NEXOGENESIS
STREAMLINING WATER RELATED POLICIES

Deliverable 6.13

NEXOGENESIS Policy Brief: Contribution on the WEFE nexus to the Water Resilience Strategy

Lead : Loïc Charpentier (WE)

Date : ~~29.11.2024~~27.01.2025

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 101003881

Project Deliverable

Project Number	Project Acronym	Project Title
101003881	NEXOGENESIS	Facilitating the next generation of effective and intelligent water-related policies, utilizing artificial intelligence and reinforcement learning to assess the water-energy-food-ecosystem (WEFE) nexus

Instrument:	Thematic Priority
H2020RIA	LC-CLA-14-2020

Title
NEXOGENESIS Policy Brief: Contribution to the Water Resilience Strategy

Contractual Delivery Date	Actual Delivery Date
30-11-2024	29.11.2024

Start Date of the project	Duration
01-09-2021	48 months

Organisation name of lead contractor for this deliverable	Document version
Water Europe	1

Dissemination level		Deliverable Type	
Public	**X**	**Document, Report**	**X**

Authors (organisations)
Loïc Charpentier (Water Europe) Contributing authors: Tamara Avellan (AVA), Florentina Nanu (BDG), Stefania Munaretto (KWR), Antonio Trabucco (CMCC), Maria P. Papadopoulou (NTUA), Chrysaida-Aliki Papadopoulou (NTUA), Daniella Kristensen (JAWS), Blaine Haupt (JAWS), Ingrida Bremere (BEF), Daina Indriksone (BEF), Sabina J. Khan (UFZ)
Reviewers (organisations)
Janez Susnik (UN-IHE)

Abstract

As part of the activities for communication and dissemination, this second NEXOGENESIS policy brief includes recommendations focusing on Water Resilience Strategy, and the benefits of implementation based on the Water-Energy-Food-Ecosystem (WEFE) nexus. The preliminary policy recommendations emerge from the initial project results. The document includes recommendations around: financial support, data interoperability, local level cooperation challenges, and tackling pollution at source.

Executive Summary

The NEXOGENESIS project's second policy brief aims to contribute to the EU Water Resilience Strategy announced by the European Commission. It provides recommendations on enhancing cooperation, financial backing, and data standardization for water resilience. Key priorities include transboundary coordination, public-private financial support, and interoperable data sharing across river basins. Each case study highlights localized challenges, emphasizing the need for targeted solutions. The policy brief will particularly target the European Commission and will be distributed in a two-page summary in Q1 2025, bridging top-down EU strategies with bottom-up local engagement to strengthen water resilience across Europe.

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Abbreviations

D	Deliverable
DG	Directorate General
EU	European Union
LRAs	Local and Regional Authorities
NEPAT	Nexus Policy Assessment Tool
Q	Quarter
RBMP	River Basin Management Plan
WEFE	Water-Energy-Food-Ecosystem nexus

Introduction

This deliverable (D6.13) presents the second policy brief from the NEXOGENESIS project, designed to support the European Union's Water Resilience Strategy by offering overarching project recommendations alongside specific insights from case studies.

The document is structured into an introductory chapter, the main policy brief, and a concluding section. Within the policy brief, key recommendations are highlighted to advance water resilience, specifically by encouraging:

- Standardized transboundary and cross-national cooperation
- Secured financial support for an EU water-smart transition
- Enhanced data collection through systemic standardization and interoperability

