WATER SAFETY PLAN (Planning?)

26nd of October 2026

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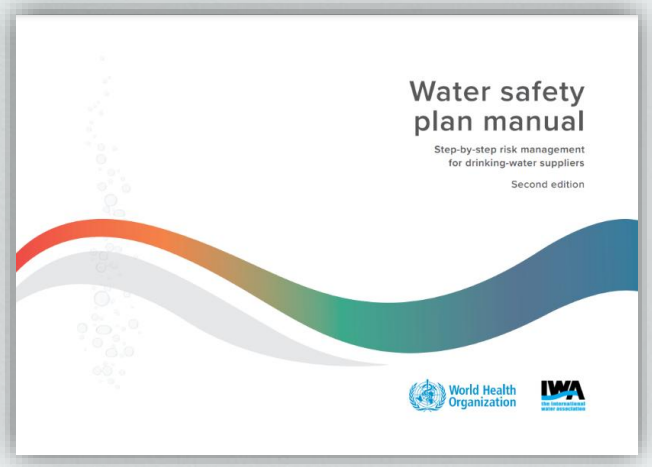

Rui Sancho

- *Águas do Algarve since 2000 – Head of the Water Operations Directorate*
- *1st Risk assessment 2001 (HACCP)*
- *1st Water Safety Plan (WSP) implemented in 2007*
- *WSP trainer, auditor and consultant since 2009*

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INTERNATIONAL COLLABORATION

The Water Safety Planning Specialist Group

A practical knowledge network to broaden and strengthen WSP implementation.

PURPOSE

Disseminate practical knowledge on WSP implementation to the people and organisations responsible for safe drinking-water.

Key audiences

Water suppliers • Regulators • Health organisations • International water community

PRIORITIES FOR THE COMING YEARS

Promote small supplies

Make practical WSP implementation more achievable for small water systems.

Expand collaboration

Work with IWA to engage stakeholders beyond utilities and end users.

Connect knowledge to practice

Share experience and practical approaches across the international community.

Source: Water Safety Planning SG purpose statement supplied by the user

Who we are



Águas do Algarve, (Portugal):

- ✓ an affiliate of **Águas de Portugal, SGPE, SA;**
- ✓ responsible for supplying drinking water up to approximately 1,5 million inhabitants in the Algarve region (southern of Portugal)



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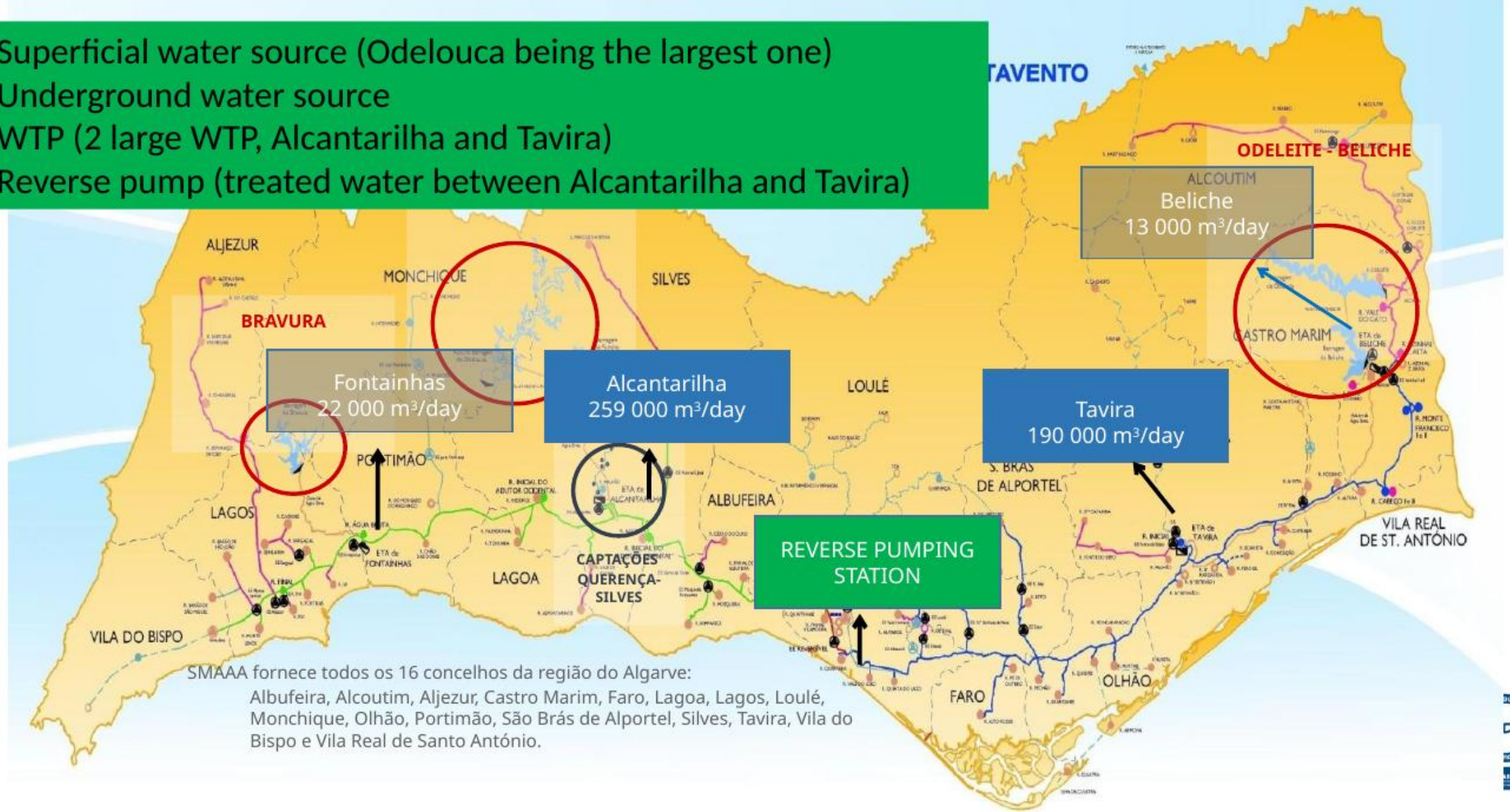
WaterWorks

