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Achieving Better Implementation of EU Policies by Restoring the Sponge Function

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Summary

- Europe's water and climate resilience is under severe strain, with degraded soils, intensively drained catchments and the loss of wetlands intensifying droughts and contributing to more destructive floods.
- Restoring the sponge function of Europe's landscapes and retaining more water on land, in soils and groundwater systems, is a systemic, no-regret strategy that enhances public safety by limiting floods, increasing water availability and improving water quality.
- Utilising nature-based solutions (NbS), rather than relying on grey infrastructure approaches alone, can address multiple challenges simultaneously while delivering co-benefits for climate mitigation, biodiversity, resilient food systems and human well-being.
- Despite strong scientific evidence and growing political recognition, enhancing the sponge function remains insufficiently embedded in EU implementation frameworks and funding mechanisms, due in part to fragmented governance across water, agriculture, nature, climate and regional development policy domains.
- This policy brief identifies how the upcoming EU policy processes in 2026–27 offer a strategic opportunity to integrate sponge measures into regional and national water, agriculture, nature restoration, climate adaptation and mitigation plans and strategies.



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Key Policy Recommendations



Embed sponge restoration as a low-regret, catchment-scale solution in River Basin Management Plans and Flood Risk Management Plans under the Water Framework and Floods Directives.



Advocate for the inclusion of targeted measures in consultation and planning processes related to the implementation of the Drinking Water Directive.



Operationalise the European Water Resilience Strategy's Sponge Facility as a cross-directorate investment and delivery mechanism, linking finance, planning, and monitoring.



Align EU instruments (CAP, Cohesion Policy, LULUCF, and Nature Restoration Regulation) around catchment-scale sponge targets, rather than sector-specific interventions.



Introduce measurable sponge-function indicators into EU monitoring and reporting systems (soil health, water retention, flood attenuation, drought buffering).



Peatland restoration Graminhais Plateau, São Miguel Island, Azores, Portugal. Photo credit: Edgar Karofeld.

A Changing Climate is Intensifying Europe's Water Risks

Europe is the fastest warming continent due to climate change. Extreme heat, prolonged droughts, forest fires and severe floods are growing in frequency and intensity. According to the first *European Climate Risk Assessment* (EUCRA), these climate-related extreme events are expected to further intensify, and these risks are outpacing the development and implementation of EU policies.¹

Droughts over large parts of Europe are regularly drying soils and reducing river flows,

with severe negative impacts for ecosystems and the economy. For instance, the drought across Europe in 2022 cost €50 billion alone.² Meanwhile, floods are now the costliest natural hazard in Europe, with devastating floods causing €325 billion in damage between 1980 and 2023.³ The scale of impacts can be overwhelming even for single events: the 2021 floods in Germany, Belgium and the Netherlands caused more than €44 billion in losses and more than 200 fatalities.⁴

Strengthening Water and Climate Resilience through Preventive and Nature-Based Approaches

EUCRA identified that a shift is needed towards preventive and low-regret adaptation measures, and that a systems-based approach for increasing Europe's resilience should be prioritised. This represents an important opportunity to restore the regulating role of the water cycle that supports the functioning of ecosystems, the economy and human society.

Political momentum for NbS is growing, with policymakers increasingly recognising the need to enhance the natural sponge function of European landscapes, including in the 2025 European Water Resilience Strategy. This policy brief offers concrete suggestions on how this aspiration to increase **sponge function** can be operationalised within relevant EU and national policy processes in the short term.



Degraded peatlands, Graminhais Plateau, São Miguel Island, Azores, Portugal. Photo credit: Tarso Costa.

- 1 European Environment Agency (2024). *European Climate Risk Assessment*. EEA Report No 01/2024.
- 2 European Environment Agency (2025). *Climate Preparedness Dashboard: Droughts*.
- 3 European Environment Agency (2025). *Economic Losses from Climate-Related Extremes in Europe*.
- 4 European Environment Agency (2025). *Water and Climate Impacts. European Environment State and Outlook 2025*.

Why is Water Resilience Declining?

