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EU WATER RESILIENCE STRATEGY

Position Paper

October 2025

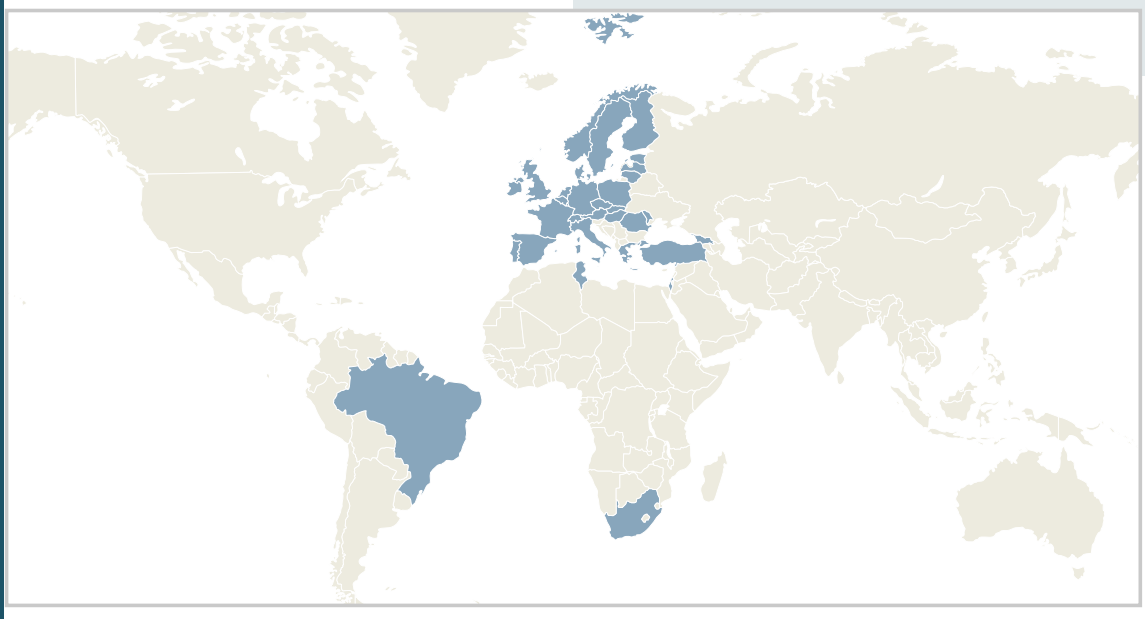


INTRODUCTION
Water4All, a European Partnership for Water Security

Water4All is a European Research and Innovation (R&I) partnership designed to promote water security through coordinated efforts across national and European levels. It is part of the Horizon Europe framework and brings together stakeholders from research, policy, industry, and civil society to address water-related challenges. As of September 2025, the Water4All Partnership brings together a group of 90 partners from 33 countries in the European Union and beyond, including Brazil, Georgia, Israel, Moldova, Norway, South Africa, Switzerland, Turkey, Tunisia, and United Kingdom.

The Partnership is coordinated by the French National Research Agency (ANR, in French). The consortium has been strategically conceived in order to gather partners covering the whole water R&I chain including academia, R&I funders, research performing organisations, water management authorities, water utilities and water associations.

Launched in June 2022, Water4All is a ten-year programme although some activities will extend till 2034. The programme supports a wide portfolio of multi-national and cross-sectoral freshwater related activities, from physical and biological sciences to human and social sciences. All these activities have been grouped into different categories, leading to the implementation of a wide range of activities including joint calls for research proposals, strategic alignment, science-policy interfaces, living labs, international cooperation, and communication, dissemination and exploitation at regional, national and international scales.



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EXPECTED OUTCOMES OF WATER4ALL

1. Strengthening the water R&I collaboration and strategic coordination for the conservation,restoration, regeneration and best use of the natural functions of groundwater, surface water and dependent or associated ecosystems.
2. Supporting and promoting demonstration and access to the market of innovative solutions.
3. Communicating water-related knowledge and data through open access.
4. Providing tools for water management through innovative knowledge, methodologies and tools.
5. Designing and implementing approaches for the participatory, accountable and transparent development of innovation whilst ensuring the empowerment and capacity development of communities.