3 Superficial water source (Odelouca being the largest one)
1 Underground water source
4 WTP (2 large WTP, Alcantarilha and Tavira)
1 Reverse pump (treated water between Alcantarilha and Tavira)



SMAAA fornece todos os 16 concelhos da região do Algarve:
Albufeira, Alcoutim, Aljezur, Castro Marim, Faro, Lagoa, Lagos, Loulé, Monchique, Olhão, Portimão, São Brás de Alportel, Silves, Tavira, Vila do Bispo e Vila Real de Santo António.

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Water Safety Plan?

Waterworks

4 WTP – 5,65m3/s
450 km of mains
#pumping stations
water reservoirs

Certification

Quality Management Systems **Environmental Management Systems** **Health and Security Management Systems**	2005
Laboratory Accreditation	2006
Water Safety Plan **Food Management Systems** **Drinking Water Product** **Social Responsibility**	2007







GLOBAL PERSPECTIVE • 20 MIN

WATER SAFETY PLANS

From global vision to measurable impact

The evolution, adoption and future of preventive drinking-water risk management

GLOBAL CONTEXT

Safe drinking-water remains a global public-health challenge

Historical WHO estimates in the supplied synthesis illustrate why prevention matters.

6.0 billion

people using safely managed drinking-water services

~73% of world population

2.2 billion

people without safely managed services

Access and service quality remain unequal

1.7 billion

people using sources contaminated with faecal matter

Estimate for 2022

505,000

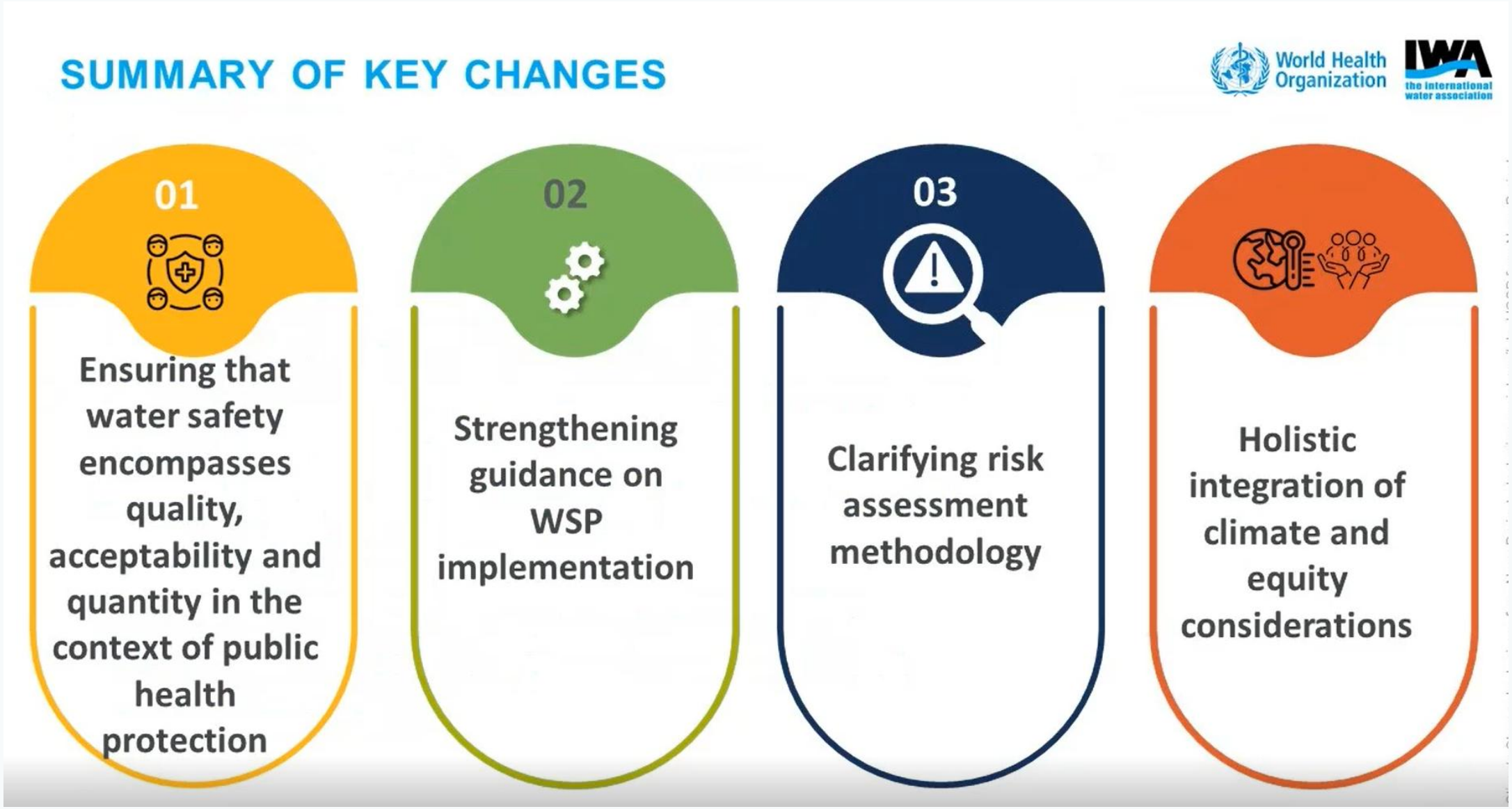
estimated diarrhoeal deaths per year

Attributable to microbiologically contaminated drinking-water

Safely managed means an improved source, on premises, available when needed and free from faecal and priority chemical contamination.

Source: WHO, “Drinking-water” fact sheet (figures mainly relating to 2022; as summarised in supplied text)

Water Safety Plan Manual – 2nd Edition (2023)