Centuries of drainage for farming and forestry, urbanisation and poor water management have resulted in a massive loss of sponge capacity in Europe:

- 🌱 An estimated 34% of agricultural lands in Northwestern Europe are equipped with artificial drainage infrastructure.⁵ Sweden, Finland, Baltic states and Poland have significant levels of drained forestry on peat and mineral soils.⁶
- 🌱 70% of Europe's wetlands have been lost, with loss exceeding 75% in countries such as Ireland, Lithuania, Czechia, Hungary, Italy, Finland and Germany.⁷
- 🌱 50% of EU peatlands are degraded (with a significant role played by drainage).⁸
- 🌱 70–90% of Europe's floodplains are ecologically degraded.⁹
- 🌱 Wetlands are among the most threatened yet ecologically and socio-economically valuable ecosystems in Europe, with mires, bogs and fens showing particularly high levels of risk.^{10 11}
- 🌱 70% of soils in the EU are not healthy and this affects their water holding potential.¹²

This loss and degradation of soils and wetlands, together with the channelisation of streams and rivers, directly contributes to the severity of droughts and floods and declining water resilience in the landscape. While restoring the sponge function is not a panacea, especially in extreme events, scaling sponge measures at basin scale along the source-to-sea continuum offers a low-regret, systems-based approach to restore hydrological functioning. This strengthens water and climate resilience – benefiting people and biodiversity while achieving multiple EU policy objectives.



Serra do Xistral Peatlands, Galicia, Spain.
Photo credit: Aniela Stachnik.

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- 5 Blann et al. (2009). Effects of Agricultural Drainage on Aquatic Ecosystems: A Review. *Critical Reviews in Environmental Science and Technology*, 39(11), 909–1001.
- 6 Sponseller et al. (2021). Ditches Show Systematic Impacts on Soil and Vegetation Properties Across the Swedish Forest Landscape. *Forest Ecology and Management*.
- 7 Evans et al. (2025). Wetland Loss Across Europe and Implications for Ecosystem Services. *Nature Reviews Earth & Environment*.
- 8 European Commission Joint Research Centre (2024). *Towards a Methodology for Reporting Greenhouse Gas Emissions and Removals from Rewetted Organic Soils under LULUCF*. JRC Technical Report.
- 9 European Environment Agency (EEA). *Floodplains: A Natural System to Preserve and Restore*. EEA Report No 24/2019.
- 10 European Environment Agency (2016). *European Red List of Habitats: Terrestrial and Freshwater Habitats*.
- 11 Tanneberger et al. (2021). Mires in Europe—Regional Diversity, Condition and Protection Status. *Diversity*, 13(8), 381.
- 12 Panagos et al. (2022). Soil Priorities in the European Union. *Geoderma Regional*, 29, e00510.

The Natural Sponge Function

Natural sponges are soils, wetlands, floodplains and forests that intercept, absorb and store water, then release it slowly, helping to reduce flood peaks, buffer droughts by sustaining baseflows, improve water quality and strengthen Europe's water and climate resilience.

Large parts of Europe drain water too quickly – transformed into 'fast-water' systems through decades of drainage, river regulation and soil degradation. As an example, a 50-km-long lowland stream in the Netherlands ([Buurserbeek](#)), where water used to take 16.5 days to flow from the headwaters to the outlet, now takes nine hours due to the drained system.

This plays out across European landscapes where the sponge function has been lost – water rushes downstream during storms, causing destructive floods in populated areas, and disappears too quickly during dry periods, deepening droughts by reducing soil moisture and groundwater recharge.