Partners of Water4All collaborate with other R&I initiatives in the European Research Area in order to enhance the impact of planned activities. Amongst others, collaboration is already taking place with EU Missions, like the Mission "Restore our Ocean and Waters by 2030", and other Horizon Europe Partnerships such as the ones on Biodiversity, Sustainable Blue Economy and Driving Urban Transitions. The main purpose of Water4All is to support European strategies for preserving natural resources and adapting to climate change, in particular the European Water Resilience Strategy (EWRS) published in June 2025. Link to the EWRS

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CONTRIBUTION TO THE IMPLEMENTATION OF THE EUROPEAN WATER RESILIENCE STRATEGY

Water4All recognises the critical role of the European Water Resilience Strategy (EWRS) in ensuring the long-term sustainability and security of Europe's water resources. Given the increasing pressures from climate change, pollution, and competing demands, a coordinated approach is essential to enhance water resilience across sectors and regions.
In this context, Water4All looks forward to collaborating with the European Commission in the implementation of the strategy by leveraging its extensive network of research institutions, policymakers, and stakeholders. Such collaboration takes different forms, including:

- **Provision of scientific evidence and impact assessment for water policies**, ensuring that decisions are based on robust data and knowledge. The first Water4All joint transnational call, launched in September 2022, focused on the area of "Management of water resources: resilience, adaptation and mitigation to hydroclimatic extreme events and management tools"[1]. This call led to the funding of 27 projects on the causes and patterns of hydroclimatic extreme events, on the tools for water management in extreme contexts, and improved governance to strengthen institutional capacity and stakeholder participation. In doing so, the call also contributes to Objective 1 of the EWRS by supporting the restoration and protection of the water cycle through improved knowledge, tools, and governance for managing hydroclimatic extremes.

  Water resilience is also a strong driver of the second joint transnational call launched in 2023. This call resulted in 23 projects funded on the thematic of "Aquatic Ecosystem Services"[2]. Out of the 23 projects, 10 are clearly addressing the water resilience in their objectives. The results of these projects, launched in early 2025, will be communicated and largely promoted to enhance the policy uptake of relevant results. The work carried out by the first Knowledge Hub (KH) of the programme on aquatic ecosystem services, launched in April 2025 and running for three years, ensures sustained dialogue between scientific experts and policymakers over the lifetime of funded projects. The call and the Knowledge Hub contribute directly to Objective 1 of the EWRS, by fostering new knowledge and policy-relevant solutions to restore and protect the water cycle through better understanding, management, and safeguarding of aquatic ecosystems.
- **Advancing cross-sector collaboration and translating knowledge and innovation into real-world solutions by fostering synergies between research, policy, and practice** and ensuring a coordinated and integrated approach to water resilience. To support this objective, Water4All implements a range of complementary activities including policy assessment exercises, mobility programmes for young researchers, vocational training for students, and facilitating data-sharing.

1 Link to the booklet - 2022

2 Link to the booklet - 2023

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- **Provision of experts** to the proposed Water Resilience Forum.
- **Contribution to developing an EU wide digitalisation action plan for the water sector**, leveraging its expertise from consortium members and the network of digitalisation experts built on the occasion of the second Water4All's consultative workshop in Lisbon (June, 2024).
- Water4All plays a key role in supporting the implementation of the EWRS by **mobilising its broad network of research funders, innovators, and stakeholders to co-design, co-develop and upscale solutions aligned with the strategy's objectives**. Through its accelerator and incubation programmes, Water4All boosts start-ups and SMEs aligned with the EWRS ambition. In addition, Water4All promotes living labs as real-world environments where innovative approaches are tested, demonstrated, and validated with end users, ensuring that solutions are both practical and impactful.

