Opportunities and limits to water pollution regulations

To a paradigm shift in water quality and safety assessment framework

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Global Water Research Coalition

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Outline

- Introduction to the Global Water Research Coalition
- Protecting vulnerable water resources
- Facing the challenge of anthropogenic micropollutants
- OECD commitment to improve water quality
- Predictive & alternatives testing strategies
- From research to implementation on the water cycle
- Main results & outputs
- Benefits of international Science to Policy Interface (SPI) to promote a paradigm shift in water quality and safety assessment framework

Global Water Research Coalition

Source

of top-quality international expert knowledge

for water managers and policy-makers

Operational

since 2002… strong partnership between world leading water research organisations

Network

of water research organisations coordinating water research programmes at (inter) national level

Effective use of R&D strategies to respond to global issues through coordination of research efforts

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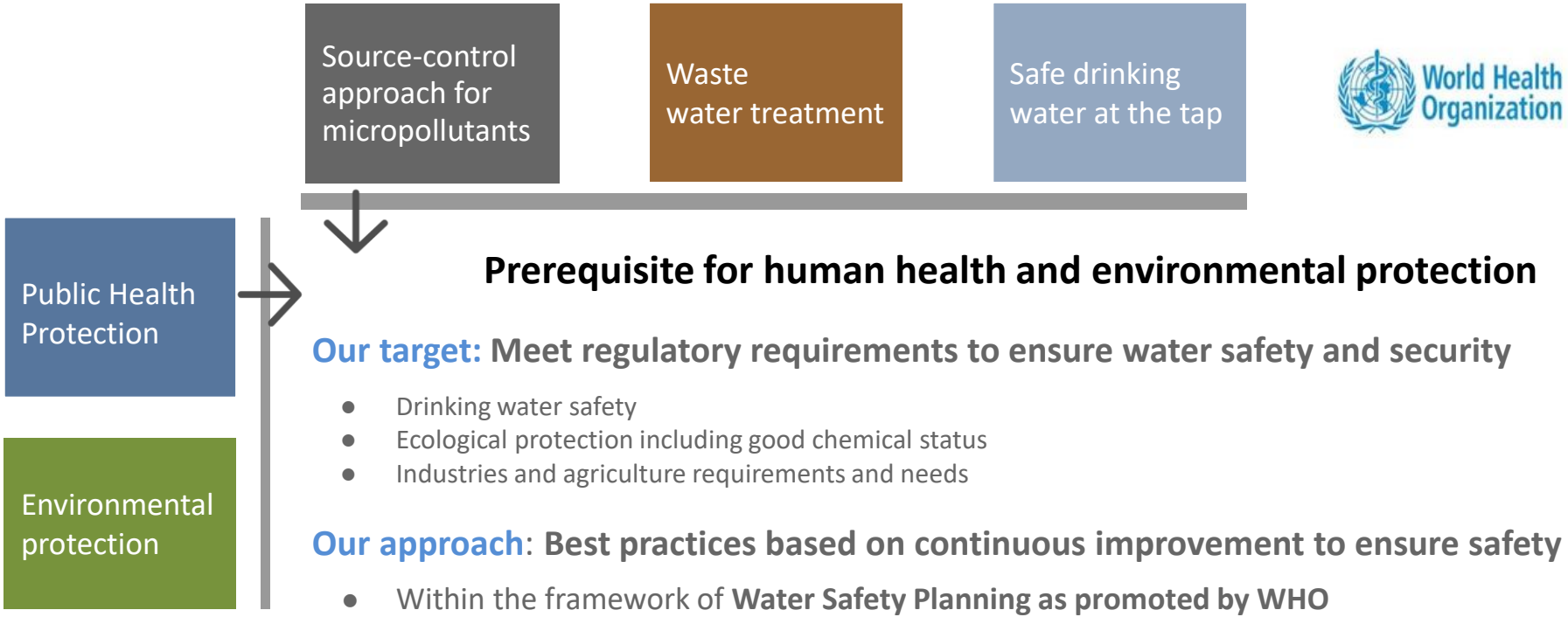
Protecting vulnerable water resources



Prerequisite for human health and environmental protection

Our target: Meet regulatory requirements to ensure water safety and security

- Drinking water safety
- Ecological protection including good chemical status
- Industries and agriculture requirements and needs

Our approach: Best practices based on continuous improvement to ensure safety

- Within the framework of **Water Safety Planning as promoted by WHO**

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Facing the challenge of anthropogenic micropollutants

Chemical Use & Innovation

Context & Stakes

Improve standard of living, but may show adverse effects

World Bank : 400M tons of chemicals

Today's challenge : Prospectively protect human & environmental health

Develop realistic - practical solutions to ensure chemical safety assessment

OECD 50
BETTER POLICIES FOR BETTER LIVES

Water Professional challenges

Context & Stakes

Analytics progress Growing list of metabolites, by-products Identify the potential hazards?

