World Health Organization
European Region

The WHO water safety plan approach:
rationale and principles

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Brussels, 26 March 2021

Dedicated health and WASH goals

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European Region

UNIVERSAL | FOR ALL | NEEDS OF WOMEN & GIRLS | EQUITABLE | ADEQUATE & SAFE

Ensure healthy lives and promote well-being for all at all ages

Target 3.3: By 2030, (…) **combat** hepatitis, **waterborne diseases** and other communicable diseases

Target 3.9: By 2030, substantially **reduce** the number of **deaths and illnesses** from (…) **water** and soil **pollution** and contamination

Ensure availability and sustainable management of water and sanitation for all

Target 6.1: By 2030, achieve **universal** and **equitable** access to **safe** and affordable **drinking-water for all**

Target 6.2: By 2030, achieve access to **adequate** and **equitable sanitation** and **hygiene for all** (…), paying special attention to the **needs of women and girls** (…)

The have nots (2024)

An unfinished agenda in the WHO European Region

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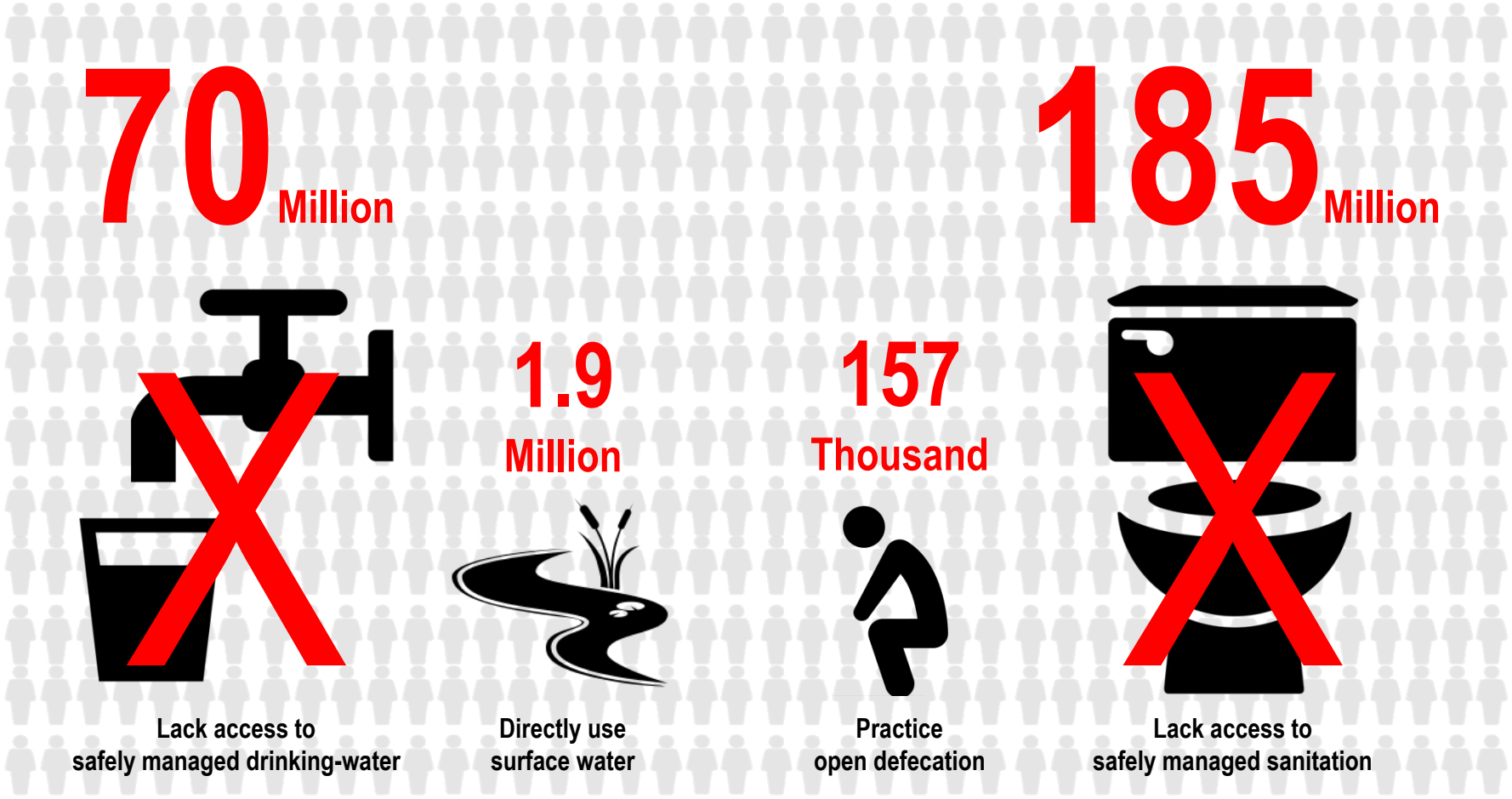

Source: WHO & UNICEF 2024

Burden of disease attributable to unsafe WASH (2019)

