Water4All
Water security for the planet

European Partnership

THEMATIC POLICY AND TECHNICAL GAPS REPORT

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Web-Site Address	www.water4all-partnership.eu
Coordinator	ANR
Management Team	Ariane BLUM, Juliette ARABI, Armelle MONTROSE, Claire TREIGNIER
E-Mail	Water4All@agencerecherche.fr
Phone Number	+33 1 78 09 81 20 / +33 1 73 54 81 43

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Editor (s)	Julie MAGNIER (OiEau/INBO), Kor VAN HOOF (VMM), Yannick POCHON (OiEau/INBO), Osman TIKANSAK (Formas), Stefania ERBA (CNR), Georgia ANOUSAKI (GSRI)
E-Mail (s)	j.magnier@oieau.fr; k.vanhoof@vmm.be; y.pochon@oieau.fr; osman.tikansak@formas.se; stefania.erba@irsa.cnr.it; g.anousaki@gsrt.gr
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Verification by	Osman TIKANSAK (Formas) and Maria Chiara SOLE (ISPRA)
Date	02/07/2024
Validation by	Juliette ARABI
Date	24/07/2024

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LIST OF ACRONYMS

ACRONYM	FULL TITLE
BACI	Before-After-Control-Impact
BOD	Biochemical Oxygen Demand
CAP	Common Agricultural Policy
CIS	Common Implementation Strategy
CSF	Cohesion and Structural Funds
DWD	Drinking Water Directive
EC	European Commission
EESC	European Economic and Social Committee
EPR	Extended Producer Responsibility
EIP	European Innovation Partnership
IAS	Individual Appropriate Systems
ICPDR	International Commission for the Protection of Danube River
IED	Industrial Emissions Directive
IWRM	Integrated Water Resources Management
JPI	Joint Programming Initiative
KTM	Key Type of Measure
NBS	Nature Based Solution
ND	Nitrates Directive
OECD	Organisation for Economic Co-operation and Development
PE	Population Equivalent
PES	Payment for Ecosystem Services
PFAS	Perfluoroalkyl and Polyfluoroalkyl Substances
RBMP	River Basin Management Plan
SDG	Sustainable Development Goals
UN	United Nations
UWWTD	Urban Wastewater Treatment Directive
UWWTP	Urban Wastewater Treatment Plant
Water4All	European Partnership on Water Security for the Planet
WTP	Wastewater Treatment Plant
WFD	Water Framework Directive

Water4All partners mentioned in the report:

AKA	Research Council (Finland)
ANR	French National Research Agency (France)
BRGM	French geological survey (France)
CNR	National Research Council (Italy)
EEA	European Environment Agency
EPA	Environmental Protection Agency (Ireland)
EUBA	University of Economics in Bratislava (Slovakia)
FORMAS	Swedish Research Council (Sweden)
GSRI	General Secretariat for Research and Innovation (Greece)
IenW	Ministry of Infrastructure and Water Management (Netherlands)
INBO	International Network of Basin Organizations
ISPRA	Italian Institute for Environmental Protection and Research (Italy)
LIS-WATER	Lisbon International Centre for Water (Portugal)
LNEC	National Laboratory for Civil Engineering (Portugal)
MMM	Ministry of Agriculture and Forestry (Finland)
MST	Danish Environmental Protection Agency (Denmark)
PTEA	Water Technology Platform (Spain)
PtKA	Project Management Agency Karlsruhe (Germany)
RCN	Research Council Norway (Norway)
SUEN	Turkish Water Institute (Türkiye)
UEvora	University of Evora (Portugal)
VITO	Flemish Institute for Technological Research (Belgium)
VMM	Flanders Environment Agency (Belgium)
WE	Water Europe – Technology and Innovation network
WRC	Water Research Commission (South Africa)
YM	Ministry of the Environment (Finland)

ABSTRACT

The Water4All Partnership is a Research and Innovation programme for scientific research in freshwater. Co-funded by the European Commission under the framework of Horizon Europe, it aims at tackling water challenges and at enabling water security for all. Water4All will boost systemic transformations and foster the matchmaking between problem owners and solution providers. Launched in June 2022, Water4All will last seven years although some activities will extend till 2032. The Partnership brings together a wide and cohesive group of 90 partners from 33 countries in the European Union and beyond.

Under Water4All Pillar C activities, a **Policy Support Working Group** was established to identify research and innovation needs in support of implementing selected water policies and legislations. The task began in 2022 with selecting relevant **thematic policy area** to focus (Water Framework Directive - WFD, Urban Wastewater Treatment Directive - UWWTD, Drinking Water Directive - DWD).

The second step, objective of this document, was to work on a **thematic policy and technical gaps report**, aiming at identifying the **technical and governance needs** for the implementation of the selected policy areas. This gaps report will be the main source of information for the next step, **guidelines on available solutions and implementation strategies,** by May 2025.

The work involved analysing inputs from desk studies, a webinar, and interviews to pinpoint main gaps (separated in two main categories: technical gaps and governance gaps). Technical gaps identified include controlling diffuse pollution, addressing water quantity and climate change challenges, promoting Nature Based Solutions (NBS), and improving data collection and usage. Governance gaps highlight the need for cross-sector collaboration, coherence among EU legislations, effective stakeholder communication, adequate financing, and integrating scientific evidence into decision-making.

To help the next steps in developing solution guidelines, two webinars and a policy forum event are planned. Constant interactions with relevant strategies and initiatives will also support the process.

THEMATIC POLICY AND TECHNICAL GAPS REPORT

1. INTRODUCTION

1. Context

Launched in June 2022, the Water4All Partnership – Water Security for the Planet[1], co-funded by the European Union (EU) within the frame of the Horizon Europe programme, aims at enabling water security for all in the long term through boosting systemic transformations and changes across the entire research – water innovation pipeline, fostering the matchmaking between problem owners and solution providers.

Within the Partnership, **Pillar C** promotes the uptake of results from research and innovation activities through science-policy interface actions and capacity building. This Pillar is designed for addressing the challenges and developing solutions for better uptake of innovative approaches and tools in policy making processes, and includes four Tasks, one of which (Task C.1) is devoted to strengthening the science – policy – governance interface. The sub-Task C.1.2 is dedicated to the implementation of a **Policy Support Working Group**. This sub-Task is led by INBO and VMM and is counting on the support of various partners (AKA, ANR, BRGM, CNR, EPA EUBA, EWA, FORMAS, GSRI, IenW, ISPRA, LIS-Water, LNEC, MMM, MST, PTEA, PtKA, RCN, SUEN, UEvora, VITO, WE, WRC, YM).

In this context, the Policy Support Working Group has been working to **identify research and innovation needs in support of implementing selected water policies and legislations** (e.g., European Green Deal[2], Water Framework Directive – WFD and daughter directives[3], Circular Economy Action Plan[4], Biodiversity Strategy 2030[5], Farm to fork strategy[6], UN Sustainable Development Goals – UN SDGs[7]).

It functions as a platform for systematic dialogue to make sure that policy makers, scientists and economic sectors exchange ideas and experiences to fill in the implementation gaps.

The overarching aims of the Policy Support Working Group are to:

- **Clarify the short/medium/long term policy expectations**, and by doing so providing the research communities the insight they need to steer their RDI activities towards the policy needs,
- Identify and introduce recent innovations and applications that can already be of use for particular policy areas and **pinpoint the policy/legislation targets that the identified technologies** can address.

[1] Water4All Partnership - https://www.water4all-partnership.eu/
[2] European Green Deal - https://commission.europa.eu/strategy-and-policy/priorities-2019-2024/european-green-deal_en
[3] Water Framework Directive - https://environment.ec.europa.eu/topics/water/water-framework-directive_en
[4] Circular Economy Action Plan - https://environment.ec.europa.eu/strategy/circular-economy-action-plan_en
[5] Biodiversity Strategy 2030 - https://environment.ec.europa.eu/strategy/biodiversity-strategy-2030_en
[6] Farm to Fork Strategy - https://food.ec.europa.eu/horizontal-topics/farm-fork-strategy_en
[7] UN Sustainable Development Goals - https://sdgs.un.org/goals

2. Method

A. Selection of policy areas

A first step was then to identify and select a **list of potential policy areas** to work on, and the most **relevant stakeholders and networks** to involve, in order to have a representative group on the topic.

To do so, the methodology illustrated in the following figure (Figure 1), consisted of working through an **iterative process** with targeted stakeholders, starting from the C1.2 sub-Task members, then extending to other Water4All stakeholders, and in a final step to external stakeholders.