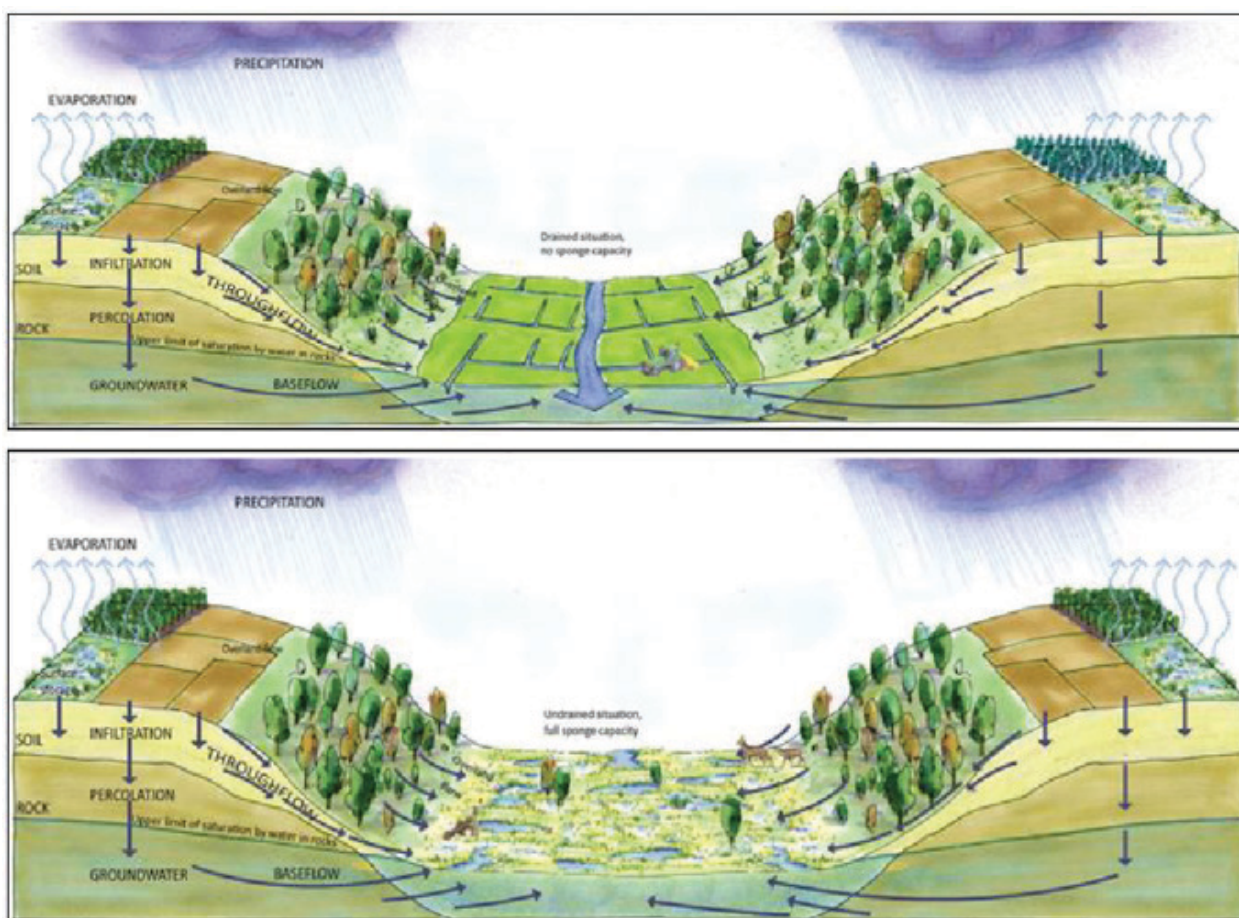


Fig. 1. Before and after restoring sponge function. Comparison of a degraded and restored landscape, illustrating how wetlands, vegetation and natural hydrological processes increase infiltration, groundwater recharge and water storage, while reducing rapid surface runoff. Credit: Bureau Strooming.

A growing body of peer-reviewed research shows that sponge restoration can deliver significant benefits for water resilience. While outcomes will depend strongly on local conditions, modelling from a German catchment at the epicentre of the 2021 floods found evidence of significant sponge effects:¹³

- Up to 30% reductions in local flood peaks.
- Around 20% increases in baseflows during dry periods, supporting improved drought resilience.
- Substantial reductions in nitrogen and phosphorus pollution, demonstrating important water quality co-benefits.

A Quick Guide to Improving the Sponge Function of Landscapes

Healthy soils are our most powerful ally in restoring the water cycle. When a raindrop is intercepted by vegetation, infiltrates easily into the ground or is slowed down in rivers, it does not immediately contribute to downstream flooding. This can help reduce flood peaks in soils that are not fully saturated, and lead to more water being stored for longer to help bridge dry periods.

In most landscapes, absorption and infiltration can often be improved by simple and low-cost measures, such as woody leaky dams, buffer strips, cover crops, mixed forests and hedges.