  By supporting the development and uptake of innovative water management technologies, promoting efficiency, and facilitating the scaling of solutions across regions, these activities directly contribute to Objective 2 of the EWRS, helping to build a water-smart economy that is resilient, resource-efficient, and attractive for investment.
- Finally, the partnership's commitment to international collaboration -evidenced by cooperation with UNESCO's Intergovernmental Hydrological Programme and ongoing work with Ramsar- will help **translate lessons learned from EU driven projects into broader global water resilience efforts. These mainstreaming efforts** will foster coherence between EU actions and global sustainable water governance.

  Water4All encourages the European Commission to deliver a water resilient Europe. Whereas adaptation efforts are necessary to adjust to specific changes or shocks (like droughts or floods), resilience encompasses the ability not only to adapt but also to anticipate, absorb, recover from, and even transform in response to challenges. The EWRS marks a significant and timely shift toward a more integrated, forward-looking approach in managing water challenges. We appreciate the comprehensive nature of the strategy. However, Water4All has targeted comments and recommendations for each of the strategic goals of the strategy: Restoring and protecting the water cycle, developing a water-smart economy, and guaranteeing clean and affordable water. We look forward to collaborating with the European Commission to refine and reinforce these core areas in order to ensure the strategy's success.

1 - A Water-Smart Economy is the economic dimension of a Water-Smart Society. It is a system that recognises water not only as a basic need and environmental asset, but as a strategic resource for innovation, competitiveness and sustainable development. In this economy, the value of water is fully embedded in design, production models, business and investment strategies, and public well-being, ensuring water is used efficiently and within planetary boundaries across entire value chains and product life cycles. Circularity becomes the norm, with water, energy and materials recovered and reused across sectors, especially through water reuse and recycling. This transition is powered by digital technologies applied across infrastructure and systems, alongside market mechanisms that incentivise sustainable practices. A Water-Smart Economy builds resilience to risks such as scarcity, pollution and climate extremes through adaptive infrastructure, cross-sectoral collaboration and inclusive governance. Water Europe, Advancing Investment in Water Resilience: A strategic Pathway Towards a Water-Smart Society and Economy, Brussels, 2025.

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STRATEGIC GOAL -1 -
Restoring and Protecting the Water Cycle

Restoring the water cycle requires a long-term, integrated vision, instead of one that strategic planning can provide. A disrupted water cycle, driven by human interventions such as land-use change, water over-abstraction, wetland degradation, and infrastructure mismanagement, reduces the ability of natural systems to regulate water flows, recharge aquifers, provide ecosystem services and sustain biodiversity. Strategic planning enables the identification of where, when, and how restoration efforts can be most effective by aligning environmental, social, and economic objectives across sectors and governance levels.

However, strategic planning has historically relied on traditional modelling approaches, focusing solely on biophysical factors such as precipitation, hydrology and climate variability. The impacts of geopolitical changes on water management and transboundary water cooperation, as well as the impacts of anthropogenic pressures (urbanisation, industrialisation, and agricultural practices), are not fully understood or integrated into predictive models.

Combining biophysical and socioeconomic models enable water planners to understand the full picture of water system dynamics, predict how both natural and human-induced changes will affect water resources and the water cycle over time, identify the root causes and multiple pressures of water-related risks, and design more targeted, integrated, and adaptive water management strategies. Moreover, these models contribute to more coordinated and adaptive governance, allowing for early warning systems, better prioritisation of investments, and the design of policies that are not only reactive but preventative and transformative. Despite advances in both biophysical and socioeconomic modelling, truly integrated models that support strategic water planning remain limited and underutilised. Existing models often operate in silos and lack context-specific adaptability, usability for policymakers, and the capacity to handle uncertainty or support transformative change. Further research is needed to develop operational, user-friendly tools that link natural and human systems in ways that support resilience, foresight, and decision-making. Funding targeted efforts in this area would significantly enhance Europe's ability to implement the European Water Resilience Strategy and sustainably manage its water resources.

Water4All's contribution to the EWRS

As identified in the SRIA, the development of combined biophysical and anthropogenic models, paired with a source-to-sea-approach, is a priority area where further research and innovation activities are recommended. In view of this, and as part of the preparation for the next work plan of the partnership, Water4All partners are considering the development of a thematic publication to map the state of the art on this topic, identify key knowledge gaps, and outline future research needs. Experts participating in existing and upcoming KHs will be invited to collaborate in such endeavours. Subject to approval by the European Commission, this publication would involve contributions from both consortium members and external experts, and would be disseminated widely to water authorities, policymakers, researchers, and relevant programmes across Europe and beyond.