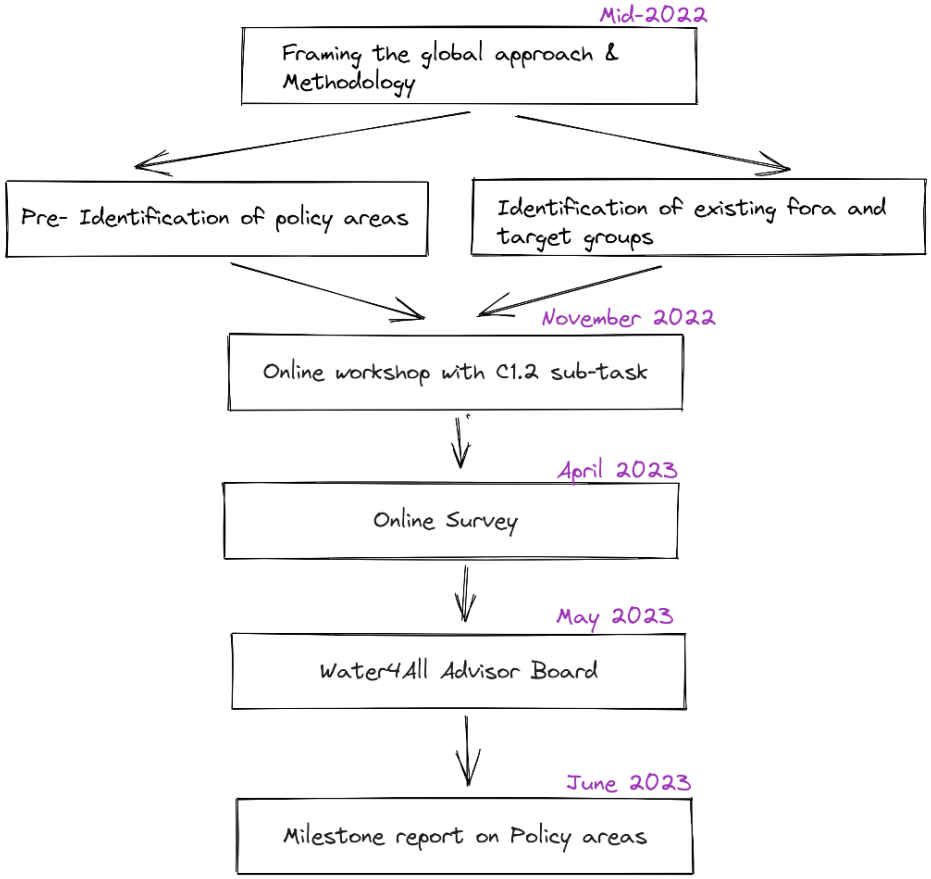

Figure 1. Methodology of the selection of policy areas

Milestone 46: Thematic Policy Areas Selected

Under Task C1.2 of Pillar C, the first key step of the Policy Support Working Group was to identify **thematic policy areas** to build upon the gap analysis and solutions guidelines.

Milestone 46 describes:

-**the method**: in order to select the thematic policy area, the working group has conducted a workshop in November 2022 and circulated a survey among Water4All partners during May 2023 to identify the strategic interest of the Water4All partners and external stakeholders.
-**the inputs**: contents from the workshop and the survey.
-**the selection criteria**: discussions were held with different groups of partners, leading to highlight some major criteria for selection of the policies.
-**the results**, that led to the selected directives and the decisions presented just above.

After a series of consultation activities (workshops, surveys, Advisory Boards consultation) the working group decided to:

- Focus the work on a group of **three Water-related Directives**: the Water Framework Directive (WFD), the Urban Wastewater Treatment Directive (UWWTD), the Drinking Water Directive (DWD) (see box above in text on the Milestone 46 - Thematic Policy Areas Selected and achieved in June 2023).
- Operate a monitoring of developments as regards the Zero Pollution Action Plan and other emerging policies in the European Green Deal.

B. Process towards a thematic policy and technical gaps report

The current step is now to work on a **thematic policy and technical gaps report**, aiming at identifying the **technical and governance needs** for the implementation of the selected policy areas. Our objective is then to look at what is preventing the objectives of the current legislations to be achieved.

This gaps report will be the main source of information for the next step, **guidelines on available solutions and implementation strategies,** by May 2025.

During the second Grant Agreement period, two **policy forum events** (in the second half of 2024 and 2025) will also use this selection of policies as a basis for discussing policy expectations and research & innovation needs.

The work for this gap analysis document is mainly based on the following building blocks:

- a **literature review/desk study** of technical reports and peer reviewed articles;
- a **webinar** with key stakeholders;
- **targeted interviews** with experts and practitioners.

We considered two main gaps categories for analysing the results:

- the **technical** gaps, related to the tools, infrastructures, data or measures needed for the implementation of the directives;
- the **governance** gaps, which include broadly what affects the implementation of the directives like financing, legislations, communication, stakeholders' engagement, training...

2. THE INPUTS

1. Desk study

A **desk study** of technical reports and peer reviewed articles has been carried out: a list of 20 (scientific) articles, (policy) reports from governments, studies from other stakeholders such as the Organisation for Economic Cooperation and Development (OECD) and Water4All reference publications has been gathered and reviewed by Water4All partners involved in the task. The complete reference list is reported in Annex 1.

The main content of each of these documents has been summarized and commented on by several reviewers. This has led to a list of more than 40 gaps, that have been categorized under two main categories: technical (including scientific) and governance (including financial, legal, political).

As these gaps are often relevant for the implementation of all three directives, the following paragraphs do not clearly distinguish gaps per each directive and present them as relevant for all three directives to a certain extent.

Technical gaps identified through desk study

All three directives ultimately aim to increase the quality of water resources in Europe, which have been subject to anthropogenic influence for a long time. Mining and industrial activities in most parts of Europe has been a major source of diffuse pollution both on surface and groundwater resources. This historical pollution has caused long-lasting impact on environment and societal health, which is not easy to be corrected without technical capacities and infrastructures.

Besides the historical pollution, diffuse pollution caused by unsustainable agriculture practices, overflows and poorly collected and treated waste waters in urban areas constitute major challenge against achieving good ecological status in many basins. Although many countries have done relatively well in compliance with the UWWTD by mitigating point source pollution, more measures need to be taken to mitigate the diffuse pollution that has a huge impact on the ecological status of basins. Need for restoring the hydromorphology of rivers and lakes is challenged further as it gets difficult to understand and prevent the sources of pollution in this case.

In addition to these quality related concerns, there is also an emerging trend of droughts that puts the water quantity shortages under the spotlight, particularly in southern Europe for now. This new challenge exacerbated by climate change will require technical solutions to increase resilience of ecosystems, societies and economies, as well as better communication and coordination across various end-users to make possible consensual trade-offs.

The desk study further reveals the potential use of Nature Based Solutions (NBSs) to regenerate the quality of aquatic ecosystems. The challenge remains to promote NBSs as applicable methods by increasing the awareness regarding the benefits of NBSs (Zingraff-Hamed et al., 2020). One side of this awareness raising relates to increasing capacities to measure the impact of these methods and demonstrate the cause-effect relationship between the problems and solutions. NBSs could be of particular benefit for cities and towns with small populations (below 2.000 people), which are at present not covered by UWWTD, thus not obliged to build and operate advanced wastewater treatment facilities due to high cost of operation and energy needs.

One key topic is related to monitor and measure the implementation of the directives. One major concern is linked to the translation of the program of measures within River Basin Management Plans (RBMPs) into effective measures (Zingraff-Hamed et al., 2020). Other warnings relate to the timeframe and scales of implementation and to the - sometimes poor - link between environmental status / pressures / measures (EC 2021; Wuijts et al., 2023). In general, all these topics are cross linked to governance aspects, because often the failure in implanting measures is not only dependant on lack of technical capacities but also to governance and economic issues (EC, 2021).

Governance gaps identified through desk study

There are several aspects to governance related gaps that are common to all three directives (WFD, UWWTD and DWD). One primary aspect is related to the need for looking at multi-level and cross-sectoral relations. Among other things, this relates to lack of coordination between environmental regulations at EU and national levels. As framework directives, EU regulations do not necessarily correspond and translate into national regulations. Economy policies in particular may first and foremost favour the benefit of different sectors (agriculture, industry, energy, transportation, tourism etc.), while hindering the full implementation of EU water directives and leading to a clash of interest between the members states and the European Commission

(EC). It truly takes political willingness to change 'business-as-usual' applications by promoting cross-sectoral and multi-level collaboration (Wujits et al., 2023, Zingraff-Hamed et al., 2020).

The desk study underlines that we need strong communication to, inclusion and participation of key stakeholders to build the consensus that is needed for effective implementation of the directives. Without improving these channels of dialogue, the low awareness and sense of responsibility on how different stakeholders can contribute to achieve environmental goals will prevail. It is not only the key stakeholders, but also the low awareness of the general public on environmental hazards and impacts related to water quantity and quality issues adds pressure on the implementation of the directives. Water literacy campaigns can help us building public opinion and demands for improving the conditions.

Another key aspect of governance gaps is certainly related to finance issues. It takes adequate and sustainable financing of investments, operation and maintenance costs for water infrastructures to drive the implementation process at advanced levels (EEAC, 2019). As a key principle of financing for sustainable water management, the polluter pays principle has been in presence for long, however actual implementation of this principle has its own flaws. There is a need for a wider and better application of the polluter-pays principle especially by the big industries and large-scale agricultures. In a similar vein, cost recovery measures should be pursued more actively by water operators (water service providers, water and wastewater treatment facilities) by utilizing holistic circular economy techniques to minimize the risks of water scarcity. Economic and recreational valuation of water resources may help demonstrating the benefits of measures and environmental cost of water in this context. Last but not the least, existing funds and initiatives for financing water services need to be utilized more efficiently, and private sector investments should be encouraged, when possible, to fill in the financing gaps.

On a more general perspective water governance models and decision-making schemes need to be integrated with planning processes that are based on scientific evidence. Scenarios and models that are focusing on long term impacts of climate change shall be supplementing project level analysis and strategic investment pathways, which encompasses rather low cost NBSs as well as large scale blue-green infrastructures.

In this framework, institutional and personnel capacity building processes should not be underestimated (Zingraff-Hamed et al., 2020). Available staff resources both at administrative organizations and facilities needs to be assessed periodically and enhanced further depending on specific needs. Especially concerning the implementation of the UWWTD, the level of operators' performance and transparency greatly vary from one to another. At the staff level, vocational education and training facilities play an important role for aligning the skills of water professionals. At the institutional level, water intensive industries should take and allocate new roles for water stewardship by using innovative approaches such as Extended Producer Responsibility (EPR) scheme.

