European Partnership

Results of the public consultation

Water4All SRIA update process

Deliverable D1.16, June 2025

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The contents of this document mainly build upon the experiences accumulated by Water4All partners that contributed in the past to the development and update of the Water JPI strategic research and innovation agenda and, in particular to the task aimed at the launch of public consultation. We wish to acknowledge the invaluable contribution of Water4All Pillar A partners in the preparation of this document. We wish to specially thank the European Commission for funding this ambitious programme.

TABLE OF CONTENT

LIST OF ACRONYMS

Acronym	Full title
AI	Artificial Intelligence
AMR	Anti-Microbial Resistance
EU	European Union
IoT	Internet of Things
IWRM	Integrated Water resources Management
JPI	Joint Programming Initiative
NBS	Nature Base Solutions
NGO	Non-governmental organisation
PFAs	per- and polyfluoroalkyl substances
SDGs	Sustainable Development Goals
SRIA	Strategic Research and Innovation Agenda
UN	United Nations
Water4All	European Partnership on Water Security for the Planet
WOLLs	Water Oriented Living Labs

ABSTRACT

This deliverable presents the results of the public consultation conducted to support the revision of the Water4All Strategic Research and Innovation Agenda (SRIA) for the period of 2026–2029. The consultation gathered insights from 162 participants across 31 countries, covering diverse stakeholder groups, including research institutions, government bodies, NGOs and private enterprises. The survey combined quantitative assessments of the SRIA themes´ significance and urgency with qualitative insights into water challenges, solutions and innovation uptake. Among the seven SRIA themes, sustainable water management and water and health emerged as both highly significant and urgent priorities, closely followed by ecosystem resilience and governance. These findings reflect stakeholders' strong concern for climate resilience, pollution control, and the protection of public health. Respondents emphasized the importance of integrated governance, investment in innovation and infrastructure, and the need for effective science-policy-society interfaces. The findings will directly inform the revision of the SRIA to ensure it reflects the current priorities and expectations across the European and international water community.

RESULTS OF THE PUBLIC CONSULTATION

Introduction

The primary aim of the public consultation was to gather a broad range of stakeholder perspectives to support the revision of the Strategic Research and Innovation Agenda (SRIA) for the period 2026–2029. Participants were invited to evaluate the relevance of the themes outlined in the current SRIA, considering their significance from environmental, socioeconomic, and political standpoints, as well as the urgency of these themes within a short-term horizon of 1 to 3 years. In this context, *significance* refers to the potential of research and innovation in a given theme to address pressing needs, while *urgency* relates to the timeframe within which action should be taken.

To complement the quantitative assessment, the consultation also included open-ended questions related to the SRIA's overarching objectives, global challenges, and potential barriers to implementation. These qualitative insights aimed to capture more nuanced views and emerging concerns.

The planning and design of the consultation process are described in detail in a previous deliverable, *Structuring the SRIA Public Consultation*, which outlines the rationale, methodology, and framing of the stakeholder engagement approach.

This consultation also offered an opportunity to reflect on findings from an earlier stakeholder survey conducted by the **Water Joint Programming Initiative (Water JPI)**, an EU initiative that played a key role in coordinating water-related research across Europe. The Water JPI consultation, carried out between December 2018 and February 2019, gathered valuable input to inform the revision of its own SRIA. While Water JPI continues to operate in certain contexts, the **Water4All Partnership** now serves as the principal EU-level initiative driving strategic coordination and funding in the water domain. Given the profound global changes since the Water JPI consultation—including the Covid-19 pandemic and geopolitical developments such as the war in Ukraine—this new consultation was seen as timely and necessary to ensure that future research priorities reflect the current and emerging realities facing the water sector.

This report presents the survey results and some analysis on how the results could influence the new SRIA.

Methodology Recap

The public consultation was designed to gather broad input from a diverse range of stakeholders to support the update of the Strategic Research and Innovation Agenda (SRIA) for the Water4All Partnership. The planning and structuring of the consultation process, including the rationale and question framework, are described in detail in a previous deliverable, *Structuring the SRIA Public Consultation*.

The online survey was open between 29 May and 11 September 2024. To ensure wide reach, the consultation was promoted through multiple channels, including Water4All's LinkedIn, X (formerly Twitter) accounts, and the Water4All website. In addition, Water4All partners were encouraged to share the survey within their national and international networks to increase visibility across different stakeholder groups.

The survey was implemented using the Webropol platform and included a mix of closed and open-ended questions, enabling both quantitative and qualitative data collection (Appendix 1). In total, the survey comprised 36 questions, of which:

- 6 were background questions (e.g. stakeholder role, country, affiliation),
- 22 were multiple-choice or ranking questions, and

- 8 were open-ended questions designed to capture detailed insights on challenges, research priorities, barriers, and suggestions for the future direction of the SRIA.

Participants had the option to submit responses anonymously or to leave their contact information for future engagement.

To identify perceived gaps in the Water4All SRIA, selected open-ended questions were included in a broader stakeholder survey. Responses were first screened to exclude null or non-informative entries, and only effective responses were included in the analysis. The qualitative data were then reviewed and thematically synthesized. Recurring themes were grouped into macro-categories using an inductive approach supported by AI-assisted text analysis (ChatGPT) to ensure consistency in classification. The resulting clusters were visualized using graphical tools (e.g. Canva) to enhance interpretation and communication of findings. Frequency distributions were used where applicable to assess the relative importance of identified themes.

Responses to open-ended questions were reviewed in line with the thematic areas of the Water4All SRIA. Key mentions across the responses were quantified and summarised in a table to identify the major challenges under each SRIA theme. ChatGPT was also used as a supporting tool to help interpret overall trends and commonalities, and to pinpoint recurring tendencies in the answers.

Overview of Participation

A total of 162 participants from 31 countries responded to the survey, reflecting a broad and diverse geographic reach. The highest number of responses came from France, Germany, Spain, Sweden, and Turkey, but individual contributions were also received from countries such as Colombia, Cuba, Ethiopia, and India (Figure 1).

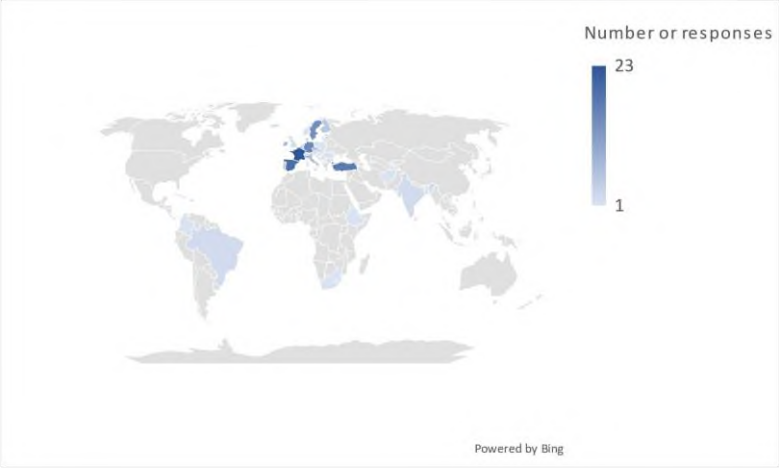

Figure 1: Countries represented in the public consultation

Regarding demographics, 53% of respondents identified as female, 44% as male, and 3% preferred not to specify. While gender may not directly impact the results of the consultation, reporting it supports transparency and may be useful for assessing representativeness and inclusiveness.

More than half of the respondents (54%) participated as individuals, while 46% responded on behalf of an organization. The most common type of affiliation was universities or research organisations (63%). Other affiliations included governmental organisations, non-governmental organisations, water and other enterprises, professional water associations, funding organisations, ministries and private citizens. Other-

category included entities such as a European association, agricultural technical institute, environmental laboratories, and national metrology institutes (Figure 2).

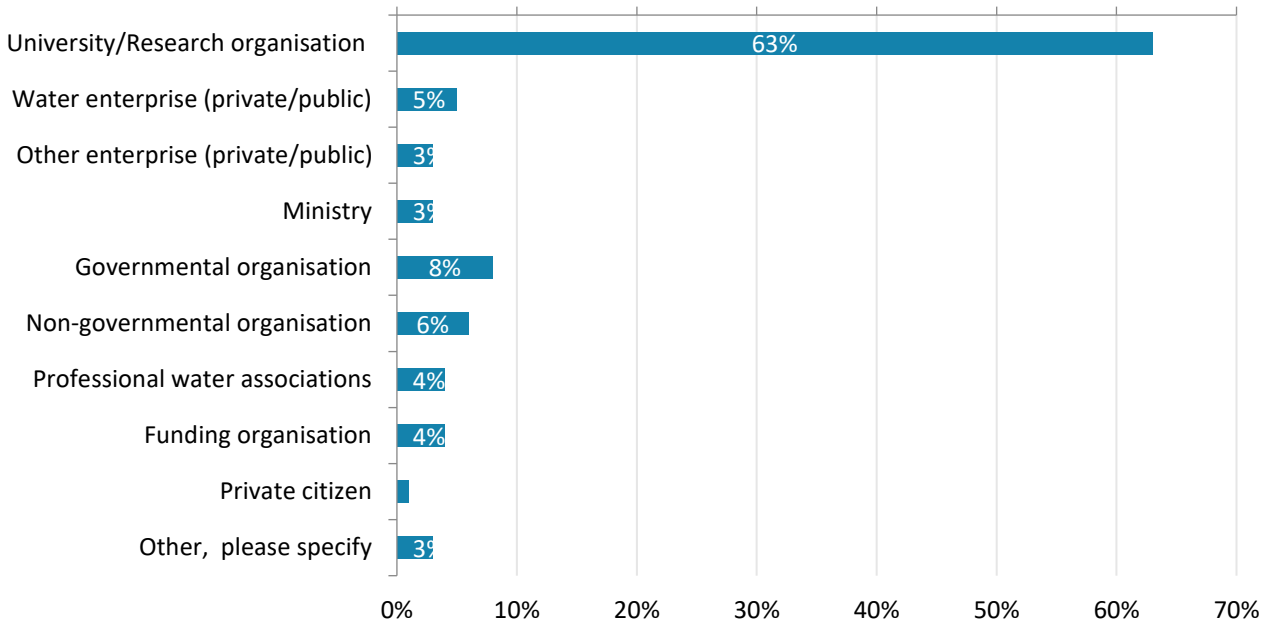

Figure 2: Type of affiliation or organisation of the respondents

A strong majority (83%) of respondents indicated involvement in water-related platforms, networks, or initiatives. When asked to specify (multiple answers allowed), they reported participation in European funded projects or networks, regional initiatives, Water4All partnership, public research authorities or related networks, international initiatives, other European research initiatives or partnerships, European end-user initiatives. Other category included for example EU Mission Boards, UNESCO water programs, Water Europe, river basin committees, national research infrastructures, and UN-related water initiatives (Figure 3).

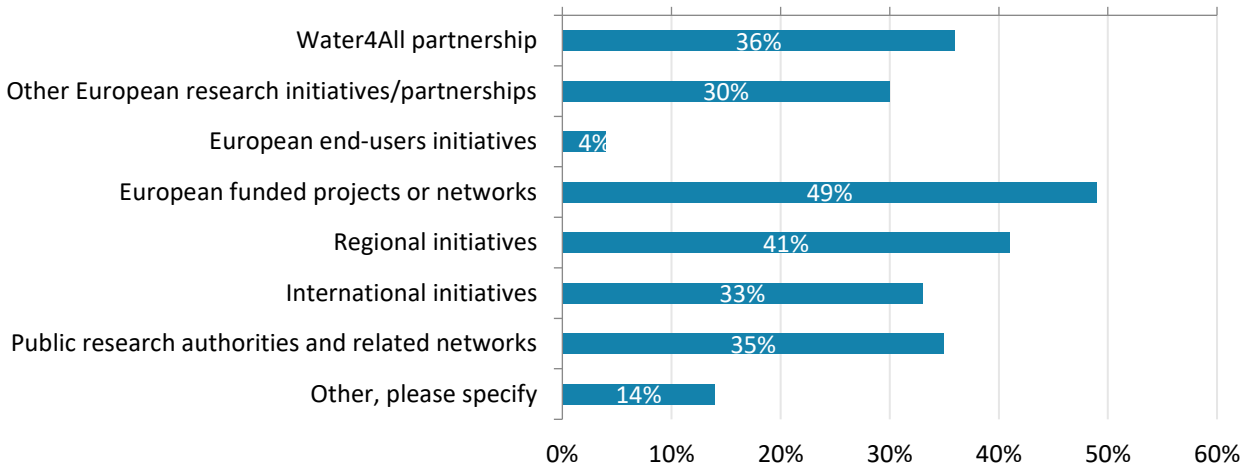

Figure 3: Involvement in water-related platforms, networks or initiatives.

Quantitative Results

Respondents were asked to rank the global water challenges identified in the UN-Water SDG 6 Synthesis Report based on their perceived importance (Figure 4).

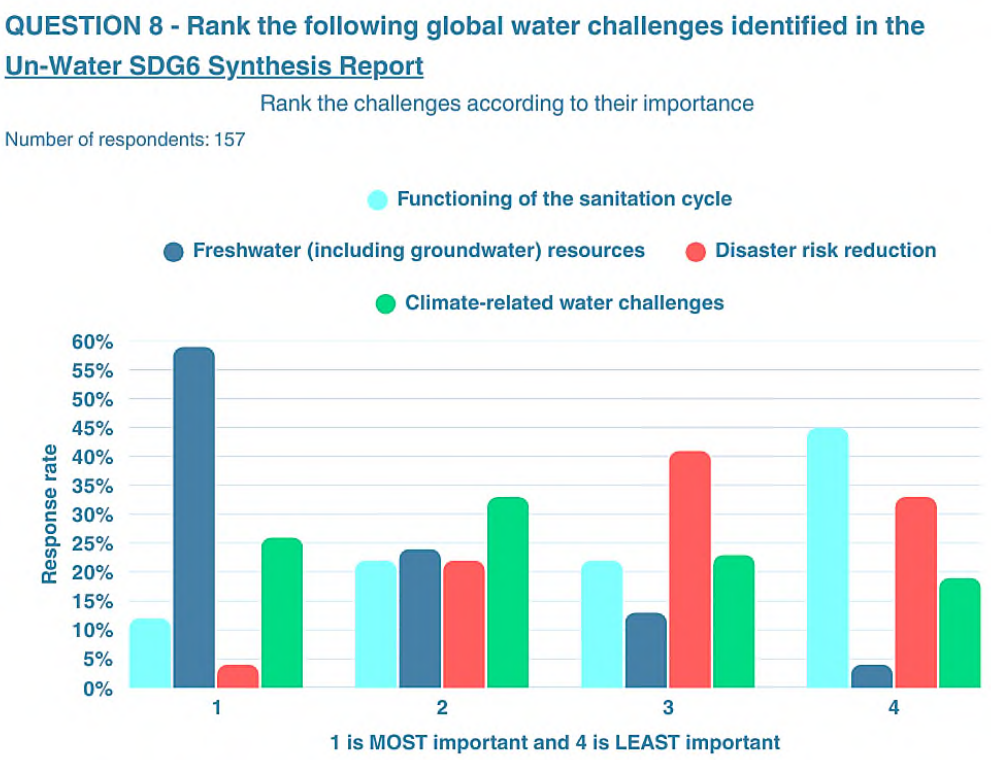

Figure 4 Importance of global water challenges

The challenge considered most important was the management of freshwater resources, including groundwater, in terms of their quality, quantity, development, monitoring, and use. It was ranked as the most important by 59% of respondents and second most important by 24%. Climate-related water challenges were the next priority, selected as the most important by 26% and second most important by 33%. The functioning of the sanitation cycle was viewed as the most important by 11%, and second most important by 22%. Disaster risk reduction was considered the most important by only 4% of respondents, but 22% ranked it as the second most important challenge.