Principles of delaying water with NbS

-  1. Rain drop interception by rough vegetation
-  2. Rainwater reaching the surface is able to infiltrate
-  3. Water temporarily stored in soil layers should stay there as long as possible, otherwise re-infiltrate
-  4. Sub surface water rising to the surface should be stored in rough vegetation in the valley floors
-  5. Once water is in the riverbed, use natural floodplains to decrease the flow velocity

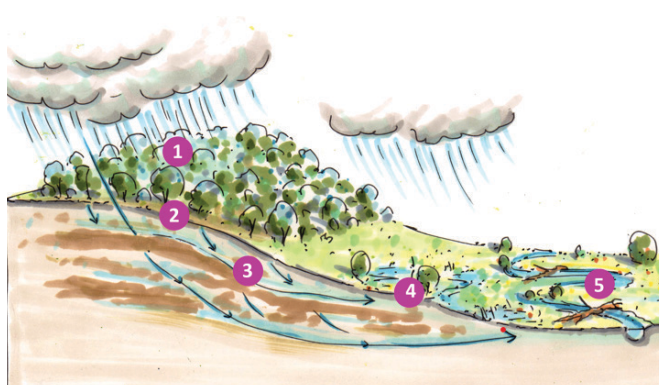
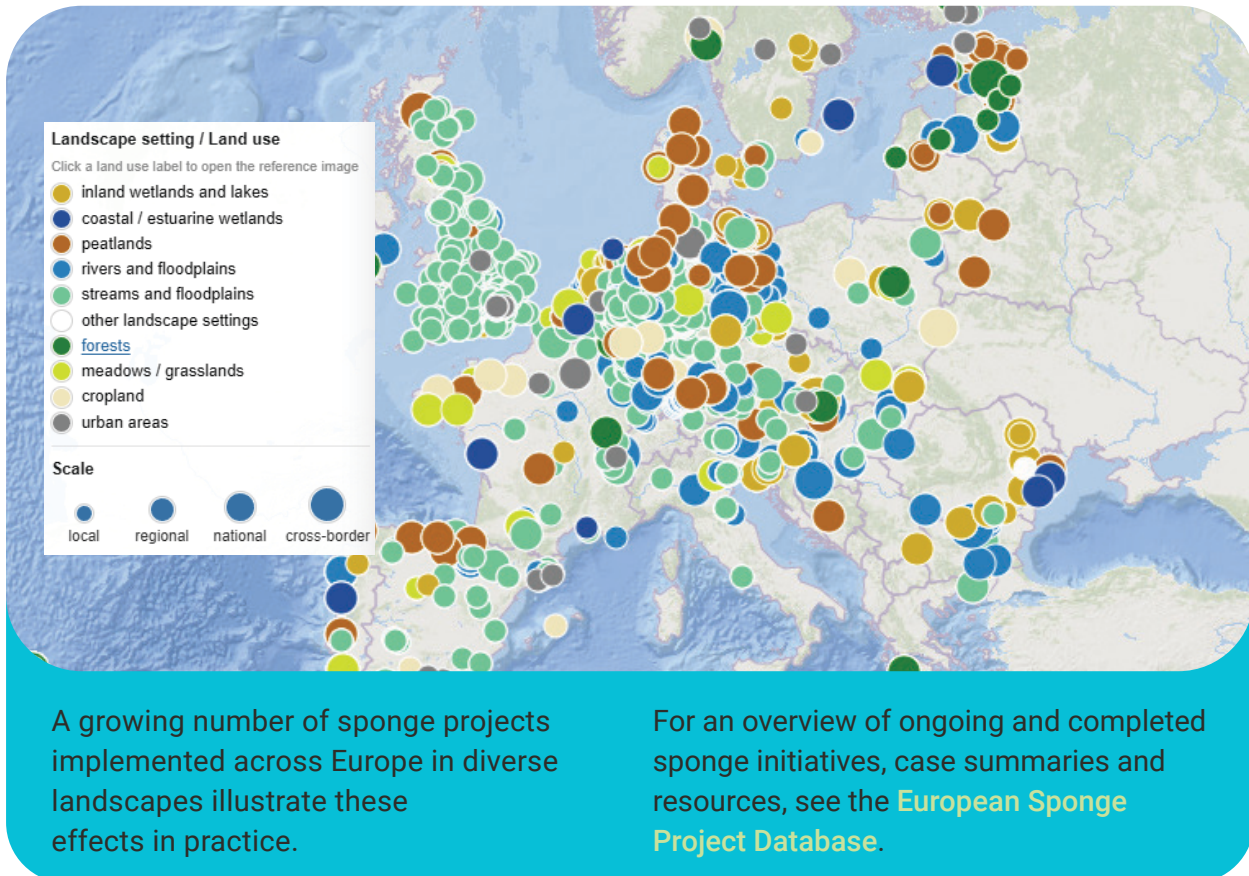


Fig. 2. Principles for improving the sponge function of landscapes. Examples of nature-based measures that increase infiltration, water retention and groundwater recharge. Credit: Bureau Strooming.