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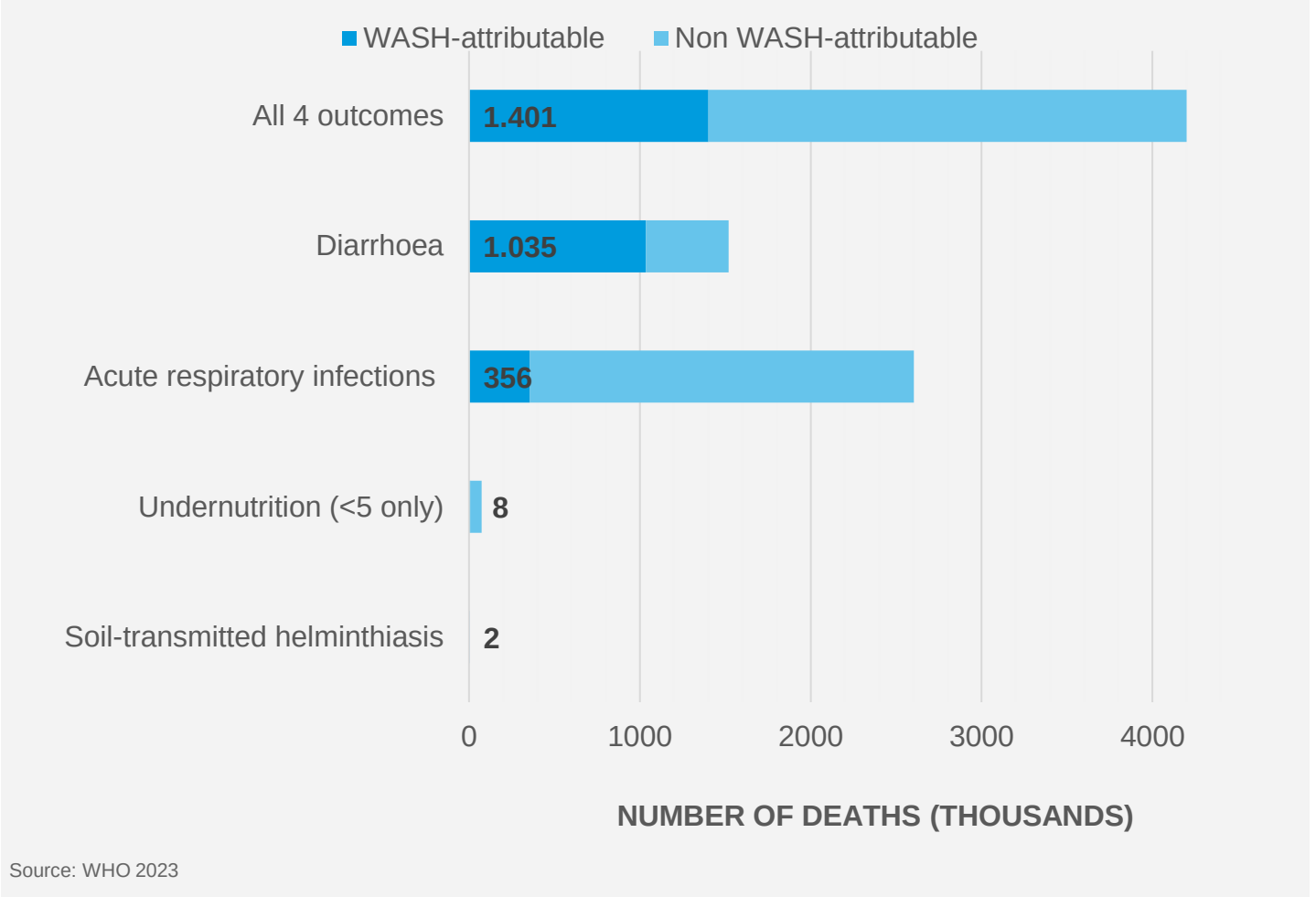
- **Deaths** attributable to unsafe WASH out of **total deaths** for each health outcome
- Globally, inadequate WASH caused **1.4 million deaths** from:
  - Diarrhoea
  - Acute respiratory infections (linked to inadequate hygiene)
  - Undernutrition
  - Soil-transmitted helminthiases



Source: WHO 2023

Burden of disease attributable to unsafe WASH (2019)

