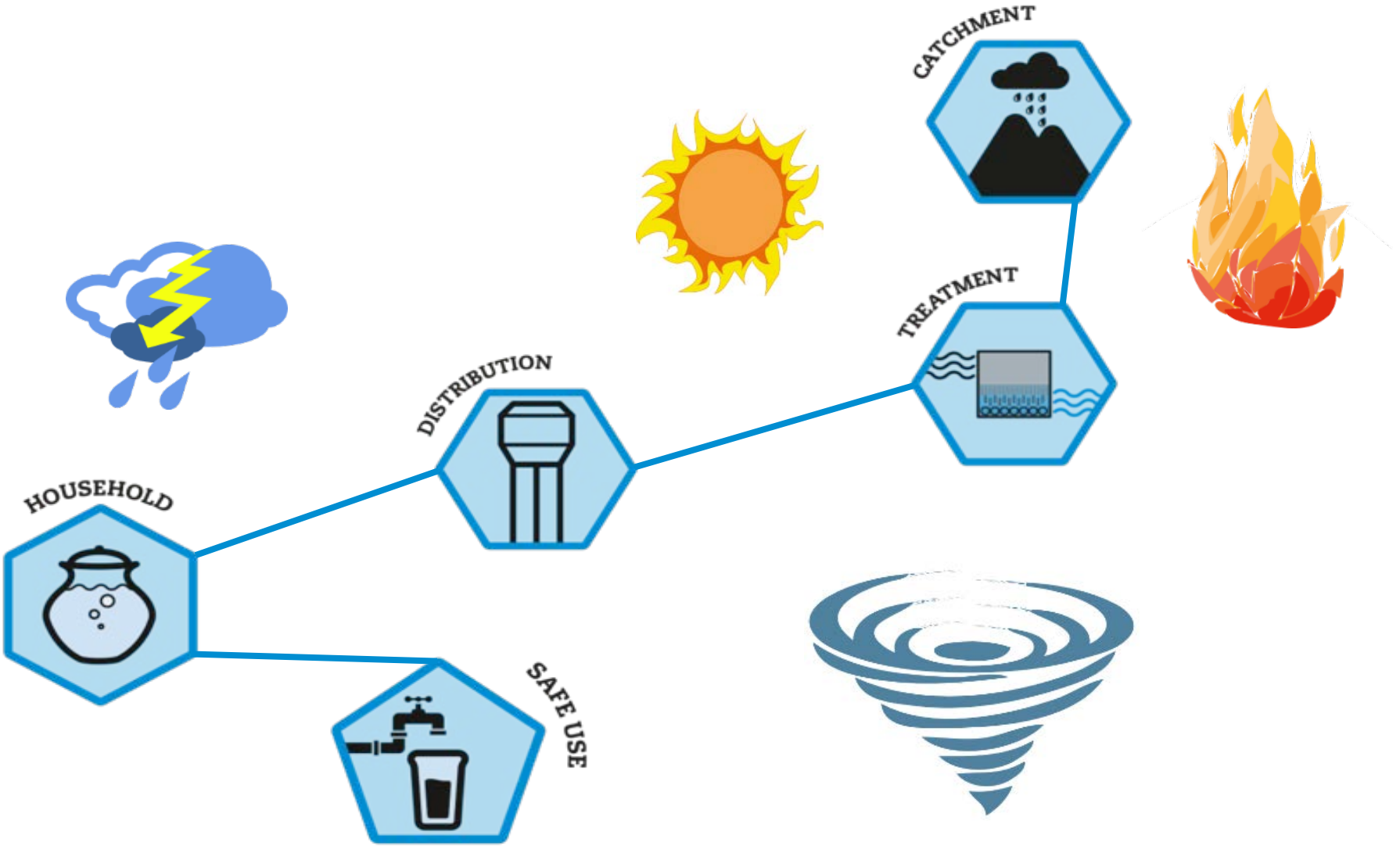
- Water Safety Planning is a comprehensive risk assessment and risk management approach
- The aim of a WSP is to consistently ensure the safety and acceptability of drinking-water supply
- Adopted in Bonn Charter for Safe Drinking Water, 2004
- Provide a public health benchmark for safe water supplies, promoted in WHO guidelines for Drinking Water Quality
- WSPs have been adopted in at least 93 countries, and are required or promoted through policies and guidelines in many others.