When asked to identify up to five of the most significant barriers to addressing the Global Water Challenges (Figure 5), respondents emphasised issues related to governance, collaboration, and stakeholder engagement.

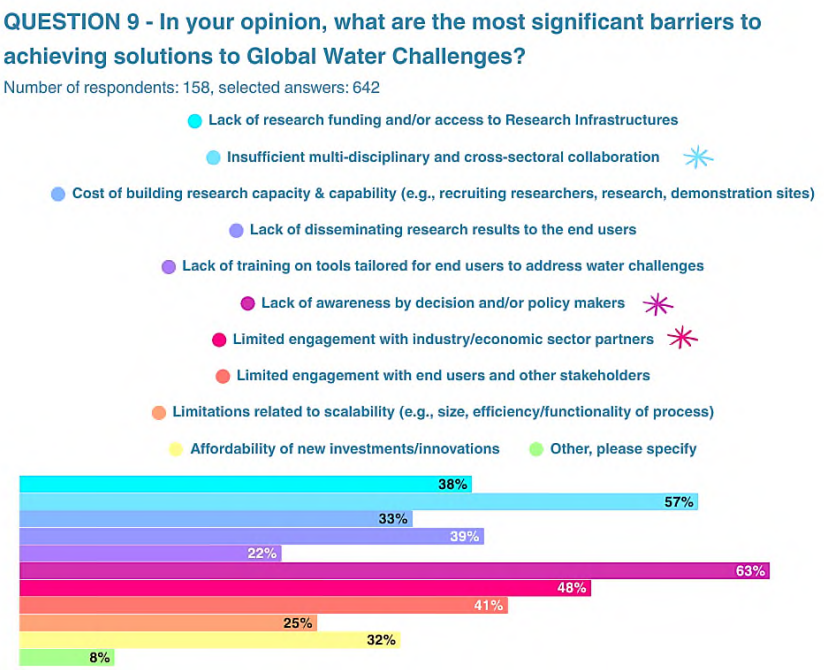

Figure 5 Most significant barriers to achieving solutions to global water challenges

The lack of awareness among decision-makers and policymakers (63%) was the most commonly cited barrier. This was followed by insufficient multidisciplinary and cross-sectoral collaboration (57%), limited engagement with industry and economic sector partners (48%) and limited engagement with end users and other stakeholders (41%).

Responses in the "Other" category (12 in total) are categorized for five themes (Figure 6), covering issues related to 1) political and governance barriers, 2) economic and resource constraints, 3) structural and institutional barriers, 4) awareness and knowledge gaps and 5) short-term thinking. They highlighted broader systemic challenges such as political and institutional inertia, short-term thinking in policy processes, limited awareness of global interdependencies (e.g., through virtual water trade), and structural barriers like restrictive funding mechanisms, legislative gaps, and lack of holistic, multi-stakeholder governance approaches. As one respondent noted, *"[There is] Insufficient awareness of the impact on water that we have via trade. Europe is the largest importer of virtual water, and hence impacts water resources globally in a significant way"*. Another pointed out the challenge of aligning political cycles with long-term water strategies: *"Short-sightedness. Time from action to effect is too long for political decision-making to be effective."*

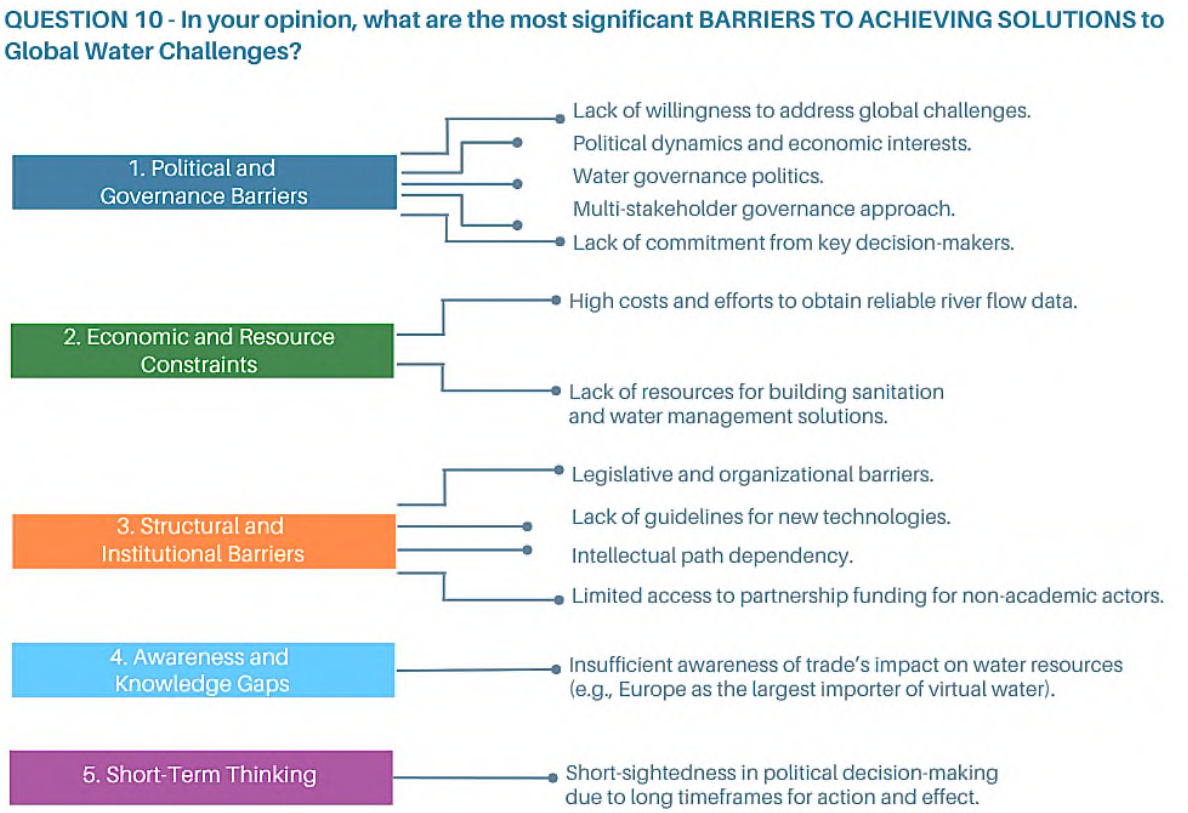

Figure 6 Additional barriers identified by the respondents

Significance and urgency of SRIA themes

The respondents were asked to rate the themes and sub-themes identified in the current Water4All SRIA according to their significance (significance here referred to the extent to which research and innovation in a particular theme could contribute to responding to socioeconomic, environmental or political needs) and urgency. The findings provide a clear picture of where respondents believe attention should be focused to address critical water challenges.

From a significance perspective (Figure 7), the strongest consensus emerged around long-term sustainability and health-related priorities. "Theme 3: Water for the future – sustainable water management" was rated extremely significant by 64.6% of respondents, making it the most highly prioritized theme. Closely following was "Theme 4: Water and health", with 53.1% of respondents considering it extremely significant. Sub-themes such as integrated water resources management (Sub-theme 3.1), the effects of emerging contaminants (Sub-theme 4.1), and resilience to hydroclimatic extremes (Sub-theme 3.4) were among the most frequently cites as extremely significant, with ratings between 44% and 48%. These results highlight a clear emphasis on sustainability, climate resilience, pollution control, and public health.

Other sub-themes, including ecosystem resilience and adaptation (Sub-theme 2.2.) and risk assessment for protecting human health and ecosystems (Sub-theme 4.4.), were also seen as important, though with slightly less intensity – typically drawing around one-third of respondents selecting "extremely significant".

In contrast, areas such as infrastructure security (Sub-theme 5.3) and transboundary cooperation (Sub-theme 6.2) received more moderate ratings in terms of extreme significance but were still considered "very significant" by substantial portions of respondents.

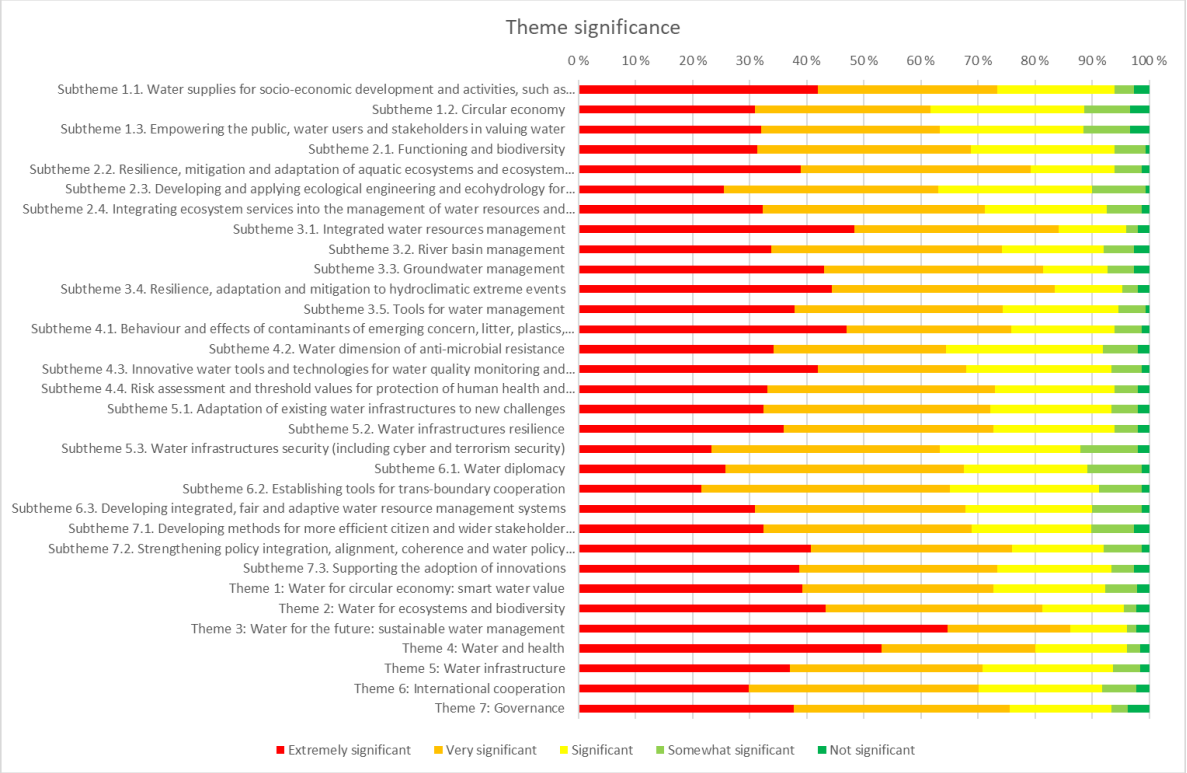

Figure 7 SRIA themes rated based on their significance. *See full titles of themes and sub-themes in Appendix 2.*

When considering the urgency, the pattern largely mirrored the significance findings, reinforcing which themes are seen as both important and requiring immediate action (Figure 8). Again, “Theme 3: Sustainable water management” stood out, with 46.2% of respondents assessing it extremely urgent, followed by “Theme 4: Water and health” at 40.2%. The most urgent sub-themes included resilience to hydroclimatic extremes (Sub-theme 3.4), integrated water resources management (Sub-theme 3.1.), and contaminants of emerging concerns (Sub-theme 4.1.), each drawing over 38% of responses in the “extremely urgent” category. These sub-themes align closely with those rated most significant, indicating a strong perceived need for timely action in these areas.

Ecosystem-related topics also registered high urgency ratings. “Theme 2: Water for ecosystems and biodiversity” was rated extremely urgent by 35.2% of respondents, and its sub-themes – particularly Sub-theme 2.2 on resilience and adaptation – showed similar intensity, suggesting growing awareness of climate impacts on aquatic systems. Governance (Theme 7) and infrastructure adaptation (Sub-theme 5.1.) were also viewed as notably urgent, suggesting that enabling frameworks and physical systems are recognized as vital to supporting future resilience.

In contrast, some sub-themes associated with diplomacy, stakeholder engagement, or transboundary tools (such as Sub-themes 6.1 and 6.2) received lower ratings in the “extremely urgent” category, though many were still viewed as “very urgent” or “urgent” by the majority – indicating that while they may not top the list for immediate action, they are not seen as irrelevant.

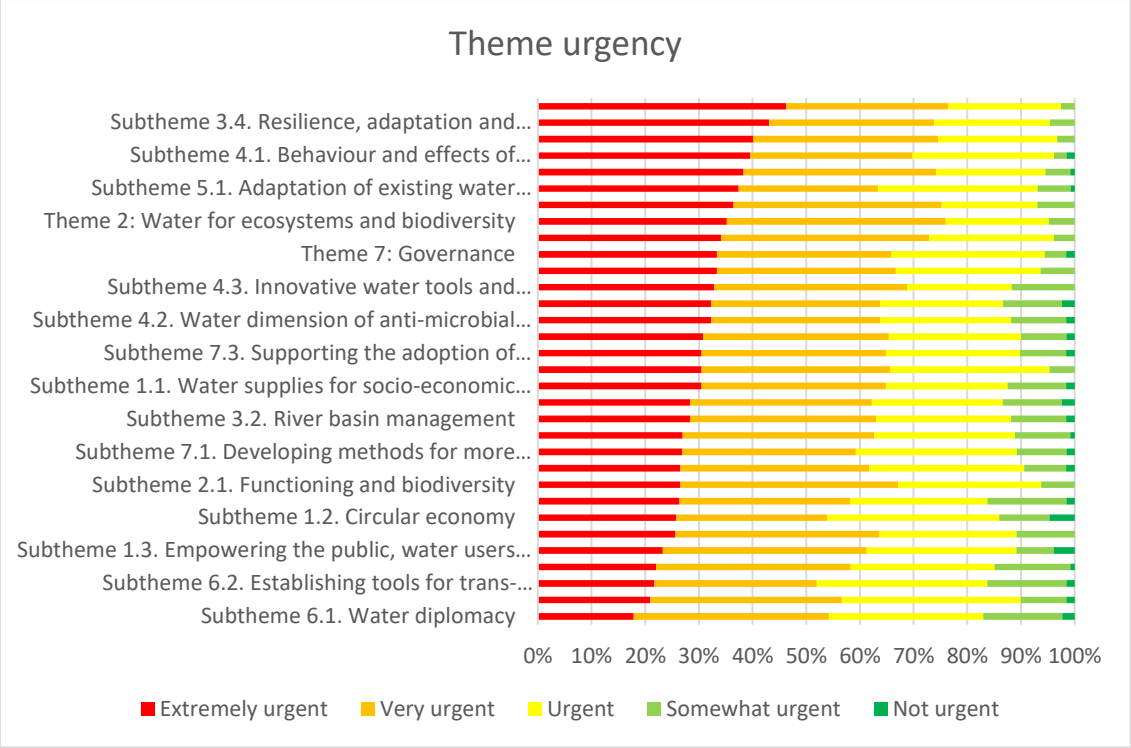

Figure 8 SRIA Themes rated based on their urgency. *See full titles of themes and subthemes in Appendix 2.*

In summary, the data reflect a consistent prioritization of sustainability, health protection, climate resilience and integrated management as both highly significant and highly urgent (Figure 9). These themes dominate the top rankings across both dimensions, suggesting a clear consensus on the most pressing water-related challenges. While topics like governance, international cooperation, and infrastructure security are viewed with more varied intensity, they remain firmly within the scope of relevant and actionable concerns, requiring ongoing attention and support.