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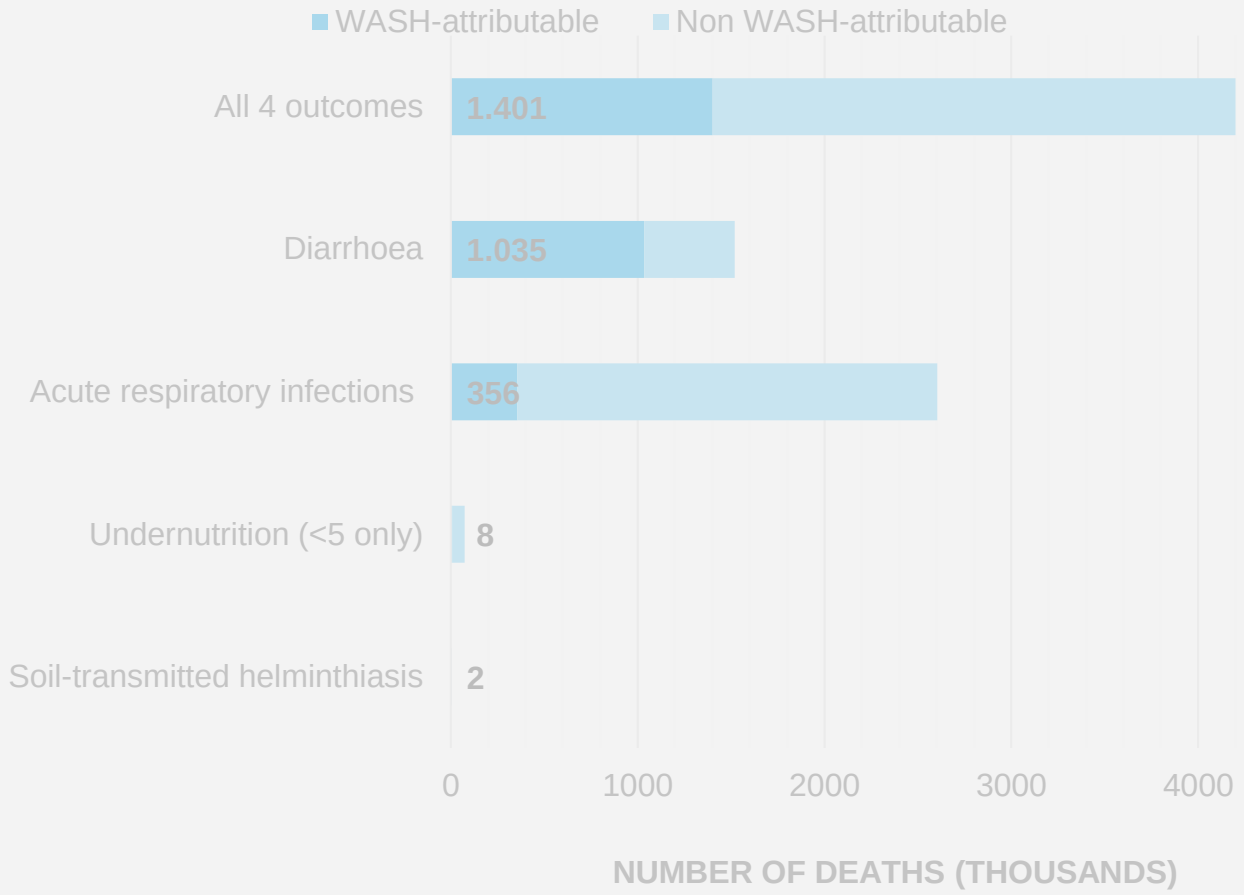
WHO European Region

33,500

Annual WASH-related deaths

13% diarrheal disease

87% acute respiratory infections



WHO Guidelines for drinking-water quality

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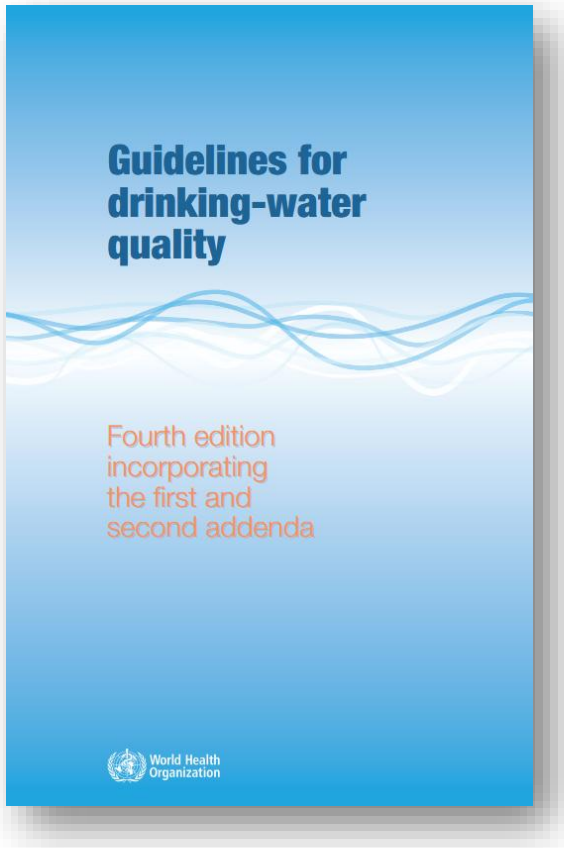

https://www.who.int/publications/i/item/9789240045064

- Established since 1958
- Authoritative reference for the for the setting of national drinking-water regulations and standards in support of public health
- Rigorous assessment of biological, chemical, physical and radiological agents
- Health-based guideline values for about 100 chemicals
- Advisory in nature and based incremental improvement principle
- Need for adaptation to national circumstances and priorities

WHO Framework for safe drinking-water

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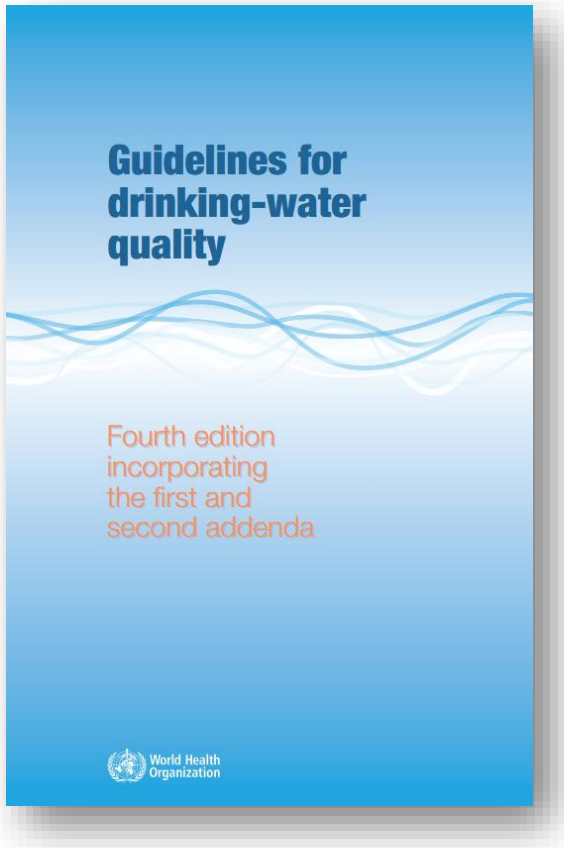