Source: WHO, “Drinking-water” fact sheet (figures mainly relating to 2022; as summarised in supplied text)

GOVERNANCE & RESILIENCE

Effective water safety depends on three complementary functions

Risk management by the supplier works best within a clear public-health and regulatory framework.

HEALTH-BASED TARGETS
National authorities define public-health objectives and requirements.

↓

PREVENTIVE RISK MANAGEMENT
Suppliers implement, monitor and regularly review WSPs.

↓

INDEPENDENT SURVEILLANCE
Surveillance bodies assess compliance and the effectiveness of prevention.

EMERGING PRESSURES

- Drought and water scarcity
- Floods and extreme events
- Changing source-water quality
- Population growth and urbanisation
- New risks from reuse and resource recovery

Climate resilience, trained people, reliable infrastructure and continuous verification must be built into the way the system is managed.

Source: WHO Guidelines for Drinking-water Quality (2026) and supplied WHO synthesis

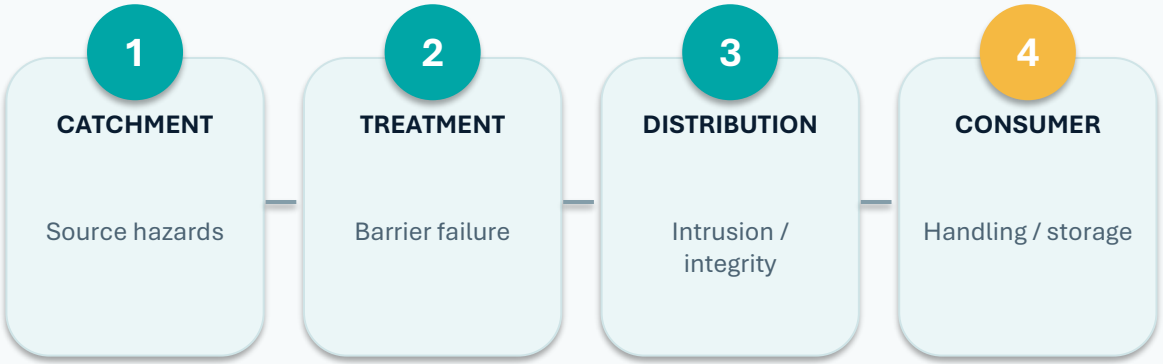
Safe water is not a one-off test result

Water safety is a system property — and it must be maintained every day.

A water sample tells us what was true then.

A preventive system helps us manage what could go wrong next.

RISK CAN ENTER AT ANY POINT



The WSP response: identify significant risks, control them, monitor performance and learn.

Source: WHO Guidelines for Drinking-water Quality (2026)

A Water Safety Plan is a (proactive) management system

Comprehensive risk assessment and risk management — from catchment to consumer.

01

UNDERSTAND

Describe the system and its context

02

ASSESS

Identify hazards and prioritize risks

03

CONTROL

Validate barriers; plan improvements

04

MONITOR

Check controls; verify outcomes

05

LEARN

Prepare for incidents; review and improve

A WSP is not a report to file. It is a living process embedded in daily operations.

