REPORT

Towards regenerative landscapes: embedding water resilience in EU biosphere strategies

Following the High Level Group 15th meeting on 4 April 2025

Summary and main outcome of the HLG meeting

During its 14th meeting, chaired by Phil Hogan, the independent tripartite High Level Group on Agri-Food System Innovation continued its role as a laboratory for EU policy innovation in this specific realm.

This role was given to these High Level Groups by the Competitiveness Council Presidency in 2011[1], aiming at inclusive policy innovation by thinking "outside the box". Members are a diverse group of experts from the public, private, and academic sector, brainstorming together according to the Socratic dialogue method, in order to reach operable ideas.[2]

Key recommendations:

- **Water management must be embedded as a central pillar in future EU agriculture and forest policies,** recognising its role as both a critical input and an ecosystem service. A systemic, cross- sectoral approach guided by the WEFE nexus will be essential to build climate resilience, manage environmental shocks and unlock regenerative opportunities across Europe.

- **Targeted investments in soil's water retention capacity, regenerative agriculture and farmer advisory systems** should be priorities by the EU. Future agricultural funding, including CAP reforms, should directly support water-centred interventions.

- **High-level meetings, e.g. among EU agriculture ministers, must urgently prioritise regenerative hydrology and nature-based solutions** within the current CAP and broader

[1] Council of the EU, 5-6 December 2011, Presidency Note.
[2] Members participate in their personal capacity. All recommendations for action and all ideas for further consideration have not always been agreed on by all members, but each advice is based on a very wide consensus. The final version is written under responsibility of the chairperson and the executive director. More information is available at: https://www.highlevelgroup.eu/

agricultural reforms. Europe cannot afford further delays: immediate, coordinated investment in water resilience is essential to prevent escalating climate, economic and ecological crises.

- **Actions plans should be further elaborated in current and upcoming EU policies.** Integrating water cycle restoration, boosting investment in regenerative landscapes and deployment Earth Observation tools from ESA will drive and secure Europe's climate resilience.

- In addition, **water policy** should include the role of water use in other areas, such as energy or digital, where water plays a role in cooling systems, or in tourism infrastructures.

1. Water-energy-food nexus: a new policy approach

Rising environmental and financial pressures are intensifying calls for agri-food system reform. From increasing droughts and floods to the impending reforms of the Multiannual Financial Framework (MFF) and the Common Agricultural Policy (CAP), the system faces growing challenges that demand coordinated, strategic responses.

Against this background, a major obstacle to this transformation remains the EU's siloed policy approach, which fails to reflect the interconnections and interdependencies of agri-food systems. The insufficient integration of the water management into current agricultural policies is a striking example of such an approach, despite water's central role in sustaining the agricultural sector. This is visible in past EU initiatives as well, where fragmented governance and a lack of systemic thinking led to a disconnect between the CAP and the Water Framework Directive. To avoid repeating these mistakes and enable agri-food system transformation, policymakers must now recognise and integrate the central role of water management into EU agricultural policies.

Achieving this goal will require a paradigm shift in agricultural and forest policymaking - one that recognises water both as a vital input for agriculture and as a provider of ecosystem services that underpin the sector's productivity, resilience and sustainability. At the same time, land use must be valued not only for its economic function but also for its critical role in regulating water cycles—including usage - agriculture accounts for around 70% of global freshwater withdrawals- and storage across farming, forestry and fisheries. Advancing this integrated land and water approach—through the Water-Energy-Food-Ecosystems (WEFE) nexus—will be essential to address and efficiently manage environmental shocks such as disrupted hydrological cycles, desertification and extreme heat, through EU policies.

Such a systemic perspective will promote more coherent, cross-sectoral resource management at multiple governance levels. It will enable policymakers to identify trade-offs, develop synergies and

ensure more integrated and cost-effective decision-making—spanning planning, implementation, monitoring and evaluation of EU agriculture policies. This would also help unlock opportunities for regeneration and support companies in adopting sustainable, integrated investment strategies.

2. Water cycles contribution to climate stability and risks' reduction

Notwithstanding the growing recognition of climate-related risks, water retention capacity—essential for mitigating floods, droughts, and local temperature extremes—remains largely underappreciated as a public good in Europe. Yet, this water dimension remains strictly dependent on both land management and hydrological systems, calling for a greater recognition in improving EU climate resilience.

2.1 Regenerative Agriculture: leveraging soil to rebuild the water cycle

Agriculture plays a central role in supporting water cycles and their optimal functioning. Usually, this role can be assessed through key indicators, namely soil and landscape water retention capacity; vegetative cover; and sensible heat footprint - indicating the land's ability to dissipate solar heat. These elements also contribute to regulating energy flows and are critical in shaping landscape function.