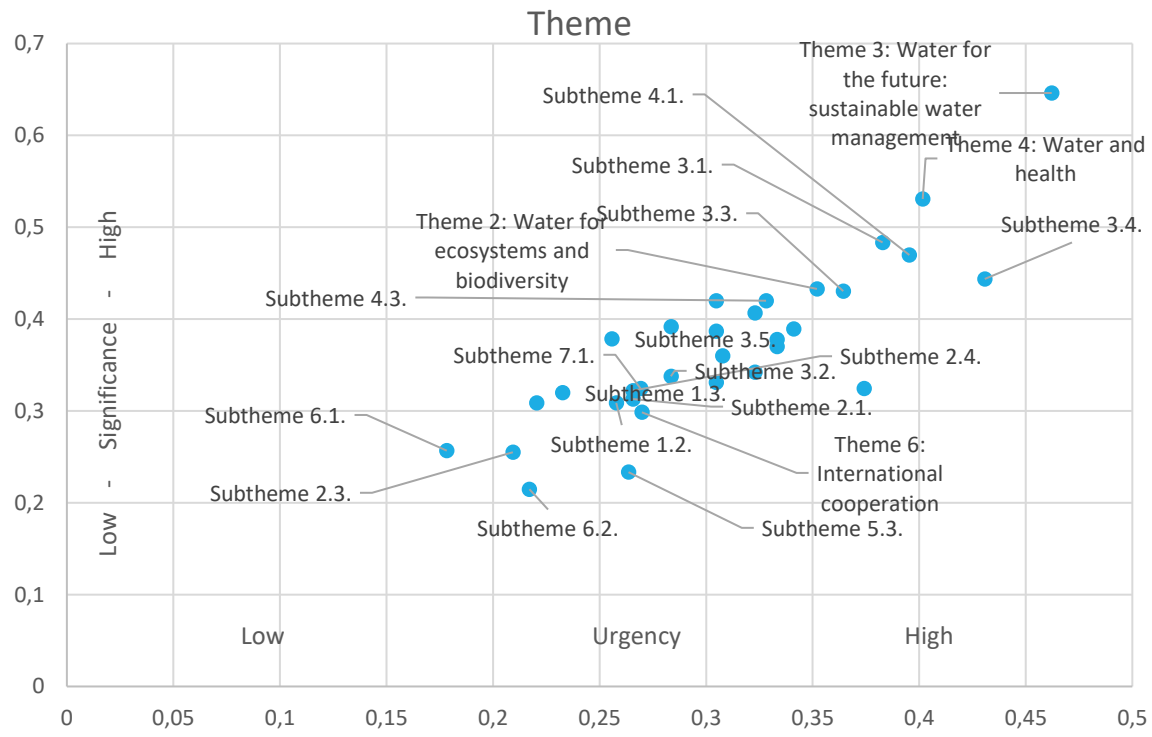

Figure 9 Combination of significance and urgency of the SRIA Themes. See full titles of themes and subthemes in Appendix 2.

The Water4All SRIA has identified the following six drivers (i.e., overarching factors that may lead to shifts in strategic priorities): climate change; human and ecosystem health; migration, urbanization, and population growth; food and energy security; global needs and human-water interactions.

Among these, climate change emerges as the most significant driver (43%), followed by human and ecosystem health (23%). In contrast, aspects related to migration (46%), global needs and human-water interactions (28,5%) are considered less important by the selected stakeholders (Figure 10).

The identification of climate change as the most critical driver by stakeholders highlights its overarching influence on water-related challenges and the urgency of integrating climate adaptation and mitigation strategies into water governance frameworks. The prominence of human and ecosystem health as a secondary priority reinforces the recognition of water's role in sustaining both public health and ecological resilience. In contrast, the relatively lower importance attributed to drivers such as migration, global needs, and human-water interactions suggests a potential underestimation of their long-term systemic implications. This discrepancy points to the need for broader stakeholder engagement and capacity building to ensure a more holistic understanding of socio-environmental dynamics in water resource management.

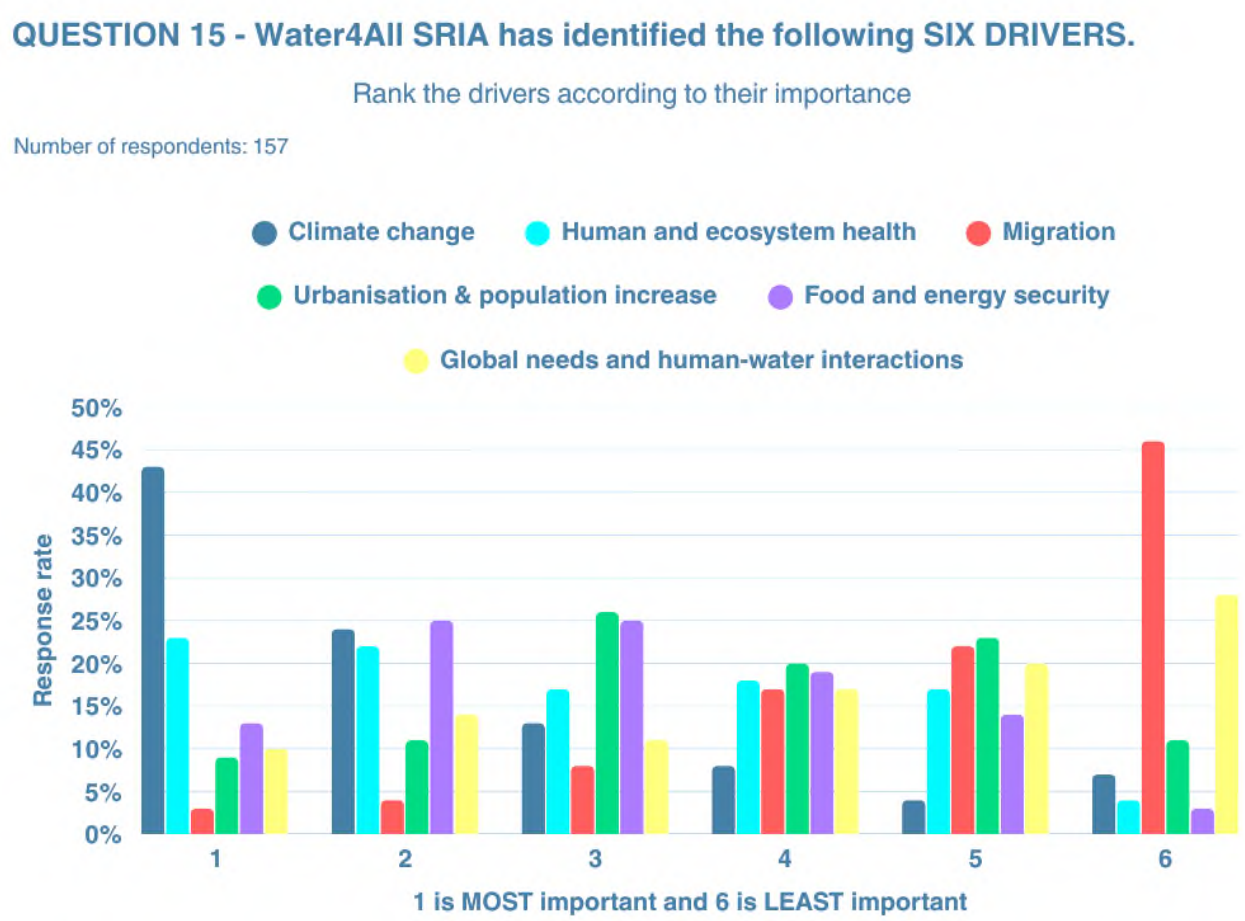

Figure 10 Importance of Water4All SRIA six drivers.

In response to question: **"***In your opinion, are there any missing drivers?*", a total of 53 responses were collected out of 162 distributed questionnaires (among these, 14 responses were null, while 39 were considered effective answers). Some of the respondents provided multiple suggestions within a single response; these were disaggregated and treated as separate entries to capture the full range of insights. As a result, the total number of effective, separated answers used for analysis was 44. To analyse the qualitative data, responses were reviewed, synthesised, and grouped into nine macro-clusters representing thematic categories of missing drivers (Figure 11).

The frequency of responses within each cluster was quantified to calculate the relative importance of each category. Percentages were computed based on the 44 total effective entries. The results are presented visually through a diagram (Figure 12).

While the core drivers identified by the Water4All SRIA capture several fundamental challenges, a more comprehensive analysis reveals additional, underrepresented drivers that merit strategic attention. These *missing drivers* span across environmental, geopolitical, economic, technological, and socio-behavioral dimensions, reflecting the growing complexity and interdependence of water-related challenges in the 21st century.

Geopolitical and conflict-related drivers represent the first missing driver with 30% of responses. Issues such as transboundary water disputes, geopolitical instability, and the strategic manipulation of water resources raise concerns about sovereignty and regional security. Furthermore, the proliferation of disinformation may exacerbate public distrust in water governance, hindering effective policy implementation.

Second, **environmental degradation and biodiversity loss** reach 18%. The degradation of terrestrial and aquatic ecosystems, driven by land-use change, pollution, and overexploitation, fundamentally alters hydrological cycles and reduces ecosystem services vital for water regulation and purification. The collapse of aquatic ecosystems due to biodiversity loss has profound implications for water quality, resilience, and long-term sustainability.

Third, **governance and public policy gaps** (14 %), including inequities in water access, rigid or outdated regulatory frameworks, and insufficient transnational cooperation, highlight the need for more inclusive, adaptive, and equitable governance structures.

Economic drivers (9%), such as the commodification of water, its role in industrial processes, and vulnerabilities in global supply chains linked to water scarcity, also demand closer scrutiny. The transition toward sustainable consumption and production systems, although underway, remains uneven and constrained by policy and market barriers. In the realm of **technology and innovation** (9%), the dual need for both green and digital transitions—coupled with persistent infrastructure deficits and research gaps—calls for sustained investment in interdisciplinary science and scalable technological solutions. Moreover, **social impacts and behavioral factors** (7%), including public perceptions of water, evolving consumption habits, and demographic changes, are often underestimated despite their crucial role in shaping demand patterns and influencing policy acceptance. **Health and food security** (5%) also remain insufficiently addressed. Emerging pathogens in aquatic environments, waterborne diseases, and the water-dependence of food systems pose significant threats, especially in the context of climate change and population pressures. The **climate change** and environmental impact (5%) while recognised as a central driver, interrelates with nearly all others, magnifying their effects and introducing high levels of uncertainty. This reinforces the importance of viewing climate not in isolation but as an intensifier of systemic risk.

Finally, the **interconnected and overlapping nature of these drivers** presents a methodological challenge: many are co-dependent or mutually reinforcing, complicating the prioritisation process. This underscores the need for integrated frameworks that account for cross-sectoral linkages and uncertainty.

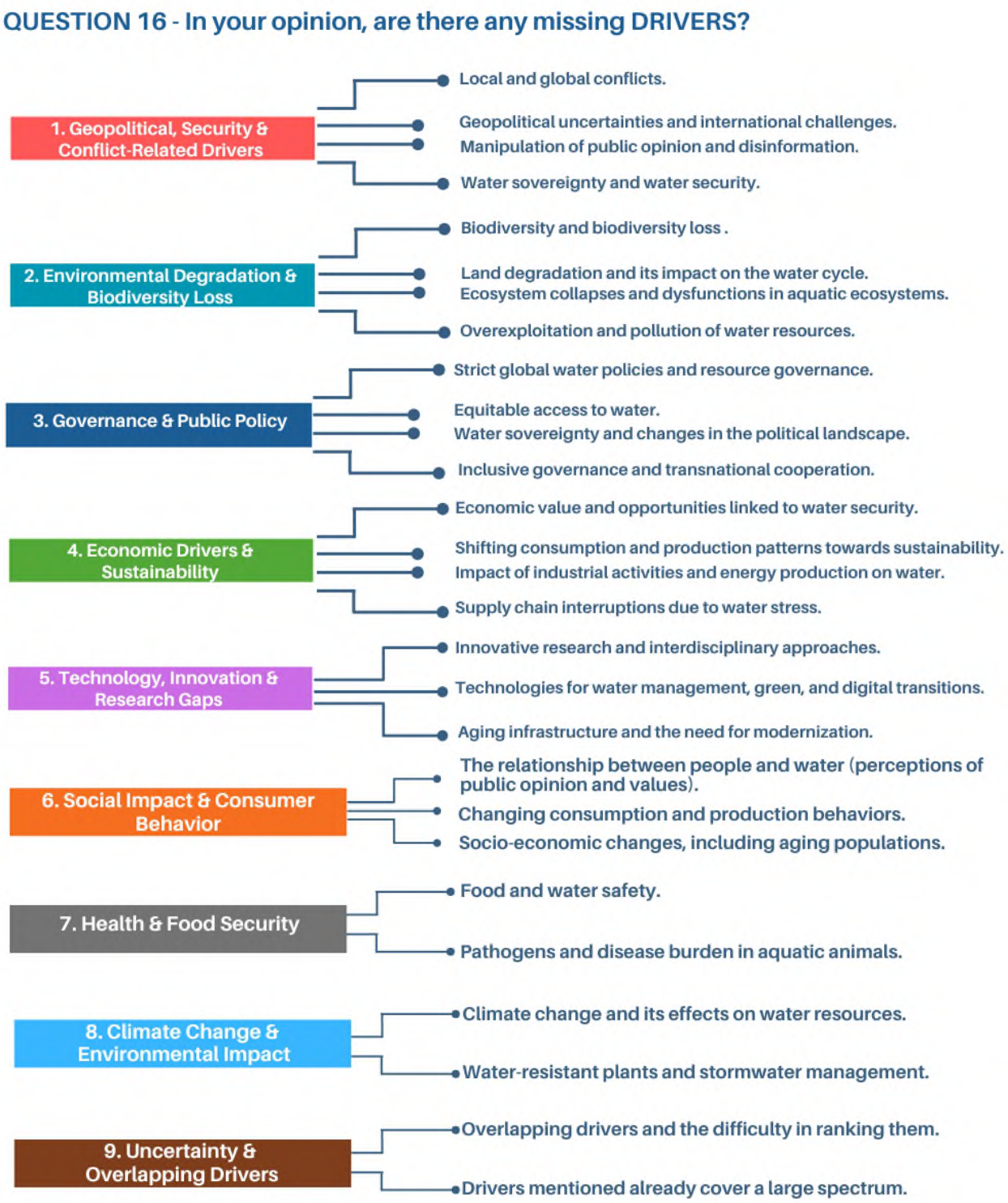

Figure 11. Thematic clustering of perceived missing Drivers.