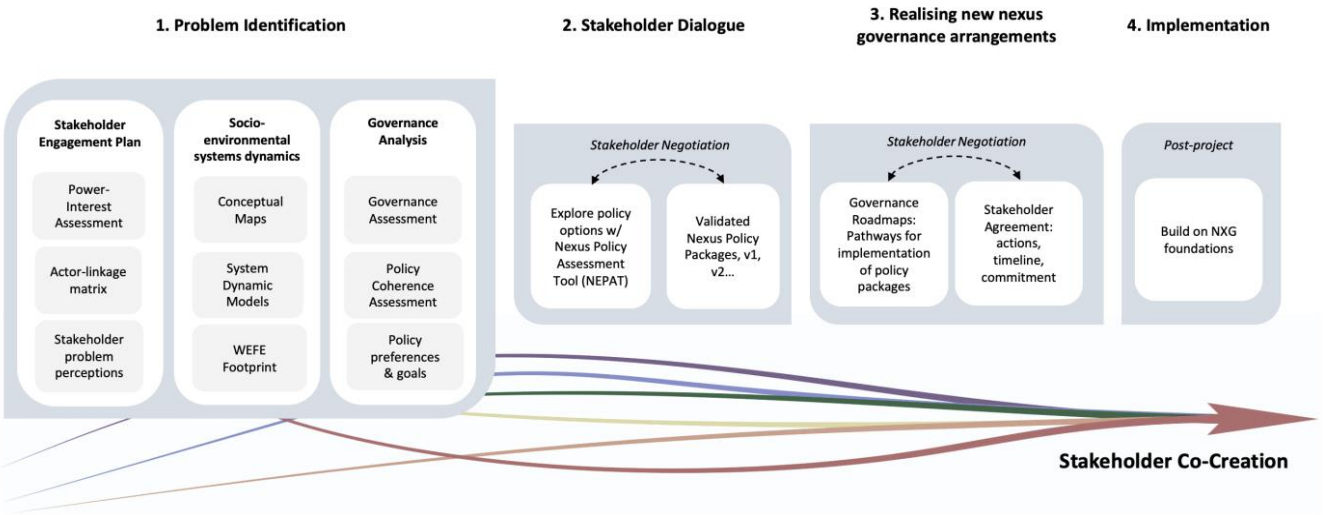
Recognizing the importance of a bottom-up, co-creation approach, the brief also includes targeted recommendations for each case study. This localized focus empowers stakeholders at the regional and local levels to effectively communicate with their relevant policymakers.

NEXOGENESIS will combine both top-down and bottom-up outreach to engage EU networks and local policymakers, releasing a concise, two-page summary in Q1 2025. The primary audience for this brief is the European Commission’s DG Environment, responsible for the Water Resilience Strategy. The secondary audience includes members of the European Parliament, who are drafting their own-initiative resolution on water resilience. The brief will also be distributed more widely to reach EU networks, the EU Committee of Regions, and local stakeholders, ensuring the recommendations support practical, multi-level policy implementation.

POLICY BRIEF: Contribution to the Water Resilience Strategy

NEXOGENESIS is a 4-year (2021-2025) European research and innovation project funded by the European Commission under the H2020 programme. It gathers 20 partners from Europe and South Africa with the aim of enabling the next generation of intelligent water-related policies, using artificial intelligence and machine learning to assess policy impacts on the WEFE nexus and suggest improved policy design for coherence. The project conducts four European case studies and one in South Africa.

Our recommendations are extracted from the project activities, including workshops, interviews, analysis of policy documents, expert knowledge and reflections and focus group discussions - co-implemented with local stakeholders of the case studies. This "co-creation process" has to identified coherency issues in case-study specific WEFE nexus policies. This policy brief identifies challenges and recommendations from the preliminary conclusions of the testing phase of the artificial intelligence decision-support tool (known as NEPAT). NEPAT facilitates the identification of the effects of policy options on the bio-physical and socio-economic WEFE interlinkages thus allowing for evidence-based stakeholder conversations around WEFE goal conflicts[1].



Main recommendations for the Water Resilience Strategy:

- Encourage nexus thinking in the development of EU policy
- ~~Standardised~~ Harmonised local transboundary and cross-national cooperation
- Secure financial support for an EU water-smart transition
- Improve data collection through systemic standardisation and interoperability

[1] Cf. Policy Brief 1 to get further details on the benefits of the Nexus Policy Assessment Tool (NEPAT) tool.

A call for Nexus Thinking in the EU Water Resilience Strategy

In the context of the new Water Resilience Strategy, the NEXOGENESIS project provides recommendations due to its WEFE nexus approach. With a WEFE nexus approach, the NEXOGENESIS project provides a systemic and holistic method to develop and implement coherent policies for natural resource management, by reducing trade-offs and exploiting synergies across WEFE policies. This approach aligns with the Water Resilience Strategy announced in the EU political guidelines for the New EU Commission 2024-2029.

The Water Resilience Strategy aims to strengthen Europe's water security by ensuring that "*sources are properly managed, scarcity is addressed, and that we enhance the competitive innovative edge of our water industry and take a circular economy approach*." This strategy will particularly look at[2]:

- The interconnection between EU policies, including a *source-to-sea* (S2S) approach.
- Enhancing the competitive, innovative edge of the water industry and taking a circular economy approach, including tackling pollution at the source.
- Facilitating digitalisation of water management, cycles and utilities.
- International and multi-level cooperations and partnerships to achieve the 2030 Agenda for sustainable Development.

