MERLIN

Deliverable D2.2: Synthesis of the Interim Regional Scalability Plans

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MERLIN

Imprint

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Lead contractor: Syke and Deltares

Contributors: Aarhus University, Naturstyrelsen Denmark, Swedish Forest Agency, Swedish University of Agricultural Sciences, Kampinos National Park, Warsaw University of Life Sciences, Ponte de Lima municipality, University of Lisbon, Syke Finnish Environment Institute, Tapio, James Hutton Institute, Scottish Natural Heritage, UK Centre For Ecology & Hydrology, University of Stirling, Forth River Trust, University of the Basque Country, Gipuzkoa Provincial Council, Emschergenossenschaft/Lippeverband, University of Duisburg-Essen, Directorate-General for Agriculture and Rural Development Portugal, Kishon Drainage and River Authority, Tel Aviv University, Province of East Flanders, Ghent University, Scottish Natural Heritage, UK Centre For Ecology & Hydrology, Dutch Ministry of Infrastructure and Water Management, Deltares, University of Natural Resources and Life Sciences Vienna, Via Donau Österreichische Wasserstraßen Gesellschaft MBH, WWF Hungary, National Institute for Research and Development of Marine Geology and Geoecology Romania, WWF Romania, Balaton Limnological Research Institute Hungary, Federal Institute of Hydrology Germany

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MERLIN Key messages

1. The interim regional scalability plans (RSP) are the next step on the roadmap to upscale freshwater ecosystem restoration after the optimisation strategies (MERLIN Deliverable 2.1). They offer visions for upscaling restoration across wider areas by 2050.
2. A template has been designed for collecting input using the manual "Scaling up – From vision to Large-Scale Change. A Management Framework for Practitioners" (Management Systems International 2016).
3. Seventeen case studies have prepared their interim RSPs answering questions related to the 'what, 'why', 'where', 'how', and 'who' of scaling up restoration initiatives.
4. Further dialogue between cases from each cluster will provide inspiration and feedback to work towards a final RSP at the end of the MERLIN project.
5. The upscaling in the RSPs has a time horizon towards 2050, and recommendations have been made to strengthen this visioning. This long-term visioning should be linked with stepwise implementation, for which the use of adaptive pathway thinking can be used as inspiration.
6. The term 'restoration' of freshwater ecosystems might put people on the wrong page in the light of changing climate and land use and the time horizon of the RSP. Improving freshwater ecosystems should take these shifting conditions into account to define realistic targets both for biodiversity and delivering ecosystem services.
7. The formation of multidisciplinary teams that cover the bio-physical, socio-economic and legal/financial aspects of the RSPs is beneficial for the overarching success of the plans. A well embedded monitoring strategy across all these disciplines is needed.
8. The interim RSPs have been prepared by each case study without interaction with the other case studies. The other interactions are with the financial expertise within MERLIN, the outcomes of the sector roundtables and with the case study board. These interactions will be the main actions to improve the RSPs.
9. RSPs are designed within the MERLIN project. The implementation of the RSP will be a process to start once the MERLIN project has ended in 2025. During MERLIN, it is essential to define the consortium to adopt and implement the RSP.

MERLIN Executive Summary

Restoration measures will be implemented at sixteen case studies within the lifetime of the EU Horizon MERLIN project (2021–2025). EU funding for these restoration activities amounts to almost 10 million €. Each MERLIN case study has developed their individual interim Regional Scalability Plan (RSP).

The RSPs aim to enhance community and stakeholder empowerment through co-production and co-management, improving biodiversity, delivery of ecosystem services and business models for effective and sustainable restoration and to inform regional strategic planning. They provide visions for upscaling restoration over larger geographical scales to reach more people by 2050.

This synthesis reports the responses of case studies, divided based on the cluster which are:

1. Peatlands and wetlands;
2. Small streams and basins;
3. Large transboundary rivers.

The case studies were provided with a template to fill in for preparing their interim RSPs, asking them to think about the "what, why, where, how, and who" of scaling up of freshwater restoration regionally. Six out of seven of the peatlands and wetlands case studies, four of the five small streams and basins, and all six of the large transboundary river case studies had prepared an interim RSP in time to be included in this synthesis.

There are many similarities between the case studies and the three clusters, while some more cluster specific messages also emerge.

- In reporting on all target audiences to the Regional Scalability Plan, all case studies' emphasis was on public agencies, though there were minor difference in the level (large transboundary rivers emphasised more the national/international aspects, the other two more on local and regional level authorities).

- In their visions in all the clusters, there were considerations for both environmental and ecological aspects, and management and policy related factors. Public awareness and people's understanding about the role and importance of different kinds of freshwater areas was raised by all, as was the importance of the taking different kinds of stakeholders into account. The visions varied in their time horizons, with some specifying a shorter timeline till 2030, others till 2050, and some did not include a timeline at all.

- On the question of 'what' to scale up, the clusters recognised the importance for the restoration activities to be holistic and have all relevant actors integrated into the process. The results for restoration techniques and tools, and for monitoring were a little more varied between the clusters.

- On 'why' to upscale, a wealth of different Green Deal Goals was identified as primary and secondary goals for the scaling up to achieve. Among the most frequently identified primary goals were climate regulation, biodiversity net gain, and flood and drought resilience. For secondary, health and well-being, inclusivity, and sustainable food systems were some of the most common goals.

- On 'where' to upscale, there was variation in all clusters between thinking about scaling up in the wider catchment area and applying the restoration in other, similar locations outside the catchment. Some case studies had very concrete ideas, whereas others will have further work and thinking to do in where to realise scaling up in practice.

- On 'how' to upscale and 'who' to include, the clusters recognised the importance of collaborative partnerships and participatory approaches. Including relevant stakeholders in the planning and implementation of restoration was seen to improve acceptability of restoration and thus improve the success of such measures.

Chapter 1 introduces and contextualises this synthesis within the larger MERLIN project. A description of the methodology and the interim RSP template can be found in Chapter 2. The results per cluster and a review of financial aspects are in Chapter 3, while Chapter 4 concludes and provides recommendations. Chapter 5 includes all the individual interim RSPs. References are found at the end of the report.

Content

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1 Introduction

The MERLIN project has 17 case studies covering a wide range of freshwater ecosystems within a basin (catchment, watershed)[1]. The case studies are grouped within three clusters: i) peatlands and wetlands, ii) small streams and basins and iii) large transboundary rivers (Figure 1; Figure 2). The ongoing restoration works in the case studies (Figure 1; Figure 2) are being monitored and evaluated within WP1 'Demonstration'. WP2 'Implementation' aims to further improve on these efforts by expanding the ideation of these restoration projects, further implementation and improvement towards optimisation strategies and prioritisation of future upscaling in a wider context. As a first step in this process a multi-perspective gap analysis has been made identifying the potential Strengths, Weaknesses, Opportunities and Threats (SWOT analysis) for improvement, optimisation and prioritisation. This gap-analysis was carried out jointly by the implementation and scientific partners of each case study, in dialogue with relevant stakeholders. The results of the IUCN Self-Assessment Tool (WP1) and the list of Green Deal goals formed the basis to structure the SWOT analysis to best connect the activities in WP1 'Demonstration' with WP2 'Implementation'.

To assist each case study individually in their future work, the results of the SWOT analysis were then used to develop optimisation strategies, with a focus on transformational change and accelerating the implementation of restoration efforts in collaboration and co-creation with relevant stakeholders and sectors (Buijse et al. 2022: MERLIN Deliverable 2.1 "Case study optimisation strategies"). The SWOT and optimisation strategy are steps in the process to come to the Regional Scalability Plans (Deliverable 2.2) and the implementation plans (Deliverable 2.3) for each case study (Figure 3).

About this report

This document presents a synthesis of interim RSPs. Each case study is asked to prepare an interim RSP in an early stage of the MERLIN project (M18). An intermediate synthesis of the regional scalability plans will serve as input for interaction with WP3 regarding financing and economics and WP4 regarding sector involvement and interaction with the case study boards. Based on those interactions a final and more extensive version of the RSP will be made (M36). The purpose of the RSPs is to have a mid- to long-term horizon (10 to 30 years) and a larger (sub-)catchment-scale perspective. They aim at enhanced community and stakeholder empowerment through co-production and co-management, improving biodiversity, delivery of ecosystem services and business models for effective and sustainable restoration and to inform regional strategic planning. A SWOT analysis within the case study groups supplemented by experience from elsewhere forms the ingredients for the plans. The RSPs aid both the implementation and replication of restoration measures.

What is upscaling and what are scalability plans? "Scaling up is the process of expanding, adapting and sustaining successful policies, programs or projects in geographic space and over time to reach a greater number of people" (Management Systems International 2016). The theory and practice come from the discipline of "strategic management" and consist of the following components: 1) to develop a scaling up plan asks for strategic planning in complex settings by creating a vision and assessing scalability, 2) to establish the required pre-conditions requires insight into the political and change management functions associated with consensus building, policy change, and resource allocation and 3) to implement the scaling up process the operational aspects of complex, multi-actor reform (Management Systems International 2016).