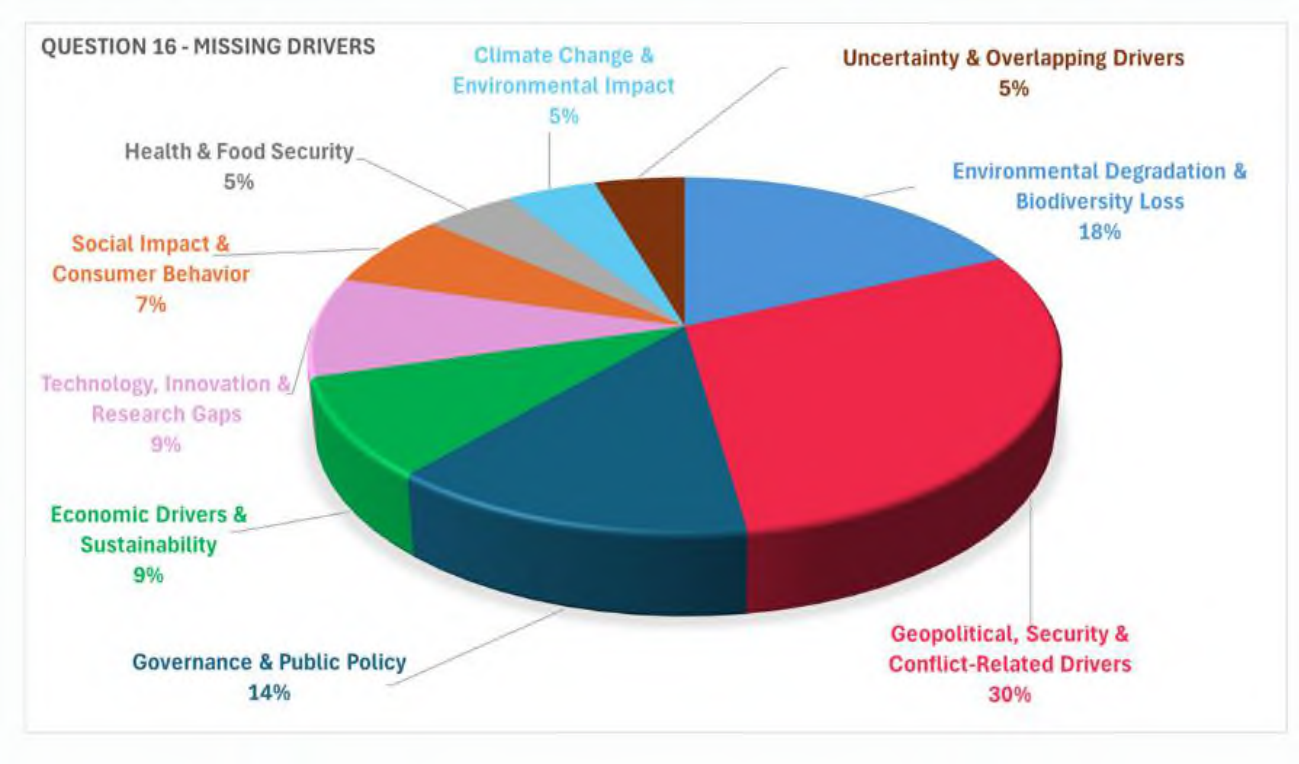

Figure 12. Distribution of responses across nine macro-clusters of missing drivers.

In addition to identifying key drivers, Water4All SRIA highlights five enabling factors that support the implementation of activities and the achievement of long-term objectives: the digital revolution (big data, AI, IoT, Digital Twins); existing research infrastructure & technologies; open science and responsible research and innovation; changes in people's vision towards natural resources; technologies and new (regulatory and economic) frameworks. Among these, the most significant enabler, identified by 42% of respondents (Figure 13) is the shift in public perception and societal values toward natural resources. This reflects a growing recognition that behavioural and cultural change is essential to achieving sustainable water management. In contrast, the digital revolution was considered less critical, selected by 30% of respondents. The least frequently identified enablers, each mentioned by 21% of respondents, were open science and responsible research and innovation, as well as technologies and new frameworks. These results suggest that while technological and institutional innovations are necessary, they may be perceived as insufficient in the absence of broader societal engagement and attitudinal change.

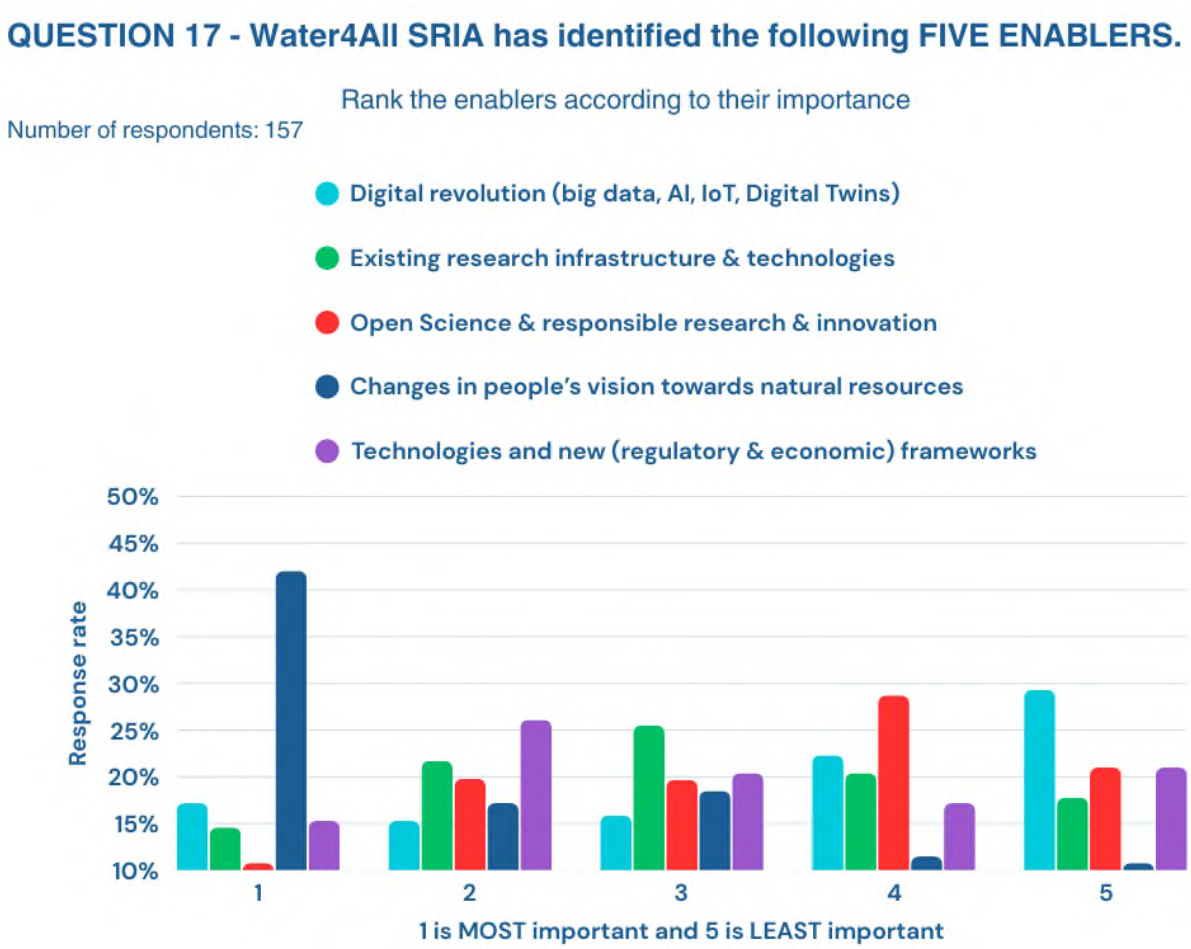

Figure 13 Importance of Water4All SRIA five enablers.

To assess stakeholder perspectives on potentially missing enabling factors within the Water4All framework, a targeted open-ended question was included in the survey. Out of 162 distributed questionnaires, a total of 31 responses were received for this question. Of these, 10 were null responses, resulting in 21 effective responses used for qualitative analysis. The missing enabling factors were identified and subsequently analysed and categorised into five overarching thematic groups (Figure 14). These categories were understood to represent broader structural and contextual conditions deemed essential for advancing the Water4All objectives. The responses suggested the need for greater political will, stronger legal frameworks, and more effective governance structures; increased public investment, economic incentives, and cross-sector partnerships; the availability of skilled professionals and enhanced interdisciplinary collaboration; support for technological development through test beds, demonstration projects, and climate-resilient innovations; and, finally, a heightened sense of urgency driven by environmental crises. Collectively, these themes pointed to the importance of establishing a more integrated enabling environment, one that brings together institutional, economic, human, and environmental dimensions to effectively support the Water4All agenda.

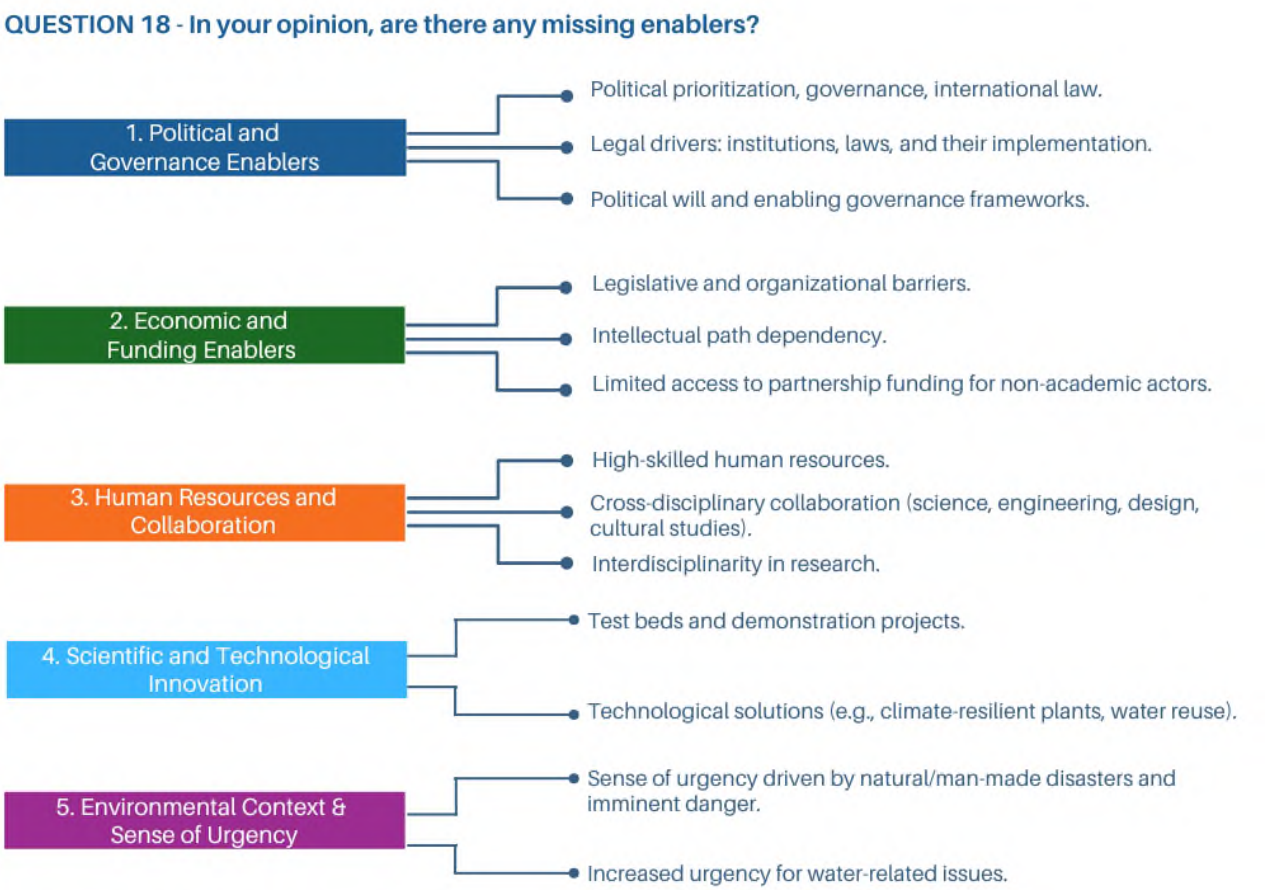

Figure 14 Thematic clustering of perceived missing enabling factors.

Qualitative Insights

Key water challenges that should be addressed by 2035

The first open-ended question of the public consultation was: "*In your opinion, what are the key water challenges that should be addressed by Water4All in the next 10 years (i.e. by 2035)? You may consider both environmental and/or socio-economic challenges.*".

This open-ended question gathered insights from about 150 respondents on priority water challenges to address by 2035. **Three overarching challenges emerged: water quantity and scarcity, water quality degradation, and the multifaceted impacts of climate change, including droughts & floods** (Table 1). To achieve water security by 2035, respondents advocated for a holistic approach balancing technological innovation, resilient infrastructure investment, robust governance, and cross-sector collaboration. Addressing these interconnected challenges—spanning environmental, socio-economic, and political dimensions—will require urgent action to align EU policies, foster public awareness, and prioritise equity in water access.

"Values should be included in the decision-making process with the same dignity as economic and engineering aspects. This challenge requires the involvement of SSH at a deep level and not just as facewashing."

"Science-policy interface remains to be improved as most of the technological solutions cannot be rapidly uptaken due to insufficient support of the policies, inadequate subsidies, etc. Stakeholder engagement/living labs could play an important role in closing the gap between science and policy."

"What we do know is that over 85% of our total water footprint takes place outside of Europe's borders. We need to be more aware of this risk and address it. We hence advocate that Water4All should make Europe's external water dependence a top priority to address - as the risk it poses is of systemic nature."

Declining water quantity and water quality are among the most pressing challenges anticipated in the next decade. Respondents stressed that the demand for water across various sectors - agriculture, domestic use, and industry - is intensifying, exacerbated by inefficient resource management. Over-extraction of groundwater is a recurring concern, leading to depletion and deteriorating water quality. To address these issues, respondents highlighted the importance of raising awareness and engaging communities in water use efficiency. Educational and communication strategies can play a key role in equipping individuals and organisations with the knowledge and tools needed to promote more sustainable water management practices.