13 Nauta et al. (2024). Micro-Catchments, Macro Effects: Natural Water Retention Measures in the Kylldal Catchment, Germany. *Water*, 16(5), 733.



EU Policy Opportunities to Improve the Sponge Function

Restoring the sponge function of European landscapes provides a unifying opportunity that can deliver on multiple EU priorities simultaneously: reducing flood and fire risk, strengthening drought resilience, improving water quality, enhancing soil health, benefiting biodiversity, and supporting climate mitigation and adaptation.

This requires coordinating actions across entire landscapes and river catchments, where soils, wetlands, floodplains, forests and agricultural areas function together as part of a single water system. No single EU policy can restore this system alone. Progress depends on integrated, co-created visioning and implementation, ensuring that measures in one sector reinforce – rather than undermine – objectives in others.

The coming cycle of EU and national policy processes offers a critical opportunity to align plans and strategies across directives and funding programmes so they work together at catchment-scale, where sponge measures are most effective.

The following table outlines how stakeholders ranging from EU policymakers to national, regional and local level actors can engage with key EU policies to contribute to landscape-scale sponge restoration, and where upcoming plans and strategies – at EU, national and regional levels – can include natural sponge measures to deliver coherent, multi-benefit outcomes.

EU POLICY	OBJECTIVES	KEY SPONGE PROVISIONS	OPPORTUNITY & RECOMMENDATIONS
Water Framework Directive (WFD) (EC/2000/60) River Basin Management Plan (RBMP) 3 rd RBMP 2022–2027 4 th RBMP 2028–2033 Deadline Good status in all waters to be reached by 2015, and then by extending deadlines to 2027	Overarching EU Directive on water establishes a framework for the protection of inland surface transitional, coastal and groundwater. Legally binding objectives defined in Article 4.1: - Prevent the deterioration of the status of all waters - Achieve good status for all waters - Reverse any upward pollution trend in groundwater	River basin-scale planning to achieve good status and pollution reduction. Member States (MS) must assess water status and identify pressures preventing good status. RBMPs must include Programmes of Measures targeting these pressures. Achieving good ecological status requires improving hydromorphological conditions, including: - Reconnecting rivers with floodplains - Restoring wetlands and natural retention areas - Re-meandering and riverbank re-naturalisation - NbS to reduce, prevent, and remediate pollution	Engage in public consultations to help integrate sponge measures into 4th RBMPs to be finalised by December 2027. Highlight sponge restoration as a low-regret, catchment-scale solution that supports WFD objectives with co-benefits for droughts, floods and biodiversity. Integrate sponge measures in RBMPs to: - Improve hydromorphology - Increase water retention and baseflows - Reduce nutrient and sediment pollution Encourage water and land authorities to work together on improving the sponge function of soils.
Floods Directive (EC 2008/60) Flood Risk Management Plan (FRMP) 2 nd FRMP 2022–2027 3 rd FRMP 2028–2033	Directive focuses on the assessment and management of flood risks. MS required to: - Assess all areas where significant floods could take place - Map the flood extent and assets and humans at risk in these areas. - Create and update Flood Hazard Maps and Flood Risk Maps - Set flood risk management objectives and take adequate and coordinated measures to reduce flood risk - Take appropriate steps: "... achieving common synergies and benefits having regard to the environmental objectives laid down in the WFD"	River basin-scale ecosystem-based risk prevention: - FRMPs need to include "non-structural" measures, which reduce the likelihood of flooding - Non-structural measures include NbS - Article 7 requires that FRMPs take into account "...areas which have the potential to retain flood water, such as natural flood plains, the environmental objectives of article 4 (of WFD), soil and water management, spatial planning, land use, nature conservation"	Engage in public consultations to integrate sponge measures into 3rd FRMPs to be finalised by December 2027. Encourage public authorities to develop catchment/landscape modelling capacity to demonstrate what flood risk reduction can be achieved with a range of targeted sponge measures in catchments/landscapes. Improve cost-benefit and multi-criteria assessments of sponge measures to demonstrate their effectiveness for floods, drought and climate and water resilience, and include additional co-benefits related to biodiversity, socio-economic and human well-being criteria. Build the evidence base to position sponge measures as priority for flood finance in EU and national flood/climate adaptation funding schemes.

