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MAINSTREAMING AND UPSCALING NATURE BASED SOLUTIONS IN NORTHWEST EUROPE: EXPERIENCES FROM SMALL AND LARGE SCALE PILOTS

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ABSTRACT

This paper explores the mainstreaming and upscaling of Nature-Based Solutions (NbS) in Northwest Europe, focusing on experiences from the INTERREG ResiRiver project. It highlights key concepts such as NbS, mainstreaming, and upscaling, using case studies from nine pilot projects across Belgium, France, Germany, Ireland, and the Netherlands. The study applies the IUCN Global Standard for NbS to establish a baseline, emphasizing the importance of iterative assessments and co-benefit valuation. Challenges in governance, economic feasibility, and adaptive management are discussed. The paper concludes by advocating for robust communication strategies and international collaboration to accelerate NbS adoption.

Keywords: *Nature based Solutions; mainstreaming; upscaling; assessment framework*

1. Introduction

Nature-Based Solutions (NbS) are innovative approaches that leverage natural processes and ecosystems to address societal challenges, such as climate change, flood risk management, biodiversity loss, and water quality improvement. These solutions include measures like river restoration, wetland creation, afforestation, and the sustainable management of floodplains. NbS not only enhance ecosystem services but also provide cost-effective and sustainable alternatives to traditional grey infrastructure.

In Northwest Europe, NbS are gaining traction due to their potential to improve climate resilience while delivering co-benefits for biodiversity and human well-being. However, despite their growing popularity, mainstreaming and upscaling NbS face several challenges, including institutional inertia, funding constraints, and the need for robust scientific evidence to support decision-making.

This contribution focuses on strategies to integrate NbS into regional and national policies, and to scale their implementation across sectors and landscapes. By examining case studies and best practices from Northwest Europe, the study aims to provide actionable insights for overcoming barriers and maximizing the impact of NbS on climate adaptation and ecosystem health.

In this contribution, we use the experiences of the INTERREG ResiRiver project (Creating Resilient River Systems by Mainstreaming and Upscaling NbS, <https://resiriver.nweurope.eu/>) to get a firm grip on the concepts of Mainstreaming and Upscaling, aiming at boosting the application of NbS in European rivers on various scale and to prepare river managers to apply the concepts as alternatives to, or in combination with more engineering like flood risk, or river restoration projects. The experiences come from 9 different pilots, in Belgium, France, Germany, Ireland and The Netherlands. The cover large scale lowland rivers like the Rhine River and the Rhône River, smaller streams like the Lys in Northern France, as well as Group Water Schemes providing drinking water in Ireland.

2. The importance of definitions

In order to avoid misunderstanding and confusion, it's important to define concepts when talking about NbS, mainstreaming and upscaling. Here, we use the definition provided by the International Union for the Conservation of Nature (IUCN 2020):

Nature based Solutions are Actions to protect, manage and restore natural or modified ecosystems, which address societal challenges, effectively and adaptively, providing human well-being and biodiversity benefits.

This definition is increasingly used in literature and applications. Mainstreaming and Upscaling are less well defined, and consequently cause more debate on the precise meaning and implication for NbS. Here, we use the following definition for Mainstreaming:

Mainstreaming is achieving that in a river project (aimed at ecological restoration, reduction of flood risk, or otherwise) the concept of NbS is always considered as a full fledged alternative to 'hard' engineering solutions and that an objective (and quantifiable) consideration is made between the alternatives.

And for Upscaling:

Upscaling involves leaving the phase of constructing projects as pilots at isolated spots, and apply the concept to larg(er) river stretches (with the question whether the same principles apply as in a pilot phase).

Clear and consistent definitions are crucial for the effective implementation of Nature-Based Solutions (NbS), mainstreaming, and upscaling. They ensure a shared understanding among stakeholders, preventing misinterpretations that could hinder project outcomes. Proper definitions also facilitate objective comparisons between NbS and traditional solutions, enabling informed decision-making. Moreover, standardized terminology supports better communication across disciplines, enhancing collaboration and promoting broader acceptance of NbS in policy and practice.

3. Experiences from the pilots

First of all, we applied the IUCN Global Standard for Nature-based Solutions (an online self-assessment tool that consists of eight criteria and associated indicators, which address the pillars of sustainable development (biodiversity, economy and society) and resilient project management) on our pilots. This provides a baseline for further development of the pilots, and by regular monitoring in time we can assess the development of the pilots, and study challenges and successes in applying NbS with respect to flood risk reduction, ecological functioning and societal acceptance.

The meta-analysis of the ResiRiver pilots highlights several key conclusions regarding Nature-Based Solutions (NbS). First, most pilots are still in early phases, making it challenging to provide comprehensive assessments due to limited data. Second, stakeholder engagement and inclusive governance are generally strong across pilots, though implementation varies. Third, economic feasibility and trade-offs often score lower, reflecting difficulties in quantifying ecosystem service benefits and ensuring financial sustainability. Fourth, adaptive management and monitoring remain underdeveloped, emphasizing the need for iterative learning frameworks. Finally, while the IUCN self-assessment tool is valuable, its flexibility results in subjective interpretations, underscoring the importance of standardized application and multiple assessment iterations to enhance learning and comparability.