Increasing evidence of potential ecological & health effect of complex mixtures of low doses

Implement preventive measures & operational procedures to mitigate the risks

[Need for harmonized validated frameworks]

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OECD commitment to improve water quality (SDG 6.3 and SDG14.1)

OECD
BETTER POLICIES FOR BETTER LIVES

Water Governance Initiative

Water Quality Management

Bottom-up multi stakeholder process

Science to Policy Interface

OECD WORK ON WATER

01 International multi-stakeholder network from public, private and non-for-profit sectors gathering to share good practices

02 Urging adherents to prevent & manage water pollution, including diffuse & emerging pollutants, reaffirming the Polluter Pays principle

03 Capture methodological and technological advances delivered by large scale demonstration projects and leading experts worldwide

04 Benefits of international Science & Policy cooperation to promote a paradigm shift in water quality and safety assessment framework

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The challenge in ensuring water safety

1

Develop & deploy risk management solutions & framework on the water cycle

- ✓ Optimize treatment design to offer a state-of-the-art quality service
- ✓ Broaden potential hazards affecting water quality to prepare for future challenges
- ✓ Better characterize the risks of chemicals mixtures towards human & ecological safety
- ✓ Better benchmark uncertainties in human and ecosystem health exposures to chemical mixture toxicity

2

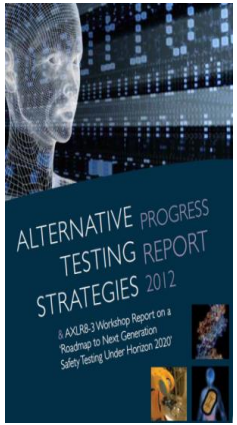
Implement integrative and cost-effective monitoring programs

- ✓ Uptake bioanalytical tools (in vitro & in vivo) to detect early stage of chemical induced toxicity
- ✓ Assign suitable safe thresholds for more protective and integrative water safety frameworks
- ✓ Provide comprehensive assessment framework for conventional & alternative water schemes

Predictive & alternatives testing strategies of (environmental) chemicals

USEPA Chemical testing in 21st Century: Tox21

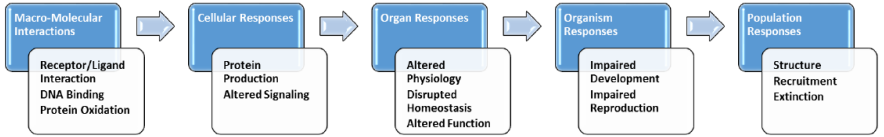
→ Identify important biological pathways disrupted by chemicals
→ Getting it safe early saves costs later
→ Shifting the burden upstream



Worldwide improvment in Chemical Safety Assessment
→ Alternative testing strategies

- Rapid, efficiently
- Cost effective
- More relevant biosystems to humans
- Larger number of substances & mixtures
- Using fewer or no animals

Based on Adverse Outcome Pathways



Supported by Institutional bodies at international level

UNEP United Nations Environment Programm
World Health Organization
OECD

Innovation applied to the water cycle quality assessment

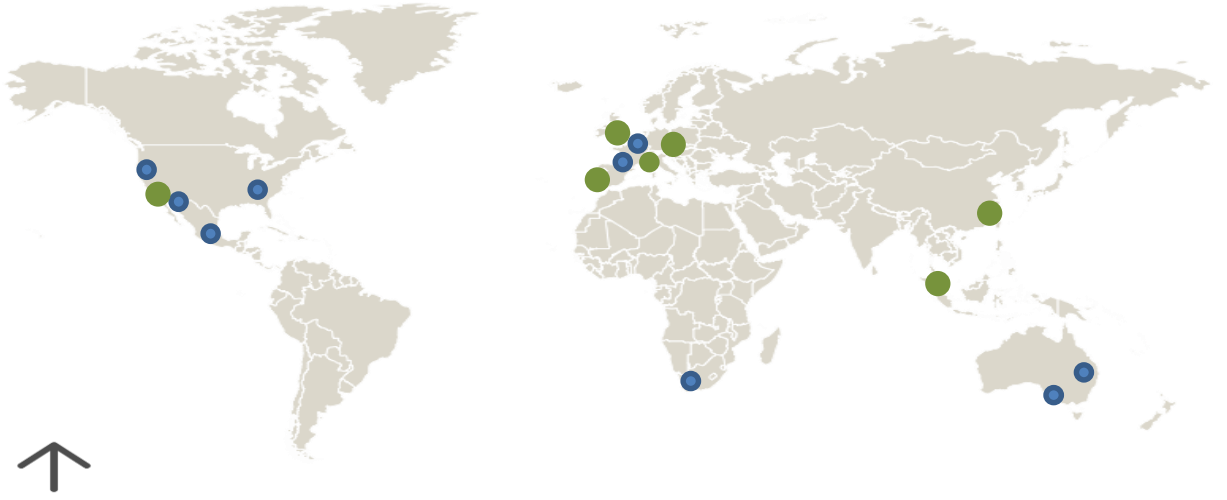
From research to implementation on the water cycle