EU POLICY	OBJECTIVES	KEY SPONGE PROVISIONS	OPPORTUNITY & RECOMMENDATIONS
Drinking Water Directive (DWD) (re-cast 2020) (2020/2184)	The updated DWD aims to: - Ensure safe and clean drinking water for all Europeans - Improve monitoring and risk assessment - Promote sustainable water management	Catchment-scale risk management: - Risk assessment and risk management of the catchment areas for abstraction points of water intended for human consumption to be carried out for the first time by 12 July 2027 (Articles 7 + 8) - Restoring sponge capacity not only addresses water quantity but also addresses water quality issues as required by the DWD - Where the soil and landscape can better absorb, retain, slow down, and naturally filter water, this reduces pollution of surface and ground waters	Engage with water authorities to demonstrate that sponge measures can address both quality and quantity aspects into the catchment risk management approach. Advocate for the inclusion of targeted measures, e.g. native afforestation of headwaters, peatland restoration, restoring wetlands, organic farming in consultation and planning processes.
Water Resilience Strategy (WRS) (2025)	The WRS has 3 overarching aims : - Restoring and protecting the water cycle - Building a water-smart economy - Ensuring access to clean and affordable water for all	Sponge measures clearly contribute towards restoring the water cycle. The WRS also includes five clear sponge-relevant commitments: 'Sponge Facility' - Water Resilience Investment Accelerator - Green and Blue Corridors initiative - Research & Innovation (R&I) Strategy - Water Academy	Engage with DG ENV/CLIMA/ REGIO on the development of the Sponge Facility, the Water Resilient Investment Accelerator, and the Green and Blue Corridors Initiative by identifying barriers to scaling up sponge measures and how they could be overcome. Engage with DG RTD on the development of the R&I Strategy. Engage with EU Joint Research Centre on development of the Water Academy to ensure that it covers skills and training needed in land management/sponge measures for restoring the water cycle.

EU POLICY	OBJECTIVES	KEY SPONGE PROVISIONS	OPPORTUNITY & RECOMMENDATIONS
Land Use, Land-Use Change and Forestry Regulation (LULUCF) (2018/841)	The objective is to deliver land-based climate mitigation and carbon sequestration to reach the overall EU Climate Law objectives/targets (90% reduction GHG emissions by 2040 and net Zero by 2050). MS must report on their LULUCF obligations in their National Energy and Climate Plans.	Each MS has an individualised LULUCF target. Sponge measures to meet the target include: - Addressing emissions from drained organic soils (peatlands) by re-wetting/raising the water table - Afforestation and better forestry management (which can improve the sponge function of landscapes)	Engage with ministries to facilitate action on peatland re-wetting. Most MS with significant peatlands (e.g. NL, PL, DE, DK, IE, FI, EE, LV, LT) will not be able to meet their LULUCF targets by 2030 without peatland re-wetting/restoration. Such measures need to be included in National Nature Restoration Plans under the NRR, with clear funding allocation either from future CAP plans or a national funding mechanism.
Birds Directive (2009/147/EC) Habitats Directive (92/43/EEC)	The goal is to conserve Europe's most valuable and threatened species and habitats by ensuring their long-term survival through protection, management and the creation of the Natura 2000 network.	Scope: All habitats and species of Community interest (Annexes I, II, IV, V) must be reported every six years. Main components are: - Conservation status (range, population/area, structure & functions, future prospects) - Trends and pressures/threats - Conservation measures in place - Natura 2000 site contribution	Restoring wetlands and sponge sites directly supports the objectives by protecting key species, maintaining and connecting critical habitats, and enhancing ecosystem functions like water retention and flood mitigation, while ensuring long-term biodiversity and ecological resilience.
Nature Restoration Regulation (NRR) 2024/1991	The NRR requires MS to submit draft National Nature Restoration Plans (NNRPs) by September 2026. The measures in each MS plan have to contribute to restoring at least 20% of the EU's land and sea areas by 2030 and restoring all degraded ecosystems by 2050. In addition there are specific ecosystem restoration targets.	Specific ecosystem-based targets set out in Articles 5- 13 of most relevance to sponge measures: - Article 8 urban - Article 9 rivers and floodplains - Article 11 Agricultural ecosystems - Article 12 Forest ecosystems	Engage directly with ministries/other stakeholders in drafting the NNRPs and public consultation process to promote understanding of the sponge function and enhance the implementation of sponge measures as key restoration actions within urban, freshwater, agricultural and forest ecosystems.