Pollution from industrial discharges and agricultural runoff exacerbates quality concerns due to contamination risks. Respondents mentioned emerging pollutants, including microplastics, antimicrobial resistance (AMR), per- and polyfluoroalkyl substances (PFAs), along with eutrophication, as factors further degrading water quality. These contaminants pose significant health risks, threaten aquatic ecosystems and lead to biodiversity loss. Therefore, respondents highlight the need to integrate Nature-Based Solutions (NBS) in water management. Improved monitoring and data collection were also emphasised, particularly in light of the revision of key EU directives. Additionally, smart water technologies and digital monitoring systems need to be integrated to enhance real-time water management and efficiency. Furthermore, respondents stressed the importance of improved wastewater treatment, resource recovery, and reduced water footprints in agriculture and industry to promote circular economy principles.

Climate change remains a key concern, intensifying water-related challenges such as droughts and floods. These disruptions stress aging infrastructure, particularly irrigation systems and freshwater supplies for food production. Rising sea levels further threaten water availability through saltwater intrusion. Additionally, climate change affects contamination levels, productivity, and sedimentation processes, requiring adaptive strategies to mitigate these impacts. Therefore, smart water technologies, improved asset management, and resilient infrastructure are essential for ensuring reliable supply and efficient distribution in the face of future uncertainties. A respondent also pointed out water accessibility in the least-developed regions of Africa and the importance of knowledge exchange on this issue.

Respondents underlined that sustainable water management requires a holistic approach that addresses social, economic, and political challenges, ensuring equitable access and fostering awareness about conservation. However, weak enforcement, lack of policy integration, and governance inefficiencies remain major obstacles. To overcome these challenges, respondents call for stronger water governance frameworks, improved stakeholder engagement, and participatory decision-making. Addressing regulatory gaps is also essential to enhance transparency and efficiency in water management. Additionally, WOLLs are proposed to facilitate the co-creation and testing of water solutions—both technical and policy-related—in real-life settings, accelerating the transition to a Water-Smart Society. A few respondents also emphasised the importance of strengthening transboundary cooperation among countries. Information gathered from the open-ended responses is summarised in Figure 15.

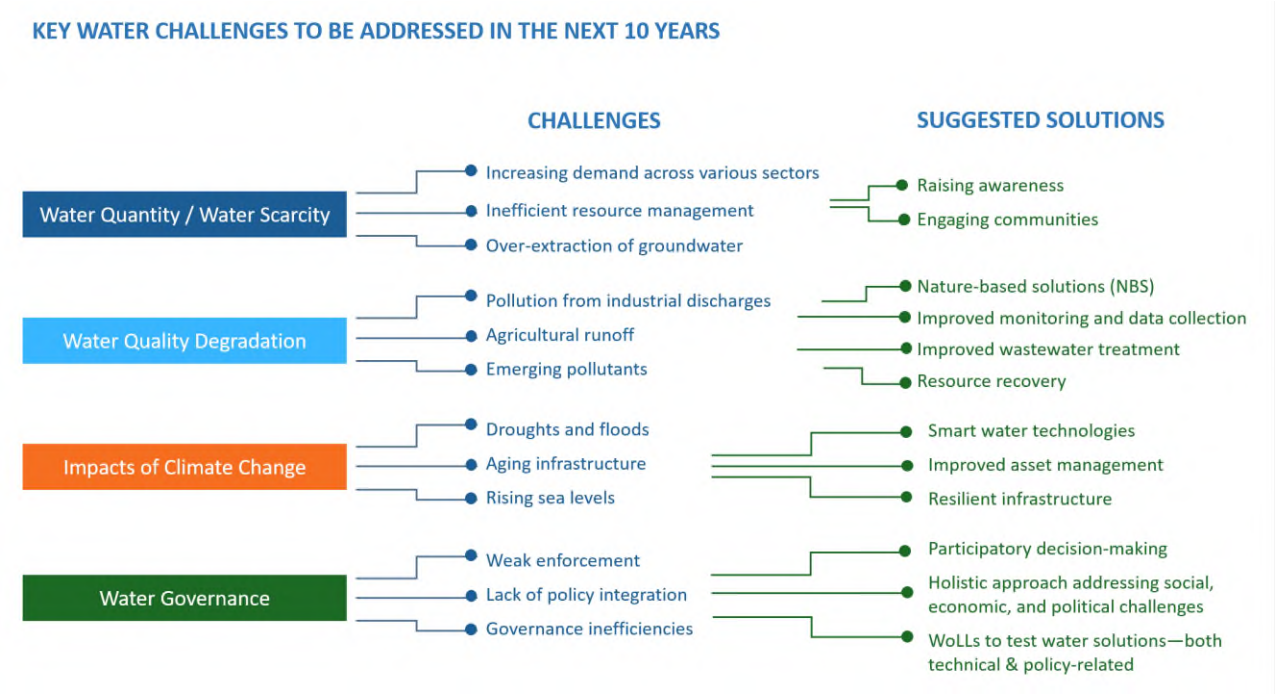

Figure 15 Schematic summary of key water challenges to be addressed in the next 10 years, as identified from open-ended survey responses. Challenges are categorised into water quantity and scarcity, water quality degradation, impacts of climate change, water governance along with proposed solutions.

The identified challenges are summarised in Table 1. The last column of the table presents the key terms predominantly mentioned, along with their frequency.

Table 1 Key water challenges identified by survey respondents

Water4All Theme	**Key Challenges Identified in Survey Responses**	**Key Terms** *(number of mentions in brackets)*
I. Water for Circular Economy	- Encouraging water reuse, resource/material recovery from wastewater to promote circular economy - Studying risks of water reuse in agriculture - Reducing water footprint, improving water use efficiency in industries and especially in agriculture	Climate change (50) Floods (31) Water scarcity (29) Agriculture (27) Droughts (24) Water use efficiency (22) Wastewater treatment /management (20) Extreme events/weather (18) Irrigation (14) Resilience (13) Adaptation (13) Water reuse (10) Resource recovery (6) Nutrient recovery/recycling (5) Circular economy (4) Circularity (3) Nature-based Solutions (3)
II. Water for Ecosystems & Biodiversity	- Nature-Based Solutions (NBS) for water treatment, rural and urban planning, flood and	Ecosystem (19) Nature/NBS (15)

Water4All Theme	**Key Challenges Identified in Survey Responses**	**Key Terms** *(number of mentions in brackets)*
	drought control options plus studying cost efficiency - Nature Restoration Law: tackling restoration planning at larger spatial scales (meta-ecosystem perspective)	Biodiversity (15) Sea level rise (5) Habitat (2)
III. Water for the Future: Sustainable Management	- Managing water scarcity and increasing climate resilience - Need for integrated water resources management (IWRM) - Stress on groundwater resources due to pollution and over-abstraction - Modernization of water supply networks, wastewater treatment, and digital monitoring systems (quality & quantity) - Establishing hydrological monitoring networks to support model development (conceptual/numerical)	Pollution (41) Water quality (40) Sustainable (35) Water scarcity (32) Water use efficiency (22) Groundwater (20) Monitoring (15) Pollutant (13) Innovation (12) Water quantity (10) IWRM/integrated approach/management (10) Digitalization (9) Water security (8) Holistic approach (8) Eutrophication (3)
IV. Water and Health	- Concerns about waterborne diseases and contamination risks - Addressing emerging contaminants (e.g. pharmaceuticals & microplastics) - Risks of antimicrobial resistance (AMR) in water sources	Emerging contaminants (7) Microplastics (5) PFAs (5) Micropollutant (4) Pesticides (4) One health (2) AMR (1) Pharmaceutical (1)
V. Infrastructures for Water	- Improved asset management and investment in resilient water infrastructure against climate extremes (e.g., floods & droughts) - Implementing smart water technologies for monitoring and efficiency	Water infrastructure (16) Monitoring (15) Resilience (13) Digitalization (9)
VI. International Cooperation	- Importance of transboundary water management for shared rivers - Strengthening international partnerships on water governance - Need for global cooperation in tackling water crises	Transboundary (9) International cooperation (3)
VII. Governance	- Addressing policy gaps, and weak enforcement - Improving stakeholder engagement and participatory governance - Stronger links between science and policy - Raising awareness and educating the public about water conservation and management - Cross-sectoral coordination for integrated governance	Raising awareness (12) Water governance (10) Policy (10) Stakeholder engagement (5) Education/Training (5) Science-policy interface (5) Living labs (2) Inclusive governance (2) Public participation (1)

Concrete solutions needed to enable water security for all in the long term

The second open-ended question of the public consultation was: "*In your opinion, what concrete solutions are needed to achieve the Water4All aim, enabling water security for all in the long term?*". This open-ended question gathered insights from 125 respondents on concrete solutions needed to achieve the Water4All aim, enabling water security for all in the long term. UN-Water defines water security (2013) as "the capacity of a population to safeguard sustainable access to adequate quantities of acceptable quality water for sustaining livelihoods, human well-being, and socio-economic development, for ensuring protection against water-borne pollution and water-related disasters, and for preserving ecosystems in a climate of peace and political stability". According to the responses provided in the survey, several concrete solutions and actions were identified to achieve Water4All's long-term goal of ensuring water security for all. These responses highlight **innovative strategies**, **cooperative governance**, and **technological advancements** that are essential to tackling water challenges on multiple fronts.

"Ensuring public focus will ensure political focus."

"Enabling water security for all in the long term requires a multifaceted approach, involving a combination of technological innovation"

"There is an increasing awareness of water scarcity, but not enough political will"

One of the most frequently mentioned solutions is the need to strengthen governance frameworks and establish clear, effective policies for water management. This includes better integration of water management into national and international policies, ensuring equitable distribution, and resolving conflicts over shared water resources. Strengthening regulations, introducing incentives for water efficiency, and creating legal frameworks that promote sustainable water use were emphasised by many. Additionally, a more inclusive governance approach that involves a wide range of stakeholders—government, industry, operators and local communities—along with enhanced data sharing, is seen as key to fostering successful, long-term water management practices. Transparency of decision-making processes and the inclusion of marginalised groups also stood out as critical components to ensure fair water access and management.

Moreover, transboundary water agreements and cooperation are highlighted as crucial for conflict prevention and shared responsibility in managing water resources. A key point raised is that water managers and end-users must collaborate to tackle climate-related challenges and other pressures in transboundary basins. Lastly, water pollution control, particularly in transboundary waters, is recognised as a critical issue requiring joint action.

The second main solution centers on technological innovations and infrastructure investments. Respondents stressed the importance of advanced water treatment technologies, such as desalination, wastewater recycling, and smart irrigation. Investment in decentralised treatment systems and water-reuse systems was also commonly mentioned, allowing for more efficient and localised water management. Many also suggested modernizing water infrastructure to improve efficiency, reduce waste, and enhance climate resilience in water systems. Technologies that promote water-saving practices, detection of leaks, and automated systems to manage water resources were also highlighted. WOLLs were seen as important platforms for developing, testing, and implementing these technologies in real-world environments, especially in areas most vulnerable to climate change and water scarcity.

Respondents also highlighted that achieving long-term water security requires a holistic approach that addresses both water quality and quantity through sustainable use of water reserves. Enhancing monitoring

systems with advanced sensors and real-time data analytics will improve responsiveness to water challenges, ensuring efficient management. Stronger enforcement of water protection laws and the polluter-pays principle are essential for reducing contamination from pollutants. Additionally, restoring natural ecosystems such as wetlands and watersheds can help regulate water flow, improve water quality, and enhance groundwater recharge. Aligning water usage quotas and fostering stakeholder collaboration will ensure equitable water distribution, balancing availability, affordability, and long-term conservation.

The third overarching solution involves raising public awareness and fostering behavioral change towards water use. A strong theme across the responses was the need to increase education at various levels to promote water conservation, responsible use, and the understanding of sustainable practices. Respondents suggested the development of community-led initiatives, sensitization campaigns, and training programs to build awareness and engage both urban and rural populations in water management. Behavioral change is seen as essential to reducing water consumption, avoiding pollution, and improving public health. The increasing demand for sustainable solutions and the transfer of scientific knowledge to decision-makers were also noted as critical to ensuring that long-term water security remains a priority on both local and international agendas.

These three overarching solutions—governance and policy, technology and infrastructure, and public education and engagement—are essential for achieving the Water4All aim, enabling long-term water security for all. Addressing these solutions holistically, with a comprehensive view of the entire water cycle and its interconnectedness with ecosystems, will promote sustainable, equitable, and efficient water management. This approach will also help societies better prepare for future challenges related to water availability and climate change. Information gathered from the open-end responses is summarised in Figure 16.

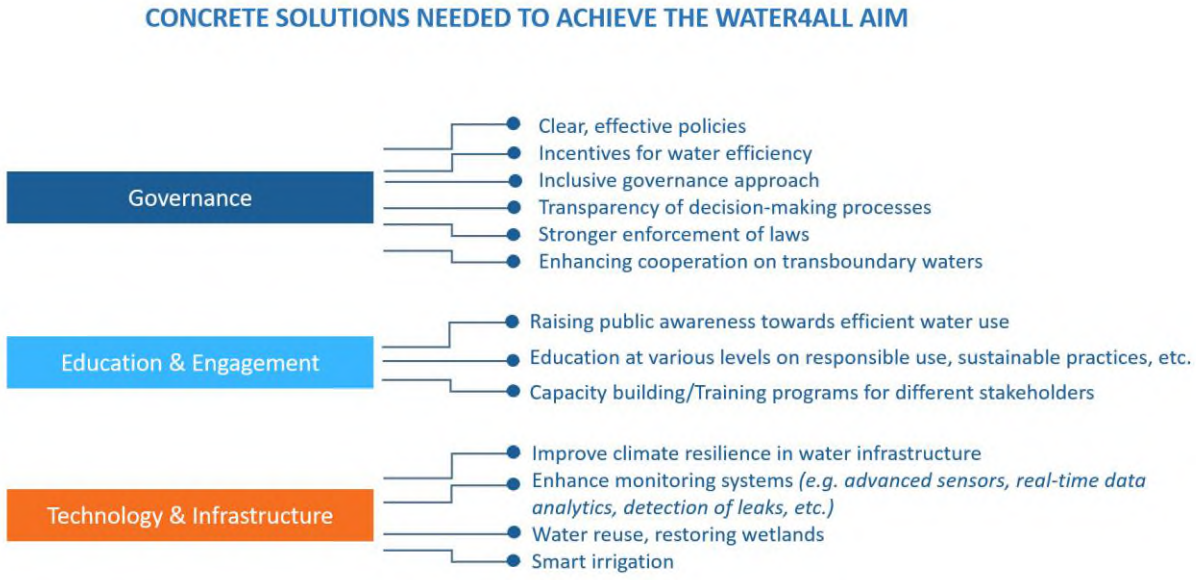

Figure 16 Schematic summary of concrete solutions needed to achieve the Water4All aim, as identified from open-ended survey responses. Solutions are categorised into governance, education & engagement and technology & infrastructure.

The identified solutions are summarised in Table 2. The last column of the table presents the key terms predominantly mentioned, along with their frequency.