The purpose of this synthesis is to showcase the key aspects, which each of the case studies in the three MERLIN clusters – peatlands and wetlands, small streams and basins, and large transboundary rivers – have identified in their interim RSPs. The case studies were provided with a template to fill in for preparing their interim RSPs, asking them to think about the "what, why, where, how, and who" of scaling up of freshwater restoration regionally (Chapter 2 'Methodology'). Six out of seven of the peatlands and wetlands case studies, four of the five small streams and basins, and all six of the large transboundary river case studies have prepared an interim RSP (Chapter 5 'Individual RSPs'). Common findings and lessons learnt in the process of drafting these RSPs are discussed in the three clusters (peatlands/wetlands, small streams and basins and large rivers) (Chapter 3 'Summary per cluster'). These results provide conclusions and recommendations in working towards the final RSPs and related future initiatives on freshwater restoration in other areas (Chapter 4 'Conclusions and recommendations').

[1] The Case-study 18 'Ervidel floodplains' was not yet part of this deliverable.

Figure 1 The MERLIN case studies placed in a hypothetical catchment

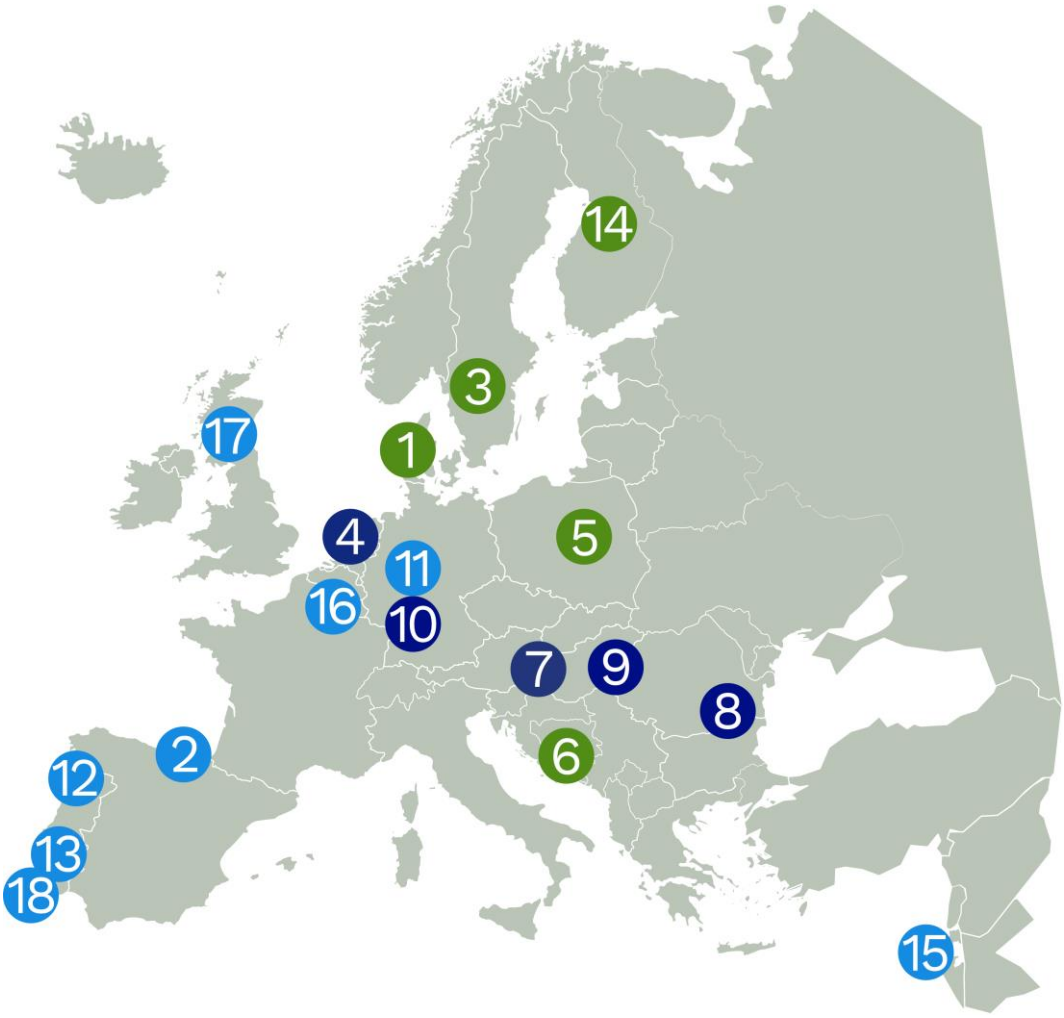


Figure 2 The geographical positions of the MERLIN case studies. Green: peatlands and wetlands; blue: small stream and basins; purple: large transboundary rivers. N.B. CS 12 has been moved to peatlands and wetlands

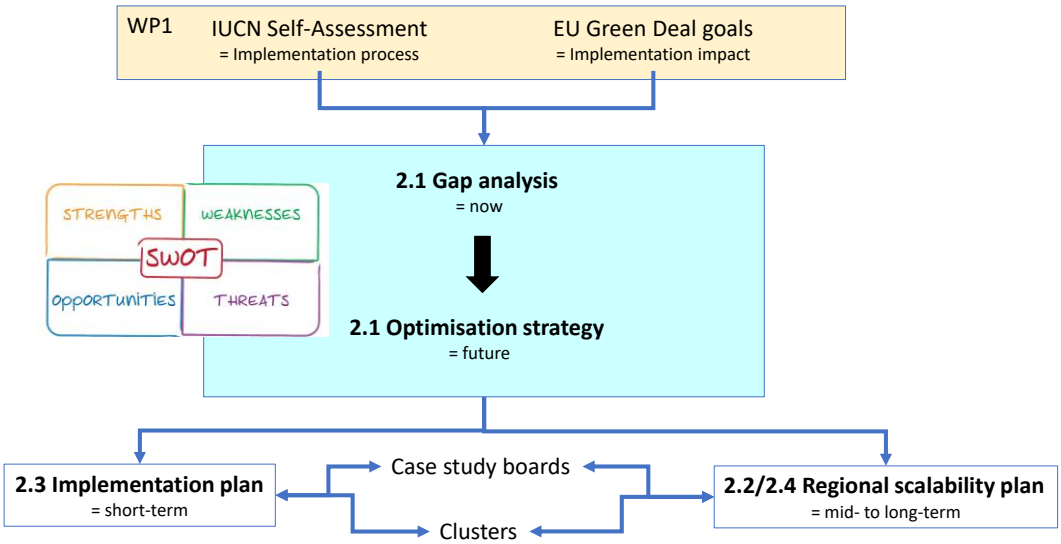


Figure 3 The SWOT and optimisation strategies are steps towards the implementation plans and Regional Scalability Plans for each case study. This figure shows the linkages the WP1 tasks (IUCN SAT and Green Deal goals) and other activities in WP2.

2 Methodology

2.1 Towards the interim Regional Scalability Plans (RSP)

The case study partners in all three clusters were asked to compile interim RSPs. The interim RSP were written in English, with translations to local language(s) to be provided later. The interim RSPs can be used in the consultation processes with the case study boards and other stakeholders, and as a basis and a steppingstone towards a final version of RSP due in September 2024. The case studies had previously prepared SWOT and optimisation strategies, which they were encouraged to use as a starting point but apply with a longer timeframe (10-30 years).

The case studies were provided with a template (see subsection below) to assist in their thinking about the different aspects of scaling up. The template drew inspiration from an existing guidance document for scaling up (Management Systems International (2016) Scaling up: From Vision to Large-Scale Change. A Management Framework for Practitioners. Retrieved from: https://www.msiworldwide.com/sites/default/files/additional-resources/2018-11/ScalingUp_3rdEdition.pdf).

The template was pre-screened and tested by three case studies for feedback, then revised and finally sent out to all case studies in November 2022. Two identical online information webinars were held in November to help the case studies become familiar with the document, and to encourage them to start the process of filling in the template. Further two online webinars were held in January to give an opportunity for the case studies to raise any issues or answer any questions they had regarding the interim RSP.

The deadline for submitting the interim RSPs was at the beginning of February 2023, with the latest included in this synthesis received in mid-March 2023. All but two case studies submitted an interim RSP in time for inclusion in this synthesis.

2.2 Template: How to report Regional Scalability Plans

The interim regional scalability plans (RSPs) are short documents (e.g., 5-15 pages) that report what, why, where, how, and who of the scaling up process over the timeframe of 10-30 years. Further guidance on the final RSPs will be provided after the interim RSPs have been completed.

This interim RSP should report what, why, where, how, and who of the RSP. In this template, there are designated sections and questions for each of these questions. To prepare the RSP read this document:

Management systems International (2016) Scaling up: From Vision to Large-Scale Change. A Management Framework for Practitioners. Retrieved from: https://www.msiworldwide.com/sites/default/files/additional-resources/2018-11/ScalingUp_3rdEdition.pdf.