Results from the first and second joint transnational calls provide a solid foundation for supporting the implementation of the EWRS. In addition to these projects, other key outputs such as Living Labs focused on the water cycle, our deliverables on solutions and strategies to address implementation gaps in EU water directives, the KH, and the upcoming Thematic Annual Programming action (TAP) will further strengthen evidence-based action and innovation uptake. Phase 2 of Water4All foresees dedicated science-policy activities, including targeted engagement with policymakers to align research outcomes with EWRS priorities. Together, these activities ensure that research results, practical innovations, and co-created solutions are systematically channelled into policy and practice, addressing both technical and governance challenges and reinforcing Europe's resilience across all components of the water cycle.

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STRATEGIC GOAL -2 -
Developing a Water-smart Economy

The EWRS acknowledges the importance of water reuse, yet it does not sufficiently address the broader spectrum of alternative water sources, other than seawater desalination, which are essential for reducing pressure on conventional freshwater reserves. The EU remains heavily dependent on rivers, lakes, and groundwater systems -resources that are increasingly under stress due to over-abstraction, pollution, and climate change. This overreliance exposes the vulnerability of Europe's water systems, especially in the face of prolonged droughts and changing precipitation patterns.
To move towards a water-smart economy, it is crucial to increase water use efficiency across all sectors, while diversifying water supply sources according to their intended use.. While technologies such as atmospheric water harvesting, stormwater capture, and advanced wastewater recycling offer significant potential to improve water security, their uptake remains limited and their long-term effects on water cycle remain poorly known. Barriers such as fragmented regulation, limited incentives, and lack of infrastructure investment continue to hinder large-scale implementation. By aligning alternative water sourcing with leakage reduction and smart metering efforts, Europe can unlock the full potential of a circular and efficient water economy.

Water4All's contribution to the EWRS

Water4All can make a substantial contribution to the development of a water-smart economy by supporting research, innovation, and knowledge exchange focused on circular water use and resource efficiency. Through projects funded under the joint transnational call 2024 "Water For Circular Economy", Water4All will generate critical evidence on the technological, environmental, and governance dimensions of circular water management. The insights provided by funded projects can guide the design of integrated strategies that both reduce freshwater dependency and optimise infrastructure performance for a more water-efficient economy.



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STRATEGIC GOAL - 3 -
Guaranteeing Clean and Affordable Water

Persistent and toxic contaminants in water systems pose serious and growing threats to public health, ecosystems, and long-term water security. These substances –including per- and polyfluoroalkyl substances (PFAS), pesticide metabolites, endocrine-disrupting chemicals, heavy metals, and microplastics– can accumulate in the environment and organisms over time, leading to chronic exposure risks. To support the implementation of the EWRS, Water4All recommends the establishment of EU-wide monitoring frameworks for the systematic detection and tracking of persistent, mobile and toxic substances through the entire water cycle, in all aquatic compartments from source to sea, including rain, wastewater, surface and groundwater. A harmonised, science-based monitoring system would help identify pollution pathways and hotspots, inform risk assessments, and guide evidence-based policy responses. In parallel, there is a clear need to upgrade existing wastewater treatment infrastructure with advanced removal technologies such as activated carbon, ozonation, and membrane filtration. These technologies, applied at source and combined with alternative sustainable chemical from green chemistry, have demonstrated effectiveness in eliminating or significantly reducing concentrations of harmful contaminants and should be promoted as part of a broader transition towards pollution-resilient water systems. Water4All contributes to this effort by supporting R&I projects that develop and pilot such solutions, and by mobilising expert knowledge to help inform future regulatory and investment decisions aligned with the strategy.