Table 2 Concrete solutions identified by survey respondents

Water4All Theme	**Concrete Solutions Identified in Survey Responses**	**Key Terms** *(number of mentions in brackets)*
I. Water for Circular Economy	- Promote water recycle and reuse in all sectors - Take into account water footprint, especially when importing (virtual water trade) - Focus on decentralised water treatment systems, greywater recycling, and using non-potable water for non-drinking purposes like toilet flushing	Climate change (13) Agriculture (11) Droughts (10) Floods (9) Nature-based Solutions (9) Irrigation (8) Wastewater treatment/ reclamation/management/reuse/ recycling (7) Consumption (7) Desalination (6) Resilience (6) Funding (6) Economy (5) Incentives/Subsidies (5) Water scarcity (3) Adaptation (3) Water reuse (3) Circular economy (2) Water use efficiency (1) Water footprint (1)
II. Water for Ecosystems & Biodiversity	- Restoration of Natural Water Systems: Protection and restoration of wetlands**,** watersheds, and river ecosystems. - Using NBS to improve water quality and protect biodiversity **-** Green Infrastructure: Promoting biodiversity and ecosystem health.	Ecosystem (15) Environment/environmental (8) Wetlands (6) Watersheds (2) Biodiversity (2) Restoration (2) Biodiversity (2) Green infrastructure (2) Habitat (1)
III. Water for the Future: Sustainable Management	**-** Integrated Water Resources Management (IWRM): Central to many responses, promoting a holistic approach to managing water resources while balancing competing demands from agriculture, industry, and domestic use - Water-Energy-Food-Ecosystem (WEFE) Nexus: Enhance more resilient and sustainable strategies to ensure long-term water security - Climate Adaptation and Resilience: Implementing climate-resilient water systems and smart technologies for water management (e.g., smart irrigation, real-time data monitoring) - Sustainable Water Use Practices: Encouraging water-efficient practices in all sectors, especially in agriculture (e.g., promoting less-water demanding crops) and educating public on water conservation	IWRM/management (32) Sustainable/sustainability (19) Water security (12) Water quality (10) Monitoring (7) Groundwater/Aquifers (7) Innovation (6) Water quantity (5) Water scarcity (3) Crops (3) Water-Energy-Food-Ecosystem (WEFE) Nexus (2) Water use efficiency (1) Digitalization (1)

Water4All Theme	**Concrete Solutions Identified in Survey Responses**	**Key Terms** *(number of mentions in brackets)*
IV. Water and Health	- Safe Drinking Water and Sanitation: Ensuring universal access to safe drinking water and sanitation infrastructure and strengthening public health through proper water treatment systems and sanitation services - Wastewater Treatment and Pollution Control: Improved wastewater treatment and pollution control to protect water sources	Pollution (10) Pollutant (4) Clean water (4) Drinking water (3) Sanitation (3) Water-saving technologies (2) Emerging contaminants (1) PFAs (1) Decontamination (1)
V. Infrastructures for Water	- Investment in Resilient Infrastructure: Modernizing water supply systems, distribution networks and storages for flood vs drought management and mitigation - Decentralised Water Technologies: The need for small-scale, cost-effective, and localised solutions - Enhanced Monitoring Systems for both surface & groundwater quality and quantity (smart water technologies, real-time monitoring)	Water infrastructure (8) Data/Data sharing/Data analysis (8) Monitoring (7) Decentralised (7) Resilience (6) Digital/digitalization (6) Surface water (6) Technology (5) Groundwater (5) Storage (4) Integrated Urban Water Management (1) Greywater (1)
VI. International Cooperation	- Global Agreements and Collaborative Platforms: Strengthening international policies and agreements for equitable water distribution and promoting multi-stakeholder cooperation in water management and governance - Transboundary Cooperation: Promoting cooperation between countries on water management	Collaboration (9) Network (5) Transboundary (4) Basin (4) Agreements (3) International cooperation (1)
VII. Governance	- Enhancing transparency, accountability, and participation in water governance, ensuring equitable access and fair management. - Capacity Building: Raising awareness and educating stakeholders (government bodies, industries, local communities) on sustainable water management practices (water quality, consumption, reuse)	Public (15) Awareness (14) Education/Training/Capacity-building (13) Regulations/Legislation (10) Policy (8) Water governance (7) Scientific research/knowledge/community (6) Decision makers (5) Policy makers (4) Water-Oriented Living Labs (WOLLs) (2) Multidisciplinary (2) Scientific knowledge (2) Stakeholder participation (1) Science-policy interface (1) Science-society interface (1)

How to enhance the uptake of scientific knowledge into practice?

The third open-ended question of the public consultation was: "*The current SRIA states the following: "The Partnership emphasises the Innovation part and the implementation of solutions, as many have already been developed by scientists, but their uptake by policy makers, end-users and the society is often too limited or too slow to deliver on water challenges at a sufficient pace.". In your opinion, what is needed to enhance the uptake of scientific knowledge into practice?*".

This open-ended question gathered insights from 141 respondents on the concrete actions required to enhance the uptake of scientific knowledge into practice, particularly in addressing water-related challenges. Scientific advancements in water management are abundant; however, their integration into policy, decision-making, and practical applications remains slow or limited. This gap between research and implementation hampers progress in ensuring water security, sustainable resource use, and climate resilience.

According to the survey responses, several key strategies were identified to improve the translation of scientific knowledge into actionable solutions. These responses emphasize **collaborative governance, policy integration, technological advancements, and stakeholder engagement** as essential components in accelerating the adoption of science-driven solutions (Figure 17).

Strengthening Governance and Policy Integration

One of the most frequently mentioned solutions is the need to enhance governance frameworks and establish clear policies that encourage the practical application of scientific research. Many respondents emphasised that:

- Scientific findings should be better integrated into national and international water policies to ensure decision-making is based on evidence rather than political or economic influences.
- Develop strong monitoring and evaluation systems to measure the effectiveness of implemented solutions, enabling continuous adjustments and enhancements based on real-world outcomes.
- Establish "feedback loops" that enable policymakers and practitioners to share insights on the effectiveness of scientific solutions, ensuring a continuous process of refinement and improvement.
- Legal and regulatory frameworks should mandate the use of scientific insights in developing water management strategies, including environmental protection measures, climate adaptation plans, and resource allocation models. To achieve this, "flexible and dynamic policy development processes" must be established, ensuring that scientific findings are swiftly and effectively integrated into decision-making.
- The inclusion of social sciences and humanities in this process is equally essential for a more comprehensive and effective approach.
- Incentives and funding mechanisms should be introduced to encourage industries, municipalities, water utilities and agricultural sectors to adopt research-based innovations, and adapt to evolving industry dynamics.

Enhancing Stakeholder Engagement and Knowledge Exchange

A significant number of respondents highlighted the importance of co-creation and multi-stakeholder collaboration in bridging the gap between science and practice. Key suggestions include:

- Establishing multi-stakeholder platforms where researchers, policymakers, and end-users (e.g., local communities, farmers, utilities, industries) collaborate on the co-design and implementation of scientific solutions.

- Cross-Sectoral Integration: Strengthen cooperation between governments, scientific institutions, private enterprises, and civil society to systematically apply scientific advancements in policy and practice.
- Encouraging scientists to engage with policymakers from the early phases of research to ensure the practical applicability of their findings. Many respondents emphasised that scientific knowledge should not be confined to academic circles but should be actively disseminated through interactive platforms, policy briefs, and stakeholder workshops.
- Engaging knowledge brokers or intermediaries to bridge the gap between science and practice by interpreting, translating, and disseminating research findings to relevant stakeholders.
- Promoting better communication of research outcomes, using accessible language and tailored approaches (e.g. local practices) to different stakeholder groups.
- Strengthening data-sharing mechanisms between scientific institutions and decision-makers to facilitate informed policy choices.

Investing in Technological Innovations and Infrastructure

Technological advancements play a crucial role in bridging the science-practice gap. Respondents stressed the need for:

- Greater investment in cutting-edge water management technologies, including smart irrigation systems, advanced water treatment, and AI-driven monitoring tools.
- Investment in user-friendly tools and applications that enable policymakers and practitioners to easily access and interpret scientific data.
- Supporting the development and scaling of WOLLs, where scientific research can be tested and implemented in real-world conditions before broader application. This fosters trust among stakeholders, enhances emerging technologies, and accelerates the adoption of innovative solutions.
- Modernising water infrastructure to integrate real-time data collection and automated resource management systems.

Raising Awareness and Fostering Behavioral Change

The role of education and public awareness campaigns was also frequently mentioned as a key enabler for science-based decision-making. Many respondents emphasised that public perception and political will are critical factors influencing the adoption of scientific knowledge. By fostering greater awareness, societal demand for evidence-based solutions could drive more effective policy implementation.

Respondents recommended:

- Increasing public education efforts on the benefits of science-driven water management through school programs, media campaigns, and community-based initiatives.
- Promoting training programs for policymakers and society to enhance their understanding of scientific research and its practical applications.
- Creating knowledge-sharing platforms that bring together scientists, policy makers, industry leaders and community representatives to discuss challenges and co-develop solutions.

Conclusion on enhancing the uptake of scientific knowledge into practice

The responses indicate that the uptake of scientific knowledge into practice is hindered by governance challenges, weak stakeholder engagement, limited financial incentives, and gaps in communication. To

address these barriers, a holistic approach combining policy reform, technological advancements, education, and collaboration among stakeholders is required.

"Feedback Loops: Create feedback mechanisms where policymakers and practitioners can provide input on the effectiveness of scientific solutions, fostering a continuous cycle of improvement"

"Create platforms that bring together scientists, policymakers, industry leaders, and community representatives to discuss challenges, share knowledge, and co-develop solutions"

"Clear framework for the work in Living Labs to enable thinking outside the current legislative context"

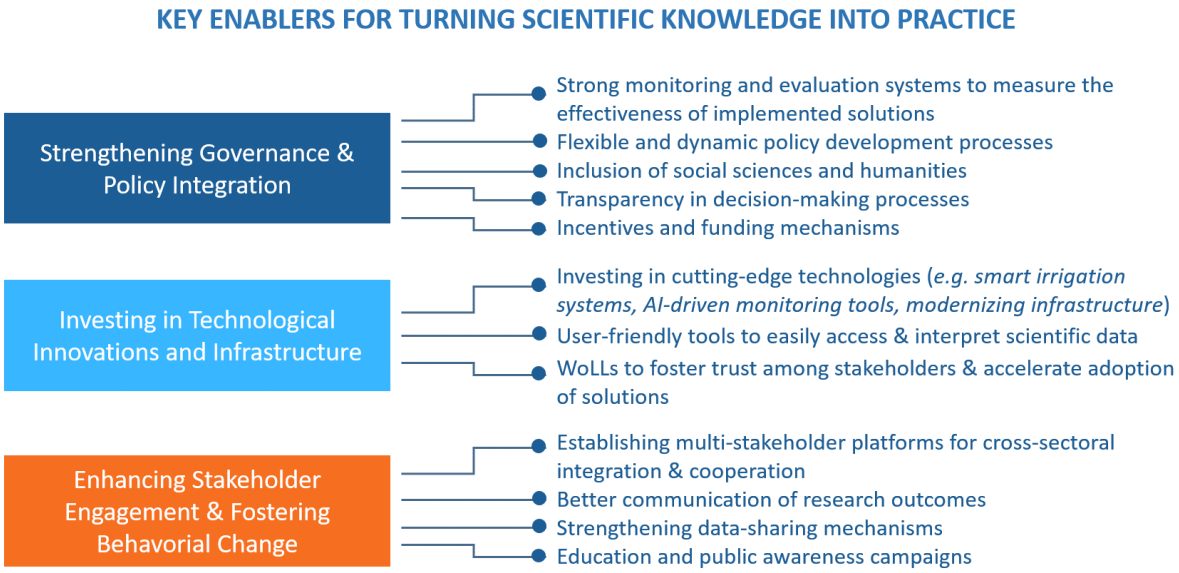

Figure 17 Schematic summary of actions needed to enhance the uptake of scientific knowledge into practice, as identified by the open-ended survey responses.

The three overarching solutions—governance and policy integration, technological innovation, and stakeholder engagement & awareness—are critical in ensuring that scientific advancements translate into tangible improvements in water security and sustainable resource management. By embracing multi-actor collaboration and cross-sectoral integration to strengthen the science-policy interface, societies can better navigate future water challenges and ensure a more resilient, science-driven approach to water management.

Table 3 summarises the actions identified by survey participants along with the most frequently used key terms.

Table 3 Concrete actions identified by survey respondents

Water4All Theme	**Concrete Actions Identified in Survey Responses**	**Key Terms** *(number of mentions in brackets)*
I. Water for Circular Economy	- Encourage funding mechanisms and financial incentives for innovative water management solutions - Promote interdisciplinary collaboration among different sectors (public-private, academia, industry and municipalities) for better water resource management - Support innovative and cost-effective water technologies and best practices (e.g., water treatment systems) - Increase awareness about scientific water benefits and integrate them into policy frameworks	Innovation (19) Interdisciplinary/Private-public/Trans-sector collaboration (15) Effective/Effectively/Effectiveness/Efficiency /Efficiently (15) Funding (12) Incentives/Subsidies (10) Community/Public/Research-policy/Stakeholders engagement (9) Economic benefit/s (3) Treatment/reuse (3) Economy (2) Irrigation (2) Best practices (2) Climate change (2) Holistic solutions (2) Environmental costs (1) Economic ecosystems (1) Droughts (1) Floods (1) Consumption (1) Resilience (1) Adaptation (1) Water use (1) Footprint (1)
II. Water for Ecosystems & Biodiversity	- Strengthen scientific-based solutions for water conservation - Integrate scientific research into policies/regulations - Encourage multi-stakeholder engagement in water management - Establish mechanisms for assessing and tracking the impact of scientific knowledge on real-world applications - Providing policymakers with scientific recommendations for protecting water systems	Environment/Environmental (7) Protection (2) Feedback loops (2) Ecosystem (1)
III. Water for the Future: Sustainable Management	- Implement long-term water management tools, and technologies - Encourage interdisciplinary research collaboration in water management - Strengthen science-policy interactions to align long-term water management strategies with real-world needs - Promote evaluating digital monitoring and data-driven decision-making tools	Sustainable/sustainability (7) Water management (6) Digital/digitalization (3) Water security (1) Water scarcity (1)
IV. Water and Health	- Strengthen regulations for water quality standards - Support innovative water purification technologies - Improve access to clean drinking water	Water treatment/reuse (4) Health (2) Clean water (1) Drinking water (1) Water quality (1)

V. Infrastructures for Water	- Increase investments in resilient water infrastructure projects - Develop financing models for sustainable water infrastructure projects - Demonstrate the long-term costs and benefits of infrastructure projects to decision-makers - Encourage collaboration between policymakers and engineers/scientists - Enhance real-time water monitoring systems for better decision-making	Data (8) Monitoring (5) Technology (4) Infrastructure (3) Resilience (1) Digital Water Oriented Experts (1)
VI. International Cooperation	- Promote global platforms for knowledge and technology sharing in water governance - Strengthen international partnerships for water governance - Expanding holistic water management solutions	Collaboration (15) Cooperation (6) Network (5) Partnership (3) International (1) Knowledge sharing (1)
VII. Governance	- Develop clearer policy frameworks to incorporate scientific research into governance more effectively - Create "interface" mechanisms to integrate scientific solutions into policy documents - Enhance communication among scientists, policymakers, end-users, and other stakeholders through improved dialogue and stronger partnerships - Improve regulatory frameworks to strengthen water governance - Foster greater stakeholder participation in decision-making processes - Establish regulatory incentives for the implementation of water-related policies - Make scientific knowledge more understandable for policymakers - Strengthen stakeholder participation in decision-making - Raise public and policymaker awareness about the significance of water	Decision-makers/policymakers (51) Policy makers/policy (50) Scientific knowledge/solutions/research/ findings/innovations/approaches/data/ output/results/facts/evaluations/insights/ inventions/modelling/evidence/thinking/ mediation (46) Education/Training/Capacity-building (24) End-users (24) Public (17) Awareness (16) Policy (14) Society (11) Water-Oriented Living Labs (WOLLs) (8) Private (7) Dialogue (5) Regulations/Legislation (5) Interdisciplinary (4) Stakeholder (3) Science-policy interface/interaction (2) Governance structures/bodies (2) Multidisciplinary (2) Feedback loops (2) Political will (1)

Key Messages and Stakeholder Expectations

The public consultation confirmed that the core global water challenges identified in the SRIA remain highly relevant, but the analysis of the thematic significance and urgency adds new information to this understanding. Respondents gave the highest ratings for both significance and urgency to “Theme 3: Sustainable water management” and “Theme 4: Water and health,” emphasising climate resilience, pollution mitigation, and access to safe water as key priorities. Sub-themes such as integrated water resource

management, resilience to hydroclimatic extremes, and the effects of emerging contaminants were highlighted as both critical and time-sensitive.