Water Safety Plans require a step-by-step approach

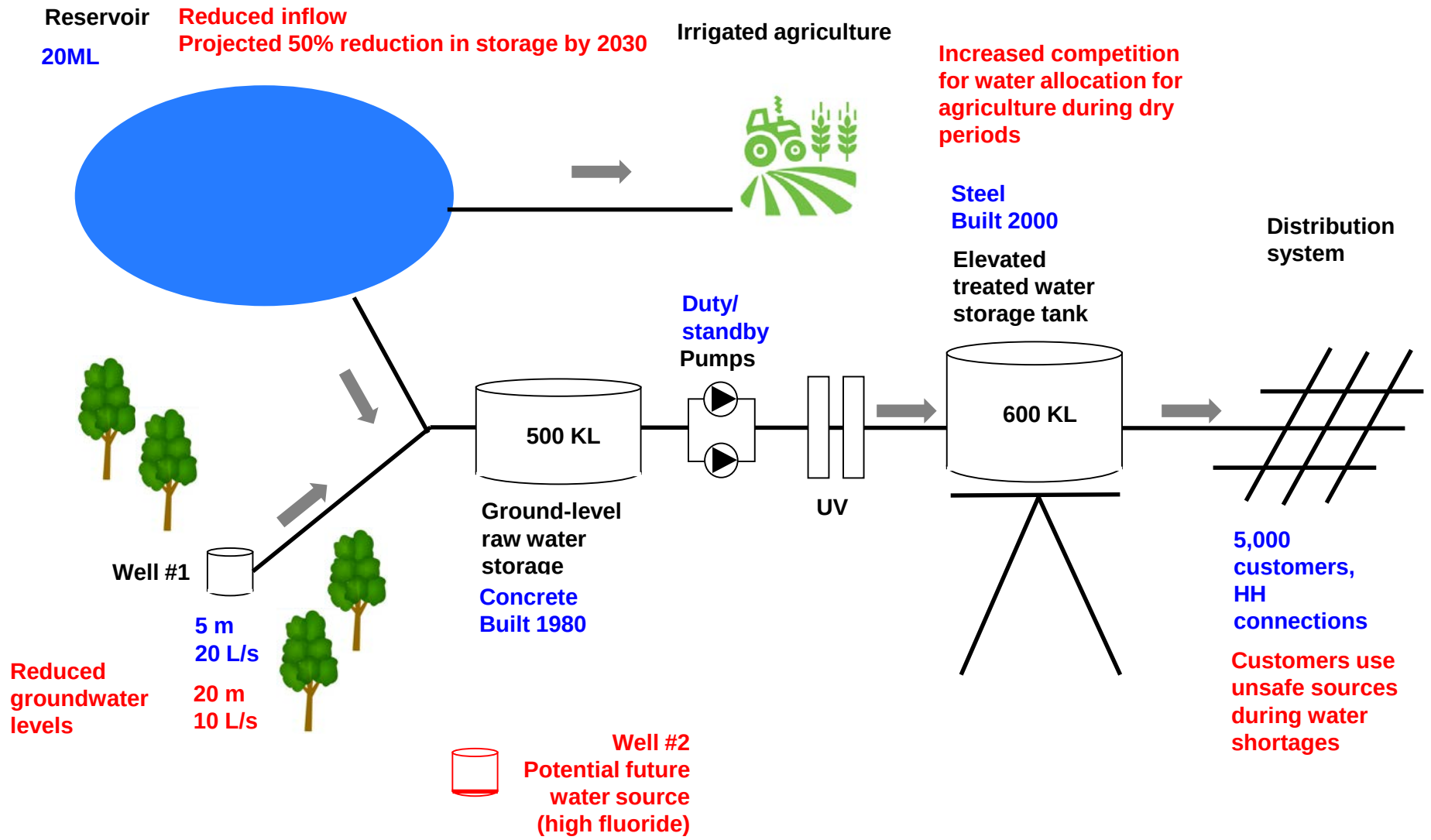
- Assemble team
- Describing the water supply system
- Identify the hazards & assess the risks
- Determine control measures and re-assess risks
- Improvement planning
- Operational monitoring
- Verify the effectiveness of the WSP
- Management procedures
- Supporting programmes
- Review and revise the WSP

WSP is a suitable framework to consider climate risks, including scarcity



Annual rainfall:
2017 – 600 mm
2030 – 450mm

Climate considerations



Raw Water → Treated Water

Climate Resilient-WSP hazard and risk assessment

CR-WSPs may consider:

1. **Changes in the risks associated with *existing* hazards/hazardous events**
   - i.e. impacting likely and severity of the hazard/hazardous event

