

Addressing WEFE nexus challenges in the Nestos/Mesta river basin

The Nestos/Mesta river basin, shared between Greece and Bulgaria, spans 243 km and supports a vital ecosystem. Its delta is protected under the Ramsar Convention and is considered as a first priority site under EU Natura 2000. In Greece (downstream), two dams generate electricity while also supplying water for irrigation and maintaining a basic ecological flow. Agriculture and livestock are the main sources of income in both countries.



The complex challenges that Nestos/Mesta river basin faces, were identified through a stakeholder co-creation process and are related to: flood risk management and coastal erosion, preservation of the ecologically-significant delta, compromise of transboundary water-diplomacy issues, monitoring water quality, management of conflicts between the water and energy sectors, climate change impacts on the aquatic ecosystem, waste disposal, absence of transboundary cooperations and common action plans, agricultural development under climate change conditions, maintenance of ecological flow, reduction of water losses (water saving) and increase of energy generated from multiple renewable energy sources.

NEXOGENESIS' actions in the River basin

Implementation of the NEXOGENESIS co-creation approach / Stakeholder Engagement process aimed to:

- **Co-explore existing pressures and challenges** in managing the WEFE nexus.
- **Co-design solutions and policies** for efficient, sustainable, and integrated WEFE nexus management.
- **Co-decide on policy implementation** through a Governance Roadmap.

The NEXOGENESIS activities include :

- Organisation of international workshops between Greece and Bulgaria
- Establishment of a core group of local stakeholders interested in the evolution of the project and the exploitation of its outcomes / Trust building
- Development of an advanced hydrological model covering the entire basin
- Development of a conceptual map/model depicting the interlinkages among the WEFE nexus sectors
- Development of a System Dynamics Model (SDM) including quantitative data and quantified interlinkages among the WEFE nexus sectors
- Policy quantification
- Development of the Nestos/Mesta NEPAT supporting policy impact assessment and policy recommendations via a Decision Support System

Stakeholder Engagement Goals

The main goals of engaging stakeholders are to gather information, delve into local characteristics, exchange knowledge, understand local needs, build on stakeholders' priorities, set future goals, develop relevant solutions and design efficient policies for managing current and future challenges:

- **Understand the system (system knowledge): investigate** existing pressures, challenges, hot-spots, **identify** conflicts, trade-offs and synergies (e.g. water, energy, food production), **learn** about ongoing projects, **explore** local priorities.
- **Plan for the future (target knowledge): elicit** stakeholders' expectations, **co-design** broadly accepted solutions, **assess** policy impacts (NEPAT), **focus** on common interests.
- **Support change (transformation knowledge): design** Governance Roadmaps/agreement on policy implementation, **establish** trustful relationships with key stakeholder groups to promote project results/stakeholder engagement sustainment.

Implementation and testing of the NEPAT tool: main functionalities & comparative advantages

NEPAT is an **interactive online solution** (a web tool) designed to improve nexus understanding and support **stakeholder dialogue** about **WEFE nexus interlinkages and policymaking**. The tool incorporates different functionalities:

- Policy impact assessment
- Policy recommendations - Decision Support System (DSS)
- Artificial intelligence algorithms supporting generation of innovative knowledge
- A System Dynamics Model (SDM) to support future policy recommendations under various IPCC scenarios (RCP2.6, RCP8.5, SSP2 and SSP4)
- Realistic results incorporating stakeholders' priorities and capturing their interest
- DSS supporting decision-making

Roadmap & preliminary results:



Theory of change: logical sequence of outcomes supporting system transformation



Policy goals and measures targeting: efficient water management & renewable energy generation



Local stakeholder coalitions to convince high-level decision makers for the necessity of the suggested changes and to "push" for implementation
 Channels: Local stakeholders > Municipalities > Regional authorities > National authorities