Source: Water Safety Portal — “What are Water Safety Plans?”; WHO Guidelines (2026)

A Water Safety Plan is a (proactive) management system

Comprehensive risk assessment and risk management — from catchment to consumer.

Understanding the complete water supply system

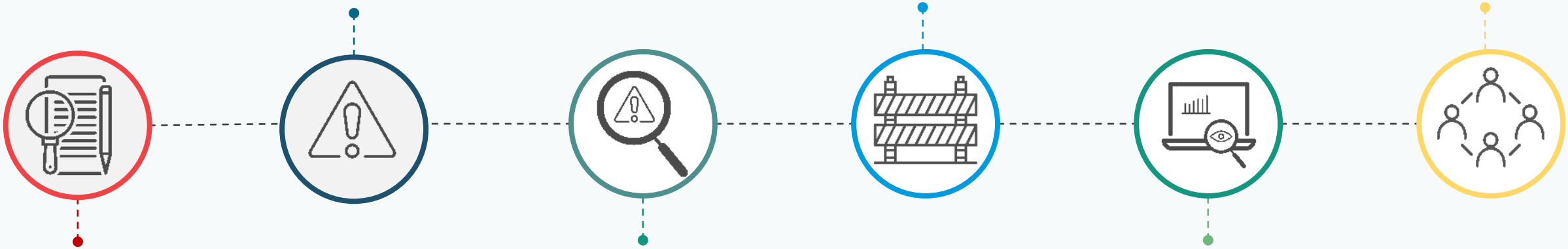
Identifying where and how the problems could arise

Focusing initially on priority risks

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

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

Involving all stakeholders



After Water safety planning for urban water supply systems an introduction (WHO, 2024)

Source: Water Safety Portal — “What are Water Safety Plans?”; WHO Guidelines (2026)

A Water Safety Plan is a (proactive) management system

Comprehensive risk assessment and risk management — from catchment to consumer.



Example: Restrictions on land use in catchment

Example: Sand filtration & disinfection at a water treatment plant

Example: Maintaining residual disinfection during distribution

Example: Household treatment and safe storage practices

Source: Water Safety Portal — “What are Water Safety Plans?”; WHO Guidelines (2026)

IMPLEMENTATION FRAMEWORK

The 10 steps of a Water Safety Plan

A practical risk-management cycle — from system understanding to review and continuous improvement.

1

Assemble the WSP team

Define roles, responsibilities and multidisciplinary expertise.

2

Describe the water supply system

Map the system from catchment to consumer.

3

Identify hazards and hazardous events

Determine what could happen, where and how.

4

Assess and prioritise risks

Evaluate likelihood and consequences; focus on significant risks.

5

Identify and validate control measures

Confirm which barriers prevent, eliminate or reduce risks.

6

Develop an improvement plan

Address gaps where controls are absent or insufficient.

7

Monitor control measures

Define operational limits, monitoring methods and corrective actions.

8

Verify WSP effectiveness

Check water quality and whether the plan works as intended.

9

Prepare management procedures

Document routine operation, incidents and emergency response.

10

Review and improve the WSP

Update the plan after changes, incidents, audits and new evidence.

Cross-cutting throughout: climate resilience • equity • communication • documentation • continuous improvement

Source: WHO, Water safety plan: step-by-step risk management for drinking-water suppliers: training package (11 Feb 2026); WHO/IWA WSP Manual (2023)

From early practice to an international framework

A timeline of milestones documented by the two permitted sources.



Melbourne

WSPs implemented before regulation

IWA Manual

IWA/WHO WSP Manual

Global review

WHO reports on uptake across 118 countries

Manual, 2nd ed.

Climate resilience and equity integrated

Updated Guidelines

Updated WSP guidance; stronger support role

The story is not a single launch date — it is a gradual shift from practice, to policy, to continuous improvement.

Source: Water Safety Portal case studies and WHO Guidelines (2026)

WSPs moved from local innovation to global practice

WHO's 2017 global review provides a historical baseline — not a 2026 count.