When drafting the RSP consider the following:

- Who is this RSP targeted at: who is meant to read this RSP and use it? A regional government, administrators and civil servants, NGOs, a network of actors, national water agency, some other entity?
- When thinking about the target audience and key user/reader of your RSP, consider what “region” means in the case study: what scale makes sense for the scaling up? This will also depend on what will/can be scaled up, if there are multiple aspects and if some aspects are prioritised over others.
- Are there already existing plans, strategies or guides that can be used or make links with in this RSP? There is no need to reinvent the wheel. Make use if something already exists to build on and improve. If some plans or strategies exist but there are barriers to using them or linking to them, include these in the RSP and think about how those barriers could be overcome.

Make use of the SWOT analysis and optimization strategy (MERLIN Deliverable 2.1) as the base of the RSP but apply this to a 10-30-year timescale:

- How to foster the strengths and address the weaknesses of your case at a bigger scale and longer timeframe?
- Are there further/new opportunities that the longer timeframe and bigger scale allow? How to make the most of them?
- What about threats, are there some new ones related to longer timeframe and large scale? How to address them?

Main questions and aspects to be addressed
Who is this RSP targeted?

Who is meant to read your RSP and use it? If exact target audience is still unclear, define what type of an actor you are targeting.
Note: if you identify multiple target groups for your RSP, it may be easier to fill in this RSP separately for each target group. Producing more than one interim RSP is allowed: this is an interim exercise and there will be time to think about how to bring all the targets group together later.

2.2.1 What is being scaled up?

Create a common vision (ideally with the stakeholder board) for 2050 and an understanding over what is being scaled up: e.g., is it a technology, process, model and/or organizational innovation? What is needed for this vision to be realized?

Relevant questions:

- → What would successful scaling up look like, and what is "success" in the context of this regional scaling-up? This could be different than in your case study! What are the (measurable) outcomes and (long-term) impacts of scaling-up?
- → What opportunities identified in the SWOT and aspects of the optimization plan could be used in the scalability plans? What are the linkages between project strengths (identified in SWOT) and the need to improve biodiversity and ecosystem services delivery, stakeholder engagement and business opportunities?
- → Will the measure you plan on scaling up now be applicable and suitable also in 2050? Have the planned measures been assessed both for their current and future applicability or do you need scenario studies to improve understanding of the potential impacts of e.g., climate change, land-use change and demographic change? Ensure that relevant sectors are included in the scenario modelling.

a)	Describe the vision for what you are scaling up.
b)	Describe what you are scaling up: technologies or techniques, processes, models or tools, and monitoring/evaluation aspects that you will scale up.
c)	Describe the opportunities (in SWOT and optimization strategy) and their relevance regarding the timeline till 2050.
d)	Describe the applicability of your measure regarding changes in the local and global environmental and socio-economic contexts and the timeline till 2050.

2.2.2 Why to scale-up?

- → Are there more/new/multiple GD goals that apply to a larger scale and the scaling-up that could be used to finance the scaling-up beyond nature and biodiversity, i.e., to include more of the Green Deal goals into the restoration concept? What are these and how can you make the most of them?
- → Are there other benefits which support the upscaling? How will the long timescale till 2050 change what these benefits may be?

e)	Describe the main (GD) goals that the scaling-up plan addresses and how you plan to make most of them.
f)	Describe additional (GD) goals that have potential for the scaling-up and how you could make the most of them.
g)	Describe the expected benefits in terms of biodiversity and ecosystem services delivery, climate change mitigation and adaptation.
h)	Describe the expected benefits in terms of stakeholder engagement.
i)	Describe the expected benefits in terms of business opportunities.
j)	Describe other benefits that result from the scaling-up.

2.2.3 Where does the scaling-up take place?

- → Where are you planning this scaling-up? Are there some spatial or space-specific factors which contribute towards a successful scaling-up or that represent barriers?
- → How do you expect climate change to change the environmental/ecological landscape you plan on up-scaling?
    - ○ How will your (and others') perceptions have changed with regard to what kind of scaling-up of restoration is possible?
    - ○ Are there current studies on the impact of climate change in this area, and what are the most important findings from these studies?

- How will climatic changes alter what exactly you will be restoring? How can you highlight the importance of the up-scaling of restoration?

→ How do you deal with potential upcoming shifts in political/administrative landscapes and how will these impact the up-scaling? (e.g., institutional embedding of restoration objectives in legislation and policies might help making for a stable longer-term visioning)

- In your regional scalability plan, is it more relevant for you to focus on administrative scale or ecological/hydrological functional scale, or some other scale (describe what kind)? (e.g., small-streams catchment basin crossing multiple administrative areas, or peatland extraction locations all spread out within one administrative region)
- What kinds of needs and requirements does this pose to spatial planning as well as stakeholder engagement?

→ How will you address challenges with landownership and how will you take advantage of benefits? Are there strategies you can deploy to engage and incentivise different kinds of landowners?

- What kinds of landownership dynamics will you need to consider when planning upscaling? (who/what entity owns land; are there multiple landowners; are they a mix of different kinds of landowners (private citizens, public, corporate, cooperative, other))

k)	Describe the catchment/landscape area (bio-physical context).
l)	Describe the main policy actors, their interests, and decision-making processes (policy context).
m)	Describe relevant legislative issues, and formal and informal land tenure.

2.2.4 How the scaling up happens?

Create a common understanding of how scaling-up will be accomplished concretely and how it can be monitored.
Describe the strategies that you will use to scale up. Your vision is for 2050: what kinds of adaptive elements will be required to make that vision a reality?

→ How are you going to ensure that this RSP you are drafting is implementable and helps also other stakeholders to put master planning into practice?
→ How do you envision the role of the local communities? How can they play their part in the scaling-up from the very beginning?
→ How can the scaling-up plan be evaluated and further improved? How can the implemented monitoring framework support scaling-up?
→ How to deal with the threats identified in the SWOT in the scalability plans?
→ How will the financial sustainability of the scaling-up be ensured?

n)	Describe what kind of collaborative partnerships will be built/what kind of advocacy strategies are needed in the context of this RSP.
o)	Describe the role and responsibilities of the case study board.
p)	Describe the role of local community members.
q)	Describe the role of monitoring and evaluation systems.
r)	Describe what the funding plan is like. Are new financial instruments needed?

2.2.5 Who scales up?

The who includes identifying key roles and responsibilities (incl. funding and monitoring). It might be helpful to think in terms of different organizational roles, such as originating organizations (e.g., MERLIN research and implementation partner), adopting organizations (e.g., regional government actors) and intermediary organizations that facilitate the scaling-up process (e.g., conservation NGO, investment bank).

→ Are there any lessons from the case study board roundtables that could inform this analysis?

- Who can you collaborate with? How do you collaborate with stakeholders? See table 1 (next page) for possible scaling-up strategies.
- How will you engage the case study board? Will your project inform, consult, or collaborate with them? Do they provide funding? For more information on these roles, please see the guidelines for stakeholder mapping (e.g. Figure 4) in the MERLIN Nextcloud storage.
- How to involve private sector or is upscaling mainly done by public sector using public funding?

→ How do you expect the social/demographic landscape to change and how will it impact the upscaling?

- Are there demographic changes in the next 10-30 years that you can anticipate? How will these changes effect up-scaling?
- What kinds of educational elements (implemented in the short-to-medium term) may ease the scaling-up in the long term? Are there networks or formal/informal knowledge exchanges at regular intervals between scientists, practitioners and those involved in decision-making?
- How are you planning to engage different/more stakeholders and ensure all relevant stakeholders are represented?

→ How do you expect the economic and financing landscapes to change and how will it impact the "who" of up-scaling?
→ Are there conflicts or overlaps with administrative boundaries, responsible authorities and legislative matters which are relevant to scaling-up? How will you take these into account in the RSP?
→ Are there legislative changes that can "make or break" the scaling-up? Are you able to influence new/changing legislation?

Describe the main actors, their roles, and responsibilities
s) who to involve?
t) who funds?
u) who implements?
v) who monitors?

2.2.6 Final thoughts

To ponder at the end: does this RSP respond to and help address current and forthcoming concerns preventing large-scale restoration?

Overarching question: What prevents effective and large-scale restoration?
w) Describe the policy barriers that need to be removed and overcome in order to scale up.
x) Describe how your scaling-up plan addresses these barriers.