EU POLICY	OBJECTIVES	KEY SPONGE PROVISIONS	OPPORTUNITY & RECOMMENDATIONS
Common Agriculture Policy (CAP) Strategic Plans Existing CAP Strategic Plans 2023-2027 Future CAP to be included as part of National and Regional Partnership Plans (from 2028)	CAP strategic plans submitted by MS must address environmental and climate issues as part of the overall EU funding support that goes to farmers.	The EC proposal for the future CAP introduces water and climate resilience as an objective. The new 'green architecture' of the CAP (within the National and Regional Partnership Plan) includes: • Farm stewardship • Agri-environment-climate • Organic payments • Compensation payments for mandatory commitments (Natura/WFD) • Non-productive investments • Transition payments • Cooperation All these instruments can be used to improve the sponge function of soils and landscapes for water, biodiversity and climate objectives.	Utilise the EC proposal for CAP post 2027 to identify how water resilience/sponge schemes could be supported in the future – and engage with local catchment communities and farmers to build support.
Soil Monitoring Law 2025/2360 First soil health assessment, December 2031	Newly enacted law to establish a coherent soil monitoring framework, to achieve healthy soils by 2050 so that they can provide multiple ecosystem services, prevent and mitigate the impacts of climate change and biodiversity loss, and increase resilience against natural disasters and in terms of food security. First ever EU law on soil health, including water retention.	Articles most relevant to sponge measures: • Article 6 sets out monitoring framework for soil health, soil sealing + development of soil health data portal • Article 7 soil descriptors, criteria for healthy soil condition, and soil sealing • Article 10 soil health assessments are carried out every six years • Article 11 support to land managers to improve soil health • Annex I, Part C, sets out the soil descriptors making up healthy soils which must be monitored. Of most significance for water resilience are: • Loss of soil organic carbon • Subsoil compaction • Reduction of soil water retention and infiltration	Consider how to use this new monitoring framework to build the evidence base for how improving soil health will build water resilience. Engage with ministries responsible for providing advice to farmers on soil health, to ensure knowledge on sponge function benefits is communicated.

EU POLICY	OBJECTIVES	KEY SPONGE PROVISIONS	OPPORTUNITY & RECOMMENDATIONS
EU Civil Protection Mechanism	As part of the proposals for the next Multiannual Financial Framework, the EC proposes to update and expand the existing civil protection mechanism. The over-arching objective is to “prevent, prepare for and respond to all kinds of natural and human-induced disasters”.	The article most relevant to preparedness (flood/drought/fire) is Article 4.2: a. strengthen the understanding and anticipation of disaster risks and threats, b. facilitate capacity building at Union and MS level (including uptake and use of research and innovation results, deployment of experts, technical and financial assistance to support strategies, plans and investment)	Engage with DG ECHO to identify how sponge capacity can be pursued through this mechanism as a priority action to build preparedness/reduce the impact of flood, drought and fire risks.
EU Integrated Framework on Climate Resilience Currently in development – scheduled for Q4 2026	The EC is developing a new integrated framework for European climate resilience and risk management to help MS prevent and prepare for the growing impacts of climate change. The main objective is to establish a more ambitious, comprehensive and coherent EU approach to climate resilience and preparedness, covering individual MS and the EU as a whole.	Initial call for evidence was summarised by DG CLIMA with the following priority actions: • Resilience-by-design in policies • Harmonised climate risk assessments • NbS as first line of defence • Stable long-term adaptation funding • Consideration of climate-related health impacts.	Prepare proposals for how sponge/NbS measures could be the first line of defence (e.g. ‘mandated’ through the legal framework drawing on examples of where this has been done, or given priority funding). Contribute with evidence on sponge measures for the Impact Assessment.

EU-Funded Research and Innovation on Sponge Landscapes

Three EU Horizon projects are currently advancing knowledge and practical implementation of sponge landscapes across Europe.

SpongeBoost focuses on developing guidance and transformative approaches to strengthen resilience to extreme weather, drawing on best practices and examples from across Europe to support policy, restoration and land-use planning.

SpongeScapes builds the scientific evidence base by analysing the sponge function of soils,

groundwater and surface water, using extensive reviews of existing measures and case studies to support co-creation of integrated, catchment-scale strategies.

SpongeWorks complements this research with a strong emphasis on innovation and real-world testing, implementing sponge measures and developing sponge strategies in large demonstrators in Greece, France and the German–Dutch Vecht catchment, and upscaling this through eight associated regions.