118

COUNTRIES

included in the global review

93

COUNTRIES

reported WSP implementation

46

COUNTRIES

had policy / regulatory instruments

23

COUNTRIES

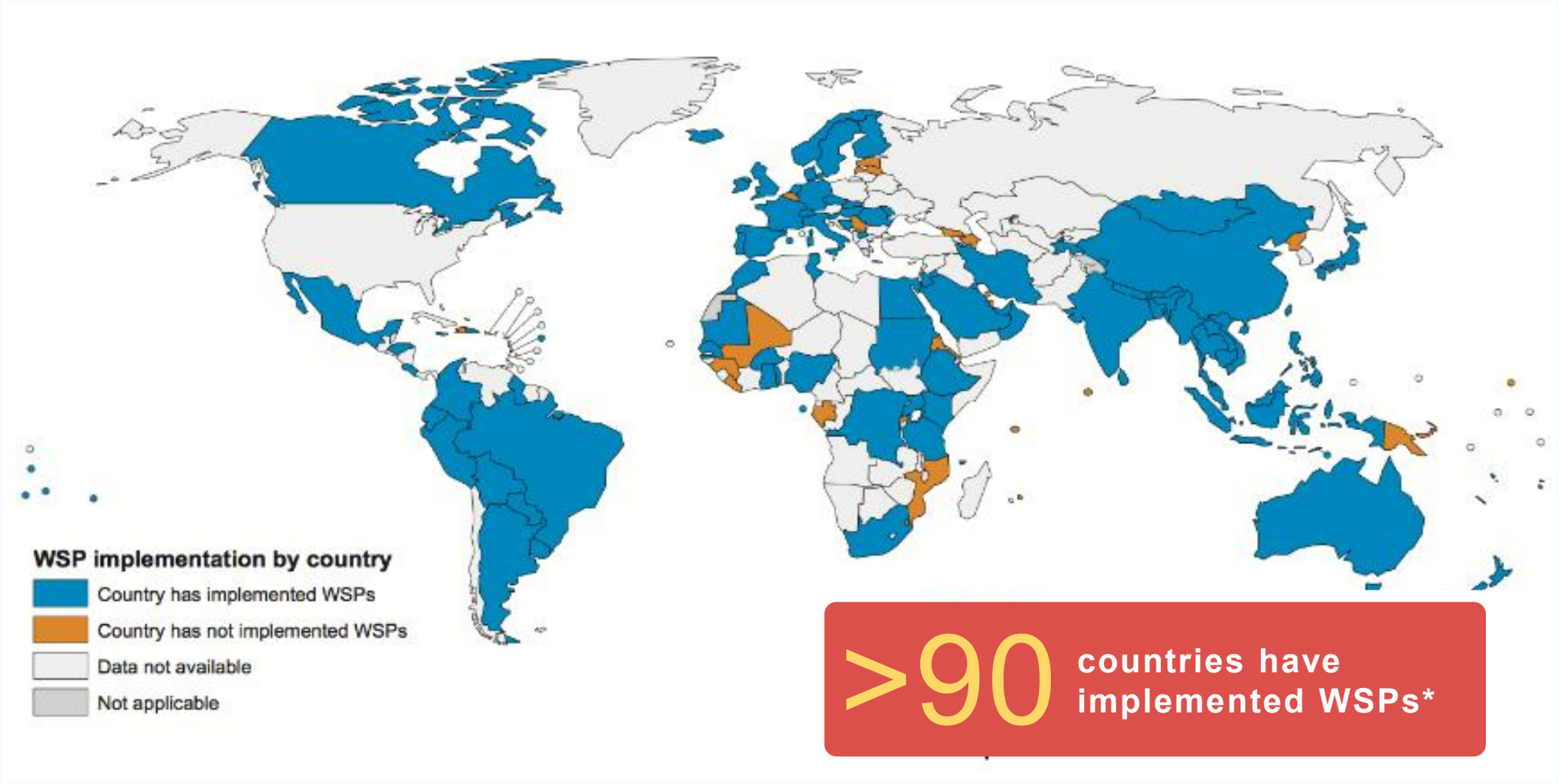
were developing such instruments

Interpretation: widespread adoption — but national policy, implementation quality and verification are different measures.

Source: Water Safety Portal — WHO Global Status Report on WSPs (2017)

WSPs moved from local innovation to global practice

WHO's 2017 global review provides a historical baseline — not a 2026 count.



Source: Water Safety Portal — WHO Global Status Report on WSPs (2017)

One principle — different implementation models

WSPs are designed to adapt to different system sizes and socioeconomic settings.

URBAN WATER SUPPLIES

10 modules commonly used

Multidisciplinary team
Detailed system description
Structured risk assessment
Validated control measures
Operational monitoring, verification and review

SMALL WATER SUPPLIES

6 simplified tasks

Community engagement
Practical system mapping
Prioritised risks and controls
Incremental improvements
Monitoring, verification and review

Same objective: consistently safe drinking-water. The method should fit the context — not the other way around.

Source: Water Safety Portal — “What are Water Safety Plans?”; WHO Guidelines (2026)

EU DRINKING WATER DIRECTIVE (EU) 2020/2184
RISK ASSESSMENT: SEQUENCE & DEADLINES

ARTICLE 7 — INTEGRATED RISK-BASED APPROACH

Whole chain: catchment ⟶ abstraction ⟶ treatment ⟶ storage ⟶ distribution ⟶ point of compliance / supply



1 ARTICLE 8 | CATCHMENT AREAS

Member States ensure risk assessment and risk management

- Characterise catchments and safeguard zones.
- Identify hazards and hazardous events (anthropogenic and natural).
- Monitor relevant surface water, groundwater or raw water parameters.

FIRST COMPLETED BY 12 JULY 2027

Review at intervals no longer than 6 years; update where necessary.

Article 8 results feed into Article 9.

2 ARTICLE 9 | SUPPLY SYSTEM

Water supplier carries out risk assessment and risk management.

- Covers abstraction, treatment, storage and distribution to the point of supply.
- Must take Article 8 results into account.
- Assess risks including climate change, leaks and leaking pipes.
- Use findings for control measures and operational monitoring.