Table 1 Possible strategies, activities, and outcomes

Possible strategies	Possible activities	Possible outcomes
Engage, influence and advice national, regional, and local level key actors so that they take active role in promoting the scaling-up. Pay attention to "champions" or "leaders" who can "pull" other stakeholders along (or motivate them to stay onboard)	- Building effective communication strategy - Organizing events for target communities - Advocacy/Lobbying with the case study board and other policy actors - Public communication through traditional and social media - Providing evidence (e.g., economic modelling, monitoring results) of the benefits of the scaling-up	Policy adoption/integration into existing policy Commercialization
Collaboration: forming of strategic partnerships with different stakeholders For example: - NGO collaboration - Formal partnerships - Joint ventures - Collective action by community members Informal networks	Brokering and managing partnerships Transferring knowledge through training and capacity building	New forms of partnerships (or even organizations) that share rights and responsibilities New roles for existing organizations

Possible strategies	Possible activities	Possible outcomes
Building infrastructure (e.g., new organizations or funding models) that conduct the implementation	Raising funds Developing organizational and staff capacity and systems	New policy and implementation actors created Improved capacity and efficiency

Compulsory reading
Management systems International (2016) Scaling up- From vision to Large-Scale Change. A Management Framework for Practitioners. Retrieved from:
https://www.msiworldwide.com/sites/default/files/additional-resources/2018-11/ScalingUp_3rdEdition.pdf

Additional reading
Nine steps for developing a scaling-up strategy

Making it big: strategies for scaling social innovations
https://media.nesta.org.uk/documents/making_it_big-web.pdf

3 Summary findings per cluster

This chapter gives the summary findings per cluster for each of the 5 aspects that are reported in the individual case study interim RSPs, namely answering the “what, why, where, how, and who” of scaling up regionally. The final section in this chapter reviews the financial aspects found in the individual RSPs.

3.1 Peatlands & wetlands cluster

At the time of writing this deliverable, there are six out of seven peatland and wetlands interim RSPs submitted, with the Hutovo Blato peatland case study missing.

3.1.1 Target audience of the RSP

Each of the case studies identified a target audience for the regional scalability: who would be reading it and who should be involved in the implementing of the plan. For the peatlands and wetlands cluster, most commonly different kinds of public actors are identified as a target audience for the RSP. The target audiences varied from national level public agencies (such as ministries and their relevant departments), regional and local level public agencies, regulating agencies and those who are responsible for implementation; and environmental, forest, marine and water authorities as target groups for the RSP. Also, frequently mentioned were local communities, landowners or civil society associations, local and larger NGOs. The scientific institutions and private companies who are involved in water resource management (e.g. hydropower) were also mentioned specifically. This may stem from an understanding that involving all stakeholders is essential for the success of restoration and having stakeholders read the RSP is useful within the overarching processes that are ongoing in each case study area.

3.1.2 What

For the interim RSPs, the case studies needed to think about what exactly they were planning to scale up. This exercise began with creating a common vision for the plan, followed by clarifying what is being scaled up – a process, a restoration technique or a tool, monitoring, or something else. This section also summarises the opportunities and applicability that the case studies considered relevant for their visions and scaling up to be realised.

Vision

The case studies were asked to think about a timeline of 10-30 years from now. Consequently, the visions in the peatlands and wetlands cluster varied in level of detail and time-horizon. Some mention a time horizon of 2030 (Denmark) and others a time horizon of 2050 (Poland, Sweden), while two case studies do not mention an explicit time horizon (Finland, Portugal). The visions included aspects of both environmental and more process-oriented social outcomes. The case studies envisioned for both former agricultural land and peat extraction sites to be re-established as more natural systems by recreating the natural hydrology as far as possible, thereby improving biodiversity, flood management, and climate resilience.

The improved structural and functional ecosystem health of wetlands and riparian zones was also linked to compromises and co-benefits taking into account stakeholder needs and boundary conditions: if these ecosystems are restored, they are not only a haven for nature, but also provide benefits for stakeholders to live, work and thrive on the same land. The mainstreaming of freshwater ecosystem restoration across society was mentioned as a facet of implementation. To improve social acceptance of the implementation of these measures is important and improved public awareness and understanding the role of wetlands and peatlands for health, safety, biodiversity, and climate change mitigation can contribute to acceptability.

It was also recognised in the cluster's visions that a cohesive partnership between stakeholders including local and regional authorities, government bodies, non-governmental organisations and local communities is key for the realisation of these visions.

Scaling up

In terms of what exactly to scale up, the case studies identified different kinds of processes, restoration techniques and tools, and monitoring. Below these different aspects are all further detailed.

Process

In the peatlands and wetlands cluster, there are many different processes with potential for scaling up. Below are some of the processes the peatlands and wetlands cluster identified for scaling:

- evaluating how to screen potential areas for peatland restoration, with a focus on hydrology, carbon content in the soil and cost efficiency. This process can include the use of ICT and GIS tools for the screening of potentially suitable locations
- defining optimal after-use of peat extraction sites that reduces GHG emissions, improves carbon sequestration and enhances biodiversity or restores previous peat extraction sites
- studying biophysical and socioeconomic aspects which are currently poorly understood to improve and inform restoration strategies
- environmental screening and getting permissions in relation to effects on nature/Natura 2000
- engaging stakeholders, sharing knowledge about the case to other restoration projects
- establishing a framework which can be continuously evaluated and includes pre-investigations and detailed project implementation conducted by external advisors
- payment for stakeholders and landowners to ensure land use practices and land use change for biodiversity net gain is financially viable.

Restoration techniques and tools

The peatlands and wetlands cluster identified multiple different restoration techniques and tools that could be scaled up or applied in other sites, such as:

- beavers as a Nature-based Solution
- effective restoration technologies which have been proven to provide good results, such as coupling river restoration techniques (e.g. improving connectivity with floodplain wetlands, and Natural Flood Management (NFM) techniques) with peatland restoration in overarching strategies
- use of hydrological modelling for planning wetlands restoration
- improving the sustainability of existing restoration techniques (e.g. using locally/nationally sourced materials rather than internationally) and reducing carbon footprint to align with net-zero goals.

Monitoring

The case studies considered focusing on monitoring the effectiveness of different techniques (such as NFM), understanding the importance of monitoring, and conducting systematic assessments and monitoring in the regular management of target ecosystems to improve evidence-based adaptive decision-making. Specifically for Sweden, the monitoring of beaver distribution and environmental impact was also seen as something that could be scaled up.

Opportunities

Many opportunities were identified related to scaling up of peatlands and wetlands restoration. Among these, promotion of public access and recreational value of the open land are seen as opportunities, as the improved knowledge of the role of Nature-based Solutions for human wellbeing can also improve acceptability of such measures across policy-levels. Narratives about the benefits and disservices of beavers in the environment was specifically mentioned as a factor improving social acceptability of NbS in the Swedish case study.

Favourable (policy) circumstances were also another category of opportunities. Case studies saw opportunities in the current policy circumstances or existing programmes (e.g. in the Kampinos National Park (KPN) region in Poland, there is a programme for depopulation and buying up land, freeing new lands for wetland restoration) or in the form of already a high level of nature protection, thus making the area suitable for long-term protection. Previous positive experiences of wetland restoration implementation in the micro scale with local municipalities and municipality authorities provide a fertile context in which further scaling up can be built on existing links. In terms of positive changes, the legal framework developments that are currently in the works, e.g. upcoming national strategies for rehabilitation of rivers and streams and the EU restoration law give hope of further certainty and stability in the policy environment going forward.

However, showcasing success and doing something new was seen as the primary opportunity for scaling up in the cluster. This included, among others, the following:

- improved cost comparisons; hydrological modelling demonstrating flood risk and drought mitigation; and use of remote sensing in documenting the complexity of restoration
- a sharing of collated data across multiple organisations to co-ordinate efforts and minimise unnecessary expenditure of resources, such as two organisations not in collaboration researching the same subject
- involvement of additional stakeholders (such as higher education institutions and landowners), including in co-learning activities; development of economic compensation for private landowners affected by restoration; private companies in conservation (e.g. via carbon credits)
- building trust with stakeholders and landowners via demonstrating successes (including trusting working practices of those delivering the restoration works, having experienced tangible benefits because of

flood/drought resilience or benefits in the form of financially through farm payment systems), taking into account up- and downstream residents and their differing issues and needs
- → multiple gains simultaneously: reduction of nutrient and carbon loading from the site to waters, greenhouse gas emissions, and increase in carbon storages, while also increasing biodiversity (particularly birds) and recreational value
- → opportunity to synergise current payment systems into one; creation of new finance models
- → Points specific to the UK Forth case study combining peat and small streams restoration:
    - enabling the project to monitor and evaluate the effectiveness of both peatland and river restoration, but more importantly to assess the combined influence of both peatland and river restoration in the same catchment
    - monitoring and showcasing of successful restoration projects, with the ability to demonstrate accurate metrics applicable to NFM goals, with the possibility to encourage local authorities (councils) to invest further in NbS for NFM, as opposed to frequent "grey-bank" techniques currently utilised which are typically more costly and involve heavy machinery and concrete intervention which does not align with sustainability and net-zero goals

Applicability

The applicability of the scaling up was primarily seen via various positive effects. The Danish case study considered their approach to be able to give valuable input to other regions too, particularly with regards to governance (how to include stakeholders and have their support). The Swedish beaver case study noted that beavers are a free NbS, so as a restoration measure, it is insensitive to economic shifts. The Finnish case study recognised that the developed method - a process for defining optimal after-use - is very applicable to other peat extraction sites, with options to expand to other peat extraction sites in Finland and more widely in Northern Europe. The UK case study in the Forth, on the other hand, pointed out that the way the developed new single farm payment system for Scotland takes environment into account will have a major impact on how quickly and effectively changes can be made on catchment-wide and national level.

