

Shaping the Future of Water Management through Digital Transformation and AI

07 SEPTEMBER 2026

inspiring change

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(We will answer these during the discussions)

***Please Note:** Attendees’ microphones are muted. We cannot respond to ‘Raise Hand’.*

AGENDA

- **Welcome and Introduction to the Webinar**

Tharika Fernando, Secretary, IWA-YWP SL - Moderator

- **Opening Remarks**

Kala Vairavamoorthy, Executive Director, International Water Association

- **Shaping the Future of Water Management through Digital Transformation and AI**

Prof. Harsha Ratnaweera, Professor of Water and Wastewater Technology at the Qingdao University of Technology, China

- **Panel Discussion and Audience Q&A**

Prof. Harsha Ratnaweera, Professor of Water and Wastewater Technology at the Qingdao University of Technology, China

Dr. Lal Muthuwatta, Deputy Country Manager - Sri Lanka, International Water Management Institute (IWMI)

Dr. S.K. Weragoda, Specialist (Water Treatment) , National Water Supply & Drainage Board, Sri Lanka

- **Closing Remarks**

Tharika Fernando, Secretary, IWA-YWP SL - Moderator

IWA YWP Sri Lanka Webinar on Digital Water and AI

7th September 2026



Shaping the Future of Water Management through Digital Transformation and AI

Harsha Ratnaweera

President, European Water Association-EWA
Distinguished Fellow and Director of the Board, IWA
Professor, Norwegian University of Life Science & Qingdao University of Technology, China

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Structure of the presentation

- Introduction to digitalisation and AI
- Examples of their use to meet challenges
- Resources to learn more

Digital transformation in the water sector - A paradigm shift

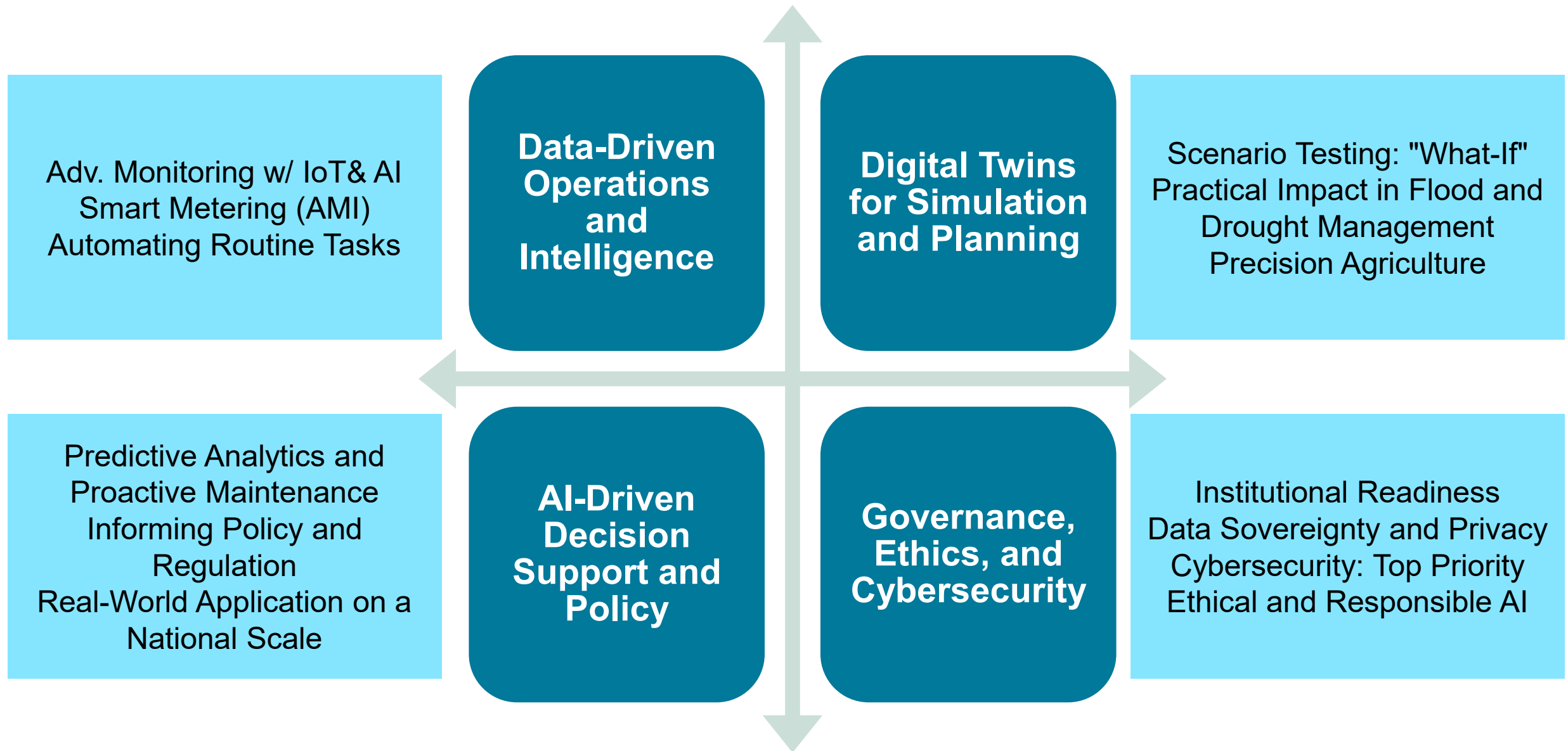


Digital transformation in the water sector fundamentally changes the way we are managing the water

Reactive vs Proactive

Aspect	Old Paradigm (Reactive)
Core Mindset	"Fix it when it breaks."
Data	Scarce, siloed, and historical (monthly reports).
Decision-Making	Human intuition based on experience and gut feeling.
Response Time	Hours or days to detect a leak or issue.
Customer Role	Passive rate-payer who receives a bill.
Risk Management	Responding to floods/droughts as they happen.

Core pillars of Digital transformation & AI



Global Trends in Water & Wastewater Digitalization

Smarter operations. Cleaner water. Sustainable future.