2. **Potential *new* hazards being experienced within water supply systems**

Broader level
Climate Vulnerability Assessments
should inform the risk assessment


Credit: RowanC82/flickr.com

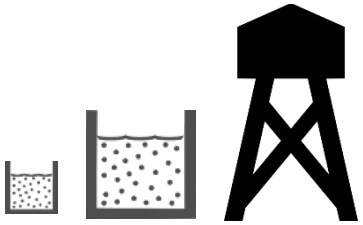
Identification of scarcity-related risks and associated control measures

Scarcity related hazards	Example control measures
Microbial pathogens at higher densities in due to increased reliance on wastewater for irrigation within the catchment	Develop & enforce codes of practices for safe wastewater reuse
Increased concentration of chemicals e.g. nitrates	Limit high-intensity agricultural activities in key catchment and recharge areas
Increased toxic algal growth due to increased hydraulic residence time with prolonged periods of drought	Improved treatment to remove algae
Increased reliance on unsafe drinking source, exposure to enteric pathogens	Develop a long-term drought management plan, find safe alternative water sources

Addressing scarcity risks through improvement planning

Consider resilience/ adaptivity of improvements:

- ***Designing adaptable infrastructure***
  - e.g. designing water treatment works which can integrate additional process steps if needed



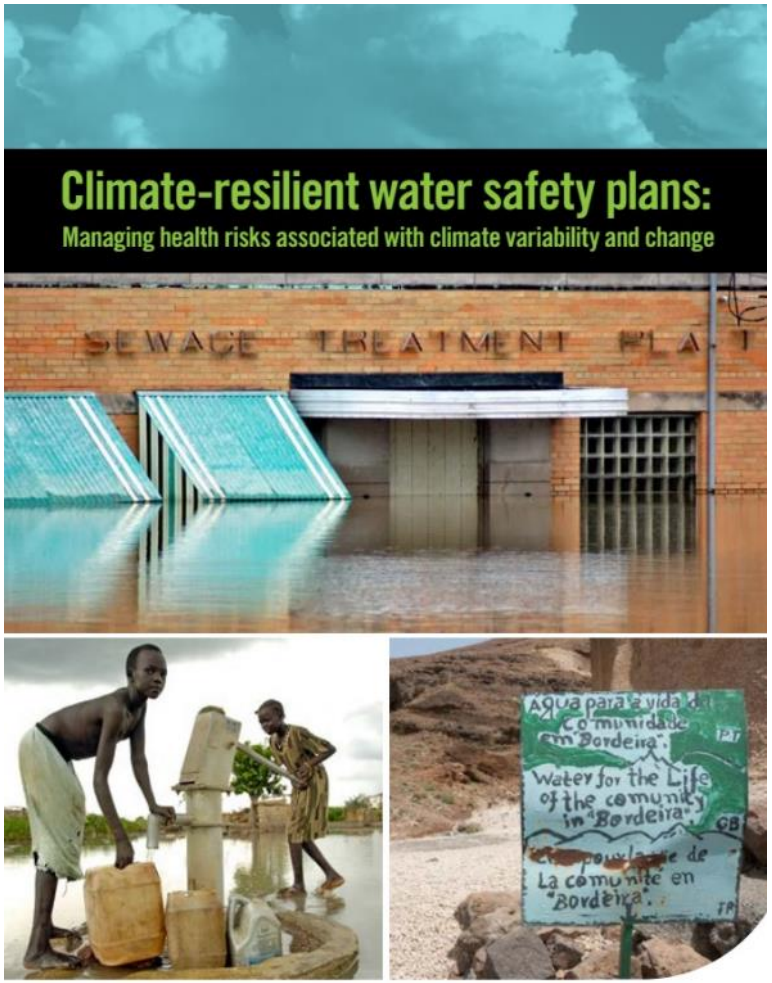
- ***Utilizing a range of options to achieve an outcome***
  - Increasing storage and system capacities
  - e.g. diversifying use of water sources
  - Connect to other systems to increase redundancies

- ***Supporting infrastructure with non-structural measures***
  - e.g. water tariffs to influence customer usage/behavior; investments in information, planning & policy
  - Engage in WRM to ensure sufficient water allocations