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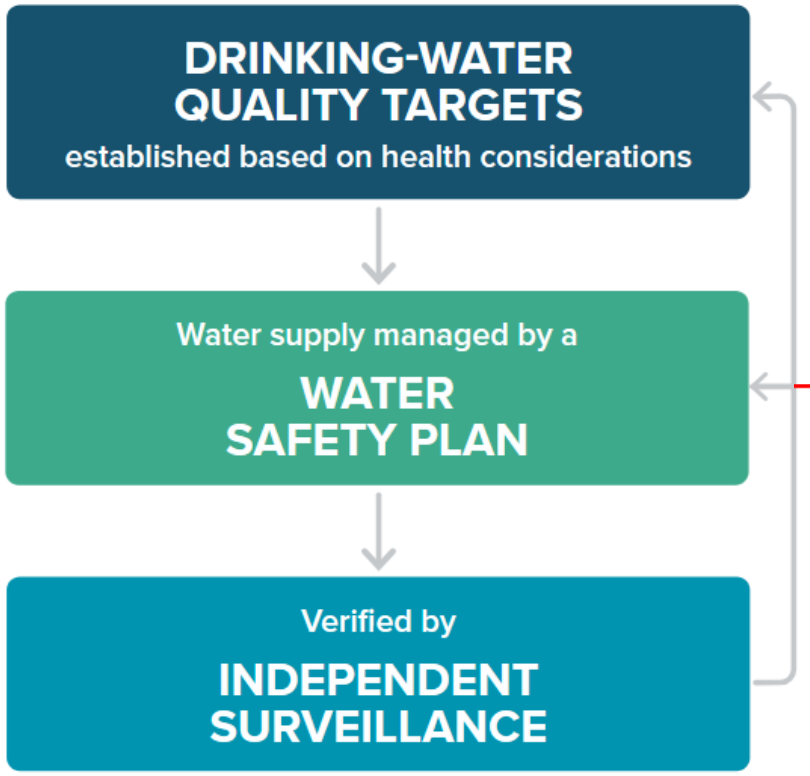

"The **most effective means** of consistently ensuring the safety of a drinking-water supply is through the use of a **comprehensive risk assessment and risk management approach** that encompasses all steps in water supply from **catchment to consumer**. In these Guidelines, such approaches are called **water safety plans**."

What is a WSP

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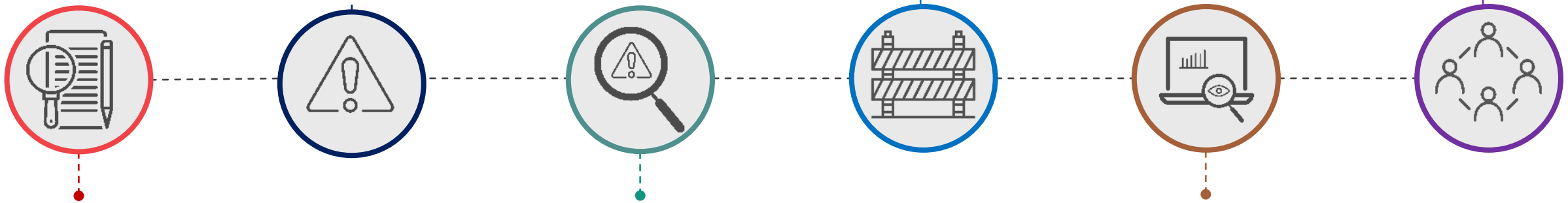
A proactive management system to ensure safe drinking-water by ▶