01

Online
water-quality
monitoring



02

AI-based
decision
support



03

Predictive
maintenance



04

Digital
twins



05

Remote
dashboards
and alarms



06

Automated
chemical/energy
optimization



Improve water quality



Increase operational efficiency



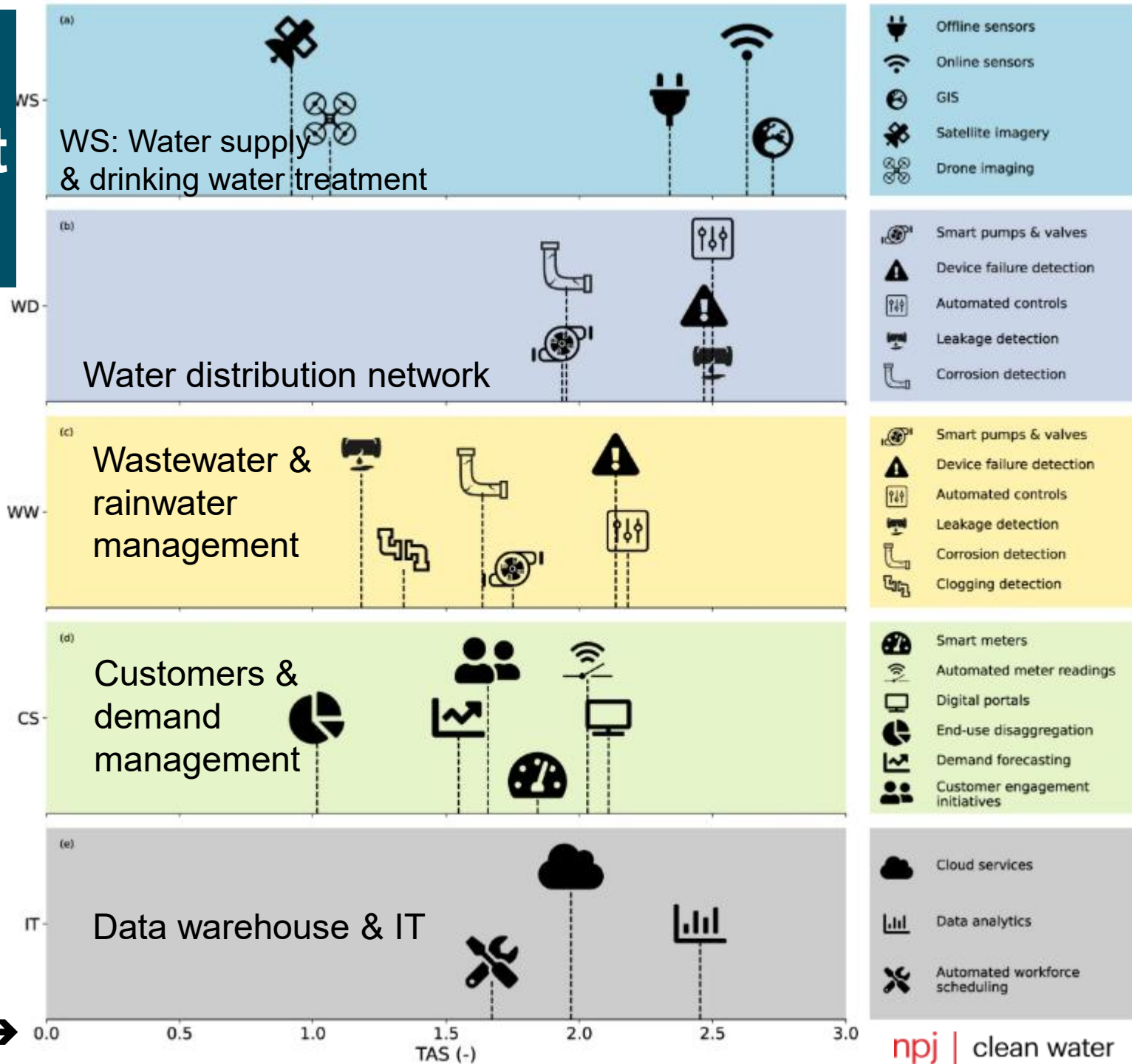
Reduce costs & energy



Ensure compliance & resilience

Penetration of digital technologies in different water utility sectors.

Survey from 64 utilities from 28 countries, 2023



Digital Wave in the water sector



Market Growth

The global **smart water management market** is projected to grow from \$24 billion in 2025 to over 43 billion by 2030, driven by IoT sensors, cloud platforms, and AI analytics.

Predictive vs Generative vs Agentic AI – Coagulation as an example

Predictive AI

The Forecaster: Looks Forward

- **Forecasts** the inlet water quality before it reaches the treatment plant

Generative AI

The Translator & Advisor: Makes Sense of the Future

- Interprets inlet WQ and predicts turbidity will rise **proposes** to increase PAC dosage and adjust pH

Agentic AI

The Autonomous Operator: Changes the Future

- Receives the proposal and **adjust** the dosing pumps if within safety limits and logs the action

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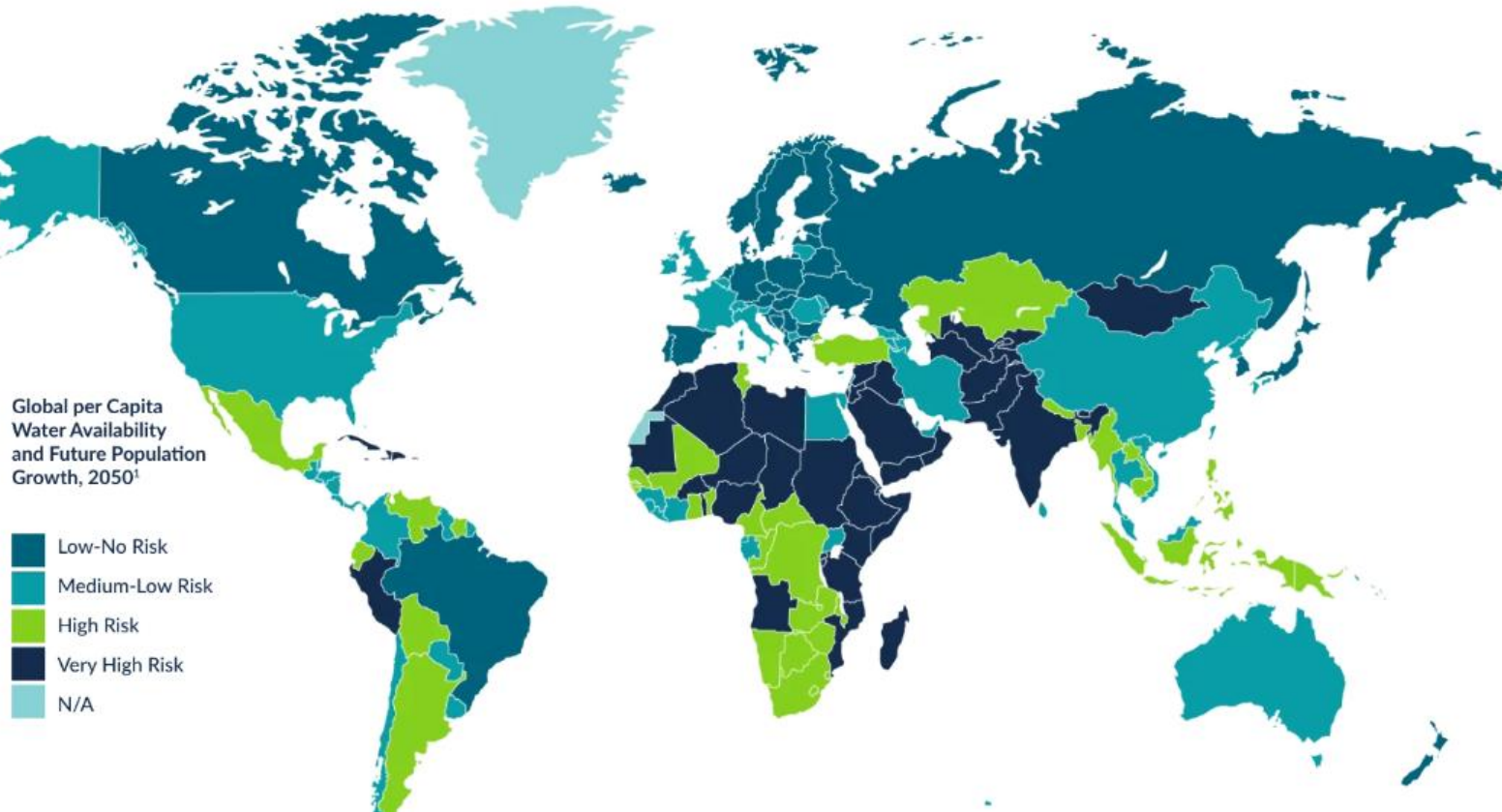
Challenges in the water sector