- ***Emergency management plans (e.g. drought response plan)***

Resources to support the integration of climate resilience into WSPs

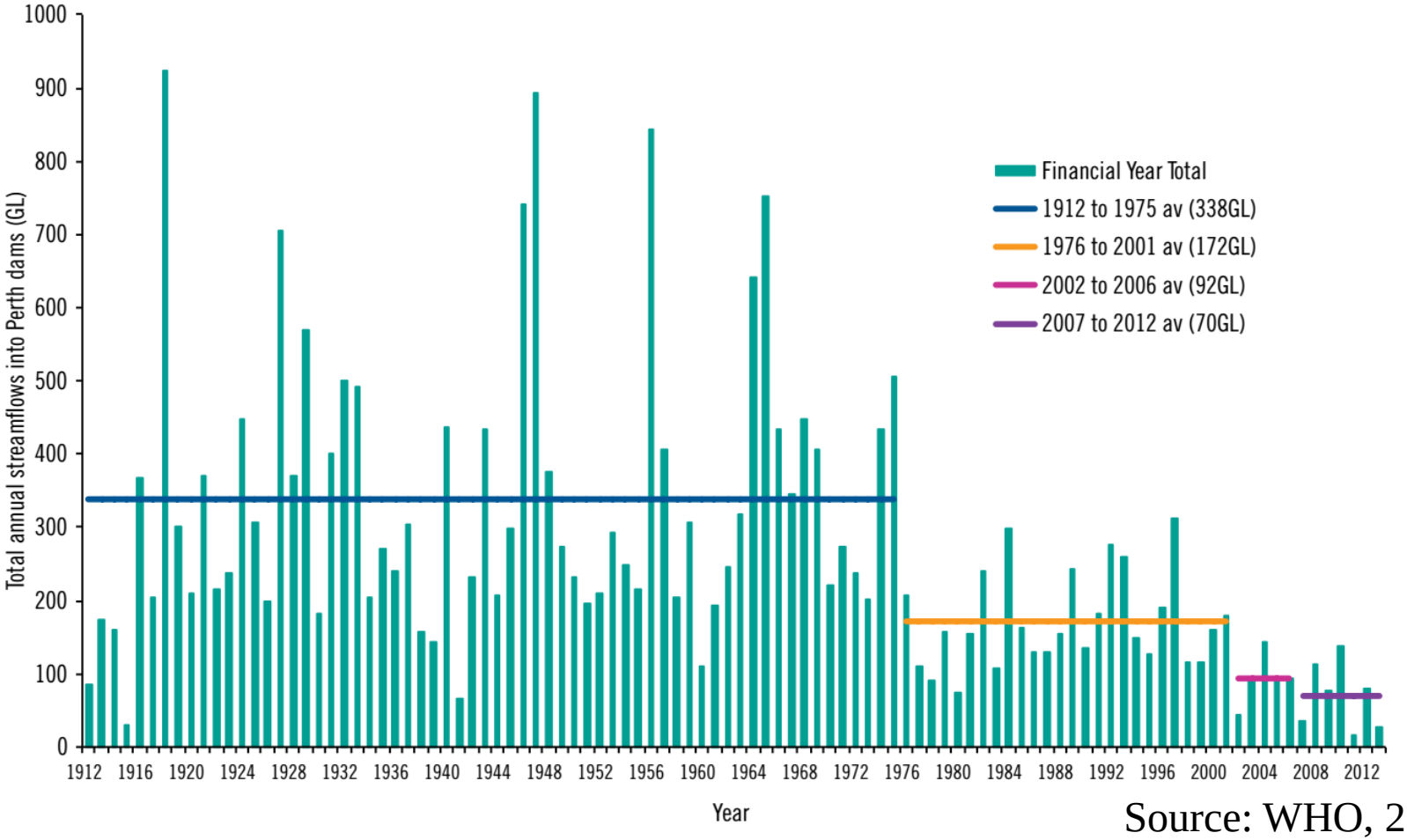
- Used in conjunction with WSP manual (WHO/IWA, 2009)
- Stepwise consideration of the integration of climate-related risks
- Includes practical guidance on identification of hazards, risk impacts and control measures for various climate scenarios
- UNICEF - WASH Climate Resilient Development