Understand the complete water supply system

Identify where and how the problems could arise

Assess risks to health and focus initially on priority risks

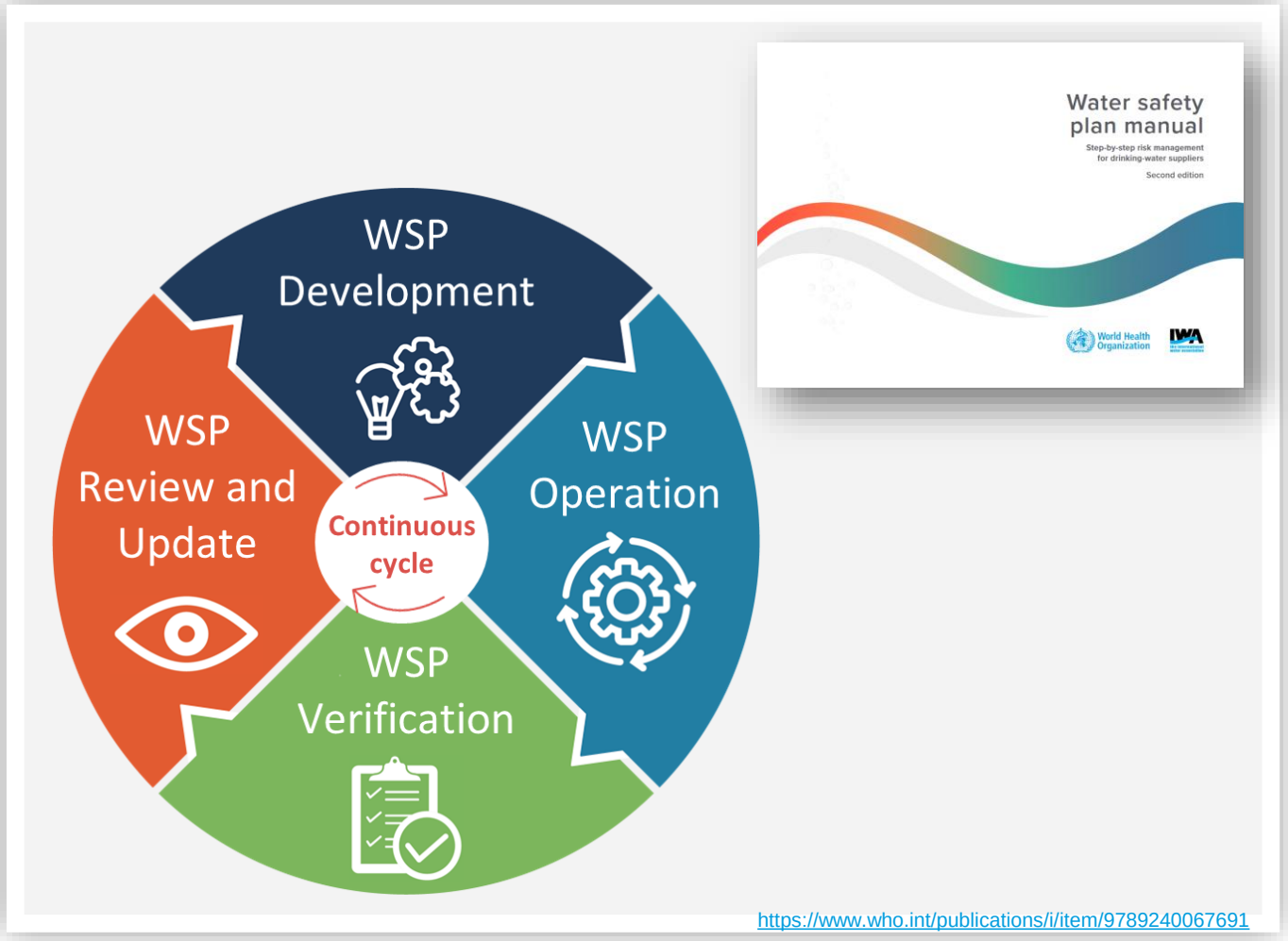
Put barriers and management systems in place to proactively manage these risks

Monitor to make sure all parts of the system continue to work properly

Involve all stakeholders

WSP features

- Provides codified safe management (with principles routing in HACCP)