This baseline assessment also revealed that the application of the IUCN tool is not straightforward and requires quite some effort to apply. Based on these experiences, we are now in the process of developing a light-version of the tool for quicker assessment. Having the pilots at hand in this project enables us to test the usability of this simplified tool within the ResiRiver project.

4. The need for a Result Based Framework and the valuation of co-benefits

Studies from Berg et al., (2024a) and Berg et al., (2024b) show that the IUCN Standard is admittedly an overarching framework that can be used for the assessment of a broad range of NbS, but it is also a process-based framework. This means that it is less suitable to assess the outcome and output of a NbS-initiative. Preliminary work within ResiRiver indicates that for a proper assessment, the IUCN Standard is best used in combination with a results-based framework. Hence, we are currently studying whether we can use an 'of the shelf'-framework, or whether it is more effective to establish indicators based on the physical properties and

societal embedding of the pilots, and develop a project-specific results-based framework. The latter activity also enables us to pay specific attention to the co-benefits NbS, and ways to quantify these.

Nature-Based Solutions (NbS) usually provide multiple co-benefits, including enhanced biodiversity, improved water quality, carbon sequestration, and social benefits like recreation and public health. However, these co-benefits are often overlooked or inadequately quantified, limiting their integration into decision-making. Assessing co-benefits is essential to demonstrate the full value of NbS, justify investments, and support mainstreaming. It enables a holistic evaluation of projects, balancing ecological, social, and economic outcomes. Furthermore, understanding co-benefits can foster stakeholder buy-in and highlight synergies with policy objectives. Thus, systematic co-benefit assessments are crucial for scaling NbS implementation

5. Communication about NbS

Effective communication is crucial for mainstreaming Nature-Based Solutions (NbS). Policy briefs play a vital role by condensing complex research into accessible, actionable formats tailored for policymakers. They highlight key findings, co-benefits, and recommendations, bridging the gap between science and policy. However, policy briefs alone may not suffice; combining them with other communication tools, like webinars, infographics, and social media, enhances outreach. Targeted strategies, such as partnering with social media platforms and connecting with other international research projects on NbS (INTERREG, Horizon, and national programs in the various partner countries), ensure broader and sustained visibility. An example of communication through social media within ResiRiver is ‘the pilot in the spotlight’, where we pay attention to one of the pilots by sharing the state of the art about the implementation, and connecting to successes in connecting to society. We also share ‘Virtual Excursions’, which give a clear impression of how the pilot looks in the field, combined with expert-elucidation about details of the pilot. We conclude that clear, concise messaging fosters stakeholder engagement, overcomes resistance and builds trust in NbS implementation.

6. Conclusion and the way forward

ResiRiver is a fine example of (1) sharing experiences of implementing pilots in the fields, which leads to (2) an active learning platform that shares information among the Resi-river partners but also the wider NbS-community to building upon, and (3) developing further existing scientific information concerning assessment of NbS. Effectiveness of this workflow is guaranteed by half yearly in person meetings, where experiences, challenges and successes are shared and where new goals are set.

In the next couple of years, further steps will be made in the process of mainstreaming and upscaling, actively using the experience of the pilots in implementing the NbS. Special attention will be put on contributing to the scientific evidence that NbS have clear advantages above pure grey solutions (not notwithstanding that there is also an added value in hybrid, green-grey solutions). We also acknowledge that international cooperation between different organizations, with different legislation and governance, paves the way to a wider application of NbS throughout Europe, contributing to the EU-goal of restoring 25.000 km. of free-flowing rivers by 2030 as laid down in the ambitions of the EU Biodiversity Strategy.

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References

- Berg, M., Schielen, R.M.J., Spray, C.S., Blom, A., Slinger, J.H., Stancanelli, L.M., Snoek, Y., (2024a). Assessing the IUCN Global Standard for Nature-based Solutions in Riverine Flood Risk Mitigation. *Environ. Dev.* 51, 101025, ISSN 2211-4645, <https://doi.org/10.1016/j.envdev.2024.101025>.
- Berg, M., Spray, C.S., Blom, A., Slinger, J.H., Stancanelli, L.M., Snoek, Y., R.M.J. Schielen (2024b), Assessing the IUCN global standard as a framework for nature-based solutions in river flood management applications, *Science of The Total Environment*, Volume 950, 175269, ISSN 0048-9697, <https://doi.org/10.1016/j.scitotenv.2024.175269>.
- IUCN, 2020. Global Standard for Nature-Based Solutions. A User-Friendly Framework for the Verification, Design and Scaling up of NbS, first ed. IUCN, Gland, Switzerland. <https://doi.org/10.2305/IUCN.CH.2020.08.en>.