- Lack of water – droughts – user conflicts
- Too much water – floods – user conflicts
- Population increase and Urbanisation
- Pollution – traditional and emerging contaminants
- Resource recovery and reuse
- Natural and man-made disruptions

Role of digitalisation:

- Early Warning/Detection Systems
- Increasing efficiency and accuracy of applications
- Making utilities and processes smarter and economical
- Innovative water quality surveillance
- Digital Twins in the water sector
- Managing cyber threats

Less precipitation: Climate Change will worsen the situation

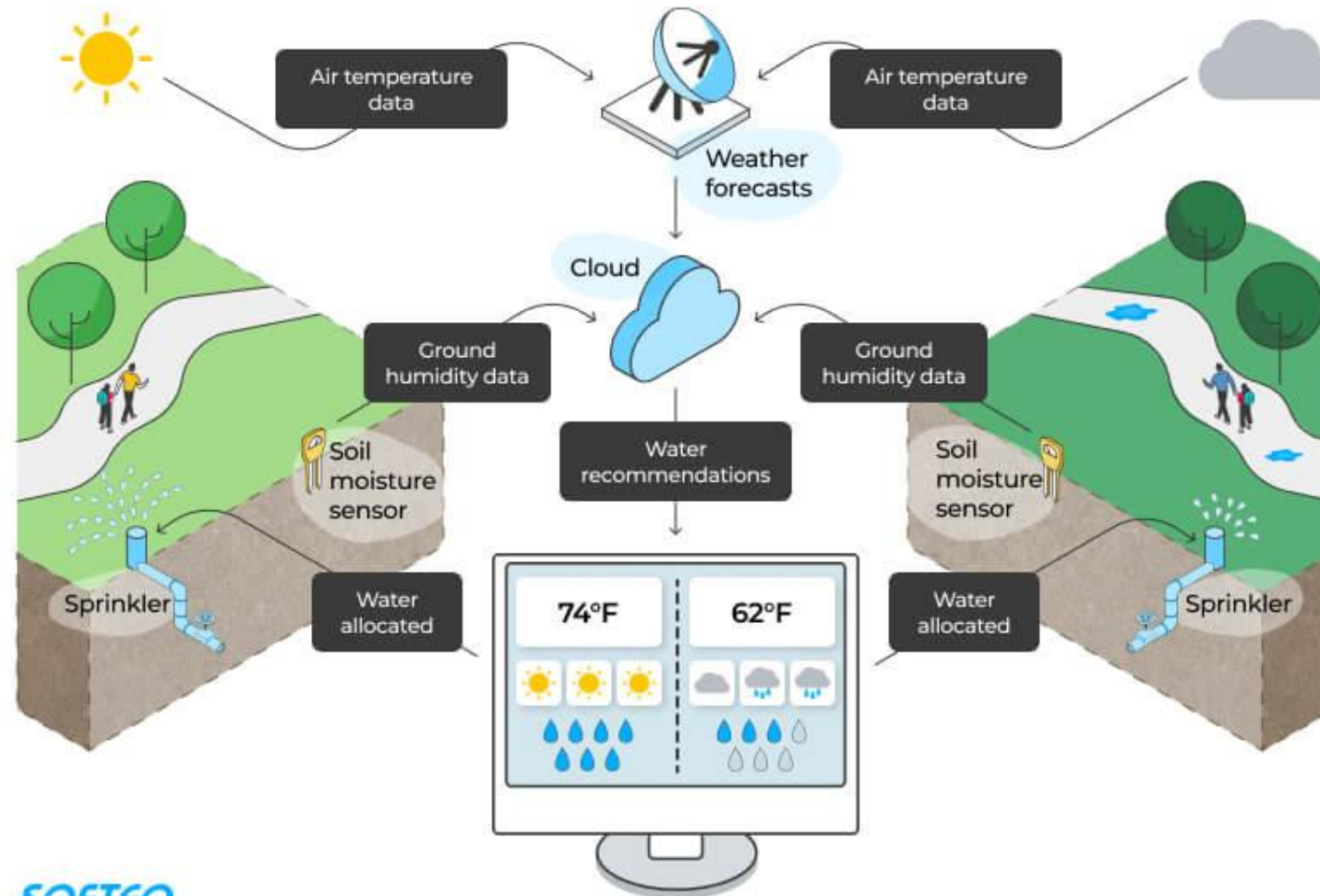


Currently, nearly half of the world's population experiences severe water scarcity or drought for at least one month each year, with projections suggesting up to 70–75% could be affected by 2050.

Advancing Early Warning and forecasting
Stopping water loss before it happens
Predicting and optimising demand
Enabling smarter allocation and alternative sources
Harnessing “invisible” (non-rainfall) water sources
Smart watering for agriculture and landscapes

Saving water in landscape watering

A smart park irrigation system relies on the soil state, weather forecasts, and current weather conditions



**More precipitation,
More frequently...
....more frequent overflows
and floods**

330 mm rain within 4 hours??