Based on the open-ended questions, respondents consistently emphasised the urgency of addressing climate change impacts, particularly in terms of droughts, floods, and ecosystem degradation, and highlighted water quality issues linked to emerging contaminants such as microplastics, PFAs, and antimicrobial resistance.

Stakeholders stressed that solutions to these interconnected challenges must involve systemic changes. Integrated water resources management, promotion of circular water economy principles, investment in resilient and digitalised infrastructures, and the deployment of nature-based solutions were widely recognized as essential strategies. The importance of raising public awareness and promoting behavioral change around water use was also strongly emphasised, reflecting a call for greater societal engagement in achieving water security.

Participants called for strengthened governance structures that are transparent, inclusive, and better equipped to translate scientific knowledge into practice. They expressed a clear expectation that Water4All should foster cross-sectoral collaboration, support innovation uptake through mechanisms such as WOLLs, influence policymaking processes, and enhance platforms for knowledge exchange between researchers, policymakers, practitioners, and citizens.

Implications for SRIA 2026-2029

The findings of the public consultation have important implications for the upcoming revision of the SRIA. The results affirm that the thematic priorities outlined in the current SRIA remain largely valid but require refinement and updating to reflect recent developments and emerging challenges. Climate change adaptation and resilience could be more strongly emphasised across all thematic areas, with a particular focus on drought management, flood risk reduction, and the protection of vulnerable ecosystems.

The consultation revealed a significant stakeholder demand for increased attention to circular economy approaches, particularly water reuse and resource recovery from wastewater, and to the development and deployment of nature-based solutions at scale. Furthermore, digitalization in water management—including real-time monitoring, smart irrigation, and AI-based systems—has emerged as a cross-cutting enabler that could be systematically integrated across research priorities.

Governance innovation and stronger science-policy-practice interfaces were also repeatedly highlighted as critical. The revised SRIA could include specific strategies to foster participatory governance, co-creation with end-users, and the accelerated uptake of scientific knowledge into decision-making and operational practices. Water-Oriented Living Labs and demonstration projects are seen as concrete mechanisms to facilitate this transition.

International cooperation also stands out as an area requiring greater attention, especially in managing transboundary water resources and fostering knowledge exchange with partners in the Global South. In this respect, the revised SRIA should promote global partnerships and capacity-building initiatives alongside its European focus.

Comparison between the results obtained in the public consultations launched in 2014 and 2024.

This section offers a comparative analysis between the results obtained in the public consultation launched in 2014 by the Water JPI (predecessor initiative to Water4All) and those from Water4All's public consultation. Its objective is to present the evolution of stakeholder priorities over time. It should be noted that the analysis has been restrained to the sub-themes that are common to both the Water JPI's and Water4All's agenda. Thus, several themes introduced in the 2022 Water4All's SRIA were not present in the 2014 Water JPI's document (http://www.waterjpi.eu/images/documents/SRIA%202.0.pdf) and therefore could not be evaluated retrospectively.

The Water4All's SRIA represents a significant expansion in scope, reflecting a more holistic and interdisciplinary approach to water challenges. It introduces new sub-themes related to digital transformation, governance, and international cooperation—many of which were absent or only loosely defined in 2014. As such, the current agenda offers a broader and more integrated framework for addressing the complex and interconnected nature of water issues today. The transition from the Water JPI's SRIA in 2014 to the 2024 Water4All SRIA illustrates a clear shift from narrowly defined technical research themes to a broader, systemic, and integrated approach to water management. While the Water JPI's strategy included subthemes on ecosystem services and ecological engineering, the Water4all's agenda expands these into four interconnected sub-themes (2.1–2.4), covering ecosystem functioning and biodiversity, climate change adaptation, ecological restoration, and the integration of ecosystem services into water management. This progression reflects a move from knowledge generation toward the operationalisation of ecosystem-based management.

The approach to water resources management has also evolved significantly. In Water JPI, the agenda contained only two broad sub-themes on sustainable management and socio-economic approaches. In Water4All, this is replaced by a comprehensive and differentiated set of sub-themes (3.1–3.5) that cover integrated water resources management, river basin and groundwater management, adaptation to extreme hydroclimatic events, and management tools. When it comes to water quality and contaminants, the earlier focus on emerging pollutants (2.1 in Water JPI) has developed into a much more detailed and targeted structure. Water4All's SRIA features four sub-themes (4.1–4.4) that address specific contaminant types (e.g., plastics, endocrine disruptors), antimicrobial resistance, innovative tools for monitoring and remediation, and health-related risk assessments. This reflects a growing concern for the effects of pollution on both ecosystems and human health (One Health approach), and a stronger emphasis on technological solutions.

The infrastructure dimension has also been redefined. In Water JPI, natural hazards and risks related to water infrastructures were mentioned only briefly (2.2). The Water4All agenda devotes an entire theme (5.1–5.3) to infrastructures, highlighting their adaptation to new challenges, resilience to shocks, and even their security—including cyber and terrorism-related risks—underscoring the increasing complexity of infrastructure governance.

In Water JPI's SRIA the sub-themes on reducing soil and water pollution (Sub-theme 4.2) and improving the efficiency of water use for a sustainable bioeconomy sector (Sub-theme 4.1) revealed a clear orientation towards agricultural and land-use sectors. These themes reflected the importance of addressing agricultural impacts on water resources, particularly in the context of nutrient runoff, irrigation efficiency, and the water footprint of biomass production. However, this strong agricultural focus is notably less prominent in Water4All. One reason for this shift is the existence of other European research programmes specifically dedicated to agriculture and food systems (e.g. the Horizon Europe Cluster 6 and partnerships like Agroecology

and Sustainable Future for Food Systems), which allows Water4All to concentrate more on cross-sectoral, ecosystem-based, and technological approaches to water management.

Perhaps the most striking difference between the two agendas is the introduction of entirely new thematic areas in 2022. These include water diplomacy and transboundary cooperation (6.1–6.2), which were not addressed at all in Water JPI, as well as a sub-theme on policy integration (7.2). These additions demonstrate a paradigm shift: research and innovation are no longer viewed as isolated technical domains but as part of broader societal, political, and institutional transformations.

Prioritised Sub-Themes in Water JPI's vs Prioritised sub-themes Water4All's SRIAs by respondents

Water JPI's top-ranked sub-themes by respondents to the public consultation launched in 2014

1. Sub-theme 2.1 – Emerging pollutants and emerging risks of established pollutants
   Score: 41.3%
   Focused on understanding the impacts of emerging contaminants on both ecosystems and human health, as well as options for treatment.
2. Sub-theme 4.2 – Reducing soil and water pollution
   Score: 41.0%
   Emphasis pollution mitigation in the context of land and water management.
3. Sub-theme 5.1 – Enabling sustainable management of water resources
   Score: 37.2%
   Focused on overarching strategies for long-term, sustainable water use.
4. Sub-theme 1.3 – Managing the effects of hydro-climatic extreme events
   Score: 27.7%
   Highlighted the need for research on water-related risks posed by extreme weather events.
5. Sub-theme 4.1 – Improving the efficiency of water use for a sustainable bio-economy sector
   Score: 25.6%
   Linked water use efficiency to the growing bioeconomy, particularly in agriculture and biomass sectors.

Water4All's top-ranked sub-themes by respondents to the public consultation launched in 2024

1. Sub-theme 3.1 – Integrated water resources management
   Score: 48.3%
2. Sub-theme 4.1 – Behaviour and effects of contaminants of emerging concern, litter, plastics, endocrine disruptors
   Score: 47.0%
3. Sub-theme 3.4 – Resilience, adaptation and mitigation to hydroclimatic extreme events
   Score: 44.4%
4. Sub-theme 3.3 – Groundwater management
   Score: 43.1%
5. Sub-theme 4.3 – Innovative water tools and technologies for water quality monitoring and treatment
   Score: 42.0%

Key similarities:

- Pollutants and Water Quality: Respondents to both consultations ranked emerging pollutants among the top priorities. The high score in both years shows a persistent concern with protecting human and ecological health.
- Extreme Events and Resilience: Climate-related risks were prioritised by respondents both in 2014 and 2024.

- Sustainable Water Management: Both Sub-theme 5.1 in Water JPI and Sub-theme 3.1 in Water4All reflect a consistent concern with integrated and sustainable management of water resources, though the Water4All's SRIA framing places more emphasis on operational tools and coordination mechanisms.

Key differences:

- Groundwater (sub-theme 3.3 in Water4All) was not a top-ranked or standalone topic in the Water JPI but it emerges as a distinct, high-priority area in the Water4All's public consultation. This indicates the need for a refined understanding of the specific components of the water cycle.
- Technological Innovation: In the Water4All's public consultation, innovation in monitoring and treatment technologies (Sub-theme 4.3) is highly ranked, reflecting the evolution of digital tools, sensors, and data platforms in water management. This focus was largely absent in 2014.

REFERENCES

UN 2023: Blueprint for Acceleration: Sustainable Development Goal 6 Synthesis Report on Water and Sanitation.
https://www.unwater.org/sites/default/files/2023-08/UN-Water_SDG6_SynthesisReport_2023.pdf

Water4All 2022: Water4All's Strategic Research and Innovation Agenda (SRIA): 2022-2025
https://www.water4all-partnership.eu/sites/www.water4all-partnership.eu/files/2023-02/Water4All_SRIA-2022-2025_A4_2311_bd.pdf

APPENDIXES

- Appendix 1. Survey template
- Appendix 2. List of Themes and Sub-themes

Water4All Public Consultation

Mandatory questions are marked with a star (*)

Welcome to the Water4All Public Consultation.

Your feedback is important because it will help to inform the revised Strategic Research and Innovation Agenda (SRIA) of Water4All Partnership.

The Water4All Partnership - Water Security for the Planet - is a funding programme for scientific research in freshwater. It aims to tackle water challenges in a holistic frame to face climate change, help to achieve the United Nations' Sustainable Development Goals and boost the EU's competitiveness and growth. The Water4All objective is to enable water security at a large scale and in the long term.

Water4All is co-funded by the European Union within the frame of the Horizon Europe programme (a key funding programme for research and innovation). The duration of the Water4All Partnership is 2022-2029. Water4All brings together a broad and cohesive group of 90 partners from 33 countries in the European Union and beyond. This consortium gathers partners from the whole water Research, Development and Innovation (RDI) chain.

The Water4All Partnership released its Strategic Research and Innovation Agenda (SRIA) in September 2022, and an updated version is due in 2025. The SRIA sets out water topics for which research and innovation activities are recommended to secure water for all. Topics are grouped into different key themes related to the value of water and circular economy, ecosystems and biodiversity, sustainable water management, water and health, infrastructures, governance, and international cooperation.

By answering this survey, you have an opportunity to make impact on Water4All and the future of water!

By completing this survey you accept that all of the information supplied will only be used for the purposes of this Public Consultation process. Further to the General Data

Protection Regulation (GDPR), before completing the survey, refer to the Water4All Privacy Policy which provides details on how any personal information provided in this survey will be processed. Please note that the Research Council of Finland (AKA) in Finland are collating the results of this survey in compliance with the AKA Privacy Policy.

It is possible to fill the survey anonymously, without including your contact details. However, you may choose to provide your contact details (email) for follow-up.

Your contributions will be reported as anonymous, even if you choose to provide your information.

If you have queries regarding this Public Consultation contact Water4All representatives Laura Forsström (laura.forsstrom@aka.fi) or Vesa Yli-Pelkonen (vesa.yli-pelkonen@aka.fi).