The one negative aspect related to applicability of scaling up restoration efforts identified in the cluster was that pressure for land exploitation and development can lead to a reduced size and number of wetlands and riparian zones to be restored.

3.1.3 Why

The MERLIN project uses the European Union Green Deal Goals as a framework for aligning restoration action across the case studies and justifying restoration. Each of the peatlands and wetlands case studies was asked to identify and elaborate on the primary and secondary Green Deal Goals that they would contribute to by scaling up restoration. The results are in the below two tables, with a small number of examples from the case studies. The case studies also elaborated on further benefits of scaling up, with a brief synthesis at the end of this section.

Primary Green Deal Goals

Green Deal goal	Mentioned by how many case studies (out of 6 in total)
Climate regulation	6
Biodiversity net gain	6
Health & well-being	4
Zero pollution	4
Flood and Drought resilience	4
Inclusivity	2
Sustainable food systems	1
Green Growth	1

Circular economy	1
Financing the transition	1

Example of primary Green Deal Goals

The UK case study (Forth) identified Biodiversity net gain as their primary Green Deal goal. Climate regulation upscaling will see wide-scale identification of peatland sites, both suitable and unsuitable for the current funding schemes available to restore them, and to create a huge dataset (measured in hectarage) of restorable sites. This, combined with large-scale monitoring efforts across restored and un-restored peatland sites, will set a clear foundation from which to progress onwards in terms of net-zero goals, climate resilience and peak flood/drought resilience will also be achievable. Flood and drought resilience go hand-in-hand, with flow attenuation measures also helping to maintain water on the landscape for longer, helping to combat rivers reaching unsustainably low levels.

The Forth case study additionally mentioned Zero pollution goals in relation to agricultural pollution which may be addressed in the long-term by a general increase in landowner awareness of both pollution issues and the impact they have on river habitats in particular, and also a generally increased knowledge base about broader environmental issues and the techniques used to combat them. By engaging with as many landowners as possible now, it is laying the foundation for future engagement with the next generation of farmers that will be managing the land in the decades to come.

Secondary Green Deal Goals

Green Deal goal	Mentioned by how many case studies (out of 6 in total)
Sustainable food systems	3
Inclusivity	3
Flood and drought resilience	2
Zero pollution goals	2
Sustainable energy	2
Financing the transition	2
Green growth	1
Health and wellbeing	1

Examples of secondary Green Deal Goals

For the Swedish case study: Multiple stakeholders are affected by beaver dams and can be included in education. Potential for capacity building among sectors and stakeholders. Sustainable hunting of beavers as a natural resource by using both meat, fur and castoreum.

For the Polish case study: Secondary Green Deal Goals vary from carbon crediting for restored/protected wetlands; jobs on implementing wetlands restoration and paludiculture; education, consulting and involving local communities in wetlands restoration/protection.

Benefits of scaling up

Case studies identified environmental, stakeholder, business-related and other benefits in their interim RSPs. Among environmental benefits were the following:

- reduced carbon emissions by rewetting the area; reduced/capturing of GHG (at least over time); climate change mitigation and adaptation
- reduced nutrient loss to the aquatic environment

- improved biodiversity; species diversity; habitat functioning and connectivity; fluvial communities' composition (via reduced biological invasions); restoration and protection at the landscape level
- the benefits for hydrology; flood reduction; mitigate drought risk; improved groundwater level; better water quality; improved (ecosystem) resilience and catchment integrity

For stakeholder related benefits, improved transparency, participation, and engagement of affected social actors were echoed by many case studies. Better engagement of stakeholders was seen as a way towards understanding the benefits of nature-based solutions and social acceptance of wetlands restoration, while also helping create a feeling of "ownership" to the project in the local communities. Moreover, engaging stakeholders can be a way to incorporate local knowledge and ideas into the project, and keep the stakeholders updated on the project, turning it more towards co-creation.

For businesses, case studies identified a plethora of benefits. These included:

- land consolidation (i.e., farmers exchanging lowlands for arable land closer to their farm where the agricultural output may be better)
- reduction of agriculture losses from droughts and floods; a possibility for grazing and production of more sustainable meat; development of paludiculture
- ecotourism; creating guided walks etc.; hunting
- carbon credits; options for energy production via windmill and solar energy parks
- more business opportunities for skilled tradespeople/contractors to conduct restoration actions.

As other benefits, the peatlands and wetlands case studies noted building and upscaling knowhow and expertise, such as technological innovation potential, CO2 emission measurements and comparison of environmental impacts of different restoration methods, and legal and policy developments towards encouraging wetlands restoration. Improved quality of life and wellbeing of local population, and the potential to increase attractiveness for visitors was also recognised. Finally, keeping up momentum of restoration efforts which contribute to wider national and international climate and biodiversity goals was identified as a benefit of scaling up.

3.1.4 Where

The peatlands and wetlands case studies varied in the "where" to upscale. For some, upscaling meant the wider catchment area, and for others upscaling is a restoration measure that can be replicated elsewhere on similar sites. Below are brief descriptions of the respective upscaling areas for restoration as follows:

- Danish case study: The upscaling of peatland restoration in Denmark targets low-lying soils with a carbon content > 6% but preferably (and with a higher cost efficiency) > 12%. Cost efficiency is part of the prioritization. Typically, these soils are found in river valleys and former bogs etc. where there has been peat extraction and/or farming. The national goal is to take 100.000 hectares out of production by 2030.
- Swedish case study: The Vindelälven catchment comprises the 450 km long river Vindelälven and drains 12 650 km^2 from the mountains to the Baltic Sea. It is part of the UNESCO biosphere reserve Vindelälven-Juhtátdahka. Beavers are well established in parts of the catchment.
- Polish case study: The target area is the Kampinos National Park (KPN) and its buffer zone + Mazovian Voivodship.
- Portuguese case study: The plan is to cover the catchment of Estoraos (tributary of the right margin of Lima), and the downstream part of Lima from the confluence of Estoraos to sea.
- Finnish case study: The upscaling of after-use measures for peatland mining areas targets all such active and decommissioned areas due to the political decision to stop peat extraction. In Finland the area of active peat extraction sites was 65 000 ha in 2005 and currently about 110 000 ha require definition of after-use measures.
- UK case study: The Firth of Forth catchment, which is a diverse landscape, encompassing many different types of sub-catchment with a wide variety of pressures facing each one.

Policy and legal context

The policy and legal contexts within the peatlands and wetlands cluster varied a great deal between the case studies. Again, the role of government and other local and regional public agencies were seen as central, as they often provide the policy and legal context. There is a desire/need to reduce national greenhouse gas emissions, increase carbon storage, and improve biodiversity, so there is fertile ground to scale up peatland restoration. On the other hand, farming and forestry sectors and sector representatives have an interest in such policy developments, as these are the sectors whose contribution to the emissions is some of the highest – and therefore can also contribute to the reducing of the emissions. Potential taxing of CO_2 emissions/payment for carbon sequestration through carbon crediting in the future is for example a matter which can speed up or slow down progress (if not agreed).

There is a need to change or strengthen spatial planning laws so that development of peatlands and wetlands in an unsustainable manner is no longer possible, and instead protect wetlands and peatlands. This will require different plans and management strategies and will also apply to private companies who work in or with water resources management.

Landownership arrangements play a significant role in the legal and policy landscape. Whether land is publicly or privately owned or is made up of mosaics of different land tenure (including lots of small landholdings, associations, Trusts, etc.) can have a significant impact in the strategy of how to approach restoration.

Different financial mechanisms, such as compensation for protected areas, (a system of) subsidies for protected and restored wetlands, and programmes to buy-up or swap land for restoration seek to address the ongoing competition for land for different purposes (renewable energy, climate related projects, food production, nature and biodiversity conservation, recreational purposes, urban development, infrastructure, etc.).

The case studies also shared further details on the relevant permits and processes:

- Danish case study: The extend and detail level of the environmental screening (meaning the process could last more than a year in total) could turn out to be a barrier to reach the national goals.
- UK case study: Land tenure can be split up further into individual tenants, meaning there can be several permissions to be gained before work can commence on different areas of the catchment.
- Finnish case study: Peat extraction requires an environmental permit, and national and municipal authorities ensure that extraction is carried out responsibly and in an environmentally friendly manner. The environmental permit obligations end when production has ceased, and the area has been converted to a new land use. However, the Environmental Protection Act does not apply to the physical alteration or pollution of the environment, nor to land use and nature protection, which are regulated separately.
- Swedish case study: According to Swedish law, landowners are allowed to destroy a beaver dam without permission if it happens outside the beavers' reproduction season. This freedom has resulted in the acceptance of the NbS and low controversy. Beavers can be hunted (season hunting) without a quota. If only a limited number is hunted, there is no threat to the population. This is however not regulated in any way. There is no national beaver management plan. If infrastructure is threatened (e.g. railway), there is no controversy or conflict. In such a case the dam will be removed without conflicts among stakeholders.