Predicting the Unpredictable- Advanced Early Warning
Optimising defences in Real-time
Managing hidden volumes in sewer networks
Preventing secondary disasters



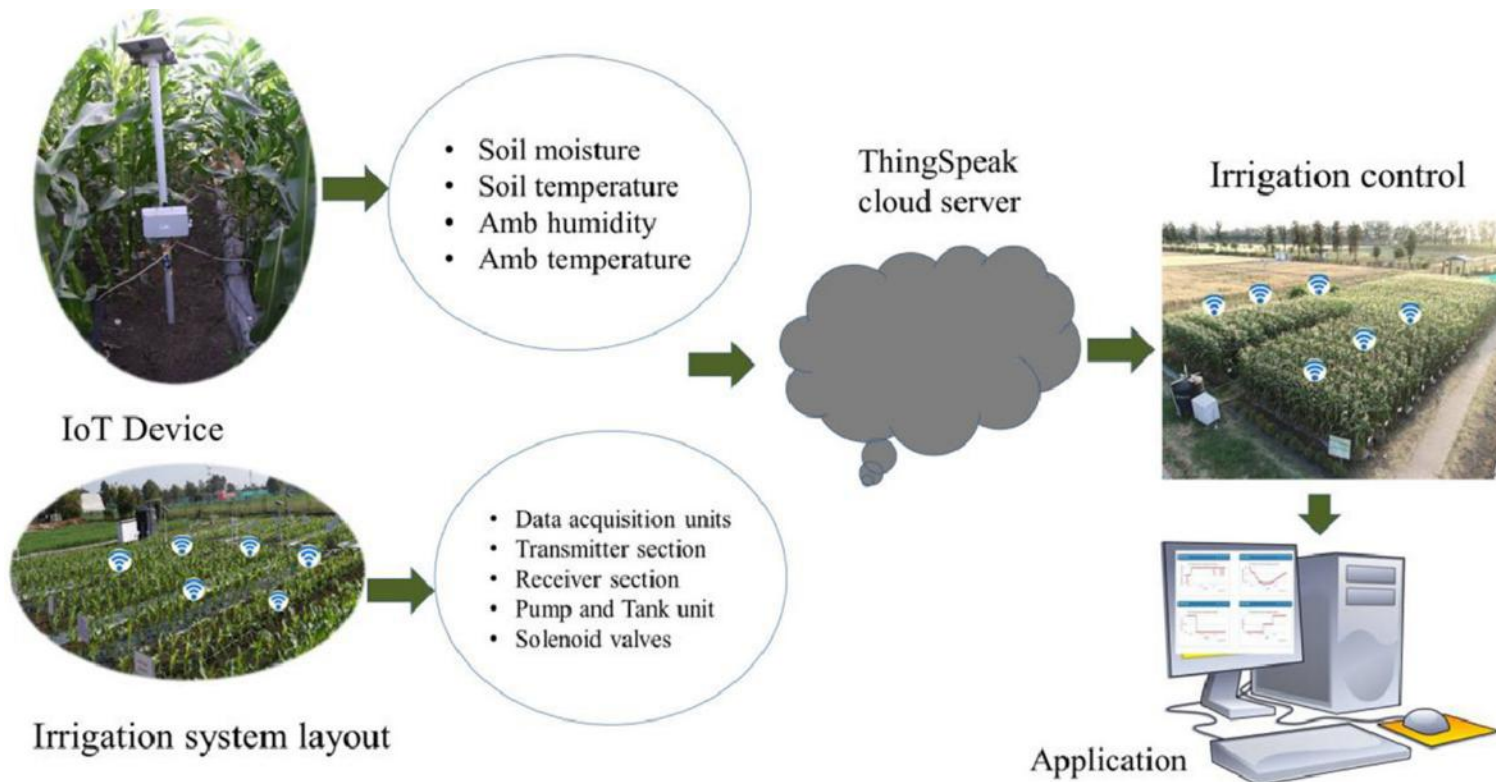
No water – no food!



AI driven precision irrigation
Forecasting water demand
Virtual simulations (Digital twins)

Technology & Location	Reported Water Savings	Impact on Yield/Production
AI-Assisted Irrigation (Iraq)	36% reduction	+35% wheat yield
Remote-Sensing System (India)	30-50% reduction	+20-30% yield & quality
AI Solar-Powered System (Africa)	35-55% reduction	Reduced crop failure risk
Data-Driven Platform (Chile)	15-20% reduction	Verified water savings; supported fruit exports