Table 1: Technical gaps from the desk study

TECHNICAL GAPS - From the desk study
Common to WFD, UWWTD, DWD
Rethinking the indicator-driving model
Correcting the long-lasting impacts of historical pollution from industry and mining
Controlling diffuse source pollution from rural and urban sources
Restoring the hydromorphology of rivers and lakes
Climate change and water quantity: new challenge requiring better communication between working groups
Promotion of nature-based solutions
Lack of direct relationship between measures and responses to measures

Table 2: Governance gaps from the desk study

GOVERNANCE GAPS - From the desk study		
Common to WFD, UWWTD, DWD		
Multi-level and cross sector	Lack of coordination between EU environmental regulations	
	Different interests between Member States and EC	
	Lack of cross sectoral and multi-level collaboration	
	Lack of true political willingness to change business	
Participation, communication	Participation and consensus-building process	
	Low awareness on how the different stakeholders can contribute to achieve environmental goals	
	Low awareness of the public on environmental hazard and impact related to water quantity and quality	
Financing	Need for a wider and better application of the polluter-pays principle	
	Integration of water economics into the framework of Integrated Water Resources Management - IWRM (Cost recovery / Polluters Pays principle / Water scarcity)	
	Make water important as a value, demonstrate the benefits of the measures, give more info on the environmental cost of water	
	Not enough use of private investment or innovative forms like Payment for Ecosystem Services (PES)	
	Lack of sufficient funding, better allocation of existing funds	
Other	Planning (scenarios analyses regarding Climate Change, supplementing project level analysis with strategic investment pathways), lack of adaptation to today's challenges and possibilities	
	Promotion of NBS	
WFD	**UWWTD**	**DWD**
Available staff resources	Introduction of the Extended Producer Responsibility (EPR) scheme.	
Insufficient land reserves	The level of operators' performance and transparency greatly vary from one to another.	
	Pollution from smaller cities outside the scope of the Directive.	

2. Webinar – 14 December 2023

Objective

This webinar aimed at gathering inputs from stakeholders from science/research as well as from policy and implementation sides on the gaps and needs for the implementation of the WFD, UWWTD and DWD. It was held online, via Zoom on 14 December 2023.

The webinar was introduced by a representative from the European Commission (Bertrand Vallet, EC, DG RTD), an academic expert (Kirsty Blackstock, James Hutton Institute) and a policy expert (Adam Kovacs, International Commission for the Protection of Danube River - ICPDR). In three parallel sessions, feedback was gathered on the perceived gaps with respect to the implementation of the WFD, UWWT and DWD.

Agenda

Part I: Context	
Keynote Speech	Bertrand VALLET – EC, DG RTD
Presentation #1: Futures needs of the WFD	Kirsty BLACKSTOCK - James Hutton Institute
Presentation #2: Implementation of the UWWTD in the Danube region	Adam KOVACS - ICPDR
Part II: Working sessions	
Session 1: Technical gaps	Split groups
Session 2: Governance gaps	Split groups
Conclusion & Perspectives	

53 participants attended the webinar, which allowed for fruitful discussions and working sessions.

PART 1: CONTEXT

The introductive presentations gave a rich overall view of the current challenges, gaps and perspectives regarding water across Europe.

- **Bertrand Vallet – EC, DG RTD**

This presentation reminded the central place of water in the European and international agendas, for example at UN Water Conference in March 2023, or with the call for a Blue Deal launched by the European Economic and Social Committee. The main components of the recasts of the DWD and UWWTD were also recalled.

Some water policy and governance facts were highlighted:

-Water quantity assessment is missing;
-Water availability is crucial for economic activities;
-Strong competition between sectors (industry, energy, agriculture, transport, households, ecosystems, etc.);
-Economics of water, polluter pays principle, affordability and ability to pay are challenging aspects for good water management;
-Additional complexity with transboundary river basins.

The fitness check and the European Environment Agency (EEA) European waters – Assessment of status and pressures 2018 also highlighted the need for an improved governance, together with the integration of water objectives on other policy areas.

Water is also a main topic in the Research and Innovation topics, both in the Horizon 2020 programme (Figure) and in the actual Horizon Europe programme (Figure).

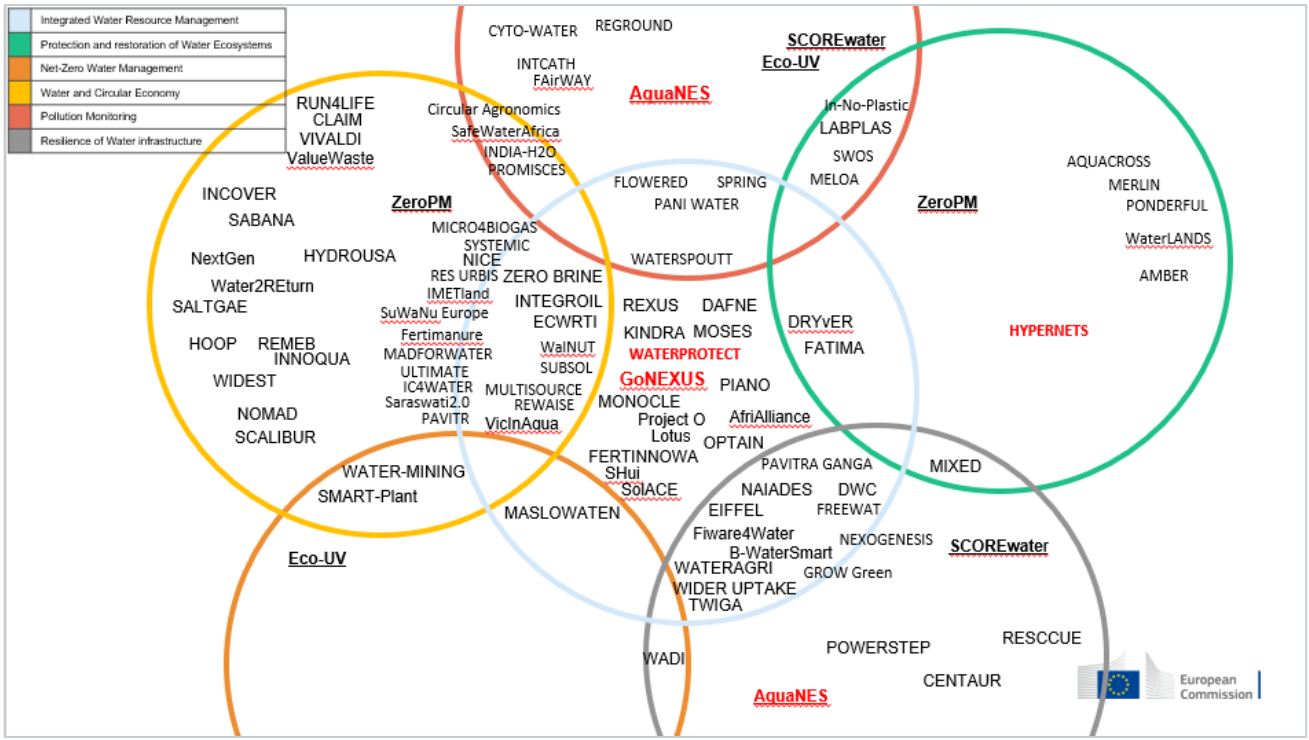

Figure 2: Water in the EU Research & Innovation projects (Horizon 2020)

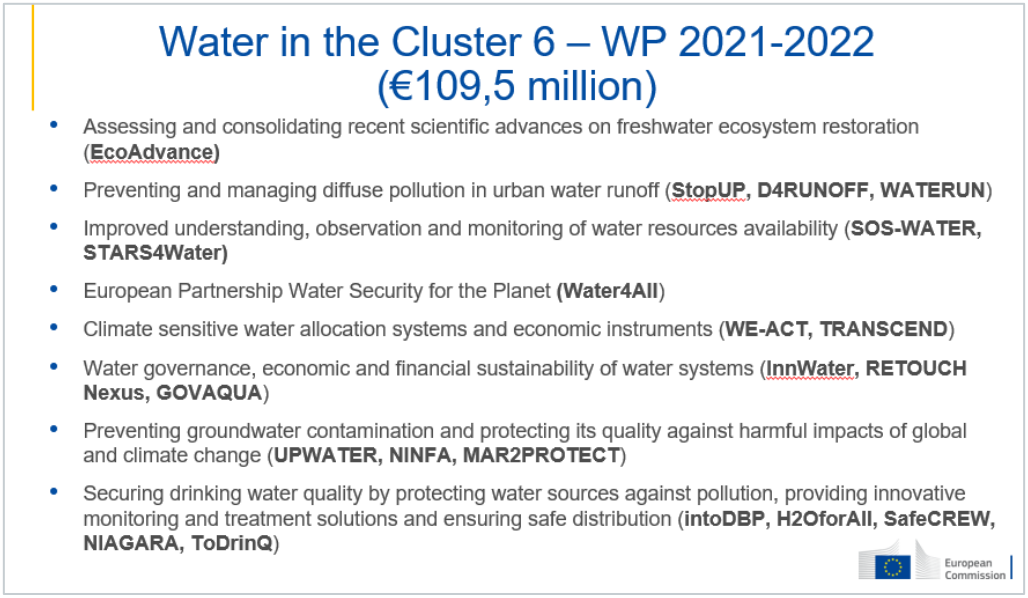

Figure 3: Water in the Cluster 6 – Work Programme 2021-2022 projects (Horizon Europe)

The future perspectives for the Horizon Europe programme (2025-2027) were given:

-Large scale implementation of circular systems for water and water sludge reuse;
-Resilience of water resources systems in the context of climate change and the emerging energy and food crisis;
-Alternative water supply solutions;
-Digital technologies / Artificial Intelligence and Machine Learning;
-Knowledge and innovation on micropollutants in water systems.