NEXOGENESIS strongly supports the nexus approach that the European Commission **intends to consider by looking at the interconnections between the different EU policies in the Water Resilience Strategy which will emphasise the f**ocus on the water node of the nexus which is critical as water is a central enabler of nexus systems[3].. This approach must be included in the River Basin Management Plans (RBMP)[4], including ex-ante and ex-post **evaluation of EU policies.**

In addition, a stronger implementation of the subsidiary principle could benefit river basin management, identifying the most impactful added-value of the European Union for such strategy and policy-making process. NEPAT tool can help identify the most impactful actions based on local context. For instance:

- Mountainous regions should be encouraged in adapting agroforestry activities and developing tree cover on agricultural land has multiple benefits for the water retention policy, carbon emissions reduction, agricultural production[5]

[2] Ursula von der Leyen, Candidate for the European Commission President, Europe's choice: Political guidelines for the next European Commission 2024−2029, 18 July 2024; European Commission, Commissioner for Environment, Water Resilience and a Competitive Circular Economy: Mission letter, 17 September 2024

[3] Sušnik J, Masia S, Teutschbein C. Water as a key enabler of nexus systems (water–energy–food). *Cambridge Prisms: Water*. 2023;1:e1. doi:10.1017/wat.2023.1

[4] Refer to the River Basin Management Plan requested by the Directive 2000/60/EC of the European Parliament and of the Council of 23 October 2000 establishing a framework for Community action in the field of water policy, art. 13.

[5] Zomer RJ, Yang J, Spano D, Trabucco A. 2023. Irrecoverable carbon in mountains and the global mitigation potential of agroforestry and increased tree cover in mountain agricultural systems. Circular Agricultural Systems 3:11 https://doi.org/10.48130/CAS-2023-0011

- ~~The~~ The Common Agricultural Policy in its objective to address environmental challenges should adopt The WEFE Nexus Index in order to quantitively evaluate trade-offs when achieving sustainable development[6].

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General Recommendations

The case studies identified common water-smart measures using a WEFE nexus approach to ensure water resilience, sustainability and security.

~~Standardise~~ Harmonise local transboundary and cross-national nexus cooperation

The case studies underscore the need to reinforce cooperative governance in river basin management, especially in transboundary settings. Enhanced management across borders and national boundaries is essential, with improvements needed in the following areas:

- **Clarifying and aligning the legal frameworks**: Standardization of quantitative and qualitative resource management laws across participating regions will enhance cohesive governance.
- **Strengthening effective stakeholder participation:** exploration of mandating stakeholders and systemic participation in river basin management processes, including through WEFE-related forums of policymakers to negotiate acceptable trade-offs and synergies (c.f. Article 14, Water Framework Directive);
- **Strengthening implementation of the principle of subsidiarity**: Enabling greater local stakeholder involvement by reducing overly restrictive governance limits via decentralisation ~~(e.g., need for bottom-up administrative flexibility in planning and decision-making and building the capacity of river basin authorities in visioning, strategic planning and skilful implementation of RBMPs).~~For examples, the NEPAT tool could be considered as an add-on in the Regional Adaptation Support Tool process in the Guidance 24[7]
- **Standardizing data collection and monitoring**: Harmonizing data processes will facilitate coherent, interoperable data sharing (e.g., standardized methodology for evaluation of quality classes for water bodies). NEPAT has been demonstrated as a transboundary tool to spark deliberation and consensus.
- **Increasing non-financial recognition for local stakeholders**: Providing incentives for local actors (e.g., natural resource managers such as farmers) to contribute to local planning processes will foster a more collaborative approach.

Beyond the implementation of the Water Framework Directive, these recommendations shall be considered in activities related to the different programmes of the European Neighbourhood Policy and Enlargement Negotiations, to build more trust among partners, support more

[6] Simpson GB, Jewitt GPW, Becker W, Badenhorst J, Masia S, Neves AR, Rovira P and Pascual V (2022) The Water-Energy-Food Nexus Index: A Tool to Support Integrated Resource Planning, Management and Security. *Front. Water* 4:825854. doi: 10.3389/frwa.2022.825854

[7] European Commission: Directorate-General for Environment, *River basin management in a changing climate – Common implementation strategy for the Water Framework Directive and the Floods Directive*, Publications Office of the European Union, 2024, https://data.europa.eu/doi/10.2779/126657

effective upstream-downstream pollution control, and alleviate administrative burdens within the implementation of the EU water acquis.