IoT in drip irrigation

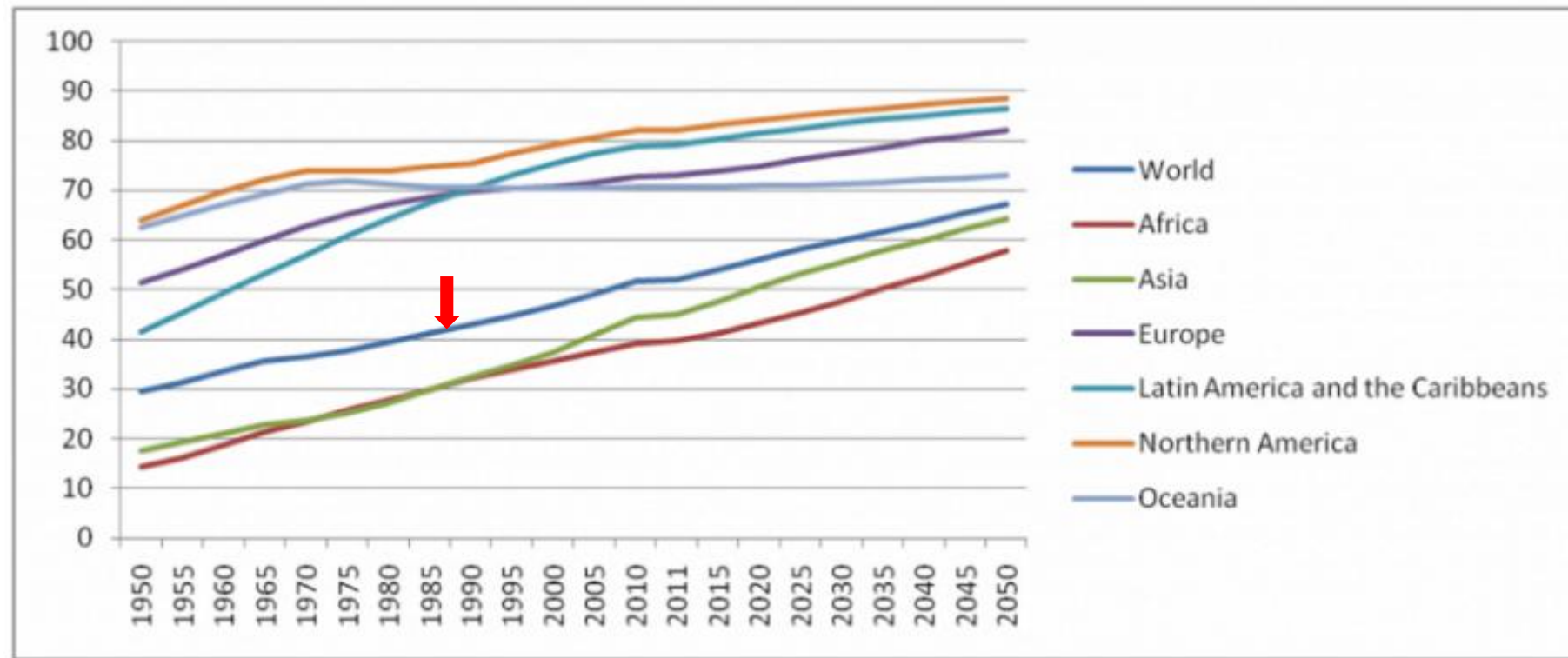


A, B, C, D, E and F: Data acquisition units, G: Pump and Tank section, H: Receiver section with 8 integrated relay module

Urbanisation



World's urban population, %



Predicting and optimising water demand
Stopping water loss before it happens
Smart energy and water infrastructure management
Enabling smarter water allocation & alternative sources

Increasing treatment capacities with reduced plant footprints

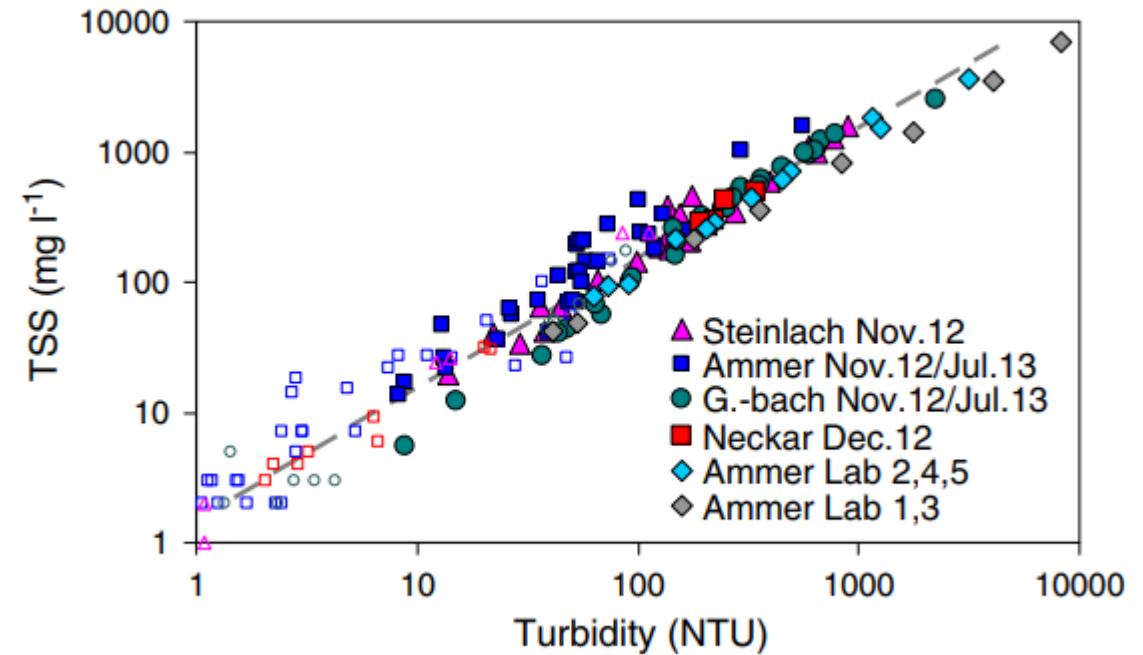
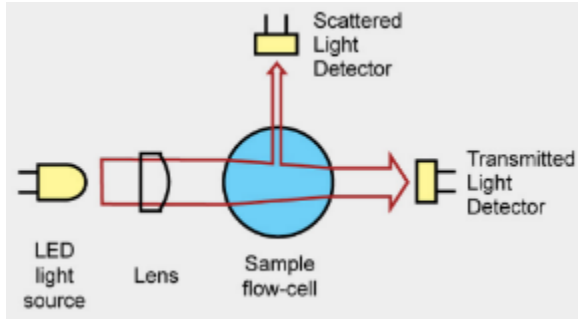


Optimizing Core Treatment Processes (ballasted coagulation)
Reducing the Need for Physical Expansion (leakage)
Maximise the use of utilities (avoid dead volumes)
Extending Asset Lifespan (preserve capacities)

[illegible][illegible]

Virtual sensors (software/surrogate sensors)

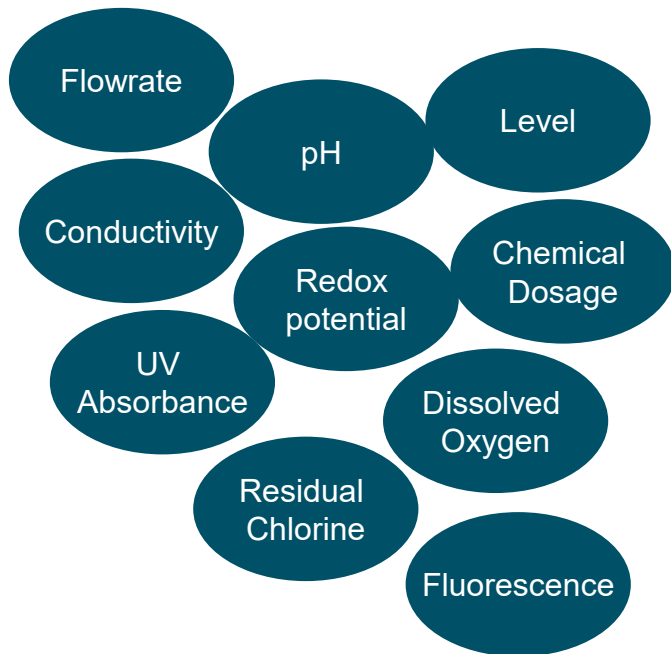
Typical example: measurement of SS via turbidity