World Health Organization

Western Australia

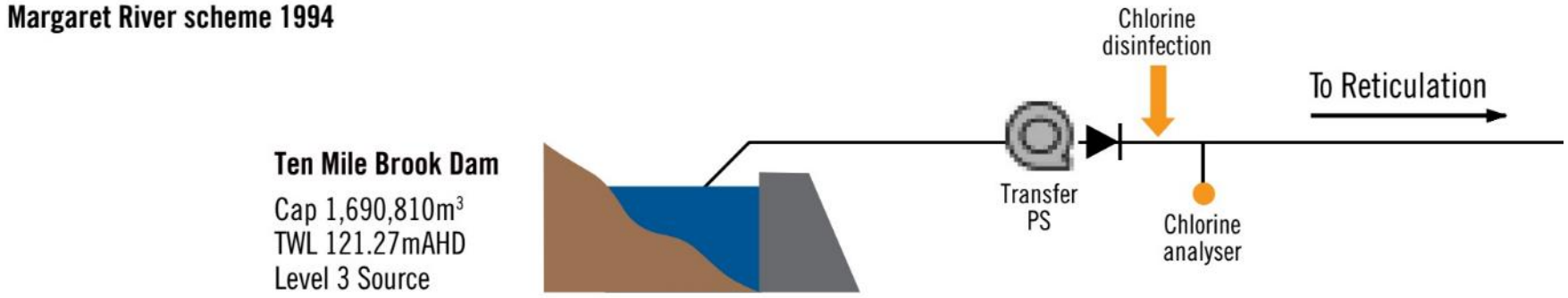
- ***Long trend of reduced rainfall resulting in low inflows, reducing supply***



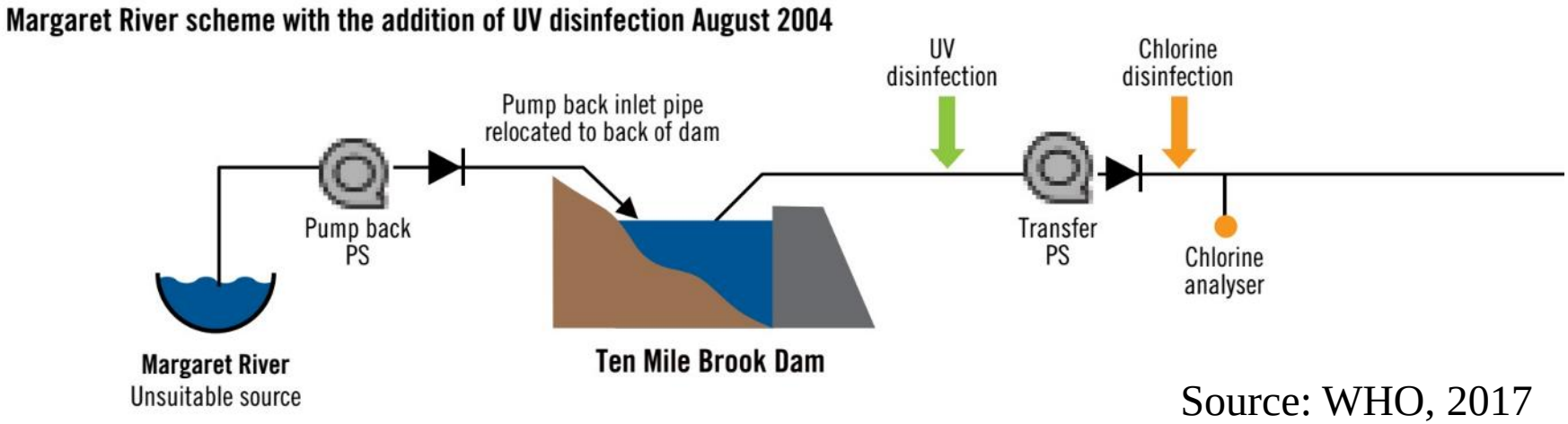
Source: WHO, 2017

Western Australia

Margaret River – 10,000 inhabitants, 500,000 annual visitors



2001 – Shortages led to introduction of pumping from Margaret River
2004 – WSPs introdued to 245 locations. Margaret River highlighted as risk