In particular, soil's ability to absorb rainfall, i.e. its water retention capability, and feed it back into the hydrological cycle through plant transpiration and evaporation, creates a vital mechanism in maintaining climatic balance, commonly referred to as "green water". This mechanism, alongside other critical soil processes, such as carbon capture, plays a key role in shaping microclimates. As these microclimatic conditions shift, often gradually but cumulatively, they contribute to broader climate dynamics, reinforcing regional and even global climate change patterns. It follows that, due to their impact on climate change mitigation, greater attention within the EU policy framework should be directed toward soil quality and its water retention capacity —particularly through initiatives aimed at rebuilding land structure, increase organic matter and enhance vegetation cover, all of which have a direct influence on climate regulation.

At the same time, regenerative agriculture represents a viable pathway to support the sustainable use of the land, reduce the consumption of pesticides, restoring water cycles and stabilising the climate. It also supports rainfall absorption, reducing dependency on irrigation and mitigating pressure on water basins. However, this potential can only be fully realised if farmers are equipped with the appropriate tools, technical knowledge, and advisory support to implement and scale these practices effectively. Therefore, EU policymakers must recognise these emerging needs and work to establish an easier, cheaper and smarter ways to properly support farmers.

Integrated land management models - such as agroforestry, holistic pasture management, permaculture, and natural sequence farming - further amplify these benefits by combining crops, especially high protein ones, e.g. soybeans, chickpeas and lentils, with cereals and cover crops (e.g. clover) , alongside livestock and trees, in mutually reinforcing systems. Complementary techniques like rainwater harvesting, cover cropping, crop rotation and organic fertilisation – which help avoid the use of chemical pesticides - can also significantly boost water retention and overall soil health. Nonetheless, the water-related outcomes of regenerative practices are still not fully understood. Without a clearer grasp of how water cycles interact with land use, contradictions and inefficiencies in implementation may persist. Scientists and policymakers must therefore work more closely to assess and integrate water dynamics into regenerative strategies, ensuring coherent and effective interventions.[3]

Moreover, a deeper understanding of the rainwater budget—the volume and timing of rainfall available for each specific plot of land—is essential. Current agricultural practices often prioritise immediate plant needs, without considering long-term rainwater availability or its broader role in the water cycle. This highlights the public good nature of soil and water management: sustaining them requires coordination beyond individual farms, engaging multiple stakeholders for the long-term stability of water systems and climate conditions. Future EU agriculture and forestry policies must embed this systemic understanding, positioning water as a central pillar in climate mitigation efforts.

2.2 Regenerative Hydrology: enhancing climate resilience through water cycle management

Just as regenerative agriculture supports soil health and biodiversity, regenerative hydrology focuses on restoring and optimising the water cycle to enhance landscape resilience and climate stability. It is a long-term strategy aimed at preventing environmental degradation and mitigating the impacts of extreme weather events.

In more detail, regenerative hydrology seeks to maximise the effectiveness of the water cycle by improving four core functions: receiving rainfall; recharging groundwater; retaining moisture in soils and vegetation; releasing water gradually back into the atmosphere and waterways. This approach aligns with the Water-Energy-Food-Ecosystems (WEFE) nexus mentioned above and directly contributes to several Sustainable Development Goals (SDGs).

For instance, under this framework, watersheds can be seen as ecological “accounts” in which water must be managed as a regenerative asset. Ensuring a positive water balance in local catchments generates returns in the form of climate stability, ecosystem health and productivity. These “returns”

[3] https://www.frontiersin.org/journals/sustainable-food-systems/articles/10.3389/fsufs.2022.891709/full

must then be reinvested -through soil management, land use planning, and rehydration interventions- to build long-term resilience. It follows that establishing and including coordinated action into EU policies to increase the continent's water retention capacity could deliver significant environmental and socio-economic benefits.

Furthermore, these improvements would not only help regulate climate conditions but also support the production of biomass, stabilise erosion lines and create new economic opportunities for different stakeholders. Thus, regenerative hydrology can be seen as one-time investments – which are relatively modest compared to the escalating costs of climate-induced disasters and land degradation - that produce several co-benefits, include CO_2 sequestration, enhanced ecosystem services and job creation in rural areas.

However, to unlock this potential requires the activation of a new economic model that links land stewards, financial institutions and policy frameworks. While substantial funds exist under climate finance instruments such as the EU Emissions Trading System (ETS), few mechanisms are able to channel these resources to local actors managing land and water. A transparent and accessible funding framework must be developed to support nature-based solutions at scale.

The Common Agricultural Policy (CAP), which influences over 80% of Europe's water budget, could be central to this transformation. Meanwhile, other policy instruments should be restructured to promote integrated water-soil management, support local-level planning, and incentivise nature-based solutions. Stronger integration between agricultural and water policies would provide the institutional foundation necessary for long-term change.