Hybrid sensors: accurate and cost efficient

Physical probes

- Easy-to-measure
- Reliable Low capital costs
- Low maintenance



Hybrid sensor

**All measurements are
validated using statistical
methods and AI**

Hybrid sensors

- Hard-to-measure
- Expensive
- High maintenance costs
- Time delayed-response

Carbon
(COD, BOD, TOD)

Phosphorus
(PO₄-P, TP)

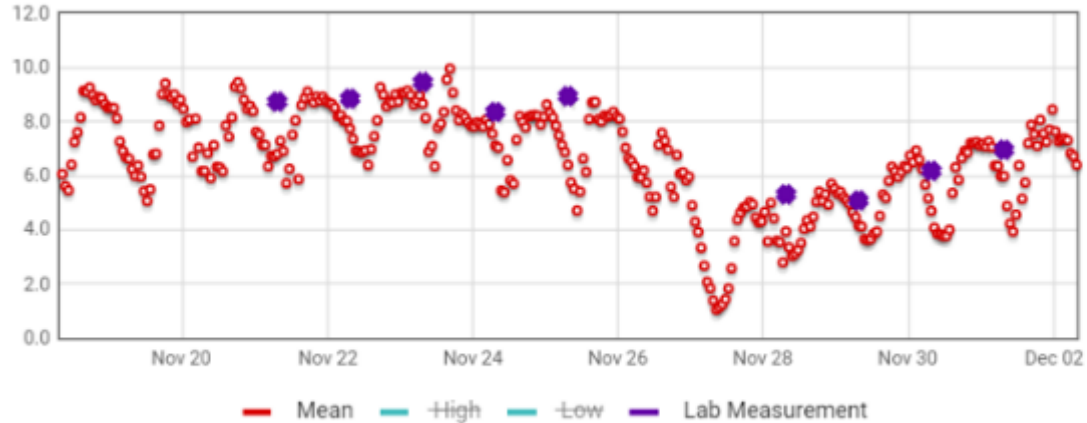
Nitrogen
(NH₄-N, NO₃-N, TN)

Emerging contaminants
(PFAs, BPA, DBP etc)

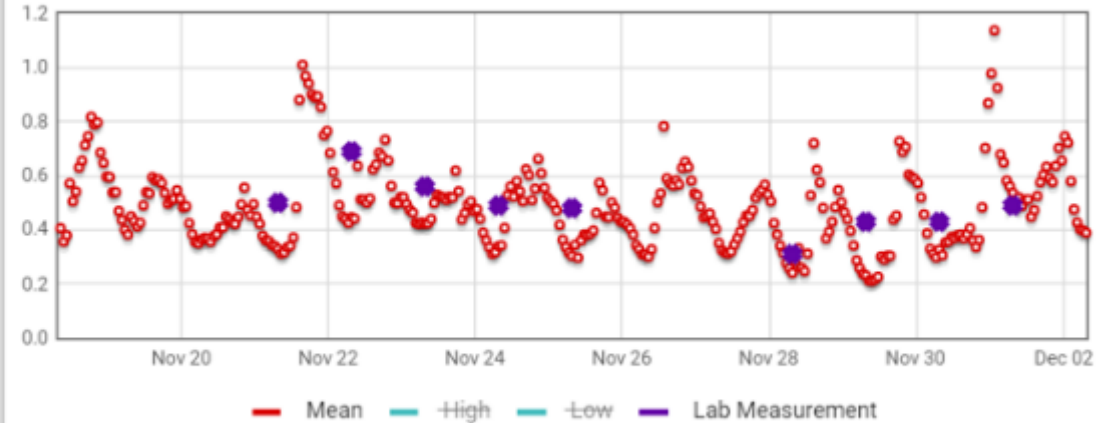
Greenhouse gases
(CO₂, CH₄, N₂O & indirect)

DASHBOARDS...with virtual/hybrid sensors

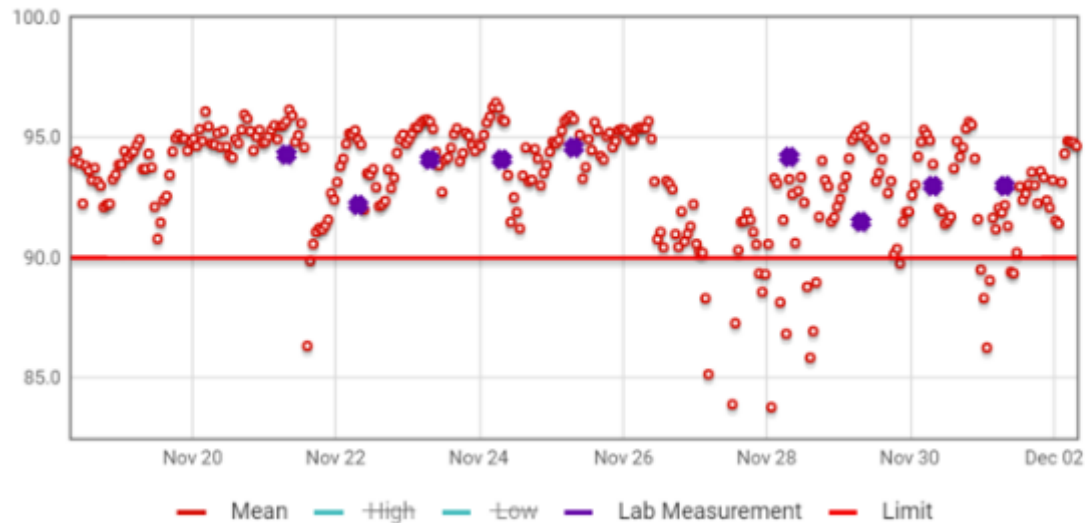
Total Phosphorus Inlet (mg/l)



Total Phosphorus Outlet (mg/l)



Total Phosphorus Removal (%)