- **Kirsty BLACKSTOCK - James Hutton Institute**

Through the MERLIN project[8] - Mainstreaming Ecological Restoration of freshwater-related ecosystems in a Landscape context: INnovation, upscaling and transformation (research and innovation action funded by the EU Horizon 2020 programme), other perspectives were given on the future needs of the WFD:

-A need for policy coherence (amongst vertical and horizontal scales);
-Basin management not only concerns water, also landscape.

Some existing gaps were highlighted.

On River Basin Management Plan (RBMP) implementation

- **Financial gaps**

-Primarily public funds (Common Agricultural Policy - CAP, Cohesion and Structural Funds - CSF);
-Administrative levies and taxes;
-Role of private investment (European Investment Bank, 2023);
→ European Investment Bank report on water sector medium 'readiness'
→EU Sustainable Finance Taxonomy
→Environmental, Social and Governance - ESG investments & crowdfunding.

- **Capacity gaps**

-Demonstrations of cost-effective measures and management best practice;
-Building strategic cross sector and cross policy networks;
-Longer life European Innovation Partnership (EIP) operational groups (e.g., Agriculture and water (2016); NBS (2022));
-Ongoing monitoring linking land management and ecological outcomes.

On monitoring & evaluation

- **Impact indicators**

-Funded long-term monitoring (Before-After-Control-Impact - BACI);
-Water balance data (forthcoming Water Balance Report).

- **Extended monitoring approach**

-Connect to European Green Deal objectives;
-Common freshwater ecological indicators across policies.

- **Deliberative interpretation of indicators**

-Connecting the key type of measures (KTM) with status changes;
-What does it mean for me? Responsibility and capacity to act…

Some inputs were given regarding what could be done for a better WFD implementation, in terms of policy framing, policy cycle, policy implementation, adaptive management, and cross sectoral.

[8] MERLIN project - https://project-merlin.eu/

Figure 4: Key points for the Water Framework Directive

- **Adam KOVACS – ICPDR**

Key facts on the wastewater management in the Danube River Basin were proposed by Adam Kovacs, such as the following recent developments:

-Improvement of wastewater infrastructure by around 6000 projects for 45 million Population Equivalent;
-Connection to enhanced technologies (collection: 84%, treatment: 77%);
-Ca. 4000 treatment plants, 80% with high standards;
-Remarkable decrease of emissions (Biochemical Oxygen Demand - BOD: 60%, Total Nitrogen: 40%, Total Phosphorus: 50%);
-Total investments in wastewater sector: ca. 28 billion EUR.
The future challenges highlighted the need for infrastructural development, new types of pollution to address like emerging contaminants, microplastic or urban runoff, the need for capacity strengthening at national and local levels, or also the need to go to more circular systems (water reuse, energy optimisation).

For new and non-EU Member States, challenges relate to financing infrastructure projects, tariff setting and affordability, but also establishing proper legal framework and restructuring the utility sector.

PART 2: WORKING SESSIONS

For the working session, the participants were split in 3 groups, each of them working on both the technical and then the governance gaps for the targeted directives.

To sum up, a lot of technical gaps were proposed, mainly on data and monitoring, but also on the lack of definition of some key terms like restoration or rehabilitation.

Different gaps were highlighted for each of the 3 targeted directives, relating either to the need to better aligned policies (e.g., WFD & CAP), the challenges linked to the need of more circular systems (for UWWTD), or the emergence of new pollutants (DWD).

Table 3: Technical gaps from the webinar

TECHNICAL GAPS – From the Webinar		
Common to WFD, UWWTD, DWD		
Data & monitoring	Lack of focus on integrated systems and technologies that can help providing decision support. Digitalization could enable addressing both governance and technical gaps. Need for IT tools/web services supporting data interpretation with cross-sectors data. Data-driven solutions.	
	Lack of use of reported data to produce information and make it available to all stakeholders, and to manage the system and its improvement. Need to explain the trends in the data to those making the changes: save a budget for communication.	
	Only low frequency laboratory measurements are accepted. Online real-time measurement should be included as an alternative.	
	Linking indicators about the basin characteristics with the ecological status indicators.	
	Lack of GIS tools for correctly considering upstream-downstream relationships	
	Too static and egalitarian vision of water quality (norther area is not the same as the Mediterranean area, urban are not the same as agricultural areas).	
	Emerging stressors (Climate Change, water scarcity, alien species) not well covered in monitoring. No consideration of water discharge decreases in the context of Climate Change that effect Habitats (WFD) and dilution capacity (UWWTD).	
	Monitoring networks not interlinked between different directives. Monitoring of pollutants from different sources.	
	Economic evaluation tools for environmental services.	
Definitions and coverage	Lack of definition of restoration / enhancement / rehabilitation	
	The riparian zone fails to be integrated clearly in many EU policies.	
	Time lag between advances in technological developments and the update of regulatory frameworks.	
WFD	**UWWTD**	**DWD**
Promotion of NBS	Linking circular water efficiency with emerging pollutants challenges. Integrating Circular Economy technical solutions to make it applicable (scaling up, global approach).	Efficient absorption, concentration and destruction of PFAS during drinking water production and other water treatment process.

More focus on floodplain and wetland restoration	Need for efficient methods to recover N and P from wastewater to reuse in agriculture. Reducing important dependencies and improving energy efficiency.	Integration of decentralised drinking water schemes in public drinking water services, quality, quantity, pricing, maintenance, long term operation
Better aligning WFD with CAP	Limited focus on smaller sources or urban wastewater tourism resorts, individual houses out of cities, small villages and the control over their wastewater management.	Monitoring and treatment of new pollutants are missing: PFAS, micro-plastics, etc.
Guidance to ensure comparability of measures taken by the competent authorities.	More possibility to appropriate local systems (so called Individual Appropriate Systems - IAS).	Do we know the impact of sludge on land on Drinking Water? Reusing resources may create health risks downstream: a gap or well known?
Missing systematic monitoring.	Limited focus on managing/controlling the sewer network functioning and performance which is key in overall performance.	
Reducing agricultural pollution.	Use of modelling as an operational tool for risk assessment.	
	Active microorganisms' treatments are efficient but missing knowledge about the effect of river biome changes caused by Wastewater Treatment Plant (WTP) outputs.	

Governance gaps were also numerous, related to the need for more cross-sector approaches, the importance of planning and ensuring stakeholders have the means to effectively implement the directives, but also the importance of innovative and prospective work.

Gaps specifically related to the WFD to the difficulty to implement the basin approach on the field, and to find sufficient resources (financing, administrative, planning).

The implementation of the UWWTD faces the same difficulties in terms of resources, but also specific obstacles regarding technical points (nutrient recovery, EPR, transport of material, end-of-waste status of products...).

The DWD faces specific challenges related for example to the catchment approach.

Table 4: Governance gaps from the webinar

GOVERNANCE GAPS - From the Webinar	
Common to WFD, UWWTD, DWD	
Cross-sector	Need for cross-sectoral involvement, particularly with water scarcity. Risk management plans amongst several actors. Cross-sectoral lack of negotiation, arbitration.
	Cross sectoral approach of water, start step by step? Which sector to start with?
	Multiple claims on water resources: how to harmonize among the catchment area?
Planification, strategy, engagement	No planning instrument to manage river at the river basin level.
	Missing harmonized transboundary strategies.
	Need for more support/methods to engage with local authorities, citizens, professionals.
	Lack of capacity building/training/specific higher education and knowledge transfer.

Dedicated means	Fragmented authorities: less staff available.	
	Unbalanced finances: big cities with sufficient resources, rural areas with little resources and big goals.	
Innovation & perspective	Conflict between economic issues of a territory and water challenges. Need for perspective, solutions for socio-economic transitions, how to anticipate changes needed in a long term?	
	Enabling competition for the uptake of innovations are lacking, especially for water solutions.	
	No dedicated law on droughts and water scarcity.	
	Reporting streamlining.	
WFD	**UWWTD**	**DWD**
Watershed approach seems still to be difficult to appropriate by stakeholders.	Coherence with other policies (Nitrates Directive - ND, Industrial Emissions Directive - IED).	Shift from mindset "selling more water" towards "sustainable water security for all".
Transboundary and basin approach: impact of upstream activities and effect on downstream regions.	Lack of capacity at administration and utility level.	Support (funding, knowledge) for catchment collectives - in MS where there is no history of water boards - to help with Catchment risk management
Alignment and coordination between WFD and “conflicting” legislation (energy, navigation, agriculture).	Optimisation of closing reuse loops: legal constraints in exchanging water resources.	
Hard to find funding sources for full WFD compliance measures. Weak directive in comparison with the CAP, the WFD should also have financial mechanisms.	Education of young people and permanent education of adults needs to be developed to help appropriation of new technics and evolution / modernisation of wastewater management.	
Shift from substance-based regulation to pathway/ source-based regulation.	Standardization and definition on IAS, EPR or risk assessments.	
Missing collaborative planning, instruments.	Nutrient recovery is technically possible, but there are legal barriers limiting Nitrogen and Phosphorus reuse. Fertilizers should have a percentage of recovered Nitrogen & Phosphorus in their final products.	
No legal power of the RBMP.	Realizing difficult sewage project where many organizations are involved.	
Timeframe implementation of measures longer than deadlines.	Introduction of "dynamic" levels according to the characteristics of the receiving water body.	
Administrative overload on MS.	Weak regulation.	
A dedicated budget for nature, so that there is less need to rely on CAP or others?	Social innovation: ensure the technical innovations are understood and available to local people.	
	Gaps on the implementation of the EPR.	
	Promotion of decentralised systems with local ownership.	
	Governance around the transport of material and end-of-waste status of recovered products.	