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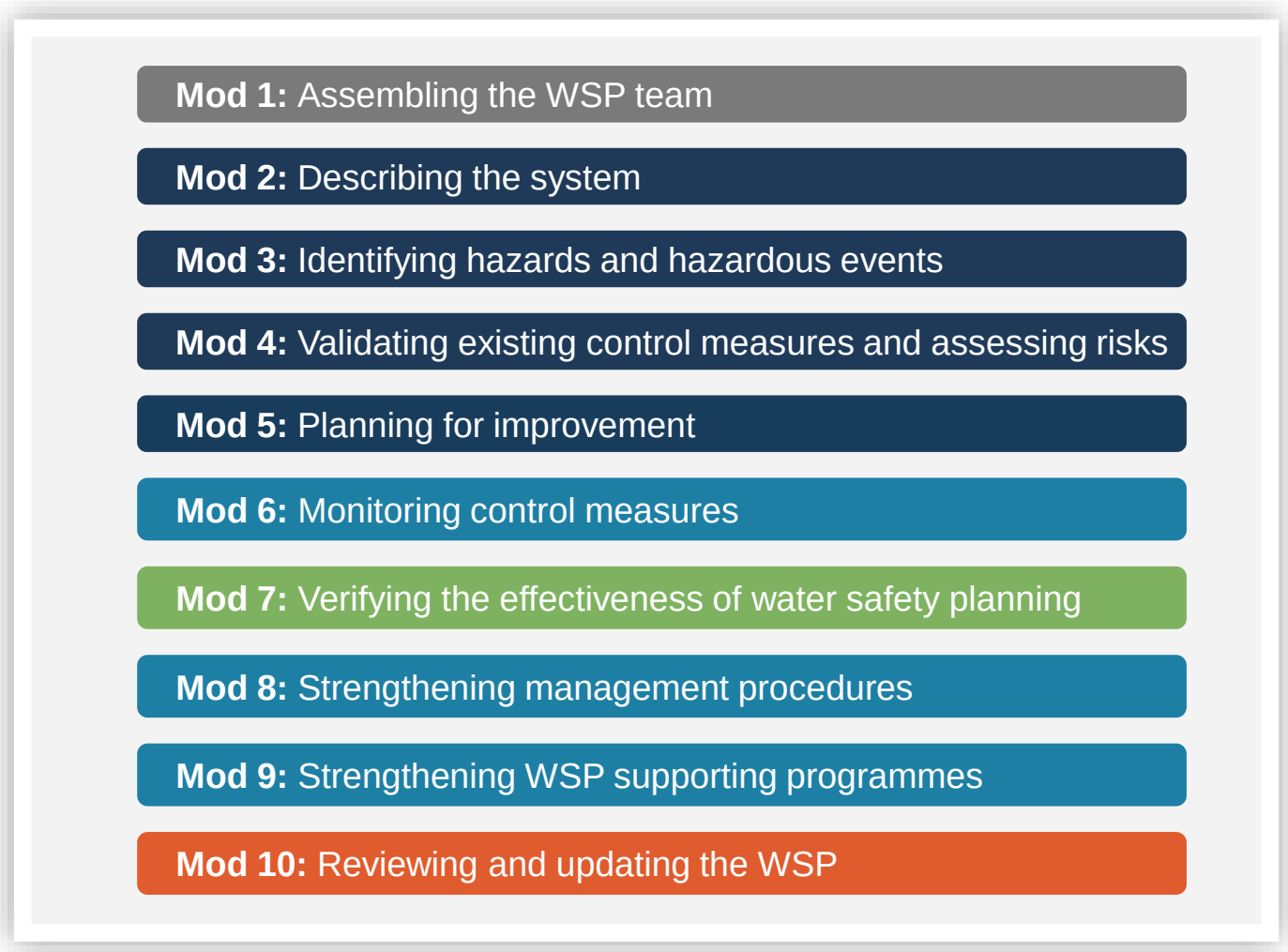
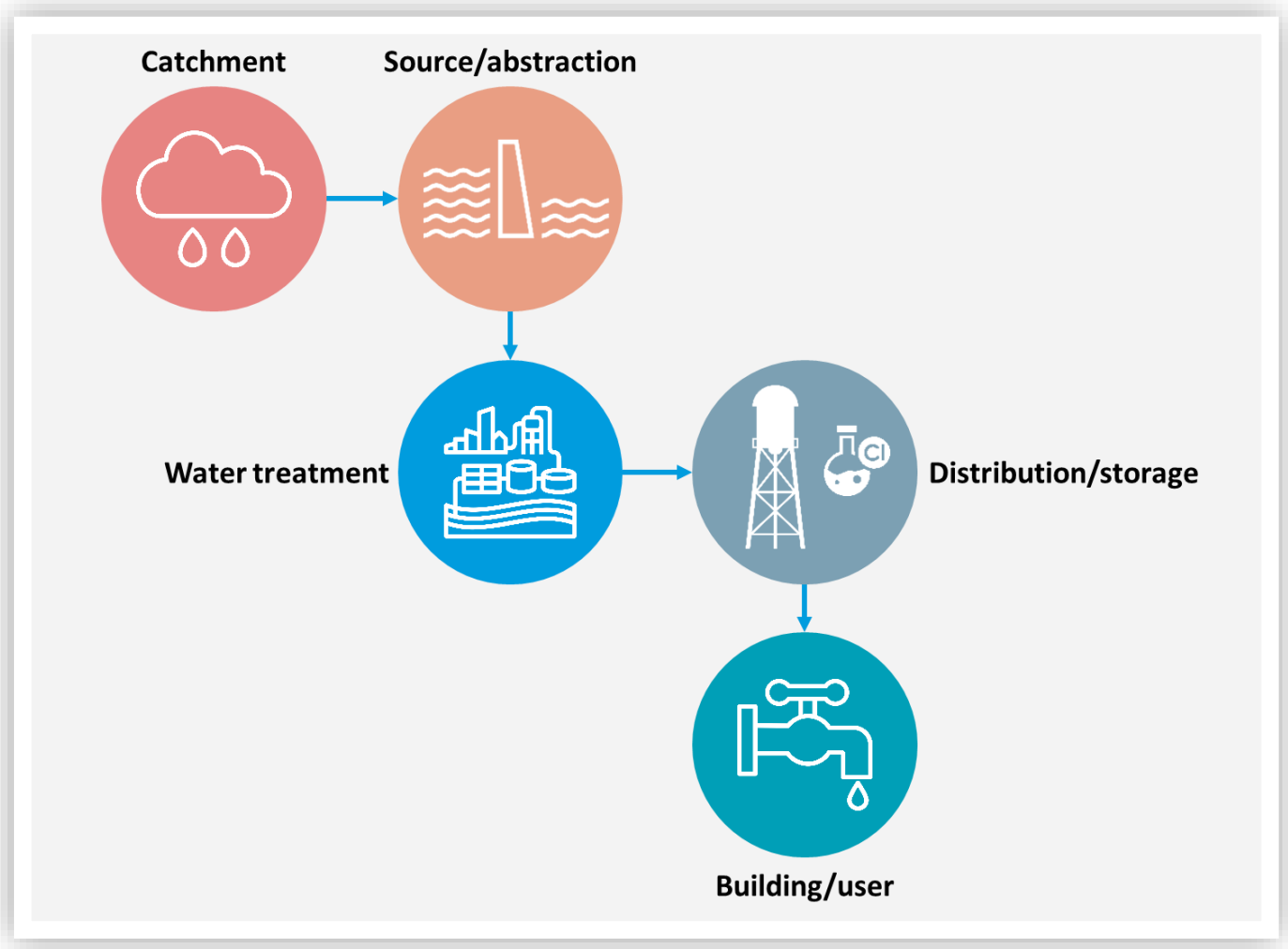


WSP features

- Provides codified safe management (with principles routing in HACCP)
- Promotes a multiple-barrier "catchment to consumer" approach



WSP features

- Provides codified safe management (with principles routing in HACCP)
- Promotes a multiple-barrier “catchment to consumer” approach
- Helps to overcome limitations of compliance/end product testing
  - Reactive approach
  - Test results provide a “spot check” only
  - Testing can be very expensive
  - May not be clear what went wrong, where and when

WSP features

- Provides codified safe management (with principles routing in HACCP)
- Promotes a multiple-barrier “catchment to consumer” approach
- Helps to overcome limitations of compliance/end product testing
- Focuses on systematically identifying and managing risks to water supply
  - What can go wrong where, when and why?
  - Are existing controls effective?
  - What is a risk to public health?
  - What requires management attention?
  - What improvements are needed?
  - Where to focus monitoring?