3.1.5 How and who

In terms of the "how" to scale up and "who" to do what, the case studies address aspects related to collaborative partnerships, the role of case study boards and local communities, monitoring and evaluation systems, and finally funding and financial instruments. Each of these are further elaborated below.

Collaborative partnerships

Partnerships are key in getting everyone on the same page and help in reaching a shared understanding of the costs and benefits of Nature-based Solutions. Collaborations help educating society about the importance of wetlands and therefore can help increase the involvement of local communities and the public in restoration action. Furthermore, to scale up to the international level, actors such as the International Peat Society, individual energy companies and landowners are important, as is collaborations between them.

Different collaborative partnerships and arrangements were identified in the RSPs. Such collaborations can take many forms, including organisational partnerships. The identified collaborative partnerships included partnerships between different governmental agencies across levels, businesses and sectors (such as energy, agriculture and forestry), and research institutions. National or regional task forces and expert groups can be a way of gathering actors and sectors, which together can help overcome barriers. Jointly forming a strategy for wetlands restoration and protection with different partners can also be an expression of partnership. On the other hand, long-term partnerships with landowners are essential, as they can be built upon and help form long-term alliances with stakeholders. Similarly, long-term partnerships with landowners are essential to ensure success over a long timeframe, especially if landowners are involved in the maintenance of the area after implementation of measures.

In terms of implementation, there was variation from case study to case study in the peatlands and wetlands cluster. The governmental/public agencies were seen to play a key role. Even in the Swedish case where implementation is done "automatically" (by beavers), the fostering of public acceptance was thought to be a governmental agency's responsibility. Furthermore, it was recognised that the hands-on implementation will depend on the exact case and circumstances and can vary from NGOs (local and wetland conservation organisations) to scientific institutions, private companies in agreement with landowners and peat extraction

companies with the help of contractors. Each of these aspects of implementation should however be facilitated by collaborative arrangements.

Case study boards

The role of case study boards (CSB) was seen in a relatively similar manner across the peatlands and wetlands case studies. The main purpose of the case study boards is to gather all relevant stakeholders (energy, forestry and agricultural sector representatives, local administrators, local communities, and other resource users, such as anglers, hunters, and hikers) around the same table.

The role of the CSB is both advisory and partly policy-implementing, depending on the region. The goal is to improve the benefits of the project that are received in the local (such as facilitate public access to restored nature) and national context. CSBs are used to help embed the project and restoration in both the local and national landscape, and to improve the uptake of restoration in policy strategies across institutional levels.

A wealth of different actors was recognised as important to involve in the scaling up of peatland and wetland restoration in the interim RSPs. Among these were many public agencies (nature and environmental agencies, municipalities; those with GIS/ICT tools), project leads on local projects responsible for performing and implementing restoration, and those coordinating restoration measures on a national scale. Regarding municipal/regional actors, local knowledge and support for permissions related to land use change and spatial planning is key for success. In terms of private actors, agricultural sector and the engagement of individual farmers, peat extraction companies, landowners of peatlands and peat extraction sites (which could be companies, associations, or individuals), private companies working in water resources management (e.g. electricity), engineering consultants, and relevant NGOs and associations (e.g. anglers, hunters, forestry, ornithologists) are also relevant to involve in peatlands and wetlands restoration when scaling up. Including such actors in the CSB is one way to improve their involvement with restoration.

Local communities

The role of local communities is to participate and to provide advice on local-level restoration. Local communities have a lot of local knowledge and skills, and can bring knowledge from local ornithologists, hunters, and others who enjoy the wetlands. Since local people are often involved in maintaining restored wetlands after restoration is complete, it is important to note that community interest and input will outlast funding streams. Local ownership over restoration action is therefore essential.

Particularly important is to improve acceptance of restoration and scaling up of NbS, which is why integrating local members of the community to collaborate in restoration is key for success. Improving awareness and the benefits of restoration help increase acceptance, and overall building a sense of connection between the locals and nature will help ensure long-term interest in maintaining the restored landscapes.

Monitoring and evaluation systems

Monitoring was not elaborated at length in the interim RSPs, and in general, approaches varied between the case studies. In Denmark, monitoring is not considered a priority, but instead emphasis is on forecasting possible outcomes and impacts. Based on the results of the forecasting, potential negative effects are assessed and addressed. In Finland monitoring after-use of peatland extraction sites is currently not systematically performed. Other peatland and wetland case studies pointed out that monitoring is key to evaluate the costs and benefits of the NbS, and that monitoring will help select the most effective wetlands restoration solutions. Having a wide set of indicators will assist in demonstrating the effectiveness and need for wetlands restoration, therefore helping justify scaling up restoration in the future.

The actor responsible for monitoring varied among the cluster. Some had not planned monitoring post-restoration (in Denmark) or noted that monitoring is done at specific national monitoring sites and not at restored sites, while others noted that the same actors who implement the restoration will carry out the monitoring. Most case studies pointed out to the role played by municipalities and other public authorities (e.g. the responsibility of monitoring implementation falling on environmental authorities). Also, universities and other scientific institutions, local communities and NGOs and private contractors were mentioned having a role in monitoring.

Funding and financial instruments

The case studies identified a variety of public and private sources of funding and financial instruments relevant for scaling up. In Denmark, regional funding and the Finance Act form a base for regional scaling up, while in Finland, peat extraction companies are required to have plans and a budget to act on their after-use measures. Also, EU Structural Funding (e.g. Just Transition Fund JTF) is considered a potential funding source. In the Forth case study in the UK, there are currently two principle financial instruments, with timelines until 2026

and 2030. In Poland, funding of restoration is currently based on grants, though the goal is to increase independence of funding (e.g. via carbon credits, subsidies, insurance, and transfer of funds from other sectors).

In Sweden, beavers are the piloted method for wetland restoration, as their activities improve the ecological functioning of the wider area. Since this type of NbS is essentially free, financing of the restoration itself is not required, but funds are still needed for monitoring the impact of the beavers.

Reliance on grants which come from multiple sources is time consuming, as each funding stream has an application process of its own. The more streamlined the funding process becomes, the easier and more effective use of restoration will become with more projects delivered.

3.2 Small streams and basins cluster

At the time of writing this deliverable, there are five small streams and basins interim RSPs submitted. The Forth case study is not widely reflected in this section, as it is already represented in the peatlands and wetlands cluster summaries. The Israeli case study could not be addressed in the synthesis, because it was submitted too late. Though as a double case study, there are points relevant to this cluster, too, specifically the focus on the Natural Flood Management strategies in the Forth basin are worth noting down as a method that can be scaled up in other case studies of this small streams and basins cluster.

3.2.1 Target audience of the RSP

Each of the case studies identified a target audience for the regional scalability: who would be reading it and who should be involved in the implementing of the plan. For the small streams and basins cluster, most commonly different kinds of public actors and stakeholders are identified as a target audience for the RSP. The case studies in the small streams and basins cluster included regional and local level public agencies, regulating agencies and those who are responsible for implementation; and environmental, conservation and water authorities and management bodies as target groups for the RSP. Also, local communities, landowners and sector specific associations together with NGOs were mentioned. Overall, it was emphasised that the RSP is used to reach the main actors involved in restoration across stakeholder groups.

The purpose of the RSP was seen to showcase a good practice example on how to deal with river restoration and implementation of buffer strips, but also to create a "protocol" which can be applied in the future restoration actions. The RSP was considered to help alleviate different potential issues that can appear during restoration, and one benefit is that the RSP can provide guidelines and set goals for the future.

3.2.2 What

For the interim RSPs, the case studies needed to think about what exactly they were planning on scaling up. This exercise began with creating a common vision for the plan, followed by clarifying what is being scaled up – a process, restoration technique or tool, monitoring, or something else. This section also summarises the opportunities and applicability that the case studies considered relevant for their visions and scaling up to be realised.

Vision

The case studies were asked to think about a timeline of 10-30 years from now. In the visions of the small streams and basins cluster, the creation of more policy coherence among regional authorities and water management bodies plays a role, as does working with residents and overcoming cultural barriers. The case studies' visions have a holistic take on restoration: the area of restoration is upscaled from the current focus area to larger areas within the basin or even the entire small stream basin, which requires integrated approaches and different measures varying from the establishment of new management boards to addressing technical, legal, and monitoring aspects in a new way.

Scaling up

Process

The small streams and basins cluster noted a couple of processes to be scaled up. Not only was the restoration area scaled up but also broader management processes need scaling up. Specifically in the Belgian case study, a process-related question is how buffer strips could be incorporated to be a part of all small and large streams within the basin and beyond.

A question that arose in the RSPs was whether to engage individuals (e.g. farmers) by using a personal approach to improve their interest and acceptability of restoration and of the MERLIN project, or whether a

more centrally organised and coordinated approach would be more effective in helping level the quality across the region.