Beyond these policies implementation gaps, some challenges were also raised by participants, like climate change, modifying the context under which the directives are implemented. The move towards artificial intelligence is also a topic that came recently but seems essential to consider.

The need for data on performance, costs and benefits of the implementation of the water related directives was also discussed as a potential way to improve the implementation of these directives.

3. Interviews

The last step of our work was to run interviews, in order to **collect specific information** from policy makers, scientists and economic sectors on policies implementation gaps jointly with information on possible solutions to fill in such gaps.

Table 5: People interviewed for the gaps report

Institution	Name and Role	Area covered	Directive(s)
Greek Ministry of the Environment and Energy	Konstantinos Papaspyropoulos: Senior Geologist	South EU	
Italian Ministry for the Environment and Energy Safety (MASE) Italian Institute for Environmental Protection and Research (ISPRA)	Martinelli Angiolo (MASE): Manager Claudia Vendetti (ISPRA): Techniologist	South EU	WFD, DWD
French National Research Institute for Agriculture, Food and Environment (INRAE)	Joana Guerin: Research fellow in Political Science		WFD
Joint Research Center	Wouter van de Bund: ECOSTAT working group co-chair	EU	WFD
Aqua Publica Europea	Milo Fiasconaro: Director	EU	WFD, UWWTD, DWD
EurEau	Sebastien Mouret: Policy advisor & representing EurEau in the Stakeholders Advisory Group of Water4All Advisory Boards Gari Villa-Landa: Senior policy advisor Oliver Loebel: Secretary General of EurEau	EU	WFD, DWD, UWWTD
Joint Programming Initiative on Agriculture, Food Security and Climate Change (FACCE-JPI)	Jean-François Soussana (INRAE): chair of the FACCE-JPI	EU	

Questions of the interviews:

1. Which **gaps** do you identify in policy directives implementation (see table after), falling in your field of expertise (rank 3 to 5 main gaps)?
   Why are these gaps the most important/relevant according to you?

2. Which gaps do you think can be addressed?

3. Please describe possible **solutions** to fill in these gaps with a practical example, and give details on how to implement the solution.

4. How do you think **research and innovation** can help to resolve in the identified gaps (e.g. defining appropriate topics for future projects calls; contribute to refine research needs, other)?

5. Please identify **3 keywords** to highlight/summarize identified gaps.

Summaries of the interviews are given hereafter. The detailed answered are available in Annex 2.

A. INRAE

In France, the regulatory tools exist but are not effective. There is a lack of practical implementation of the good ideas that already exist, linked with a lack of financial resources.

On the field, consultative processes are implemented but there is a need to go beyond with co-construction of actions.

Some specific topics are a burden for the good implementation of the WFD, like the fact that intermittent watercourses are not properly considered in the directive.

Transboundary management of water resources is also a critical point, especially with climate change, but some specific institutions are sometimes lacking, like for the Rhône river.

B. EurEau

Water policies require a holistic, integrated approach across sectors to address interconnected issues impacting water resources. Solely focusing on water directives is insufficient given pollution sources span agriculture, pharmaceuticals, textiles, and more. Water should be in the core of all other sectors.

Key gaps include lack of requirements for recovered phosphorus in fertilizers (but no invest for recovery because no market about it), data limitations, lack of polluter pays principle implementation, and challenges controlling diffuse pollution sources (control at source is needed).

Innovative solutions like digital technologies could help, but policy coherence across sectors is crucial. Water quantity challenges from climate change also increase complexity. New Green Deal initiatives like green hydrogen have high water needs that must be considered holistically for sustainable water management.

C. Joint Research Centre

The main identified gaps in WFD implementation relate to the little global progress achieved between one management plan and the other. It's time to arrive to define which objectives are really achievable and which measures are effectively applicable and contributing to reach environmental objectives. Priorities should be defined, single pressures analysed. Attention should be paid to emerging stressors like climate change. Better connection between different directives is desirable, and key for simplification searched.

D. MASE and ISPRA

The main identified gaps relate to measures implementation in many ways. Better coordination is needed to reduce time lags between identified solutions and effective measures implementation, also to be able to prevent the damage (and not only to repair it). There is also lack of dynamism in setting the objectives and low connection between environmental status / pressures / measures. Connection is also something to be searched between different sectors responsible for different directives implementation. There is a need for centralized view, integrating information at local, national and EU scale by providing support to integrate different EU policies. There is also a need to support the interaction between problem owners and solution providers, also in the phase of finding the more suitable interlocutor. Some cultural change has to be promoted, looking at nature-based solution, effective circular economy, green deal.

E. Aqua Publica Europea

The main gaps identified in the implementation of three policy directives are the relationship/inter-dependency between directives which requires attention, how to handle different views of the WFD (water bodies approach) and the UWWT (agglomerations with sewer network and treatment installation) that play also on governance level: river basin versus sanitation operator, and in the economic approach: WFD requires cost integration (resource costs) versus water bills. There is a need to integrate the impact of climate change in implementation practices, to prepare for the implementation of the new UWWT directive, to tackle new challenges from dangerous substances (PFAS), to take economic aspects into account in organizing/developing circularity (of nutrients).

With respect to research and innovation, most public sector operators are facing the same challenges. There is a need to develop common solutions for common problems. Many mentioned topics have main aspects outside research and innovation. At the same time: many of them have research and innovation challenges (energy, PFAs, other substances, …). Innovative governance in the public sector: how to take care of the aspect of not taking too much risk using public money. A more systematic matching between problem owners and solution providers would be needed.

To summarize: "multistakeholder and multisector approach are key to have a more integrated resource management".

F. FACCE-JPI

Besides the sectoral directives (UWWTD, DWD) and the umbrella directive for water quality (WFD), something essential is missing for policy with respect to water quantity. Water4All should provide evidence and insights on how water quantity policy could be improved, taking into account climate change effects and hydrology, making use of remote sensing and earth observation techniques. FACCE-JPI's One Water Summit will deliver opportunities for this enlargement of scope. Collaboration between Water4All and FACCE-JPI is desirable.

G. Greek Ministry of the Environment and Energy

Key gaps in policy directives include insufficient coverage of emerging pollutants, poor promotion of nature-based solutions, and lack of interoperability between central and decentralized monitoring networks. Addressing these gaps involves adopting new analytical techniques, creating legal frameworks for nature-based solutions, and optimizing national monitoring networks. Solutions include specialized analytical techniques, citizen education, funding for monitoring networks, and creating interoperable databases. Research and innovation can help by focusing on these areas through public-private partnerships and a holistic, multidisciplinary approach.

3. MAIN IDENTIFIED GAPS

1. Our method

As explained above, our method relies on different and complementary sources of information: desk study, webinar, interviews. The main gaps have been identified according to the following rules:

-the gap has been highlighted in at least 2 types of information sources (ex: desk study & interview)

OR

-the gap has been highlighted several times in the same type of information source (ex: in different interviews).

The most frequently identified gaps are **in bold** in the summary table (Table 7).

2. Main technical and governance gaps

This overview of the gaps highlighted through the desk study, the webinar and interviews show that several shortcomings relate to the three directives.

TECHNICAL GAPS

The need to control **diffuse source pollution** to achieve the objectives of water directives is a gap that was raised both in the desk study (linked with the UWWTD and Nitrates Directives) and the interviews (with also the need to address point source pollution, with the implementation of control at source).

Water quantity and climate change were highlighted several times (technical report, interviews) as new challenges requiring technical solutions to increase ecosystems resilience as well as the need to consider new conditions for implementation (e.g. intermittent watercourses). A better communication and coordination among various water users is also important to enable consensual trade-offs.

Linked to the previous point, the importance of considering **NBS** to address current challenges was reported, even if it brings the need to give data and information on the measure the impact of these measures and demonstrate their benefits, as well as building capacity (scientific articles, webinar, interviews).

The need for more **data collection, sharing and use** was especially highlighted during the webinar, and some interviews.

GOVERNANCE GAPS

One major gap raised was the need for more **cross-sector collaboration and multi-level approaches** (from OECD report, scientific articles, webinar, interviews), at the EU and national levels. Economic policies often prioritizing sectoral interests like agriculture, industry, and energy over environmental goals, hindering adaptation of EU water directives, was pinpointed by different sources (articles, interviews), raising the need for political willingness to promote cross-sectoral and multi-level collaboration. Improve connection between different sectors dealing with water resources to make the integration of water planning more effective was also raised. Globally, a need for more systematic matching between problem owners and solution providers would also be needed.

Linked to this first paragraph, the need for more **coherence** among EU **legislations** was discussed many times, especially during the interviews. It concerns water related legislations but not only, as nowadays there is a very diverse sectoral approach that has to be considered, with many sectors being able to potentially affect water resources. Supporting local projects for a more integrated management or linking the economic sector representatives and the scientific and implementation partners are some of the ideas that were suggested.

Effective implementation of the directives also requires strong **communication, inclusion, and participation of key stakeholders** to build consensus or even co-create the actions when it is possible (from desk study, webinar interviews). Low awareness among stakeholders and the general public about water issues impedes progress, with for example a lack of information and data on consequences of inaction. Water literacy campaigns can help build public support for change.