Secure financial support for an EU water-smart transition

Water infrastructure and policy have faced persistent underfunding by authorities. Aligning with the EU Blue Deal and the recent statement from Commissioner Roswall on the environment, circular economy, and water resilience, there is a clear need to secure financial backing in this area, to advance Europe's water-smart transition, for instance with the Blue Funds in the Multiannual Financial Framework of the EU. Key areas of focus for such support should include:

- ~~**Funding the expansion**~~**Encourage the funding of nature-based solutions when relevant to contribute to the upgrade~~ ~~and upgrading~~ ~~of~~ existing traditional infrastructure.** €255 billion is required by 2030 to ensure compliance with EU water directives and to increase the efficiency of water infrastructure systems across the continent (Water Europe, 2024) with direct impact on WEFE nexus resource management.
- ~~**Enhancing monitoring and control mechanisms to ensure the efficient use of funding**, particularly funds allocated to water infrastructure.~~\
- **Encouraging local public-private partnerships**, with enhanced involvement and capacity-building of Local and Regional Authorities (LRAs), in developing sustainable business models to fund and implement projects.
- **Increasing the visibility of water-related funding opportunities** across member countries so that non-governmental actors can leverage these for local projects (e.g. pilots in NBS).
- ~~**Support dedicated training programs for water authorities or river basin management bodies, involving the private sector:** Training programme, skills upgrade & knowledge transfer is critical for achieving the transition and attract human resources into this sector.~~

Improve data collection through systemic standardisation and interoperability at basin level

Europe currently faces a structural gap in data collection and lacks a systemic standardization process to ensure at least basic interoperability of quantitative and qualitative data across river basins. This hampers authorities and stakeholders (especially in transboundary watersheds) in problem-solving. To address these needs, it would be beneficial to:

- **Establish guidelines for evaluating and reporting quantitative and qualitative data** to ~~standardize~~ harmonise practices across regions and within transboundary river basins. For instance:

- The WEFE Nexus Index should be used to quantitively evaluate trade-offs when achieving sustainable development[8].
- The identification of water parameters both for quantitative and qualitative aspects adapted to the local case is key to successfully manage a WEFE nexus policy[9]. The Water Exploitation Index plus (WEI+) should be prioritised as a measurement of water stress in the WEFE models used to analyse the impact of policy measures[10].
- The ver**sion 3 of the Global Aridity Index and Potential Evapotranspiration Database** should be considered as a key parameter particularly in policy dealing with the water-soils nexus[11]

- **Enhance data collection using a source-to-sea approach** to better account for upstream-downstream interconnections by collecting a representative set of data to master the complexity of the WEFE nexus in the considered river basin and its main challenges identified by the relevant authorities and stakeholders.
- ~~**Promote cooperation among industrial, agricultural, social, and urban sectors** in designing and implementing data collection systems.~~
- **Facilitate open data and disclosure in a citizen-friendly manner to increase** transparency, avoid investment duplication, and support the development of accurate forecasting models & evidence-based policies such as the NEPAT one~~.~~

These recommendations help alleviate stakeholder fatigue and limitations in engagement, improving data consolidation at both the river basin and European levels and enabling a more accurate comparative analysis at the local, national and European levels.

[8] Simpson GB, Jewitt GPW, Becker W, Badenhorst J, Masia S, Neves AR, Rovira P and Pascual V (2022) The Water-Energy-Food Nexus Index: A Tool to Support Integrated Resource Planning, Management and Security. *Front. Water* 4:825854. doi: 10.3389/frwa.2022.825854

[9] NEXOGENESIS, Deliverable 3.1, *Conceptual models completed for all the case studies*, May 2023

[10] Ioannou AE and Laspidou CS (2022) Resilience Analysis Framework for a Water–Energy–Food Nexus System Under Climate Change. *Front. Environ. Sci.* 10:820125. doi: 10.3389/fenvs.2022.820125

[11] Zomer, R.J., Xu, J. & Trabucco, A. Version 3 of the Global Aridity Index and Potential Evapotranspiration Database. *Sci Data* **9**, 409 (2022). https://doi.org/10.1038/s41597-022-01493-1 ; Zomer RJ, Xu J, Spano D and Trabucco A. CMIP6-based global estimates of future aridity index and potential evapotranspiration for 2021-2060 [version 1; peer review: 3 approved with reservations]. Open Res Europe 2024, **4**:157 (https://doi.org/10.12688/openreseurope.18110.1)

Annex - Specific ~~Recommendations~~ per Case Study

Using a common methodology, each case study[12] ~~developed~~ identified specific challenges and made some tailored recommendations based on its unique policy context, stakeholder interactions and scope, which are summarized below[13]. For further details, please contact the specific case study directly (refer to the below table for contact points).