Methodology

GWRC 2008 to 2017
Endocrine Toolbox
- Estrogenicity
- Beyond Estrogenicity (ER)
- ER, AR, TR, GR, PR, MR, RXR

Applied to WW, SW, DW

International projects 2011 to 2016
Biological tools for µpollutants mixtures transformation-products?
Applied to conventional & Water REUSE schemes



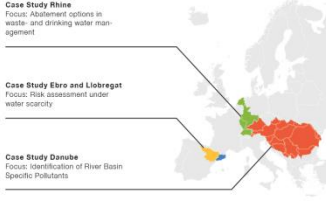
Demonstration projects

FP7 European projects

From 2012 to 2018

DEMEAU
Demonstrating promising technologies to address emerging pollutants in water and waste water

solutions



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Main Results & Outputs

Water Cycle Quality monitoring

Water Framework Directive

World Health Organization

RE USE

Water REUSE Safety

Science to Policy Interfaces

01 Effect-based and analytical large scale monitoring projects

Better uptake of mixture toxicity

Better benchmark hazards and exposures

02 Estrogen monitoring program at EU level

Watch List revision

Effect based method activity under the CIS

Priority Mixtures

Emission limit values

03 WHO Potable Reuse Guidelines note usefulness of effect-based tools

EU Water REUSE Directive / JRC

Quality criteria including EB tools

04 GWRC and NORMAN networks

Linked to

- EC activities
- US-EPA activities
- WHO actions
- WE&RF
- OECD work on Water

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Paradigm shift for a more pro-active water (chemical) managment

EU Current minimum monitoring

Legal requirements

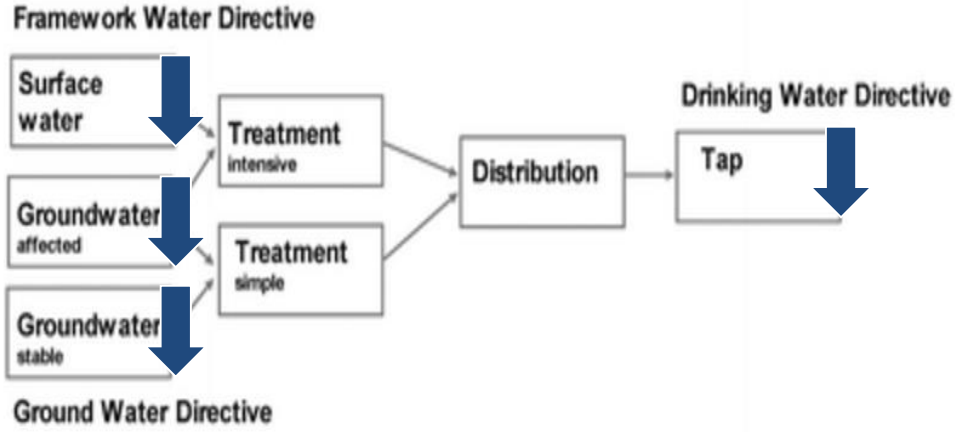
Substance based

3 EU Directives

- Water resources
- End Product (Tap)

WHO
Water Safety Plan Risk Based Approach

HACCP applied to effect-based monitoring
Built chemical water quality indicators



Hazard Analysis of Critical Control Points (HACCP)

- Enable a shift towards better understanding & managment of process within a production supply chain
- Should be included in Water Directive revisions

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World Health Organization

Benefits of international Science to Policy Interface (SPI) to promote a paradigm shift in water quality and safety assessment framework

Key Home Messages

- Alternative water environmental chemical testing strategies
- Shift the burden assessment upstream with WHO- HACCP
- Need for a harmonized & validated framework
- Assign suitable safe effect-based thresholds values for conventional but also alternative water schemes
- Submit to international water agencies & institutions
- Contribute to the water challenge by targeting WHO Water Effect-based guidelines
- Interact with OECD Work on water on CECs to support environment & human health protection

Acknowledgments

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Any questions ?

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