Water4All's contribution to the EWRS

Water4All is promoting technological breakthroughs for detecting and remediating persistent, mobile and toxic pollutants in water that may pose a risk to human, animal and environmental health like PFAs by prioritising this theme in its fourth joint call in 2025 on "Water & Health". This Water4All call addresses key challenges related to the link between water and health, including water quality, contaminants, and water treatment technologies. The call aims at developing innovative solutions, and supporting decision-making for sustainable water management in relation to health. It prioritises the development of accurate, efficient, and cost-effective water quality monitoring methods and the implementation of sustainable water treatment technologies to ensure safe drinking water and effective sanitation. These efforts align strongly with resilience goals of clean, safe, and sustainable water systems. They contribute to achieving the EWRS flagship action of developing feasible and affordable methods for the detection and remediation of PFAS and other persistent chemicals.

In addition to providing comments on the strategic goals of the EWRS, Water4All wishes to draw attention to critical data management issues.

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UNLOCKING WATER RESILIENCE THROUGH INTEROPERABLE AND FAIR DATA

A cornerstone of a truly resilient European water system is the availability, accessibility, shareability and usability of high-quality data. At present, the water domain is characterised by fragmented data landscapes, with datasets often siloed, poorly described, and not readily interoperable across borders, sectors, or digital platforms. To support science-based policy-making, and enable rapid response to water-related crises, the development of interoperable data infrastructures grounded in the FAIR principles –data that is Findable, Accessible, Interoperable, and Reusable– must be prioritised.

Achieving FAIRness in the water domain demands guidelines to help data producers produce FAIR data or a method and a digital tool capable of transforming raw, heterogeneous data into standardised formats. Ideally, data should be produced using the same format. Eventually, a transformation layer could also serve as a bridge between data providers (e.g., river basin authorities, utilities, research projects, and citizen observatories) and users, whether they are policy-makers, researchers, businesses, or local communities. This transformation capability is essential to make datasets comparable, mergeable, and interpretable across different systems and contexts.

However, data sharing will not scale without sustained support to data providers. Many institutions lack the technical means, legal clarity, or capacity to harmonise and transform their data. Therefore, the strategy must include a strong component of capacity-building and accompaniment, helping data providers adopt FAIR data practices through funding, training, and technical tools.

Water4All's contribution to the EWRS: In this regard, the Water4All Partnership is ideally positioned to play a catalytic and demonstrator role. Accordingly, Water4All has developed a White Paper on Best Practices in Water Data Management outlining a vision for a European Water Data Ecosystem. The White Paper, held in a non-technical language, presents the value potential as well as barriers to such an ecosystem. Better Data Management leading to Structured Data is the prerequisite for achieving transformative digitalization in the Water Sector. Today, however, researchers and innovators have huge difficulties in finding and accessing interoperable data, hampering their possibility to become truly data-driven. The White Paper has already constituted the foundation for dialogue between Water4All, European Commission and the European Environment Agency as well as other European Water Data projects. Water4All is ready to continue this dialogue as well as to establish pilot initiatives.

Additionally, Water4All wishes to act as an enabler bringing together the researchers who produce water-related data and the international community of data specialists responsible for developing the FAIR data ecosystem. Water4All is working with data providers to develop their skills and support them in changing their practices, define common standards, deploy transformation tools, and contribute towards a more inclusive, scalable, interoperable and sustainable water data ecosystem. By embedding data transformation and FAIRness at the top of its strategic agenda, future calls, and demonstration activities,

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Water4All helps make open and interoperable data a backbone of Europe's water resilience. As part of this effort, Water4All is currently designing a mock-up for data sharing, focused on showcasing how data generated by funded projects can be structured and made accessible. This initiative supports harmonisation and visibility of project outputs, while contributing to a more integrated and transparent knowledge base for water management in Europe. Water4All looks forward to collaborating with the European Commission on this topic and stands ready to offer guidelines on how to enable effective data sharing and capacity-building across Member States and stakeholder communities.

Other Water4All activities also contribute to the implementation of the EWRS. The Water Academy provides targeted training and capacity-building for researchers, practitioners, and policymakers, ensuring that knowledge and skills are aligned with EWRS priorities. Similarly, the Platform of Vocational Excellence strengthens vocational education and training in the water sector, enhancing technical competencies, workforce readiness, and the adoption of resilient and sustainable water management practices.