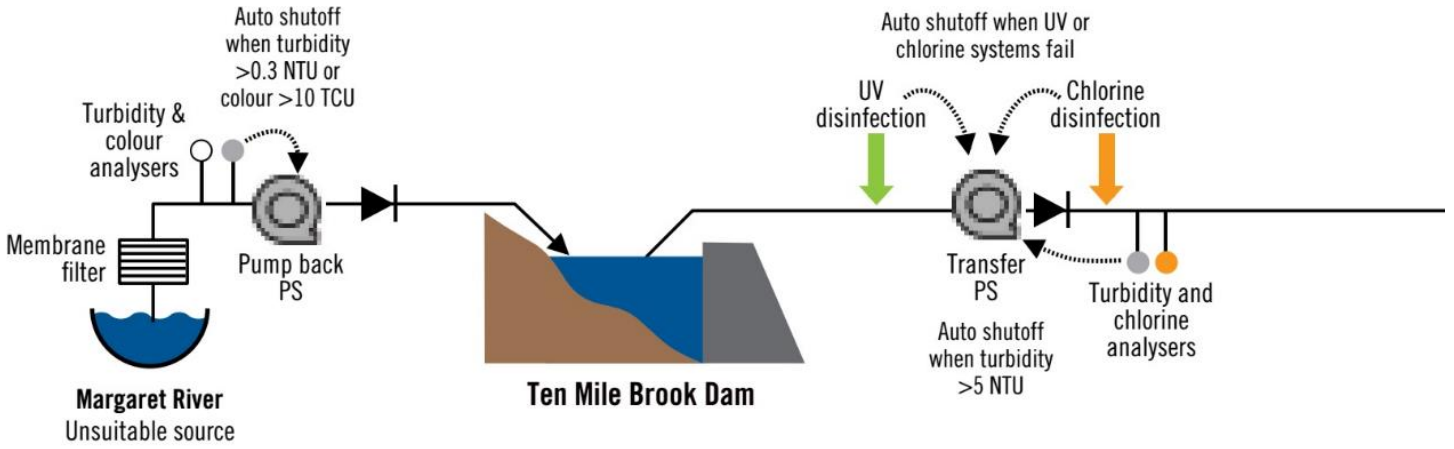


Source: WHO, 2017

Western Australia

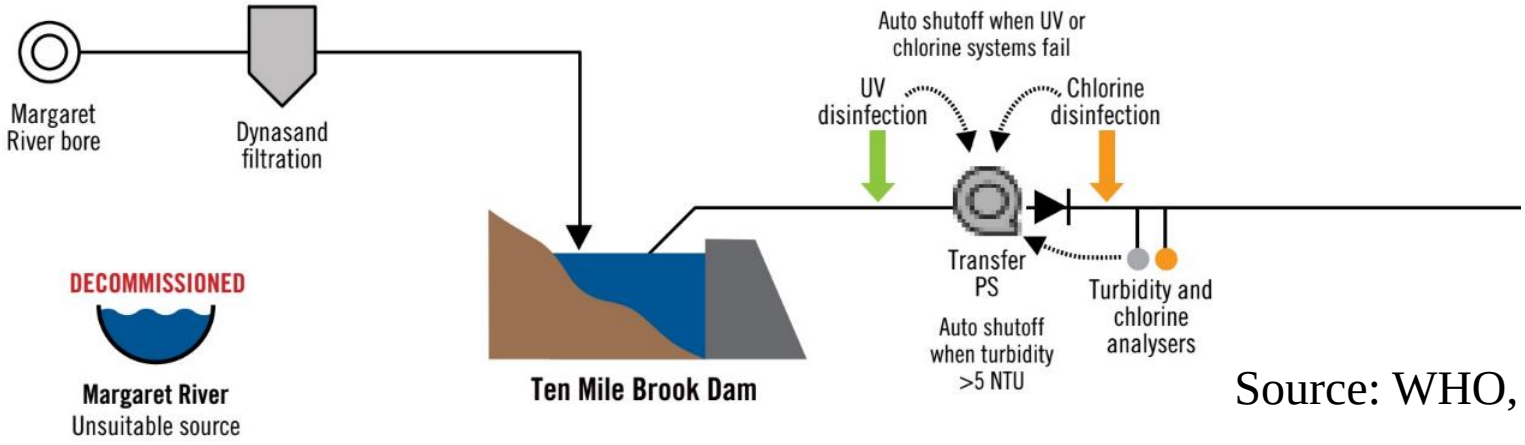
2007 – exceptionally low runoff led to water quality incident

Margaret River scheme with the addition of membrane filtration September 2008



2012 – Introduction of alternative source

Margaret River scheme with the addition of Margaret River Yarragadee bore December 2012 and decommissioning of unsuitable source



Source: WHO, 2017

Summary

WSP framework is well suited to manage risks from climate change & variability, such as scarcity:

- Bring many benefits (improved knowledge, water quality)
- Suitable in high and low resource settings and urban and rural settings alike
- Should be considered as an ongoing, iterative process.
- Implementation is increasing, but a focus on further scaling up is needed
- WSPs support other WASH activities, including SDG 6 and SDG 13

Thank you!

Further information?

WHO website: www.who.int

Water Safety Portal www.wsportal.org

Acknowledgements:

Jennifer De France (WHO, Switzerland)

Angella Rinehold (WHO, Switzerland)

Elena Villalobos (WHO, Switzerland)

Rory McKeown (WHO, Switzerland)