Adequate and sustainable **financing** for investment, operation, and maintenance costs is crucial for driving implementation. The polluter pays principle needs wider and better application, especially by large industries and agriculture. Economic valuation of water resources can demonstrate the benefits of measures. A better connection between people in charge of implementing the different measures and people deciding how money should be allocated could also help (from interviews).

Water governance models and decision-making need to **integrate scientific evidence**, long-term climate change impacts, and strategic investment pathways including nature-based solutions and green infrastructure. Institutional and staff **capacity building** through vocational **training** and new roles like Extended Producer Responsibility schemes for water-intensive industries are important, even if they are still gaps in the implementation of the EPR.

Table 7: Summary of main technical and governance gaps

	TECHNICAL	GOVERNANCE
WFD, UWWTD & DWD	Data and monitoring -Data collection: some data already existing need to be collected, real-time data missing... -**Data use to produce information and feedback / data-driven measures** -Emerging stressors not well covered (e.g., climate change)	Cross sector and multi-level **-Need for cross sectoral approaches and coordination** **-Need for coherence between policies.**
	Promotion of **Nature Based Solutions**	Knowledge and engagement **-Lack of capacity building, knowledge transfer, communication, awareness** -Role of social innovation to ensure the technical innovation are understood and available to local people (who manage water on the field) **-Need to develop stakeholders' engagement**
		Financing and Economy -**Proper implementation of cost recovery from all water users** -Miss some funding sources – possible integration of private finance -Need for solutions for socio-economic transitions, to anticipate changes in a long term.
		-Need for evidence-based planning -Capacity Building
	Digital technologies/ Artificial Intelligence and Machine Learning: technical (new topics, to investigate) and governance gaps (related to water consumption)	
		Missing harmonized transboundary strategies or some institutions (ex: Rhône)
WFD	Connect to Green Deal objectives.	Lack of dedicated funding
	Need data on performance, costs and benefits – on consequence of inaction	Transboundary & basin issues (upstream activities /downstream impact). Miss a catchment approach.
	Mainstreaming control at source for all types of pollution (diffuse, point-source, rural and urban sources...)	Timeframe implementation of measures longer than deadlines. No direct relationship between measures and responses.
	Intermittent watercourses: WFD does not take them into account	Accountability and liability
		Capacity and capability of advisors & competent authorities

<table>
<tr><th></th><th>TECHNICAL</th><th>GOVERNANCE</th></tr>
<tr><td rowspan="5">UWWTD</td><td><u>Going to circular</u>:
-Linking circular water efficiency with emerging pollutants challenges
-Large scale implementation of circular systems for water and water sludge reuse /develop the potential of wastewater in circular economy (sludge quality, water reuse)
-Integrating Circular Economy technical solutions to make it applicable.</td><td>Gaps in the implementation of the EPR.</td></tr>
<tr><td><u>Energy neutrality</u>
-how to further enhance the energy efficiency in urban wastewater treatment plant (UWWTP) and wastewater management
-energy neutrality within UWWTPs vs contribution of UWWTPs to energy neutrality at larger scale (for example, municipal)</td><td>Barriers limiting N and P reuse: lack of market to use the recovered nutrients</td></tr>
<tr><td>Control at source: need to mainstream control at source to prevent pollution in the first place in wastewater, wastewater collecting systems and UWWTPs. End-of-pipe treatment in UWWTPs cannot be the only solution to protect water resources from pollution.</td><td><u>Water Reuse</u>
Two main challenges:
-who is paying for it
-lack of acceptance from potential users of reclaimed water</td></tr>
<tr><td colspan="2">Limited focus on managing/ controlling the sewer network (even if the new UWWTD includes storm management)</td></tr>
<tr><td></td><td>Investment gap: financing of all new requirements</td></tr>
<tr><td rowspan="2">DWD</td><td>Monitoring and treatment of new pollutants are missing: PFAS, micro-plastics, etc.
Importance of control at source first (prevention principle).</td><td></td></tr>
<tr><td colspan="2">Link between reuse and health risk.
But the EU Water Reuse Regulation sets the obligation of a very thorough risk assessment and management.</td></tr>
<tr><td>OTHER</td><td colspan="2">-Lack of polluter pays principle and control at source in many other pieces of legislation related to activities polluting water resources
-There are new initiatives/solutions stemming from the Green Deal that become new and very intensive users of water (for example, digital transition – data centres; energy transition – production of green hydrogen)
-Water is still not properly and transversally addressed in other sectors' policies
-Lack of progress in reaching environmental objectives: too ambitious environmental objectives? Do we know what is really feasible?
-Lack of clear policy on water quantity</td></tr>
</table>

4. CONCLUSION AND NEXT STEPS

Identifying implementation gaps for three main and "old" water related directives is a major undertaking. Even if such a work can't be exhaustive, we worked on different and complementary results in order to reach robust and reliable results. We were in fact able to identify recurrent topics, coming from the different applied approaches to gaps identification.

1. Method for the next steps (Solutions guidelines)

The next step of our work is to deliver guidelines to match the main gaps and available solutions.

To do so, we already have some elements that we can use:

-inputs from this Deliverable, with publications and reports to further read, European projects to explore, as well as material from the different interviews we have conducted.

-two Policy Support Working Group webinars (September 2024 and February 2025), where we can focus on some specific policies or gaps for example.

-a Policy Forum event in October 2024, back-to-back to the INBO Conference, where we can foster physical exchanges with policy makers and managers at different scales.

-a Milestone to come, about "Evaluation of mapping studies (that are done in other tasks, e.g. Pillar A and Pillar C sub-Task C2.1) on innovative solutions to pinpoint effective solutions that can address the policy gaps", for January 2025, that will also be very useful in identifying the possible solutions to the main implementation gaps highlighted in this Deliverable.

2. Links with relevant strategies & policies

Some strategies or initiatives are also particularly relevant for our work, that is why special attention will be given to:

-the Strategic Coordination Group, trying to make connection with the priority areas for the next Common Implementation Strategy (CIS) programme.

-the new priorities of the European Commission, especially after the elections.

-the Blue Deal, initiative from the European Economic and Social Committee (EESC) to consider water as a priority and to adopt an EU Blue Deal as a standalone strategic policy, on an equal footing with the EU Green Deal. Mutual exchanges between Water4All and this potential initiative could be useful for our task and for the project.

-obviously, other Water4All Pillars and activities, for example Pillar A with the identification of knowledge gaps, or Pillar C Task C3.3 with the platform to come making connection between problem owners and solution providers. The Water4All task dedicated to synergies and coordination with other partner initiatives will also be especially used to make connection or exchange with targeted projects if useful.

ANNEX 1: List of considered references in the desk study

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ANNEX 2: Interviews with experts and practitioners on policies implementation gaps

French National Research Institute for Agriculture, Food and Environment (INRAE)

- ***Name***

Joana GUERRIN

- ***Institution***

INRAE

- ***Role***

Research fellow in political science. Topics: Floods, droughts, NBS

- ***Considered Directive(s)*** *(please indicate which Directive falls in your field of expertise with reference to WFD, UWTD, DWD)*

WFD and Floods Directive

1. *Which **gaps** do you identify in policy directives implementation (see table after), falling in your field of expertise (rank 3 to 5 main gaps)?*
   Why are these gaps the most important/relevant according to you?
2. *Which gaps do you think can be addressed?*
3. *Please describe possible **solutions** to fill in these gaps with a practical example and give details on how to implement the solution.*
4. *How do you think **research and innovation** can help to resolve in the identified gaps (e.g. defining appropriate topics for future projects calls; contribute to refine research needs, other)?*

Gap #1- GEMAPI (Aquatic Environment Management and Flood Prevention) is a new area of responsibility for local and regional authorities. The implementation of this new remit has been very flexible, depending on the territory, and there is not necessarily a beneficial association between restoring environments and preventing flooding. Some local authorities have separated the responsibilities (depending on their history, type of structure…). Skills have sometimes been acquired without training, e.g. from dyke management to GEMAPI without training.

France level: it would be good to carry out a national survey on the way in which GEMAPI has been implemented in France. It would also be interesting to have the lessons learned from this experience in France, so that they can be disseminated at European level.

Gap #2- Opposition between different public policies, between ecological and energy transition

For example, in the Rhône development project, residents, environmental associations and scientists were concerned. Consultations were carried out, but stakeholders fear that their opinions will not be taken into account in the decision, as there is no obligation to take stakeholders' opinions into account in public decision-making. Processes exist but are more consultative.

Acceptability studies do exist, but they are not sufficient to work on concerted and appropriate development projects. It would be interesting to move towards the co-construction of actions. Example of an interesting project: Restau-débat, developed by UMR Géo in Montpellier (Christelle Gramaglia, who works in social sciences on environmental restoration and pollution). Debate with local residents on the desired restoration of watercourses in their area. Forum theatre experiments (e.g. on the downstream Rhône with the CPIE).

Consultation tools do exist, but what's lacking is their integration into the administrative culture. Local residents are not seen as legitimate to give technical advice. The difference in timeframes between policy and action on the ground poses a problem. The ecological emergency must not sacrifice the democratic emergency.

Another interesting initiative is to give legal personality to watercourses, but there are doubts as to whether this can actually be achieved on the ground. A Water Parliament has been set up, but there is also the problem of representativeness: who is appointed to the Water Parliament and who is not. This parliament was not open to everyone (researchers, for example). The question of who can speak for the river remains unresolved.

Gap #3- Intermittent watercourses (cf Thibault Datry, INRAE).