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NEXT STEPS TOWARDS STRATEGIC IMPLEMENTATION

During its third and final phase from June 2026 to May 2034, the Partnership will reinforce its alignment with the objectives set forth in the EWRS. Recognising the EWRS as a pivotal and timely roadmap for enhancing the sustainability, security, and resilience of Europe's water systems, Water4All is committed to contributing meaningfully to its implementation. This contribution will take the form of strategic research activities, knowledge mobilisation, multi-stakeholder engagement, and policy-oriented support. Water4All will ensure that its future programming, funding priorities, and science-policy-practice interfaces are shaped by and responsive to the goals of the EWRS.

Through this alignment, Water4All seeks not only to advance the EWRS's pillars but also to create synergies with existing European initiatives, foster innovation, and scale up tested solutions that drive systemic transformation in water management. The following actions outline how Water4All will operationalise its contribution to the EWRS, ensuring continuity, relevance, and long-term impact in the years ahead.

Ensuring Strategic Alignment through Direct Engagement

Water4All will closely monitor the revision and implementation of EU water-related regulations, including the Water Framework Directive, the Floods Directive, the Water Reuse Regulation, and the Critical Entities Resilience Directive. These regulatory frameworks are central to Europe's water governance and offer key opportunities to embed the principles of resilience, circularity, and climate adaptation. Building on the deep expertise of its consortium members, lessons learned from transnational funded projects, and feedback from its stakeholder network and Knowledge Hubs, Water4All will develop dedicated position papers to inform each of these regulatory updates. These documents will present targeted scientific and technical input, highlight gaps in knowledge or implementation, and offer forward-looking policy recommendations. In doing so, Water4All aims to help shape regulatory frameworks that are not only compliant with the latest scientific evidence but also capable of withstanding future socio-environmental pressures and uncertainty.

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From Research to Action

A dedicated set of activities in Water4All will focus on supporting the uptake and operationalisation of the EWRS. Science sparring sessions will provide a structured platform for researchers, policymakers, and practitioners to critically engage with the EWRS priorities, and explore pathways for implementation across different governance and regional contexts. These events are designed not only to ensure scientific excellence but also to promote dialogue between knowledge producers and users, fostering the co-creation of actionable solutions.
In parallel, the impact assessment to be conducted will identify concrete outcomes of Water4All-funded projects and initiatives that are directly relevant to the EWRS. The impact assessment will highlight success stories, lessons learned, and scalable innovations. Activities will also support the wider dissemination and valorisation of knowledge, enhancing stakeholder ownership and policy relevance.
A future Water4All activity on water justice will complement these efforts by directly supporting Objective 3 of the EWRS, which aims to ensure access to clean and affordable water and sanitation for all. By placing equity, fairness, and inclusiveness at the centre of water governance, this activity will address persistent inequalities in water availability and affordability. In doing so, it will reinforce the EWRS ambition to safeguard vulnerable populations, promote fair water pricing, and enhance citizen participation.