Restoration techniques and tools

To enable adaptive management, scaling up of river restoration techniques, river functioning, ecological optimisation models and tools and a wide range of monitoring indicators are needed. In terms of establishing flowering meadows, considering how the whole process of mowing can be scaled up and how the cutting material can be reused are questions that implementation technologies and techniques may be able to shed some light on.

There are also other holistic approaches to scaling up restoration in the interim RSPs. The Spanish Deba case study broke down the scaling up based on three actor groups: a) technical, consisting of engineers and hydraulic specialists, b) scientific, consisting of ecologists, biologists and other experts in the natural environment, and c) public stakeholders. The purpose is that the technicians and scientists should be in constant contact with national and international river restoration and dam removal groups, which will enable the technicians to be aware of and keep up to date with the latest developments in the field of obstacle demolition. For the success of restoration, it is also important to have public awareness on the problems associated with the presence of dams and other obstacles in river habitats. For this reason, it is important to have river restoration be a recurring topic in media to improve public awareness, therefore allowing the public to exert pressure on the administration to act.

Monitoring

In terms of monitoring, the case studies in the cluster did not address monitoring very thoroughly. The plan is to scale up monitoring and evaluation using citizen science, which will also require scaling up tools and new technologies to do so, such as launching a new app for data collection.

Opportunities

A wealth of opportunities was identified in the small streams and basins cluster. One opportunity is a positive feedback loop, in which the restoration and scaling up will help develop greater social awareness and ecological knowledge among the local population, leading to a demand and promotion of improvements in all aspects of restoration. Awareness of the importance of restoration among the local communities and natural resources users can result from experiencing the impacts of climate change (whether droughts or floods), thus increasing willingness to experiment with NbS measures. Since NbS are perceived as generally cheaper than technical solutions – particularly in the long run – the cost-effectiveness can also be a factor in improving locals' acceptability of NbS.

Generally, opportunities arise from the need to have effective and efficient regulation of activities that have an impact on water and wetlands. Local authorities can improve regulation and land use planning if they are responsible for zoning activities. The impact of local authorities however depends on their reach: if they are only able to target one area of a larger catchment area, further work and cross-municipality cooperation needs to be fostered for achieving regional scaling up.

The German Emscher case study elaborated on the opportunities of upscaling:

- To put flowering meadows into practice, large-scale concepts are required to harmonize the alternative maintenance schemes with other requirements that address dikes and non-used areas (e.g. photovoltaics systems on flowering meadows). Such synergies will be evaluated together with EGLV's operating and planning departments. Furthermore, legislation on dike stability should be applied more flexible regarding ecological dike maintenance, i.e., allowing for trees and shrubs to shade the streams and for extensive flowering meadows instead of regularly mown grass surface. Consultants should learn how to assess stability of ecologically maintained dikes.
- The interpretation of nature and species conservancy laws needs to be adapted, to facilitate synergies between river restoration and nature protection rather than obstructing restoration if single protected species occur. Agreement with agencies will be addressed to classify areas reserved for later use as "areas for temporary nature". Currently, the risk of delay or stop of river restoration programs forces operators to scare off protected animals before settling down. The project "Beleidslijn Tijdelijke Natuur" from the Netherlands shows that the concept of temporary nature is compatible with EU law. Solutions applied in pilot projects, local agreements with municipal agencies and discussions with higher level agencies are planned to modify the static idea of nature protection from a legal point. Therefore, legal professionals are involved as well.

Applicability

Applicability of restoration activities is strengthened by the ever-increasing urgency of climate change, environmental pollution, and the loss of biodiversity. Dam removal, buffer strips, and flowering meadows, among others, are applicable, as they help address each of these. Existing cooperation ought to be built on when scaling up restoration, as this will also improve the applicability.

Overall, restoring small streams and basins is an action that will be applicable for the foreseeable future, as restoration will help mitigate and adapt to weather extremes, droughts, and floods, while also improving conditions for aquatic species.

At the global level, demand for food, use of pesticides and fertilisers, and crop intensification compete with environmental constrains. This highlights the need to restore wetlands while also pointing out the conflict over competing land uses.

3.2.3 Why

The MERLIN project uses the European Union Green Deal Goals as a framework for aligning restoration action across the case studies and justifying restoration. Each of the small streams and basins case studies were asked to identify and elaborate on the primary and secondary Green Deal Goals that they would contribute to by scaling up restoration. The results are in the below two tables, with a small number of examples from the case studies. The case studies also elaborated on further benefits of scaling up, with a brief synthesis at the end of this section.

Primary Green Deal Goals

Green Deal goal	Mentioned by how many case studies (out of 4 in total)
Biodiversity net gain	3
Climate regulation	2
Flood and Drought resilience	2
Health & well-being	1
Inclusivity	1
Sustainable food systems	1
Circular economy	1
Sustainable energy	1

The Belgian Scheldt case study elaborates as follows:

The main goal is to have free fish-migration, natural restoration of small streams with meandering and good hydromorphological, chemical and biological conditions to reach the goals as set by the EU Water Framework Directive. Since these goals are part of the EU regulations to achieve a good ecological status by 2027, it is believed that the scaling-up of the project has high potential given the current challenges and the fact that at the moment much remains to be done to reach these goals. It is important to have all stakeholders on board and convince especially farmers of the added value of restoration. The measures can help mitigating climate change but also can help to combat erosion, loss of nutrients and fertile soil.

Secondary Green Deal Goals

Green Deal goal	Mentioned by how many case studies (out of 4 in total)
Health & well-being	3
Inclusivity	2
Circular economy	2
Flood and Drought resilience	1
Zero pollution	1
Sustainable food systems	1
Green Growth	1

The Portuguese case study of the Sorraia describe benefits related to their secondary Green Deal goals:

Zero pollution: In the face of climate change, by lowering greenhouse gas emissions in irrigated floodplains, a higher attenuation of the Mediterranean climatic dryness and summer droughts is to be expected. The large-scale maintenance and restoration of the Blue-Green infrastructure will ensure higher nutrient retention services, and thus improve water quality and diminish greenhouse gas emissions.

Benefits of scaling up

Case studies identified environmental, stakeholder, business related and other benefits in their interim RSPs. Among environmental benefits was the realisation that the more area is transformed, the more benefits there are, such as biodiversity. Other benefits improving with scale included:

- climate change mitigation which will improve with an increase in wetland area and riparian vegetation growth; more carbon stored in the soil; climate regulation via reduction of CO2 and CH4 emissions
- regulatory services, such as improved delivery of ecosystems services (because the provisional services are already in place, i.e., the floodplain is already in itself a provisional service); dike stability
- improved biodiversity via improved ecological quality of the river ecosystem and by increased habitat heterogeneity
- improvement of river self-purification capacity, because of increasing hydro-morphologic heterogeneity, which contributes to reduce the pollution

With stakeholder related benefits, the small streams and basins case studies emphasised how further stakeholder engagement will improve inclusivity and participation across different actor groups (municipalities, local authorities, citizens, scientists, etc.). Other stakeholder related benefits included:

- the possibility to generate climate change data to contribute towards evolving climate change adaptation plans using long-term citizen science observations as data. The use of citizen science can also engage citizens to participate in environmental conservation.
- improvements in nature will provide intergenerational benefits, not only for farmers but also to the public for a long time to be enjoyed; local recreation
- possibility to trigger similar restoration measures and projects taking place elsewhere due to the positive experiences at current case sites; examples of best practices leading to a snow-ball effect in other regions

Ecotourism and sustainable natural tourism were recognised as potential business-related benefits. Other benefits ranged from improving soil quality (leading to lower costs of soil conservation and water quality treatment and providing better agricultural products) to the recycling of biomass and cutting material. Restoration was seen to be a source of more jobs in nature conservation and water management, and a possibility of increased income from environmental protection under the CAP regulation and from future NbS measures with innovative funding mechanisms.

Among other benefits, looking at the long-term, case studies identified better, clear, and shared guidelines for re-wetted floodplains, and eventually having fairer and more conscious legislation on the natural environment.

3.2.4 Where

The small streams and basins case studies varied in the "where" to upscale. For some, upscaling means wider regional or even national level action, but for most, an aspect of scaling up at the wider catchment level was a key component. Below are brief descriptions of the respective upscaling areas for restoration as follows:

- Spanish case study: Scaling up is thought at two different scales: regional or autonomic scale, and state level. Scaling-up at regional scale means to implement the restoration actions on similar basins of Gipuzkoa or Euskadi. All the catchments of this area present similar bio-physical characteristics to Deba River, high slopes, high precipitation index, and consequently high flood risk, etc. At state level, other Autonomic Communities which have a Mediterranean climate; that is for instance the case of Catalonia where the twin-project is located. These areas have a high drought risk due to the low precipitation. This is the main difference between both areas that will be carefully considered for the scaling-up.
- German case study: The implementation measures used in the MERLIN case have the potential to be scaled beyond EGLV's catchment area e.g.: Emscher catchment; Lippe catchment; Regionally; In the federal state of North Rhine-Westphalia (NRW); and beyond.
- Portuguese case study: Mediterranean floodplains can be viewed as a mosaic of agricultural crops and natural infrastructures. Since these floodplains are irrigated, the riparian infrastructures have a fundamental role in regulating ecosystem functions and services. In the case of the Sorraia catchment case study, the floodplain is crossed by rivers and channels. The agricultural matrix features long and narrow remnant ecological infrastructures.
- Belgian case study: These buffer strips are useful in the entire Scheldt River basin although these buffer strips are most needed in areas with erosion problems and thus a high slope. Typically, this is the southern part of East- and West-Flanders. The focus at the start is on the Zwalm River basin, but the search is extended for buffer strips even within MERLIN to the Upper Scheldt River basin and more specifically the Maarkebekken.