Intermittent watercourses are going to be the new norm, and the WFD does not take these watercourses into account. The WFD is designed for perennial watercourses, but many of the indicators do not apply to intermittent watercourses, which are considered to be in poor condition by managers even though they function naturally (because they are intermittent). They are not considered to be aquatic environments in their own right.

See Marylise Cottet of the CNRS on the perception of intermittent watercourses in France by managers.

Gap # 4- Cross-border governance

There is no cross-border management institution for the Rhône. This raises many questions about the sustainable management of the Rhône river, in terms of flow, flood risk, etc. It would be necessary to push for the creation of a cross-border institution on the Rhône.

Gap #5- Funding

A comparative project between France and the USA was carried out to see how NBS projects are developed: in the USA, a very ambitious federal NBS development programme, with laws giving powers to federal institutions to develop NBS in all sectors, including the environment but not only (army, agriculture). Very broad definition of NBS in the USA. In France, there is a lack of resources, the solutions remain technical but fairly disconnected from the public (e.g. measure 30 of the Water Plan, which aims to implement 70 NBS projects, but there is no associated funding, problem of matching public action resources with their ambition). Political posturing without appropriate implementation. Human resources are sorely lacking, water agencies have the resources but no one to implement, consult, create, monitor, etc.

5. Please identify 3 keywords to highlight/summarize identified gaps.

Co-construction / Resources for public action / Inclusive governance

EurEau

- ***Names & Roles***

Gari VILLA-LANDA UWWTD Senior policy advisor

Sebastien MOURET Policy advisor – DWD – representing EurEau in the Stakeholders Advisory Group of Water4All Advisory Boards

Oliver LOEBEL – Secretary General of EurEau

- ***Institution***

EurEau

- ***Considered Directive(s)*** *(please indicate which Directive falls in your field of expertise with reference to WFD, UWTD, DWD)*

All

1. *Which **gaps** do you identify in policy directives implementation (see table after), falling in your field of expertise (rank 3 to 5 main gaps)?*
   Why are these gaps the most important/relevant according to you?
2. *Which gaps do you think can be addressed?*
3. *Please describe possible **solutions** to fill in these gaps with a practical example and give details on how to implement the solution.*
4. *How do you think **research and innovation** can help to resolve in the identified gaps (e.g. defining appropriate topics for future projects calls; contribute to refine research needs, other)?*
5. *Please identify **3 keywords** to highlight/summarize identified gaps.*

If we want to address water in policies, need to have a **holistic approach**, meaning that the separation of the 3 « old » water directives doesn't match the reality and needs of the water sector – even if they are specific gaps for the different directives.

Ex: pollution in the UWWTD without considering control at source measure has no sense, these two goes together.

We can't look just at water directives, there is a change from 20 years ago to now, a very diverse sectoral approach that we have to consider. We have to look into physical security, pharmaceuticals sector, pesticides, agricultural policies... because all of that affect the potential pollution of water resources.

Water should be in the core of all other sectors.

Importance of a **holistic view**: also nitrates, textile, plastic... have impacts on the water cycles for example.

Examples of policy gaps:

-Fertilisers product regulation, fertilisers do not have to have a minimum share of recovered phosphorus from organic sources. No invest for recovery because no market about it.

-Also need more data, sometimes just collecting and not necessarily from research.

-Lack of implementation of the polluter pays principle, burden on the water consumer and not on the polluter.

-Tougher threshold for PFAS but removing PFAS is resource intensive (and they are just removed, not destroyed).

DWD: link between reuse and health risk: surprising gaps because no direct potable reuse of any kind in Europe. Drinking water has to comply with the regulation. For agriculture, there are strict criteria. (Comment: never zero risk but risk management and assessment approaches).

WFD: technical gaps: controlling **diffuse source pollution** is indeed a big challenge. Add also point sources, for example when you have undeclared point sources (ex. PFAS substances or other). Accountability also for technical innovation, pinpointing the source of pollution from the point where it was detected – some technologies exist already – helping the end of pipe to know where to control the pollution at source.

How to look into innovative solutions to solve the lack of solutions, digital support? That implies other sectors, not only the water sector.

Regarding **newer MS**, policy implementation gaps are sometimes related to material availability, sometimes no contract to do the job, complex planning period…

Control at source: a big policy gap is the **lack of coherence between different policy area**. Lot of legislative and non-legislative policy tools that could be mobilised to help achieve the WFD goals. Way to use better the CAP to reach the objective of the WFD for example. More coherence to be brought in is needed. Small steps in different policy areas also helps bringing the common goals forward.

Water quality but also need to look into **water quantity**: uncertain, bringing water management even more challenging.

Taxonomy regulation supposed to determine which activities can be considered as sustainable, but no criteria linked to water consumption of water efficiency. Lots of new solutions or initiatives from the Green Deal, ex **green hydrogen, digital transition**, but green hydrogen requires a massive amount of potable water. Same with **data centres**, which need a lot of water of high quality to cool them. Need to look into the bigger picture to consider the challenges and impacts on water.

Joint Research Centre (JRC)

- ***Name***

Wouter VAN DE BUND

- ***Institution***

European Commission, Joint Research Centre (JRC)

- ***Role***

Researcher, ECOSTAT group co-chair

- ***Considered Directive(s)*** *(please indicate which Directive falls in your field of expertise with reference to WFD, UWTD, DWD)*

WFD

1. *Which **gaps** do you identify in policy directives implementation (see table after), falling in your field of expertise (rank 3 to 5 main gaps)?*
   Why are these gaps the most important/relevant according to you?
2. *Which gaps do you think can be addressed?*
3. *Please describe possible **solutions** to fill in these gaps with a practical example and give details on how to implement the solution.*
4. *How do you think **research and innovation** can help to resolve in the identified gaps (e.g. defining appropriate topics for future projects calls; contribute to refine research needs, other)?*

#1 Objectives (Good ecological and potential status by 2027)

Little global progress from one plan to the other, we need to understand why. Better awareness on which objectives are feasible to reach is needed. When and where the good status is achievable? Need for coherence between environmental ambitious objectives and need for put into practice actions to remove the reason why objectives are not reached. Necessary to focus on measures that make objectives achievable. To reach the objectives it is needed to focus on single pressures (e.g. Hymo pressure). Focus on green deal to push for real implementation of measures. Integration between different sectors: finding different funding sources for supporting measures implementation. It is necessary not seeing WFD as something of the past, keep high the interest on WFD (also as a research topic). Focus on restoration. Promote links between research projects and WFD, when feasible.

#2 Climate change

It will be more difficult to reach environmental objectives because of climate change. Accept that climate change has an effect on ecological status. Research and innovation is required to reach environmental objectives (not only in relation to climate change).

#3 Coherence between different Directives

Lack of cross cutting between Directives (e.g. nature management and river basin management plans as close compartments, not communicating each other). Need for simplification of the different environmental policies.
Make the local projects more central (to deal with all the different policies within the same project from research and innovation point of view).
Promote projects aiming to discuss water/environmental objectives.
Link the economic sector representatives and the scientific and implementation partners (see e.g. MERLIN project https://project-merlin.eu/) in a process of learning by doing.

5. *Please identify 3 keywords to highlight/summarize identified gaps.*

Policy Coherence, Climate change, Measures implementation

Italian Ministry for the Environment and Energy Safety (MASE) and Italian Institute for Environmental Protection and Research (ISPRA)

- ***Name***

Angiolo MARTINELLI

- ***Institution***

Ministero dell'ambiente e della sicurezza energetica (MASE)

- ***Role***

Manager

- ***Name***

Claudia VENDETTI

- ***Institution***

Italian Institute for Environmental Protection and Research (ISPRA)

- ***Role***

Technologist

- ***Considered Directive(s)*** *(please indicate which Directive falls in your field of expertise with reference to WFD, UWTD, DWD)*

WFD

1. *Which **gaps** do you identify in policy directives implementation (see table after), falling in your field of expertise (rank 3 to 5 main gaps)?*
   Why are these gaps the most important/relevant according to you?
2. *Which gaps do you think can be addressed?*
3. *Please describe possible **solutions** to fill in these gaps with a practical example and give details on how to implement the solution.*
4. *How do you think **research and innovation** can help to resolve in the identified gaps (e.g. defining appropriate topics for future projects calls; contribute to refine research needs, other)?*
5. *Please identify **3 keywords** to highlight/summarize identified gaps.*

#1 Data to produce information and feedbacks coordination/data-driven measures.

Reducing the lag time between data observation, definition of ecological status, measures planning.

Work on better coordination to reduce time lags: measure should be put into practice on time and not becoming a way to repair. Move to a prevention approach not paying for recovering the damage but paying to prevent it. Lack of dynamism in setting the objectives. Improve the collection of quantitative data. Support the process of digitalization of information, endorse the setup of simple systems to provide information easily accessible with focus on the quality of the information provided, in a transparent way.

#2 Lack of effective measures implementation

Scarce awareness in consequences of inactivity. Lack of resources and connection between people in charge of implementing the different measures/solutions and people deciding how money should be allocated. Management plans are usually well constructed but funding to improve measures are low e.g. funds for measures should be found as accessories (not directly coming from WFD). Difficult implementation of win-win measures. Make aware all managers, decision makers etc. of what are the interactions between the needs for intervention and the available resources. Improve connection between different sectors dealing with water resources to make the integration of water planning more effective. More focus on article 4.7 and better communication and involvement between different authorities responsible for different stage of projects/plan implementation. Set out systems to define which are the priorities and to understand better which are the long-term effects of different actions. Low connection between environmental status / pressures / measures.

Lack of a systemic view between different actors involved in planning new intervention, evaluating env impact, reaching environmental objectives

#3 Emerging stressors like climate change

Improve the velocity in exchanging information to cope with the rapidity of changes. More innovation needed.