Case Study 1 – Nestos/Mesta River Basin	The Nestos/Mesta case study across Bulgaria and Greece identified some specific challenges related to the implementation of WEFE related legislation: ~~• Complex administrative structures and fragmented responsibilities paired with a top-down administrative system, leading to inefficient communication and cooperation amongst organizations and insufficient citizens' participation in the decision-making process.~~ ~~• Lack of cooperation between Bulgarian and Greek authorities (including diplomatic tensions), exacerbated by insufficient data sharing, standardization, and aligned practices~~ ~~• Absence of a transnational management authority and agreement.~~ ~~• Difficulty in resolving water-use conflicts among WEFE stakeholders, discussion around reuse of wate opportunities.~~ ~~• Identification of several land-use conflict (e.g. agricultural waste discharged in surface & groundwaters)~~ ~~• Stakeholder fatigue and difficulty maintaining engagement in policy processes, including EU projects such as Nexogenesis, which fill gaps in river basin management.~~ ~~• Perception amongst stakeholders that their concerns are not reaching national policymakers.~~ • Establish a transnational management authorities to manage the river basin management with a data sharing agreement, joint training programmes and transnational advisory body to cooperate with stakeholders around the WEFE nexus approach.

[12] Please note that the map of the case studies will be included at the design stage to better illustrate the diversity of the case studies.
[13] These conclusions are mainly based on the Milestone 23: second intermediate report on case study implementation and co-creation activities for the different case studies.

	• Incentivise participation in the inclusive and co-operative processes. • Made mandatory stakeholders participation in the WEFE management structure. *Contact point:* *Maria P. Papadopoulou (mpapadop@mail.ntua.gr)* *Chrysaida-Aliki Papadopoulou (xpap@survey.ntua.gr; xrypap@yahoo.gr)*
Case Study 2 – Lielupe River Basin	The Lielupe case study across Latvia and Lithuania identified some specific recommendations in response to challenges related to the implementation of the WEFE related legislation: • Establish and incorporate measurable targets in vision and respective policy documents on river basin management. • Need for closer cooperation between upstream and downstream countries to agree on joint targets and actions • A consistent, well-connected and trusted focal point to maintain cross-border cooperation of stakeholders is pivotal to maintain continuity of stakeholder engagement and policy-making processes. Consequently, The Baltic Environmental Forum – Latvia has agreed to act in this role by the year 2028. • Develop a harmonised methodology and procedures for data collection and interpretation for water quality evaluation. • Coordinated stakeholder involvement in cocreation at various levels for the river basin management activities shall be ensured thus avoiding fatigue and overload of SH addressed. *Contact point:* *Ingrida Bremere (ingrida.bremere@bef.lv),* *Daina Indriksone (daina.indriksone@bef.lv)*
Case Study 3 – Jiu River Basin (Lower Danube)	The Jiu River Basin (Lower Danube) case study identified some specific recommendations based on their activities: ▪ Pushing for WEFE nexus action needs a synchronized approach for breaking sector-siloed policy-development and encourage interaction between local, regional, national policy making (). Bottom-up co-creation processes were made visible to higher policy levels to support top-down awareness in adaptation of different policy instruments active in the region (i.e., use of NEPAT). ▪ Leverage platforms such as climate change adaptation, circular economy, just transition and sustainable development, to use a nexus approach in the