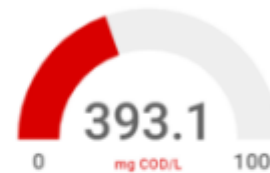


ESTIMATED VALUES

TOTAL PHOSPHORUS INLET



TOTAL COD INLET



TOTAL NITROGEN INLET



TOTAL PHOSPHORUS OUTLET



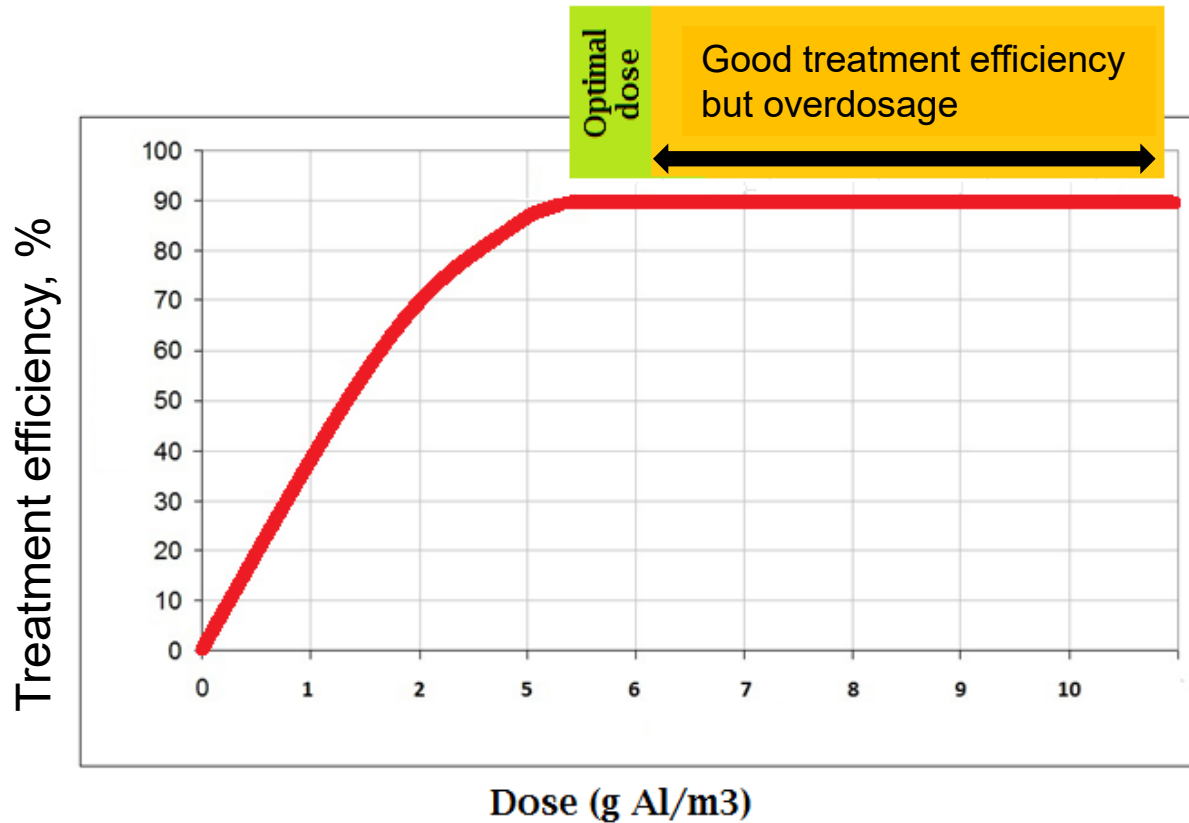
TOTAL COD OUTLET



TOTAL NITROGEN OUTLET



Optimisation of a coagulation plant



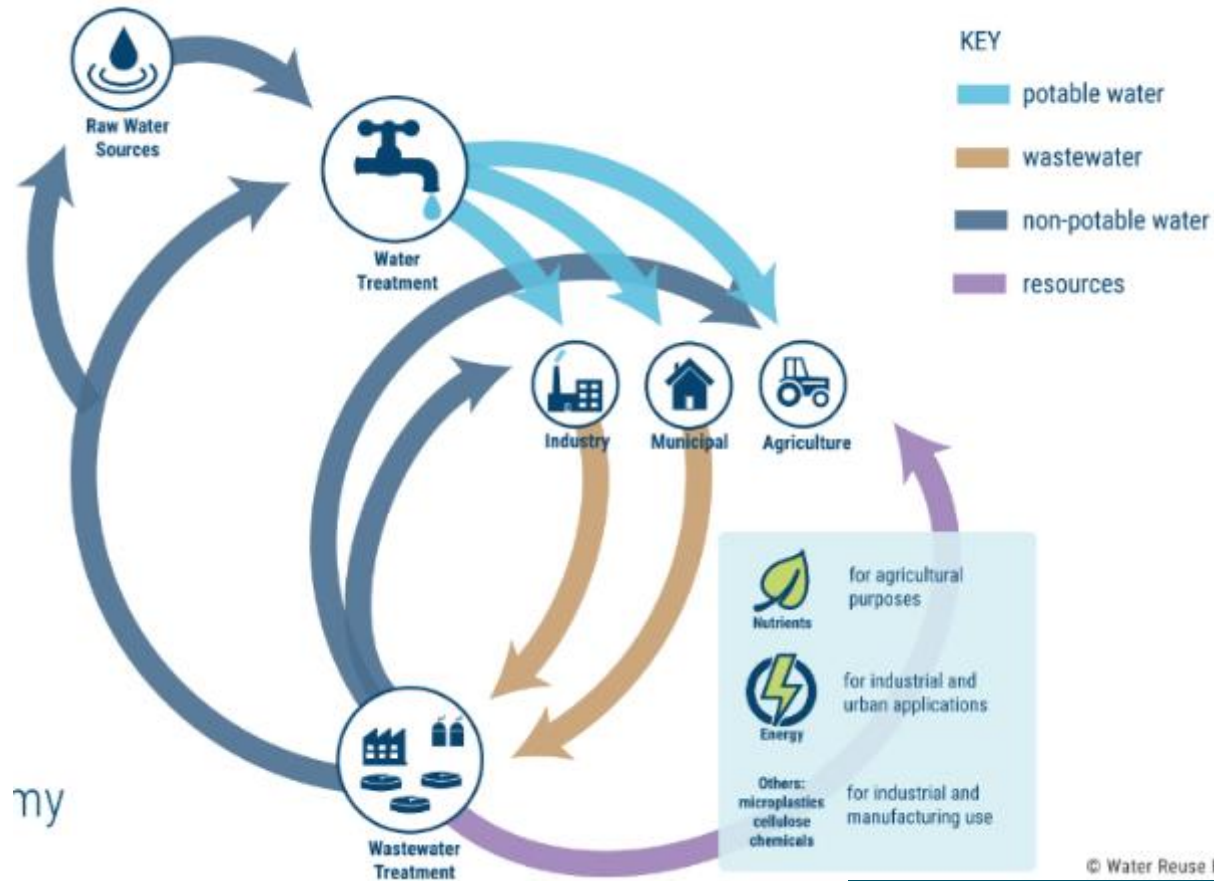
The concept uses several water quality parameters to define the optimal dosage in real-time

First installation was in 2009: NRA/Norway; still saving >30% of chemical use

$$\text{Dose} = f(Q, \text{pH}_{\text{in}})$$

$$\text{Dose} = f(Q, \text{pH}_{\text{in}}, \text{Cond}_{\text{in}}, \text{SS}_{\text{in}}, \text{ORP}_{\text{in}}, \text{SS}_{\text{out}}, T_{\text{in}}, \text{PHO}_{\text{out}})$$

Recovery, Reuse, Recycle



Optimising Nutrient Recovery: From Waste to Fertiliser
Enhancing Energy Recovery: Turning Sludge into Power
Extracting Critical Minerals: Mining "Urban Ore"
Reducing Energy Consumption: Doing More with Less

Challenges (threats) with digitalisation



Oct 20, 2021, 07:39pm EDT | 1.6K views

U.S. Water Supply System Being Targeted By Cybercriminals

>25 years of attacks....