Mainstreaming Water Resilience in International Agendas

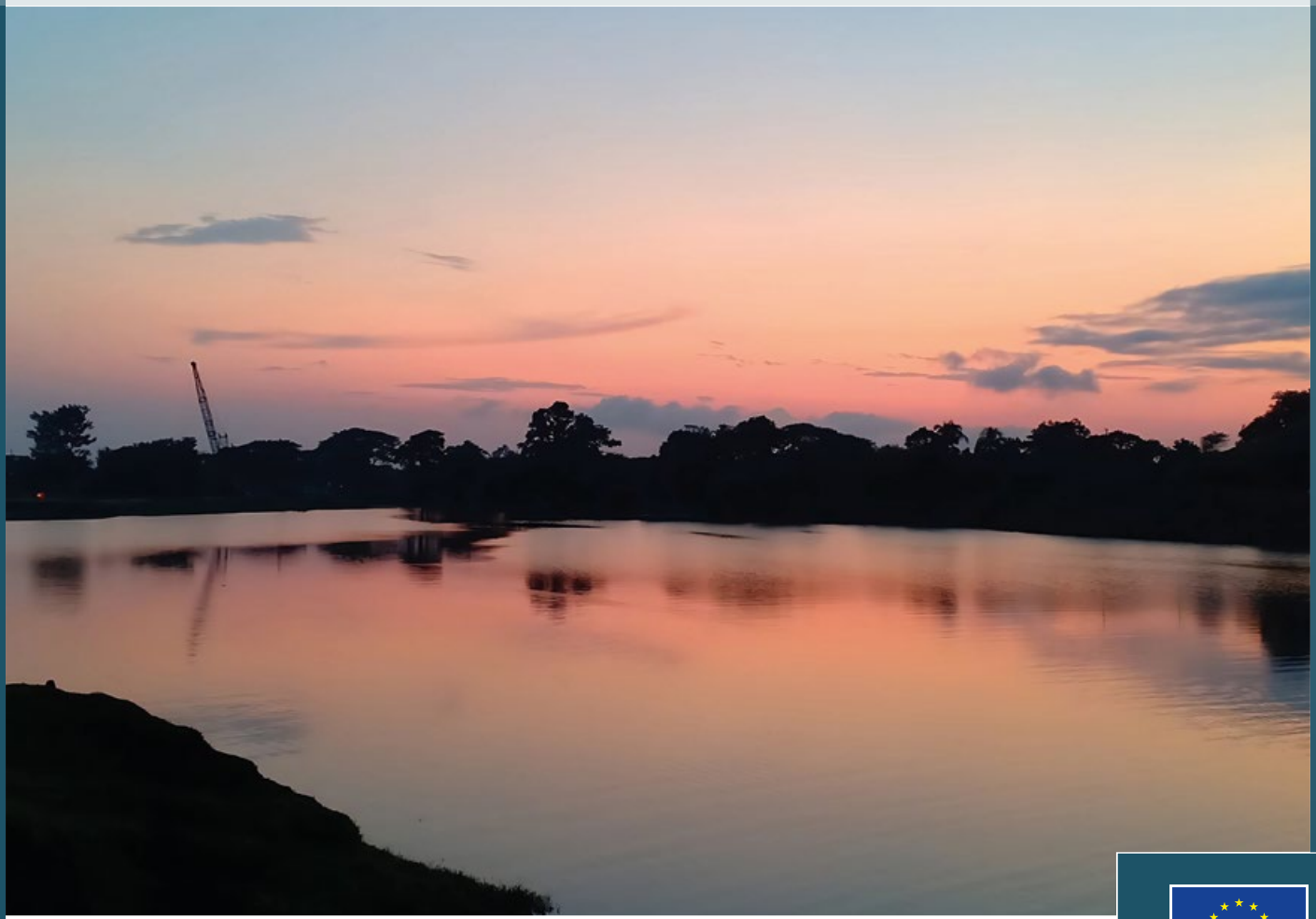
Water4All will also integrate the ambitions of the EWRS into its international engagement strategy. Strengthening Europe's leadership on global water resilience is essential to addressing interconnected challenges such as climate change, biodiversity loss, and desertification. Water4All will therefore continue to participate actively in key global processes, such as the Rio Conventions and major multilateral platforms on water diplomacy, health, and development. Efforts for the signing of agreements with international organisations and conventions such as UNESCO and Ramsar Convention, will be pursued.
To reinforce Europe's voice in these forums, Water4All will produce strategic position papers and knowledge briefs that reflect the state of research and innovation on water resilience. It will also seek to facilitate dialogue and partnerships through international events such as the Baku Water Dialogue and relevant UN initiatives. By doing so, the Partnership will help ensure that the priorities of the EWRS resonate beyond Europe's borders, while also bringing international perspectives and best practices back into EU policy discussions.

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CONCLUSION

Water4All is committed to generating knowledge that directly supports the implementation of the European Water Resilience Strategy. We aim to play an active role in turning its ambitions into action, equipped with the right tools, ranging from fundamental research and innovation pathways to strategic alignment, living labs, and international cooperation.



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Grant Agreement N°101060874

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