FIRST COMPLETED BY 12 JANUARY 2029

Review at intervals no longer than 6 years; update where necessary.

3 ARTICLE 10 | DOMESTIC DISTRIBUTION

General analysis of risks in domestic distribution systems and related products/ materials.

- No analysis of individual properties required for the general analysis.
- Monitor Annex I Part D parameters in premises where specific risks are identified (e.g. lead, Legionella).
- For Legionella or lead, monitoring may focus on priority premises (e.g. schools, healthcare facilities).

FIRST ASSESSMENT BY 12 JANUARY 2029

Review every 6 years; update where necessary.



Articles 8, 9 and 10 are linked components. The Directive does not prescribe a mandatory sequential start date for Article 10.

IMPORTANT: Deadlines are latest dates for first completion — not permission to delay action.
Take measures as soon as possible once risks are identified and assessed (Article 7(7)).

Legal basis: Directive (EU) 2020/2184, Articles 7–10 | EUR-Lex official text

Source: Water Safety Portal — "What are Water Safety Plans?", WHO Guidelines (2026)

Melbourne: more than two decades of practice

A large, complex supply — and a lesson in continuous adaptation.

5M+

residents served

1999

WSP implementation

WHAT THE CASE HIGHLIGHTS

1. **Complexity** — Multiple sources and treatment configurations require tailored controls.
2. **Adaptation** — Controls need continuous improvement as risks and operating conditions change.
3. **Preparedness** — Robust emergency management is essential for unpredictable events.
4. **Learning** — Audits and incidents can feed process improvement and communication.

Source: Water Safety Portal — Operationalising WSPs for Melbourne (uploaded 2024)

Águas do Algarve: ~two decades of practice

A large, complex supply — and a lesson in continuous adaptation.

up to 1,5M

served

2007

WSP implementation

WHAT THE CASE HIGHLIGHTS

1. **Hazards Control** — Salmonela, Aluminium, Bromates, Hepatite B, Quality of chemicals
2. **O&M and Water Quality** — Stregthed the llink between practice and Safety, between na action and the consequence for Water safety
3. **Preparedness** — WSP gave us the train on how to react (many emmergency events >2018)
4. **Learning** — Still learning and adapt. Risk Assessment for Dessalination Plant, Cyberprotection

Source: Water Safety Portal — Operationalising WSPs for Melbourne (uploaded 2024)

Extreme weather is a recurring operational reality

The supplied case material brings together floods, droughts, storms and hydrological anomalies across roughly five decades.

1	1989	**Tavira flood**	Algarve’s most destructive floods.
2	2021–2026	**Severe storms**	December 2021 storms; Storm Claudia (2025); Storm Leonardo (2026).
3	2021–2025	**Flash floods / alerts**	Flash floods in 2021; heavy-rainfall alerts in October 2024 and October 2025.
4	2005; 2017–19; 2023–24	**Severe drought cycles**	Long drought periods, including the source’s 2023–24 extreme-drought reference.
5	2025	**Downburst**	Gusts exceeding 110 km/h.
6	2010s onward	**Coastal storms and erosion**	Repeated storm damage to beaches and cliffs.
7	Winter 2025–26	**Exceptionally wet period**	Exceptionally wet hydrological period.

Source: user-provided presentation, “WHO Regional Montenegro / Águas do Algarve”, June 2026

Regional vulnerabilities: scarcity and extremes (dominant risks)

The Algarve example connects climate hazards to the exposure of water supply, urban areas, agriculture, tourism and ecosystems.

01

PERSISTENT DROUGHT

Recurring, intensifying drought can affect source availability and the reliability of water supply.

WSP question: How resilient is the supply portfolio under prolonged scarcity?

02

EXTREME RAINFALL & FLOODS

Rapid runoff and flash floods can disrupt urban and coastal areas and challenge intake and treatment processes.

WSP question: What happens when raw-water quality changes abruptly?

03

STRUCTURAL EXPOSURE

Catchment response times and coastal urbanisation can amplify impacts and constrain adaptation.

WSP question: Which assets and dependencies are most vulnerable?

RESILIENCE PRIORITY

Include climate-informed scenarios in the WSP and review them as operating conditions change.

Source: user-provided presentation, “WHO Regional Montenegro / Águas do Algarve”, June 2026

Climate risk assessment: what the source prioritises

The supplied risk matrix identifies two critical risks and two operational risks.

RISK MATRIX (AS SHOWN)



CRITICAL **25**

Drought

Long-duration source-availability pressure

CRITICAL **20**

Salinity

Source-water quality / salinity pressure

OPERATIONAL **16**

Extreme rainfall

Treatment overload

OPERATIONAL **12**

Storms

Infrastructure vulnerability

Scores are reproduced from the source presentation; the scoring methodology is not specified in the supplied slides.

Mitigation: diversify, adapt, reinforce and communicate

The source proposes four practical responses to the identified climate risks.

01

DIVERSIFY SOURCES

Desalination plant

Undertake a new risk assessment when introducing a new source.