Lowering the barrier to entry
Accelerating vulnerable hunting
Exploiting basic gaps
Turning Data into a Watchtower: Proactive Threat Detection

Structure of the presentation

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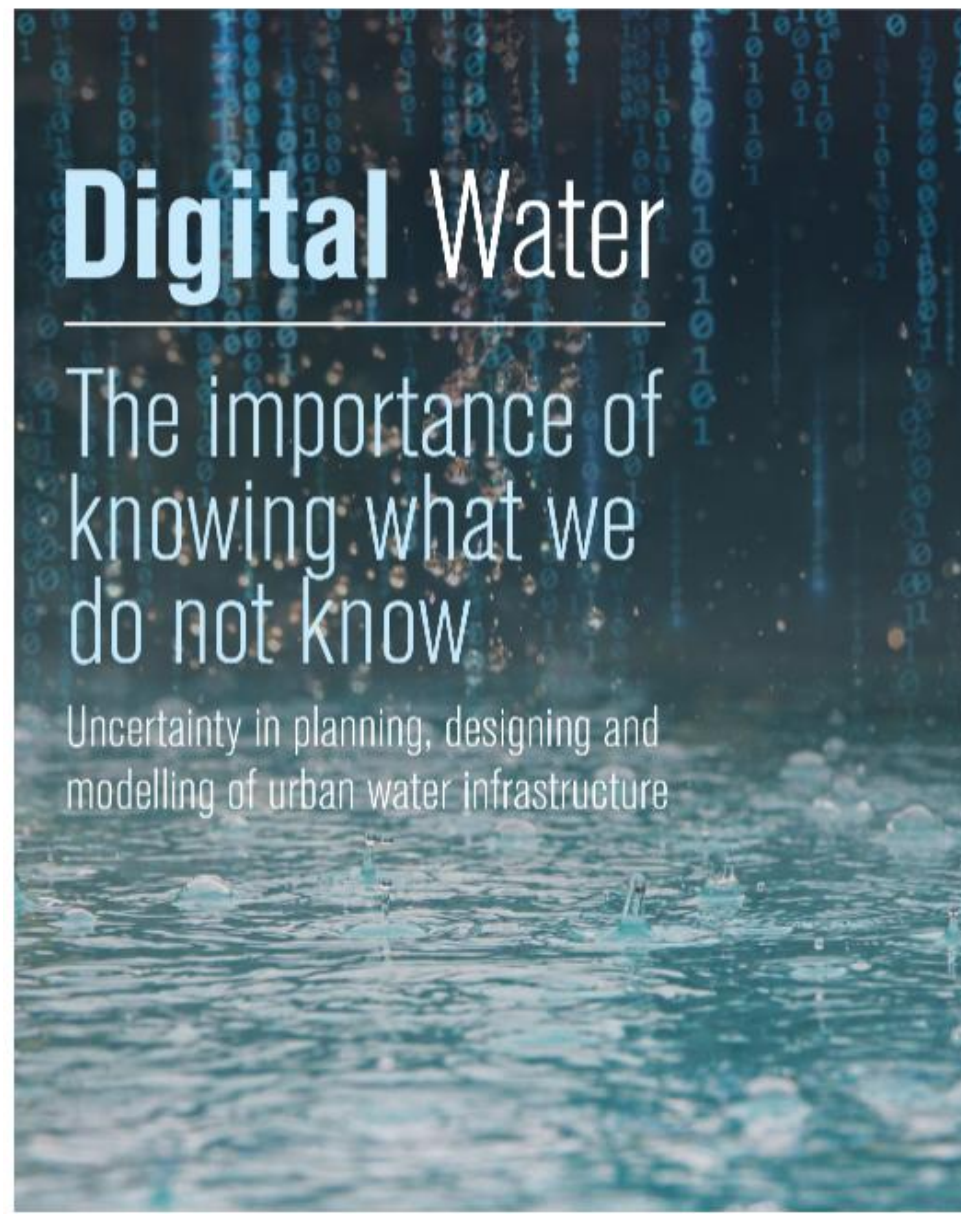
A Strategic Digital Transformation for the Water Industry



Digital Water

The importance of
knowing what we
do not know

Uncertainty in planning, designing and
modelling of urban water infrastructure



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IWA Digital Water Summit

Istanbul, Türkiye | New Date: 24-26 November 2026

IWA WWCE in Glasgow: AI and Digitalisation

- **TS 1.4 Digital Transformation and AI Applications in Water Management**
- **TS 1.3 Decision Making Frameworks – Successes and Lessons**
- **TS 1.7 Preventive Asset Management in Wastewater Applications**
- **TS 2.7 Modelling and Digital Twins for Emissions and Process Optimisation**
- **TS 2.18 AI and Machine Learning in Advancing Wastewater Treatment**

- **WS 1.3 AI In Action: Rethinking Utility Practice Through Agentic Intelligence:** exploring the practical applications of AI, stress-test scenarios, and identify organisational barriers and opportunities for adoption (Co chaired by Dragan Savic, Lina Sela, Harsha Ratnaweera)



Digitalisation & AI is
the key to the water sector's success

Thank you

Panel Discussion and Q&A

UPCOMING IWA WEBINARS & EVENTS



WEBINAR

**Engineering Design and
Operational Challenges:
The Panama Canal Locks and
Qingcaosha Reservoir**

 **10 September 2026**
13:00 BST

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United Nations | United Nations Water Conference
United Arab Emirates, 2026

GLOBAL YOUTH MOVEMENT FOR WATER | SESSION 5 | Major Group for Children & Youth
A space for children and youth in the United Nations

CAPACITY DEVELOPMENT SERIES
Water for People: Advancing Equitable Access to Water and Sanitation
Session co-lead: International Water Association

18 September 2026
3:30 GMT +1

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