Lessons learnt: Bridging borders, balancing resources and building trust

The Nestos/Mesta case study illustrates the complexity of balancing water, energy, food and ecosystem management across borders. NEXOGENESIS provided a neutral platform for dialogue, governance challenges - such as *regulatory loopholes, power imbalances, and limited transboundary cooperation* - hindered meaningful progress. Language barriers, differing regulations and restricted data sharing between Greece and Bulgaria further complicated collaboration, while local stakeholders faced difficulties adapting to collective decision-making due to the lack of similar past experience. However, NEXOGENESIS introduced valuable tools and fostered a sense of shared responsibility, laying the groundwork for future change. Ensuring lasting impact, however, requires ongoing support beyond individual project cycles to maintain engagement and institutionalise cooperation.

The Nestos/Mesta case study also **highlighted the urgent need for stronger multi-level governance to bridge the gap between local innovation and national policy implementation. While EU-funded projects drive bottom-up solutions, their impact remains fragmented without formal mechanisms for integrating research findings into national decision-making.** Reliance on informal networks leads to inconsistent outcomes, reducing the potential for widespread adoption. To enhance the effectiveness of research and innovation, the EU could implement structured consultation processes, accountability measures, and funding incentives that promote collaboration across administrative levels. Ultimately, the Nestos/Mesta experience reveals that **successful water governance is as much about trust, power dynamics, and long-term engagement** as it is about technical solutions - requiring sustained commitment beyond traditional project timelines.

Recommendations: Bridging gaps, building trust - Strengthening multi-level governance for water management in Europe

1.Strengthening Multi-Level Governance for Policy Integration

Fragmented governance in Greece and other EU states limits effective water management. To bridge this gap, the EU could:

- **Formalise Consultation Mechanisms:** require ministries to review and integrate locally developed solutions from EU-funded projects.
- **Establish Accountability Measures:** implement reporting systems to track policy adoption of research-driven initiatives.
- **Encourage Collaboration:** use funding incentives to foster cooperation between local and central authorities.

Shifting from voluntary cooperation to structured governance ensures local innovations contribute to broader policy improvements.

2. Strengthening Multi-Level Governance for Policy Integration

Many EU-funded solutions fail to gain national traction due to reliance on informal networks. To address this, the EU could

- **Reduce Reliance on Informal Networks:** create institutional pathways for integrating research into national and EU policymaking.
- **Condition Funding on Policy Engagement:** Link funding eligibility to engagement between local and national stakeholders.
- **Develop Performance Metrics:** Track how local solutions inform national policies.

This will ensure that research is systematically considered, maximising the impact of EU investments.

3. Promoting Long-Term Engagement Beyond Project Cycles

To ensure sustained collaboration beyond funding cycles, the EU should:

- **Support Institutionalisation of Stakeholder Platforms:** Encourage formal multi-stakeholder networks beyond project lifespans.
- **Ensure Financial and Technical Support for Continuity:** Provide follow-up funding to maintain engagement.
- **Promote Adaptive Governance Models:** Create mechanisms for continuous feedback and policy refinement.

Long-term support is vital to avoid fragmented decision-making after projects end.

4. Leveraging the Nestos/Mesta Experience to Inform Future EU Policies

The Nestos/Mesta case highlights the importance of trust, cooperation, and bridging divides in water governance. Key lessons include:

- **Prioritise Trust-Building Initiatives:** Invest in capacity-building and cross-border platforms.
- **Adapt Policies to Local Realities:** Allow flexibility in EU directives to address local challenges.
- **Enhance Cross-Border Collaboration:** Strengthen support for shared decision-making in transboundary water management.

Conclusion: Toward a More Cohesive EU Governance Approach

Effective resource management requires strong policies, technical solutions, and robust governance frameworks. By reinforcing multi-level governance, structured policy integration, and long-term engagement, the EU can unlock the full potential of research-driven solutions and foster lasting cooperation across decision-making levels.

More about the project on our website: <https://nexogenesis.eu/>