	public -private dialogues conducted for cross-sectoral strategic thinking and action planning processes. ▪ Support 'living labs' and 'communities of practice' in implementation of policies to keep high interest stakeholder tangibly connected with a sense of ownership, regarding resource management. ▪ Form cross-sectoral advocacy groups to convey stakeholders' concerns directly to national policymakers.~~Stakeholder fatigue and overload caused by the lack of visibility of tangible and beneficial outcomes for their participation in multiple simultaneous initiatives with the same aim, which results in disengagement and discontinuous participation.~~ *Contact point:* *Florentina Nanu (florentina.nanu@bdgroup.ro)*
Case Study 4 – Adige River Basin	In the case study activities of Adige River Basin, three main challenges have been identified: • Limit~~The limitations of the~~ models for data collection and reporting and encourage mandatory data reporting to pinpoint the gaps and to identify the steps needed to achieve a more reliable SDMs. • ~~(e.g., a lack of monitoring / data collection of specific processes, lack of open access data / limited sharing of data) could be used to pinpoint the gaps and to identify the steps needed to achieve a more reliable SDMs.~~ • Form cross-sectoral advocacy groups to convey stakeholders' concerns directly to national policymakers.~~Stakeholder fatigue and overload caused by the lack of visibility of tangible and beneficial outcomes for their participation in multiple simultaneous initiatives with the same aim, which results in disengagement and discontinuous participation.~~ • Made mandatory stakeholders participation in the WEFE management structure (i.e. energy). • ~~Limited participation of certain sectoral actors (i.e., energy) leading to lack of data to develop and implement cross-sectoral solutions.~~ *Contact point:* *Silvia Cocuccioni (silvia.cocuccioni@eurac.edu)* *Fabio Carnelli (Fabio.carnelli@eurac.edu)* *Stefano Terzi (stefano.terzi@eurac.edu)*

Case Study 5 – Inkomati-Usuthu	The Inkomati-Usuthu case study in Southern Africa identified some specific challenges related to the implementation of the WEFE-related legislation: • Organize joint workshops and training sessions for authorities and relevant stakeholders for the implementation of the WEFE nexus policies. ~~Stakeholders indicated there is a knowledge gap in the public sector and a lack of the necessary expertise to implement policy-related interventions. This, coupled with cases of inefficient use of funds, leads to ineffective implementation of WEFE-related legislation.~~ • ~~Difficulty to gain the participation of every relevant sector in WEFE workshops~~Make mandatory participation of every relevant sector in WEFE workshops, such as the energy sector (specifically Departmental of Mineral Resources and Energy). • Form cross-sectoral advocacy groups to convey stakeholders' concerns directly to national policy-makers.~~Stakeholder fatigue and overload caused by the lack of visibility of tangible and beneficial outcomes for their participation in multiple simultaneous initiatives with the same aim, which results in disengagement and discontinuous participation.~~ • Make mandatory the e~~E~~ngagement with stakeholders with relevant indigenous/traditional/local knowledge to~~is not always undertaken or~~ fully consider~~ed~~ their perspectives during policy design. ~~This may lead to maladaptive policies and pushback from local communities during the policy implementation phase.~~ • ~~Challenge around data disclosure, resulting in limited access to collected data by some specific stakeholders, undermining the collaborative approach.~~ Enhance mandatory data collection and disclosure to encourage collaborative approach. • ~~Perception of lack of interest by high-power/influential stakeholders to consider the inputs of local stakeholders, due to their lack of involvement.~~ *Contact point:* *Daniella Kristensen (daniella@jaws.co.za)* *Blaine Haupt (haupt@jaws.co.za)* *Alice Harvey (alice@jaws.co.za)*

Conclusion

This policy brief aims to contribute to the European Water Resilience Strategy. In light of the characteristics of the project, we will broadly disseminate broadly the brief and simultaneously target specific policymakers, particularly the unit of the European Commission in charge of the Water Resilience Strategy.

For easier dissemination, this version of the policy brief, without its introduction and conclusion sections, will be condensed into a reader-friendly two-page summary, to be released in Q1 2025 and will be disseminated as follows:

- **Broad dissemination: the policy brief will be disseminated via several networks (**such as NEXOGENESIS, Water Europe, the EU Water Resilience Coalition, Water4All partnership, the UN World Water Quality Alliance) via (not limited) newsletters, social media and dedicated meetings.
- **Targeted communication to the European Commission**: the EU commission is developing the Water Resilience Strategy and a report on floods management and implementation of the EU water acquis. The unit of freshwater will be particularly targeted, along with DG CLIMA, REGIO and the group DG NEAR-INTPA-EEAS. Considering the mention of the River Basin Management, the Water Directors (involved in the EU expert group on the WFD) will also be contacted.
- **Targeted communication to the Members of the European Parliament:** the new Parliament will develop an own-initiative on the Water Resilience Strategy. The policy brief will be an added value for the policy makers and members of the MEP Water Group and the ECBD intergroups, to develop the resolution.
- **Targeted communication to the EU Committee of Regions & Local and Regional Authorities** (LRAs) and relevant EU associations of LRAs such as ICLEI, Partenalia, Eurocities, ERRIN.
- **Targeted communication at local level:** The case study leaders will be mobilised for dissemination at the local level to reach key policy-makers across the local, regional and national scales.