RISK MATRIX		Severity				
		Insignificant (Score: 1)	Minor (Score: 2)	Moderate (Score: 4)	Major (Score: 8)	Catastrophic (Score: 16)
Likelihood	Almost certain (Score: 5)	5	10	20	40	80
	Likely (Score: 4)	4	8	16	32	64
	Foreseeable (Score: 3)	3	6	12	24	48
	Unlikely (Score: 2)	2	4	8	16	32
	Most unlikely (Score: 1)	1	2	4	8	16

WSP features

- Provides codified safe management (with principles routing in HACCP)
- Promotes a multiple-barrier "catchment to consumer" approach
- Helps to overcome limitations of compliance/end product testing
- Focuses on systematically identifying and managing risks to water supply
- Establishes operational procedures informed by risk assessment outcomes
  - Operational monitoring for high risks
  - SOPs for monitoring, inspection, O&M etc.
  - Emergency/incident response procedures

POTENTIAL HAZARD		**Sub-performance of coagulation process**, resulting in potential: ▪ Reduced effectiveness of other water treatment processes (i.e. clarification, filtration, disinfection) – Health Risk (Regulatory) ▪ Elevated Aluminium residual in distribution system – Health Risk (Regulatory) ▪ Dirty water (high turbidity and/or colour) in distribution system – Aesthetic Risk			
KEY CONTROL MEASURE		**Alum Dosing System Performance** **pH (Coagulation)** – during plant operation			
MONITORING	**What**	**pH**			
	How	**pH meter (online)**			
	When	**Continuous online**			
	Where	**Clarifier Inlet**			
	Who	**WTP Operator**			
	Records	**SCADA**			
TARGET		**6.0 — 6.5**			
ALERT LIMIT		**< 5.8 or > 6.8 for 15 minutes**			
CRITICAL LIMIT		**< 5.5 or > 7.0 for 45 minutes**			
CORRECTIVE ACTION CHECKLIST **(Undertake these actions as deemed necessary)**		**What**	**When**	**Who**	**Records**
		Automatic plant shutdown	Critical	Automatic	SCADA
		Check SCADA trends (e.g. coagulant pH, raw water pH, raw water flow rate, raw water turbidity, filtered water turbidity, chemical pre-dosing)	Alert & Critical	WTP Operator	Plant event log
		Check accuracy of online pH trend and meter using portable pH test kit	Alert & Critical	WTP Operator	Plant event log
		Calibrate online pH meter (CW- PC-0808)	Alert & Critical	WTP Operator	Plant event log
		Check / adjust alum dose rate	Alert & Critical	WTP Operator	Plant event log
		Check / adjust caustic pre-dose rate	Alert & Critical	WTP Operator	Plant event log
		Visually inspect alum dosing system & clarifier	Alert & Critical	WTP Operator	Plant event log
		Check chemical quantity available	Alert & Critical	WTP Operator	Plant event log
		Check chemical quality (CW-PC-0806)	Alert & Critical	WTP Operator	Plant event log
		Initiate Water Quality Incident Notification (CW-PC-0805)	Alert & Critical	LL WQ Mgr	Incident report
		Contact Manager / Supervisor for advice	Critical	WTP Operator	Plant event log
		Manual plant shutdown	Alert	WTP Operator	Plant event log
		Create Issue Manager incident report	Critical	Manager WQP	Issue Manager

WSP is a public health benchmark

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- Allows for systematic and proactive management of health risks
- Improves day-to-day operations
- Reduces incidents
- Reduces incompliance
- Brings health gains
- Identifies short-term improvements and maps needs for long-term investments
- Improves climate resilience

Uptake in 2020 EU Drinking Water Directive

Article 7: Risk-based approach to water safety

1. Member States shall ensure that the supply, treatment and distribution of water … is subject to a risk-based approach that covers the whole supply chain from the catchment area, abstraction, treatment, storage and distribution of water to the point of compliance (…).

   The risk-based approach shall entail the following elements:

   a) risk assessment and risk management of the catchment areas for abstraction points of water (…) in accordance with Article 8;

   b) risk assessment and risk management for each water supply system that includes the abstraction, treatment, storage and distribution of water (…) to the point of supply carried out by the water suppliers in accordance with Article 9;

   c) risk assessment for the domestic distribution systems in accordance with Article 10.

WSP and climate change impacts on water supply

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RAIN AND FLOODING

- Increased upstream erosion and run-off
- Damage to assets and infrastructure
- Overwhelmed storm- and wastewater containment systems
- 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 aquifers
- Saltwater intrusion into distribution networks
- Inundation of critical assets and infrastructure