1. Country *

- ◯ Afghanistan
- ◯ Albania
- ◯ Algeria
- ◯ Andorra
- ◯ Angola
- ◯ Antigua and Barbuda
- ◯ Argentina
- ◯ Armenia
- ◯ Australia
- ◯ Austria
- ◯ Azerbaijan
- ◯ Bahamas
- ◯ Bahrain
- ◯ Bangladesh
- ◯ Barbados
- ◯ Belarus
- ◯ Belgium
- ◯ Belize
- ◯ Benin

- Bhutan
- Bolivia
- Bosnia and Herzegovina
- Botswana
- Brazil
- Brunei
- Bulgaria
- Burkina Faso
- Burundi
- Cabo Verde
- Cambodia
- Cameroon
- Canada
- Central African Republic
- Chad
- Chile
- China
- Colombia
- Comoros
- Congo, Democratic Republic of the
- Congo, Republic of
- Costa Rica
- Côte d'Ivoire
- Croatia
- Cuba
- Cyprus
- Czech Republic
- Denmark
- Djibouti
- Dominica
- Dominican Republic
- East Timor (Timor-Leste)
- Ecuador
- Egypt
- El Salvador

- Equatorial Guinea
- Eritrea
- Estonia
- Eswatini
- Ethiopia
- Fiji
- Finland
- France
- Gabon
- Gambia
- Georgia
- Germany
- Ghana
- Greece
- Grenada
- Guatemala
- Guinea
- Guinea-Bissau
- Guyana
- Haiti
- Honduras
- Hungary
- Iceland
- India
- Indonesia
- Iran
- Iraq
- Ireland
- Israel
- Italy
- Jamaica
- Japan
- Jordan
- Kazakhstan
- Kenya

- ○ Kiribati
- ○ Korea, North
- ○ Korea, South
- ○ Kosovo
- ○ Kuwait
- ○ Kyrgyzstan
- ○ Laos
- ○ Latvia
- ○ Lebanon
- ○ Lesotho
- ○ Liberia
- ○ Libya
- ○ Liechtenstein
- ○ Lithuania
- ○ Luxembourg
- ○ Madagascar
- ○ Malawi
- ○ Malaysia
- ○ Maldives
- ○ Mali
- ○ Malta
- ○ Marshall Islands
- ○ Mauritania
- ○ Mauritius
- ○ Mexico
- ○ Micronesia, Federated States of
- ○ Moldova
- ○ Monaco
- ○ Mongolia
- ○ Montenegro
- ○ Morocco
- ○ Mozambique
- ○ Myanmar (Burma)
- ○ Namibia
- ○ Nauru

- Nepal
- Netherlands
- New Zealand
- Nicaragua
- Niger
- Nigeria
- North Macedonia
- Norway
- Oman
- Pakistan
- Palau
- Panama
- Papua New Guinea
- Paraguay
- Peru
- Philippines
- Poland
- Portugal
- Qatar
- Romania
- Russia
- Rwanda
- Saint Kitts and Nevis
- Saint Lucia
- Saint Vincent and the Grenadines
- Samoa
- San Marino
- Sao Tome and Principe
- Saudi Arabia
- Senegal
- Serbia
- Seychelles
- Sierra Leone
- Singapore
- Slovakia

- Slovenia
- Solomon Islands
- Somalia
- South Africa
- Spain
- Sri Lanka
- Sudan
- Sudan, South
- Suriname
- Sweden
- Switzerland
- Syria
- Taiwan
- Tajikistan
- Tanzania
- Thailand
- Togo
- Tonga
- Trinidad and Tobago
- Tunisia
- Turkey
- Turkmenistan
- Tuvalu
- Uganda
- Ukraine
- United Arab Emirates
- United Kingdom
- United States
- Uruguay
- Uzbekistan
- Vanuatu
- Vatican City
- Venezuela
- Vietnam
- Yemen

- ◯ Zambia
- ◯ Zimbabwe

2. Gender *

- ◯ Female
- ◯ Male
- ◯ Other
- ◯ Prefer not to specify

3. Are you completing this survey as an individual or on behalf of an organisation? *

- ◯ As an individual
- ◯ On behalf of an organization

4. Type of affiliation or organisation *

- ◯ University/Research organisation
- ◯ Water enterprise (private/public)
- ◯ Other enterprise (private/public)
- ◯ Ministry
- ◯ Governmental organisation
- ◯ Non-governmental organisation
- ◯ Professional water associations
- ◯ Funding organisation
- ◯ Private citizen
- ◯ Other, please specify

_____

5. Are you involved in water-related platforms, networks of initiatives? *

- ◯ Yes
- ◯ No

7. In your opinion, what are the key water challenges that should be addressed by Water4All in the next 10 years (i.e. by 2035)? You may consider environmental, socio-economic and/or political challenges.

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8. Rank the following global water challenges identified in the Un-Water SDG6 Synthesis Report (1 is most important and 4 is least important).

Functioning of the sanitation cycle	○ 1 ○ 2 ○ 3 ○ 4
Freshwater (including groundwater) resources in terms of their quality, quantity, development, management, monitoring and use	○ 1 ○ 2 ○ 3 ○ 4
Disaster risk reduction	○ 1 ○ 2 ○ 3 ○ 4
Climate-related water challenges	○ 1 ○ 2 ○ 3 ○ 4

9. In your opinion, what are the most significant barriers to achieving solutions to Global Water Challenges? (Please select from 1 up to 5 options)

- ☐ Lack of research funding and/or access to Research Infrastructures
- ☐ Insufficient multi-disciplinary and cross-sectoral collaboration
- ☐ Cost of building research capacity & capability (e.g., recruiting researchers, research, demonstration sites)
- ☐ Lack of disseminating research results to the end users
- ☐ Lack of training on tools tailored for end users to address water challenges
- ☐ Lack of awareness by decision and/or policy makers
- ☐ Limited engagement with industry/economic sector partners
- ☐ Limited engagement with end users and other stakeholders
- ☐ Limitations related to scalability (e.g., size, efficiency/functionality of process)
- ☐ Affordability of new investments/innovations

☐ Don’t know

☐ Other, please specify

10. In your opinion, what concrete solutions are needed to achieve the Water4All aim, enabling water security for all in the long term? For definition of Water Security, please see: UN-Water

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11. The current SRIA states the following: “The Partnership emphasises the Innovation part and the implementation of solutions, as many have already been developed by scientists, but their uptake by policy makers, end-users and the society is often too limited or too slow to deliver on water challenges at a sufficient pace.”.

In your opinion, what is needed to enhance the uptake of scientific knowledge into practice?

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12. Rate the themes and subthemes identified in Water4All SRIA (1 is most significant and 5 is least significant. Significance refers to the extent to which research and innovation in a particular theme could contribute to responding to socioeconomic, environmental or political needs).

	1 Extremely significant	2 Very significant	3 Significant	4 Somewhat significant	5 Not significant
Theme 1: Water for circular economy: smart water value	○	○	○	○	○
Subtheme 1.1. Water supplies for socio-economic development and activities, such as agricultural, aquaculture, urban, industrial and energy uses	○	○	○	○	○
Subtheme 1.2. Circular economy	○	○	○	○	○
Subtheme 1.3. Empowering the public, water users and stakeholders in valuing water	○	○	○	○	○
Theme 2: Water for ecosystems and biodiversity	○	○	○	○	○
Subtheme 2.1. Functioning and biodiversity	○	○	○	○	○
Subtheme 2.2. Resilience, mitigation and adaptation of aquatic ecosystems and ecosystem services to global changes e.g. climate change	○	○	○	○	○
Subtheme 2.3. Developing and applying ecological engineering and ecohydrology for ecosystems restoration	○	○	○	○	○
Subtheme 2.4. Integrating ecosystem services into the management of water resources and aquatic ecosystems	○	○	○	○	○
Theme 3: Water for the future: sustainable water management	○	○	○	○	○
3.1. Integrated water resources management	○	○	○	○	○
3.2. River basin management	○	○	○	○	○
3.3. Groundwater management	○	○	○	○	○
3.4. Resilience, adaptation and mitigation to hydroclimatic extreme events	○	○	○	○	○
Subtheme 3.5. Tools for water management	○	○	○	○	○
Theme 4: Water and health	○	○	○	○	○
Subtheme 4.1. Behaviour and effects of contaminants of emerging concern, litter, plastics, endocrine disruptors	○	○	○	○	○
Subtheme 4.2. Water dimension of anti-microbial resistance	○	○	○	○	○

	1 Extremely significant	2 Very significant	3 Significant	4 Somewhat significant	5 Not significant
Subtheme 4.3. Innovative water tools and technologies for water quality monitoring and water treatment, remediation and disinfection	○	○	○	○	○
Subtheme 4.4. Risk assessment and threshold values for protection of human health and ecosystems	○	○	○	○	○
Theme 5: Water infrastructure	○	○	○	○	○
Subtheme 5.1. Adaptation of existing water infrastructures to new challenges	○	○	○	○	○
Subtheme 5.2. Water infrastructures resilience	○	○	○	○	○
Subtheme 5.3. Water infrastructures security (including cyber and terrorism security)	○	○	○	○	○
Theme 6: International cooperation	○	○	○	○	○
Subtheme 6.1. Water diplomacy	○	○	○	○	○
Subtheme 6.2. Establishing tools for trans-boundary cooperation	○	○	○	○	○
Subtheme 6.3. Developing integrated, fair and adaptive water resource management systems	○	○	○	○	○
Theme 7: Governance	○	○	○	○	○
Subtheme 7.1. Developing methods for more efficient citizen and wider stakeholder engagement	○	○	○	○	○
Subtheme 7.2. Strengthening policy integration, alignment, coherence and water policy coordination to exert a change in society	○	○	○	○	○
Subtheme 7.3. Supporting the adoption of innovations	○	○	○	○	○

13. Rate the themes and subthemes identified in Water4All SRIA (1 is most urgent and 5 is least urgent).

	1 Extremely urgent	2 Very urgent	3 Urgent	4 Somewhat urgent	5 Not urgent
Theme 1: Water for circular economy: smart water value	○	○	○	○	○
Subtheme 1.1. Water supplies for socio-economic development and activities, such as agricultural, aquaculture, urban, industrial and energy uses	○	○	○	○	○
Subtheme 1.2. Circular economy	○	○	○	○	○
Subtheme 1.3. Empowering the public, water users and stakeholders in valuing water	○	○	○	○	○
Theme 2: Water for ecosystems and biodiversity	○	○	○	○	○
Subtheme 2.1. Functioning and biodiversity	○	○	○	○	○
Subtheme 2.2. Resilience, mitigation and adaptation of aquatic ecosystems and ecosystem services to global changes e.g. climate change	○	○	○	○	○
Subtheme 2.3. Developing and applying ecological engineering and ecohydrology for ecosystems restoration	○	○	○	○	○
Subtheme 2.4. Integrating ecosystem services into the management of water resources and aquatic ecosystems	○	○	○	○	○
Theme 3: Water for the future: sustainable water management	○	○	○	○	○
Subtheme 3.1. Integrated water resources management	○	○	○	○	○
Subtheme 3.2. River basin management	○	○	○	○	○
Subtheme 3.3. Groundwater management	○	○	○	○	○
Subtheme 3.4. Resilience, adaptation and mitigation to hydroclimatic extreme events	○	○	○	○	○
Subtheme 3.5. Tools for water management	○	○	○	○	○
Theme 4: Water and health	○	○	○	○	○
Subtheme 4.1. Behaviour and effects of contaminants of emerging concern, litter, plastics, endocrine disruptors	○	○	○	○	○
Subtheme 4.2. Water dimension of anti-microbial resistance	○	○	○	○	○

	1 Extremely urgent	2 Very urgent	3 Urgent	4 Somewhat urgent	5 Not urgent
Subtheme 4.3. Innovative water tools and technologies for water quality monitoring and water treatment, remediation and disinfection	○	○	○	○	○
Subtheme 4.4. Risk assessment and threshold values for protection of human health and ecosystems	○	○	○	○	○
Theme 5: Water infrastructure	○	○	○	○	○
Subtheme 5.1. Adaptation of existing water infrastructures to new challenges	○	○	○	○	○
Subtheme 5.2. Water infrastructures resilience	○	○	○	○	○
Subtheme 5.3. Water infrastructures security (including cyber and terrorism security)	○	○	○	○	○
Theme 6: International cooperation	○	○	○	○	○
Subtheme 6.1. Water diplomacy	○	○	○	○	○
Subtheme 6.2. Establishing tools for trans-boundary cooperation	○	○	○	○	○
Subtheme 6.3. Developing integrated, fair and adaptive water resource management systems	○	○	○	○	○
Theme 7: Governance	○	○	○	○	○
Subtheme 7.1. Developing methods for more efficient citizen and wider stakeholder engagement	○	○	○	○	○
Subtheme 7.2. Strengthening policy integration, alignment, coherence and water policy coordination to exert a change in society	○	○	○	○	○
Subtheme 7.3. Supporting the adoption of innovations	○	○	○	○	○

14. Are there any missing themes or subthemes?

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15. Water4All SRIA has identified the following six drivers, i.e., the overarching factors that may lead to changes in the strategic priorities. Rank the drivers according to their importance (1 is most important, 6 is least important).

Climate change	○ 1 ○ 2 ○ 3 ○ 4 ○ 5 ○ 6
Human and ecosystem health	○ 1 ○ 2 ○ 3 ○ 4 ○ 5 ○ 6
Migration	○ 1 ○ 2 ○ 3 ○ 4 ○ 5 ○ 6
	○ 1 ○ 2 ○ 3

Urbanisation & population increase	○ 4 ○ 5 ○ 6
Food and energy security	○ 1 ○ 2 ○ 3 ○ 4 ○ 5 ○ 6
Global needs and human-water interactions	○ 1 ○ 2 ○ 3 ○ 4 ○ 5 ○ 6

16. In your opinion, are there any missing drivers?

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17. Water4All SRIA has identified the following enablers, i.e., factors facilitating activities and the attainment of Water4All objectives. Rank the enablers according to their importance (1 is most important and 5 is least important).

The digital revolution (big data, AI, IoT, Digital Twins)	○ 1 ○ 2 ○ 3 ○ 4 ○ 5
Existing research infrastructure & technologies	○ 1 ○ 2 ○ 3 ○ 4 ○ 5
Open science and responsible research and innovation	○ 1 ○ 2 ○ 3 ○ 4 ○ 5
Changes in people's vision towards natural resources	○ 1 ○ 2 ○ 3 ○ 4 ○ 5
Technologies and new (regulatory and economic) frameworks	○ 1 ○ 2 ○ 3 ○ 4 ○ 5

18. In your opinion, are there any missing enablers?

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19. The public consultation is anonymous, but if you wish, you can give your contact information to allow further discussions on your response.

Email

Name

Appendix 2

THEMES AND SUB-THEMES OF WATER4ALL SRIA

Theme 1	**Water for circular economy: smart water value**
Sub-theme 1.1.	Water supplies for socio-economic development and activities, such as agricultural, aquaculture, urban, industrial and energy uses
Sub-theme 1.2.	Circular economy
Sub-theme 1.3.	Empowering the public, water users and stakeholders in valuing water
Theme 2	**Water for ecosystems and biodiversity**
Sub-theme 2.1.	Functioning and biodiversity
Sub-theme 2.2.	Resilience, mitigation and adaptation of aquatic ecosystems and ecosystem services to global changes e.g. climate change
Sub-theme 2.3.	Developing and applying ecological engineering and ecohydrology for ecosystems restoration
Sub-theme 2.4.	Integrating ecosystem services into the management of water resources and aquatic ecosystems
Theme 3	**Water for the future: sustainable water management**
Sub-theme 3.1.	Integrated water resources management
Sub-theme 3.2.	River basin management
Sub-theme 3.3.	Groundwater management
Sub-theme 3.4.	Resilience, adaptation and mitigation to hydroclimatic extreme events
Sub-theme 3.5.	Tools for water management
Theme 4	**Water and health**
Sub-theme 4.1.	Behaviour and effects of contaminants of emerging concern, litter, plastics, endocrine disruptors
Sub-theme 4.2.	Water dimension of anti-microbial resistance
Sub-theme 4.3.	Innovative water tools and technologies for water quality monitoring and water treatment, remediation and disinfection
Sub-theme 4.4.	Risk assessment and threshold values for protection of human health and ecosystems
Theme 5	**Water infrastructure**
Sub-theme 5.1.	Adaptation of existing water infrastructures to new challenges
Sub-theme 5.2.	Water infrastructures resilience
Sub-theme 5.3.	Water infrastructures security (including cyber and terrorism security)
Theme 6	**International cooperation**
Sub-theme 6.1.	Water diplomacy
Sub-theme 6.2.	Establishing tools for trans-boundary cooperation
Sub-theme 6.3.	Developing integrated, fair and adaptive water resource management systems
Theme 7	**Governance**
Sub-theme 7.1.	Developing methods for more efficient citizen and wider stakeholder engagement
Sub-theme 7.2.	Strengthening policy integration, alignment, coherence and water policy coordination to exert a change in society
Sub-theme 7.3.	Supporting the adoption of innovations

Appendix 2

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www.water4all-partnership.eu

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