#4 Cultural approach to nature-based solution

Promote nature-based solution, improving the link between nature-based solution and economic sector, invest in dissemination and education. Change the paradigm of 'commander & control' with the introduction of a 'reward' mechanism both for administrator and citizens (if virtuous decision are taken). There is the need to invest on education/training of people able to construct projects based on nature-based solution: this education should be multidisciplinary (not only based on engineering solutions and approaches). Usually it seems more simple to refer to the approach in restoration most often applied (usually only structural approaches) without really changing the way to cope with possible solutions.

#5 Connection with green deal: low link between different sectorial Directives and WFD.

Lack of support in disseminating research results to policy makers, administration and different stakeholders. Lack of a centralized view, integrating information at local, national and EU scale. Provide support to integrate different EU policies.

Support the interaction between problem owners and solution providers also in the phase of finding the more suitable interlocutor.

Support and encourage the use of integrated measures really applicable and practicable (validated by a scientific process) at local level.

Improve real circular economy.

#6 Economic gap investment and low capacity planning for UWTD

Low effective planning investment capacity over the long time period. Only received money (payed and received by water taxes or by public funds) is usually invested, scarce planning of investment beyond already available resources (or resources that will arrive at a second stage).

#7 Low investment in technologies / innovation (DWD)

Problems with emerging pollutants and low technological capacity.

5. Please identify 3 keywords to highlight/summarize identified gaps.

Equity, Simplification, Accessibility, Connection, Sharing, Cultural change

Aqua Publica Europa

- ***Name***

Milo FASCIONARO

- ***Institution***

Aqua Publica Europa, public water and sanitation operators (both individual and umbrella organisations)

- ***Role***

Responsible for secretariat of the association

- ***Considered Directive(s)*** *(please indicate which Directive falls in your field of expertise with reference to WFD, UWTD, DWD)*

All 3 directives are relevant. Aqua Publica Europa is active on EU-level on each directive.

*1. Which **gaps** do you identify in policy directives implementation (see table after), falling in your field of expertise (rank 3 to 5 main gaps)? Why are these gaps the most important/relevant according to you?*

Relationship/inter-dependency between directives requires attention.

How to handle different views of WFD (water bodies approach) and UWWT (agglomerations with sewer network and treatment installation). Also on governance level: river basin versus sanitation operator.

Economic approach: WFD requires cost integration (resource costs) versus water bills. Example: How to finance upstream NBS that have positive impact on treatment for drinking water production?

General: Need to integrate impact of climate change in implementation practices.

UWWT: Prepare for implementation of new UWWT directive.

DWD: new challenges from dangerous substances (PFAS).

2. Which gaps do you think can be addressed?

*3. Please describe possible **solutions** to fill in these gaps with a practical example, and give details on how to implement the solution.*

Water quantity/scarcity: recent publication with policy recommendation from Aqua Publica Europa.

Circularity, take also economic aspects into account in organizing/developing circularity (of nutrients).

Drinking water quality: need to ban specific substances.

*4. How do you think **research and innovation** can help to resolve in the identified gaps (e.g. defining appropriate topics for future projects calls; contribute to refine research needs, other)?*

From public sector: most operators are facing same challenges. Develop common solution for common problems. There are possibilities in Horizon Europe, but even then there is need for a (individual) solution.

Many mentioned topics have main aspects outside research and innovation. In the same time: many of them have research and innovation challenges (energy, PFAs, other substances, …). Innovative governance in public sector: aspect of not taking too much risk using public money. More systematic matching between problem owners and solution providers, would be needed.

Water operators need to know 'what is the state of art of specific topics (for instance toxicity information) produced by academics.

*5. Please identify **3 keywords** to highlight/summarize identified gaps.*

Multistakeholder and multisector approach, is key to have a more integrated resource management.

Joint Programming Initiative on Agriculture, Food Security and Climate Change (FACCE-JPI)

- ***Name***

Jean-François SOUSSANA

- ***Institution***

INRAE

- ***Role***

Vice-president for international affairs, as representative of FACCE-JPI

- ***Considered Directive(s)*** *(please indicate which Directive falls in your field of expertise with reference to WFD, UWTD, DWD)*

1. *Which **gaps** do you identify in policy directives implementation (see table after), falling in your field of expertise (rank 3 to 5 main gaps)?*

   Why are these gaps the most important/relevant according to you?

Something is missing. WFD, sectoral directives were and are relevant for water quality issues. There are large water amount/quantity issues. European Climate Risk Assessment - EU CRA: water most impacted sectors (floods, scarcity/droughts). It is quite important to better manage water (excess, scarcity), discuss water use among sectors, start planning water use for longer term.

Water4All should provide evidence and insights on how water policy could be improved.

There is real concern, also in other Mediterranean countries. Increased soil moisture drought is expected in coming decades. We need to understand how to better manage water resources. It will not work with present instruments.

2. *Which gaps do you think can be addressed?*
3. *Please describe possible **solutions** to fill in these gaps with a practical example, and give details on how to implement the solution.*
4. *How do you think **research and innovation** can help to resolve in the identified gaps (e.g. defining appropriate topics for future projects calls; contribute to refine research needs, other)?*

One Water summit (https://oneplanetsummit.fr/en/events-16/one-water-summit-287) is an initiative in the UN-context of France and Kazachstan. In the preparation of this summit, also needs with respect to research and innovation are detected. Further steps are required. Vision/Approach to these steps had to be changed due to lack of resources.

More is needed in field of remote sensing and earth observation. For instance, use SWOT (launched by NASA, CNES), future satellites (Thrishna) as this can help better manage water quantity.

Living labs, advises, collaboration with industries are needed and will allow a lot of progress.

This is an essential step for the future (local models giving climate change, hydrology), that enables progress with respect to agriculture practices and irrigation, for instance by living labs with farmers, advisors and industries for reduced water use. Build protection like Explore2 at European level would help.

Preventing floods (and deaths) with earth observation tools is another new dimension. Also here, there are lots of needs, links with insurance, research, …

INRAE is involved in the preparation of one water summit, with a strong focus on earth observation. An innovation pillar in those preparations would be helpful.

Greek Ministry of the Environment and Energy

- ***Name***

Konstantinos PAPASPYROPOULOS

- ***Institution***

Greek Ministry of Environment & Energy/General Secretary for Natural Environment & Water/Directorate General for Water/Directorate for Planning & Management of Water Services

- ***Role***

Personnel/Geologist

- ***Considered Directive(s)*** *(please indicate which Directive falls in your field of expertise with reference to WFD, UWTD, DWD)*

WFD, DWD, UWTD (from the above Directives the WFD is completely responsibility of Directorate General for Water, UWTD is partially responsibility of Directorate General for Water and UWTD is partially responsibility of Directorate General for Water).

*1. Which **gaps** do you identify in policy directives implementation (see table after), falling in your field of expertise (rank 3 to 5 main gaps)? Why are these gaps the most important/relevant according to you?*

a) Emerging pollutants that are not well covered

b) Poor promotion and implementation of nature-based solutions

c) Insufficient coverage of national monitoring network stations

d) Absence of interoperability between Central (Ministry of Environment & Energy) and Decentralized (mainly scientific co-financed local monitoring) monitoring networks

e) The policies of the three directives are not the direct responsibility of a Central Agency (e.g. Ministry of Environment & Energy)

*2. Which gaps do you think can be **addressed**?*

a) Adoption of new analytical techniques as well as pilot application of co-financed (EU and National) water quality monitoring programs.

b) Creating a legal framework as well as practical implementation guides (manual) of nature-based solutions, at different scales of application.

c) Condensation of the measuring stations of the National Monitoring Network for the quality and quantity of the country's waters on the basis of needs and according to the existing environmental pressures of each region.

d) Writing a legal framework so that all measurements and analyses comply with what is followed at the national level.

e) Elaboration of a strategic study recording the responsibilities at all levels of governance with the aim of understanding the current water management situation.

3. *Please describe **possible solutions** to fill in these gaps with a practical example, and give details on how to implement the solution.*

a) Specialization of new analytical techniques in areas where major environmental pressures are found.

b) Adoption of citizen education actions for the acceptance and support of these Natural Based Solutions as their results may be seen in the medium term and are not easy acceptable from the local communities.

c) Leveraging national and community funds to cover the financial needs of densifying monitoring network stations, especially in areas affected by environmental degradation.

d) Creation of a database, a repository, that connects all the incoming information, in the model of the repository of the European Environment Agency. The goal is the intercalibration of the measurements and the interoperability of the databases with each other.

e) Drafting and implementation of a new proposal for the concentration of the responsibilities, concerning the three Directives, in an administrative body of responsibility with vertically integrated responsibilities from the National to the Regional and finally to the Local level of Governance and policy implementation

*4. How do you think **research and innovation** can help to resolve in the identified gaps (e.g. defining appropriate topics for future projects calls; contribute to refine research needs, other*)?

All of the topics analysed above (a-e) can be the subject of research by bodies of the wider public sector (Universities, research institutes, etc.). Private sector research funds must be search out and public-private cross-sectoral approaches must be adopted. The critical element to consider is «polythematic approach ». This holistic approach from different scientific specialties is considered a given and necessary. This is also what the European Commission's DG Regio is asking for, in recent reports on drinking water and beyond.

5. *Please identify **3 keywords** to highlight/summarize identified gaps.*

a) Holistic approach

b) Top to bottom effective governance

c) Collaboration of the Agencies and education of citizens

water4all@agencerecherche.fr
www.water4all-partnership.eu

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