Through the restructuring of funds and policy instruments, farmers, foresters, and land managers, which are already contributing to water cycle regulation through regenerative agriculture, could enlarge their role contributing to regenerative hydrology, with their role becoming even more strategic, provided they receive proper support. Agronomists, who often enjoy the trust of farmers, can act as key enablers in translating knowledge into practice and the EU should support this through dedicated instruments.

Additional measures that should be considered to help expand regenerative hydrology include: Developing local water plans in parallel with land-use strategies; Supporting innovative solutions that combine water harvesting with renewable energy (e.g., solar panels with rainwater collection); Enhancing monitoring systems to track progress through indicators such as photosynthesis rates and soil water content.

To operationalise these changes, high level meetings in the institutions, particularly among agriculture and fisheries ministers, should prioritise supporting nature-based solutions within existing agricultural frameworks, and even more critically, through the next revision of the CAP.

However, timely action is needed as Europe cannot afford to wait several more years to act. Past experiences with droughts followed by devastating floods show the urgency of integrating climate resilience into land and water management. The time is ripe to open a new chapter in EU agricultural and environmental policy—grounded in ecosystem restoration and climate stability.

3. Action Plans and the need to adapt climate policies

Managing landscapes more effectively and shifting different stakeholders' perception will require a change in the design and implementation of climate policies and action plans. This can be adone in several existing policies, such as the EU Soil Strategy, JRC strategies and the EU Soil Mission, which offer a suitable framework for this different approach, but new and complementary action plans are also needed.

To efficiently develop action plans focused on the need to restore water cycle, landowners and local stakeholders should be involved in their drafting. Such engagement will help them recognise the strategic importance of investing in water cycle restoration. In particular, the involvement of national governments in EU policies will determine the successful outcome of this landscape restoration programme. This has already been demonstrated in Slovakia, where over 10,000 people actively participated in activities aimed at enhancing water retention capacity following the establishment of a national goal.

To ensure lasting impact, such programmes must also address urbanisation patterns and land-use changes. For instance, the Slovak planning authority is incorporating water retention criteria into new building assessments—rewarding structures that include green elements.

Furthermore, The BIOEAST Initiative could offer a practical model for developing integrated, multi-level action plans. Its pillars include: Monitoring small water cycles and advancing integrated water and soil planning at EU, national, and local levels; Maintaining and restoring small water cycles through adaptation measures and land rehydration; Financing nature-based solutions (NBS) and soil health via solidarity mechanisms and ecosystem service payments; Aligning policies across soil, water, and climate (WEFE nexus), and embedding water production as a recognised task of farmers within future CAP reforms.

It will be crucial for these approaches to be reflected in post-2027 CAP reforms. In the meantime, short-term aligned advisory services and climate action initiatives at the local level must be developed. Such alignment will help address key barriers—especially for small farmers who are expected to deliver on soil, water, and climate objectives while facing increasing financial pressures, as the true cost of sustainable production is not yet adequately reflected in market prices. Flexibility mechanisms, such as those used in response to recent floods in Valencia, must be scaled up to address both recurrent risks and broader climate resilience.

Furthermore, rather than reacting to damage post-flood, EU policies should prioritise proactive action plans that can increase water retention capacity and reduce risk. Nonetheless, emergency funding mechanisms should be formalised and embedded into national CAP implementation strategies.

A turning point in action planning would be the full integration of Earth Observation data provided by the European Space Agency (ESA). Satellite imagery, thermal data and digital landscape mapping can support informed decisions and real-time adaptation. Tools such as LUCAS (Land Use/Cover Area Frame Survey) provide high-resolution indicators of water retention capacity and soil organic carbon, allowing for accurate monitoring and evidence-based policymaking. Pilot projects also demonstrate the feasibility and added value of integrating ESA tools into land management. The question is no longer whether we can use these data for policymaking, but how we can scale up their application across Europe in support of resilient landscapes.

Lastly, it is clear that true climate resilience cannot be achieved through the optimisation of existing systems alone; transformative change is required. Systemic theory and practical experience propose three complementary pathways to enable change, i.e.:

1. Incremental transformation through bottom-up initiatives and small-scale pilots that gradually scale up;
2. Strategic flagship interventions, such as the African Great Green Wall, to catalyse change and inspire replication;
3. Structural reform of incentive systems, notably the CAP and forest strategy, to re-align financial flows with long-term ecosystem stability
4. Interdependence of the above with other economic sectors.

At present, a balanced mix of these approaches may be necessary to accelerate change, overcome institutional inertia and address both immediate climate risks and long-term sustainability goals.

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