WSP and climate change impacts on water supply

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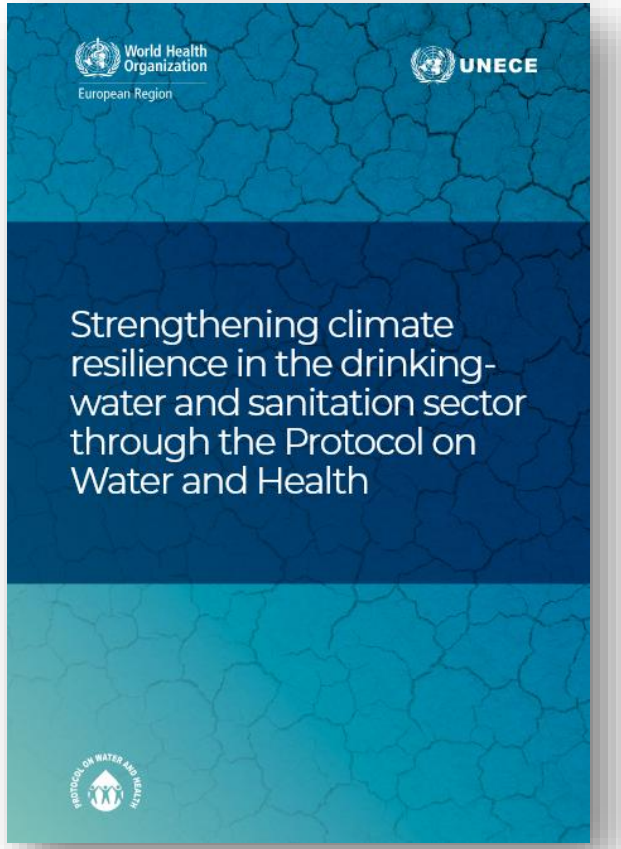

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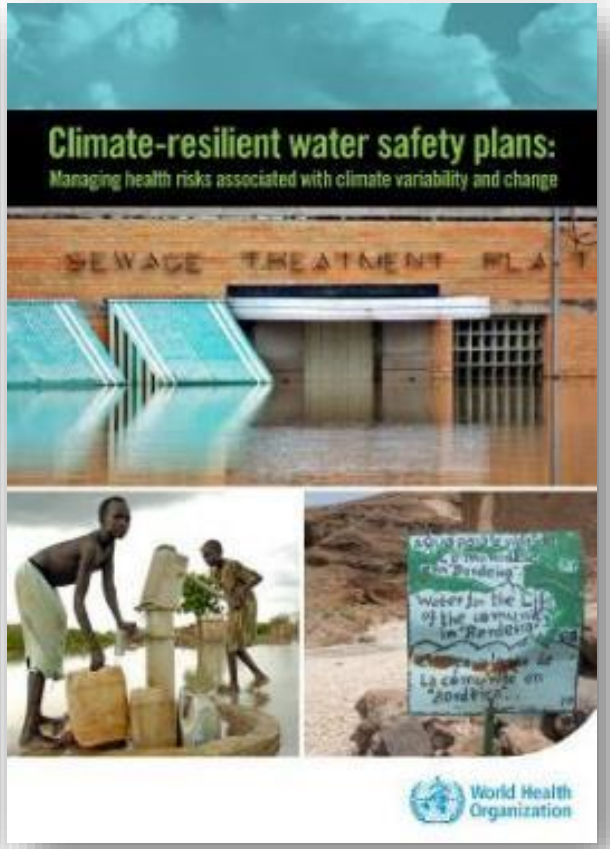

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SEA-LEVEL RISE

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

WSP & emergency readiness

Focus on Ukraine

Impacts documented

- Water quality deterioration
- Infrastructure damaged
- Disruption of essential power supplies
- Disrupted logistics for materials (spare parts, treatment chemicals, disinfectants)
- Reduced financing for services
- Displaced populations and lack of workforce availability

Photos: Association "Ukrvodokanalekologiya"

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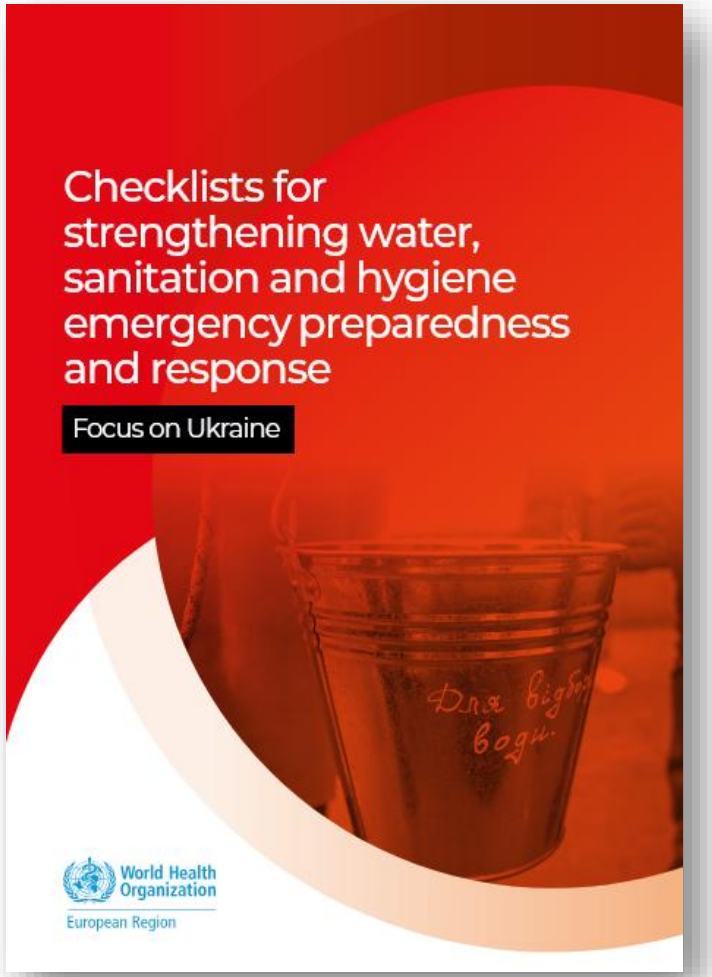
WSP & emergency readiness

Focus on Ukraine



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Photos: Association "Ukrvodokanalekologiya"

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Stay healthy and safe