02

FLEXIBLE TREATMENT

Flotation treatment stage

Adapt treatment capability to changing raw-water conditions.

03

RESILIENT NETWORK

Distribution redundancy

Build redundancy into the distribution network to strengthen continuity.

04

EARLY WARNING

Communication protocols

Establish communication protocols to support faster response to extreme events.

WSP principle: every adaptation measure should be assessed, implemented, monitored and reviewed as part of the plan.

Source: user-provided presentation, “WHO Regional Montenegro / Águas do Algarve”, June 2026

Adoption is not the same as impact

A credible global story separates implementation activity from measurable outcomes.



A practical guide to auditing water safety plans

WHO & IWA (2016)

http://www.who.int/water_sanitation_health/publications/auditing-water-safety-plans/en/

01

ADOPTION

Is a WSP in place?

Is there a policy or mandate?

02

IMPLEMENTATION

Are controls monitored?

Are improvements funded and reviewed?

03

OUTCOMES

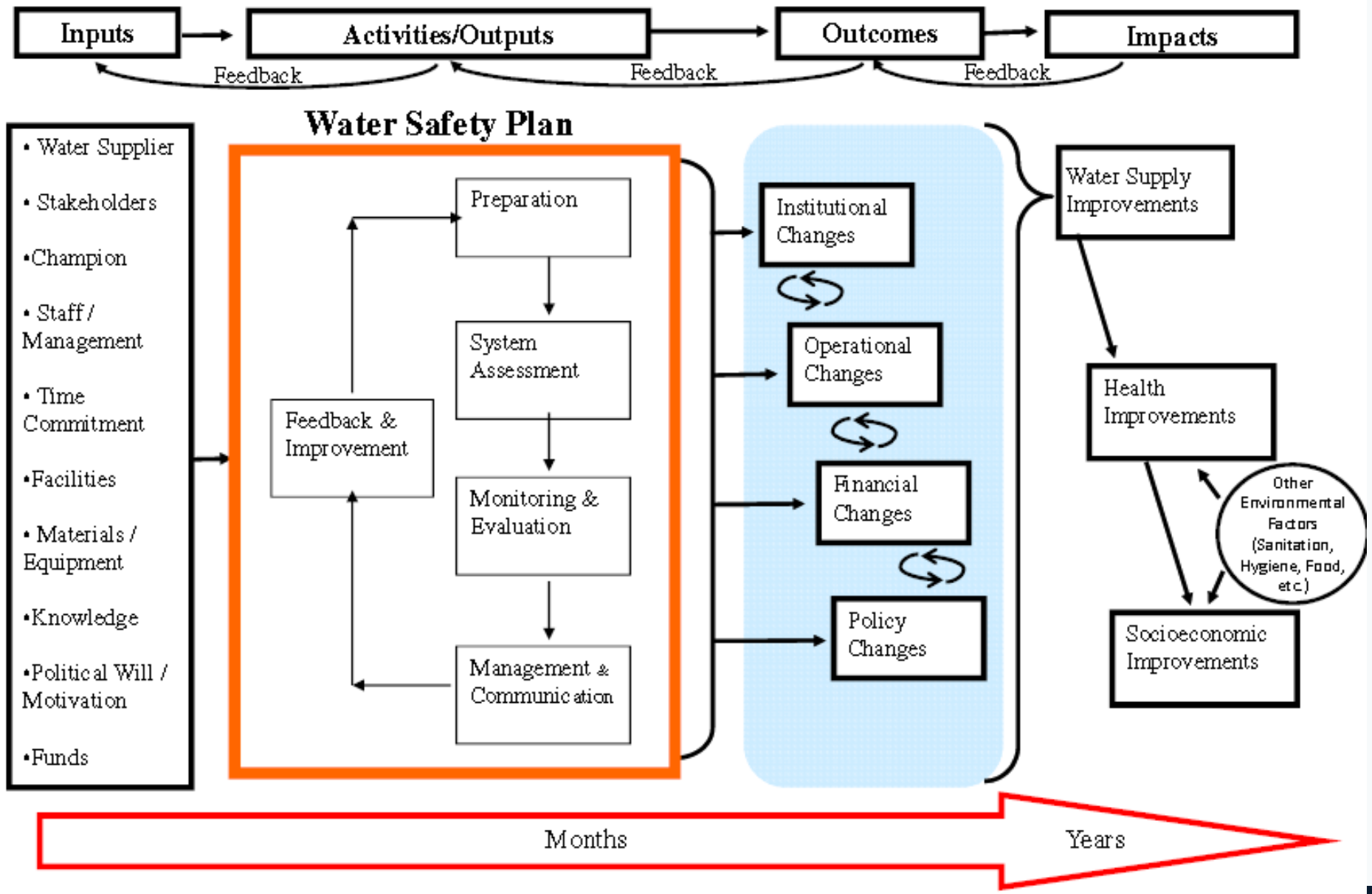
Is water safety improving?

Are risks and incidents reduced?

Impact assessment needs a baseline, repeated measurement, context and careful attribution.

Source: WHO Guidelines (2026); Water Safety Portal global review and case studies

Figure 3. WSP Conceptual Framework



Source: WHO Guidelines (20[illegible])

What the 2026 WHO Guidelines reinforce

The latest edition builds on decades of guidance and implementation experience.

A comprehensive framework

Health-based targets
+
Risk-based management
+
Independent surveillance

- **SMALL SUPPLIES** — Explicit policy consideration and implementation support.
- **GOVERNMENT ROLE** — Stronger emphasis on support for supplier risk management.
- **PRACTICAL TOOLS** — Updated WSP and sanitary inspection guidance.
- **PROGRESSIVE ACTION** — Matrices help prioritise action using water-quality results and risk-management practice.

Source: WHO Guidelines for Drinking-water Quality, 4th edition incorporating 1st–3rd addenda (17 June 2026)

Artificial intelligence can make WSPs more predictive

From periodic assessment to data-informed, adaptive risk management.

01 CONNECT

Sensors • SCADA
Laboratory • Weather

02 ANALYSE

Machine learning
Find patterns & anomalies

03 ANTICIPATE

Forecast turbidity,
demand & contamination risks

04 ACT

Earlier alerts; adjust
intake, filtration & dosing

POTENTIAL APPLICATIONS

- Detect and localise leaks
- Identify pollution hotspots
- Predict water-quality risks and support early warning

SAFEGUARDS ARE PART OF THE WSP

- Data quality, representativeness and model validation
- Explainability, human review and clear accountability
- Cybersecurity, energy use and rare-event uncertainty

AI should support — not replace — validated controls, expert judgement and responsible governance.

Source: IWA, “Artificial Intelligence in Water Safety Planning: A Path to Sustainability” (4 Aug 2026), iwa-network.org

From a plan to a resilient operating culture

The next step is not simply more plans — it is stronger, sustained implementation.

PEOPLE

Clear ownership, skills and leadership

OPERATIONS

Controls embedded in routine work

RESILIENCE

Preparedness, review and adaptive control

EVIDENCE

Monitoring, verification and transparent learning

A WSP succeeds when risk management changes decisions — every shift, every incident, every review.

Source: WHO Guidelines (2026); Water Safety Portal resources and case studies

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Conclusions

- A WSP is a **public health benchmark** for safe water
- A WSP is an effective **tool for water suppliers**
- The WSP principles are “nothing new” but present a **codified safe management** approach
- A WSP is based on **risk-based principles**
- A WSP applies for **all types and sizes** of supplies

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Added value

- WSPs lead to more **clarity on supply-related risks** and thereby improves operations
- WSPs foster **due diligence**
- WSPs can lead to reduction of **water quality incidents**
- WSPs can lead to increased **compliance**
- WSPs stimulate **cooperation and communication**
- WSPs can rise of **people's confidence** in the water supply and thereby increase **willingness to pay** fees

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Added value

- WSPs provide **rationale for decision making**
- WSPs identify **short-term improvements** feasible with own resources
- WSPs map **needs for additional resources** for long-term investments (e.g. infrastructure upgrades)
- WSPs support leverage of **external financial support** through demonstration of an proactive approach

THE REAL MEASURE OF SUCCESS

Not the existence of a document —

but its contribution to preventing risk,
improving system performance and protecting public health.

THANK YOU

Questions & discussion

Sources: WHO Guidelines for Drinking-water Quality (2026) • Water Safety Portal

Sources used in this presentation

Sources include WHO Guidelines (2026), WHO Drinking-water fact sheet, Water Safety Portal, IWA WSP resources, and the user-provided Águas do Algarve presentation.

WHO (2026)	Guidelines for drinking-water quality: fourth edition incorporating the first, second and third addenda.	https://www.who.int/publications/i/item/9789240121225
Water Safety Portal	What are Water Safety Plans (WSPs)? — definition, 11 modules and six tasks for small supplies.	https://wsportal.org/what-are-water-safety-plans/
WHO (2017), hosted on the Portal	Global status report on water safety plans: a review of proactive risk assessment and risk management practices.	https://wsportal.org/resource/global-status-report-on-water-safety-plans-a-review-of-proactive-risk-assessment-and-risk-management-practices-to-ensure-the-safety-of-drinking-water/
WHO et al. (2018), hosted on the Portal	Strengthening operations & maintenance through water safety planning: a collection of case studies.	https://wsportal.org/resource/strengthening-operations-maintenance-through-water-safety-planning-a-collection-of-case-studies/
Jayaratne et al. (2023), hosted on the Portal (2024)	Operationalising water safety plans for Melbourne – a large city case study.	https://wsportal.org/resource/operationalising-water-safety-plans-for-melbourne-a-large-city-case-study/
WHO/IWA (2023), hosted on the Portal	Water Safety Plan Manual, second edition — climate resilience and equity.	https://wsportal.org/resource/water-safety-plan-manual-2nd-edition/

Note: The 2017 country figures are explicitly presented as historical findings, not as current 2026 estimates.