Policy and legal context

The policy and legal contexts within the small streams and basins cluster varied. In some cases, the regulatory responsibilities have been decentralised, so that each province or region has its own regulatory agency for the public water domain, meaning the public implementing agencies are different from one region to the next.

However, some key aspects emerged. Work remains to be done in how different legal frameworks function together. Particularly with dam removal, an ongoing conflict is the cultural and historical value of dams, as culturally significant constructions can be legally protected. Also, e.g. nature and species conservancy laws ought to work together with river restoration in a holistic manner. Policy coherence (whether within environmental legislation or protection of cultural heritage) is an area that an RSP could target. This also applies to different actors whose interests are not aligned: farmers and forest producers may have an interest in producing more in terms of quantity, whereas nature conservancy managers and administrative regulators think more in terms of sustainability of water use and agricultural practices.

Land tenure poses its own policy and legal challenges. In the Sorraia catchment, for example, tenure is private, whereas the water element is public, and the use of water is licensed. The need for permits for water use, given by water authorities, is typical in other cases, too. This can also be a source of conflicts: on one hand the landowners are private actors, but on the other, they require permissions to use public goods.

The Belgian case study elaborates their policy and legal context as follows:

The main water managers are the Flemish Environment Agency, the Province, and the local communities. The policy is partially determined by the Flemish government and the local politicians that translate the regional policy into local policy. On the other hand, also the Province determines some policy regarding the extraction of water and the legal regulation regarding the use of fertilizers and pesticides near the watercourses. The implementation of buffer strips is highly influenced by the current policy on agriculture. The common agricultural policy needs to be set for the next few years, but it has not been decided yet because of decisions that need to be made at the Flemish level with regard to buffer strips next to watercourses but also the problems with nitrogen and the new manure action plan (MAP).

3.2.5 How and who

In terms of the "how" to scale up and "who" to do what, the case studies address aspects related to collaborative partnerships, the role of case study boards and local communities, monitoring and evaluation systems, and finally funding and financial instruments. Each of these are further elaborated below.

Collaborative partnerships

Partnerships are key in getting everyone on the same page and help in reaching a shared understanding of the costs and benefits of Nature-based Solutions. Collaborations help increase awareness in the society and among political decisionmakers about the importance of restoration, and for example NGOs (e.g. conservation associations) can have a role to play in awareness-raising. Implementation was seen to fall on many different actors, such as regulatory agencies, farmers and landowners, authorities responsible for agriculture, water management administration across levels, and erosion coordinators, whose collaboration partnerships can facilitate.

Different collaborative partnerships and arrangements were identified in the RSPs. Such collaborations can take many forms, including organisational partnerships. The collaborative partnerships varied from partnerships between different governmental agencies across scale levels, businesses, and sectors. Particularly relevant are partnerships between agricultural and water actors, which include individual actors, such as farmers, and public authorities in both agriculture and water across governance levels. What may begin as local-scale cooperation between farmers and others involved in implementing restoration needs to be scaled up at the regional scale, with the relevant policymakers aware of the changes required in the policy and legislation landscape for scaling up.

Networks can also be a form of collaboration. Existing structures, networks, and working groups facilitate information flow and thus help reach new actors, which can then become integrated into collaborations and be part of scaling up. Moreover, collaborations are key for improving participation in restoration, and therefore collaborations with schools, kindergartens and other educational institutes should be considered. Overall, implementation of restoration is a holistic task in which different actors have their roles to play.

Case study boards

The role of case study boards was seen in a similar manner across the small streams and basins case studies. The main purpose is to gather multiple relevant stakeholders around the same table. Many different actors whose involvement in scaling up small streams and basins restoration were mentioned in the interim RSPs. Most commonly, municipalities, regulatory agencies (particularly responsible for water management such as water and agricultural agencies), farmers, producer associations and other farming and forestry organisations were identified. Also, more broadly, nature organisations, politicians, academia, the public and society, NGOs, and landowners were mentioned. The involvement of a plethora of actors across different levels (local, regional, federal, national) was important, as well as doing so from an early-stage engagement onwards throughout the entire process. These actors play a role in managing infrastructure and natural resources, dealing with permits and legislative support, raising awareness, and providing scientific support.

The key purpose of the case study boards is to give feedback on the proposed measures and facilitate pathways for these measures to be implemented. Local governments and administrations are often the ones who are responsible for administrative procedures related to restoration. However, scientific backing is needed to provide justification for restoration, and media involvement can help raise awareness and social acceptability.

Local communities

The role of local communities is to participate and to provide advice on local-level restoration. The goal is that via participation, their interest and willingness towards restoration will ideally improve. It is important to have local stakeholders and farmers involved, as their willingness to participate is very central for the success of the restoration measures.

Monitoring and evaluation systems

Monitoring was not elaborated at length in the interim RSPs, though the importance of monitoring was recognised by the case studies. Constant evaluation and monitoring of the effects of different restoration action (e.g. of dam removal) will help gather evidence to support further restoration action. Monitoring helps with establishing best practices, presenting long-term effects and results, and supporting adaptive management and vice versa.

Monitoring was seen to be the responsibility of various local, regional, and national public actors (as regulatory agencies), universities and other scientific partners (e.g. biological stations). At the same time, this depends on who is currently responsible for restoration.

Funding and financial instruments

The case studies identified a variety of different funding and financial instruments relevant for scaling up. Among the different opportunities related to funding, the German Emscher case have planned to examine whether the utilisation of cutting material could be economically integrated into the maintenance concept of the case region (e.g. via production of biogas in digestion towers).

Currently, funding sources vary. Depending on the case, some funding comes from management of the water and cropland by the farmers in the restoration area or from the agriculture administration. In others, there is a need for agro-environmental financial measures to supplement and drive the funding, for instance such as those provided by CAP instruments.

In the RSPs funding for scaling up small streams and basins restoration consisted of both public and private sources. Public funding sources varied from subsidies especially to farmers (also from the EU), to different levels of government funding covering or contributing towards an aspect of restoration (e.g. towards the costs of monitoring). Also public-private-partnerships were identified, in which the government or local authority sets up long-term agreements with farmers.

However, getting private funding from companies can be difficult if restoration requires removing dams. Dam removal can be controversial if cultural and historical values compete with ecological ones, and therefore decrease potential sponsors' interest in getting involved (Deba River, Spain CS02).

3.3 Large transboundary rivers cluster

All six large transboundary river case studies have completed and sent their RSPs.

3.3.1 Target audience of the RSP

Each of the case studies identified a target audience for the regional scalability: who would be reading it and who should be involved in the implementing of the plan. In the large transboundary rivers cluster, many target audiences for the RSP were identified. Most commonly, different public officials were seen as central for the RSP, both in terms of reading the RSP and putting it into use. The public authorities varied from regional agencies, national governmental entities to international water agencies, with an emphasis on a coordinated whole-of-government approach. The RSP could also be useful for those responsible for developing and implementing sectoral plans and strategies in devolved public institutions.

Also, local, regional and national-level NGOs are recognised as key actors. Rather than relying on public authorities to do the work, a more network-led approach - consisting of NGOs representing different levels, public authorities, and local communities - to scaling up was considered a requirement of replicating the development model of the case study (in the Hungarian Tisza case study). A powerful enough network could then promote a change towards a more favourable legislative, administrative and subsidies frameworks.

Research organisations were also mentioned as a broad target audience, while at the other end specific strategic, organisational, and technical groups and boards for implementation were identified.

3.3.2 What

The case studies were asked to think about a timeline of 10-30 years from now. For the interim RSPs, the case studies needed to think about what exactly they were planning on scaling up. This exercise began with creating a common vision for the plan, followed by clarifying what is being scaled up – a process, restoration technique or tool, monitoring, or something else. This section also summarises the opportunities and applicability that the case studies considered relevant for their visions and scaling up to be realised.

Vision

The visions for large transboundary rivers see the river ecosystems functioning well and being ecologically robust, with more room for natural processes and allowing more hydro- and morphodynamics in the floodplains. Integrated approaches, which include all relevant disciplines and experts, information and public awareness on the importance of rewetting floodplains as part of a good functioning ecosystem are ingredients for successful scaling up. Local communities' needs and livelihoods are considered, and sustainable use of natural resources is also a factor. In one RSP (Blue Belt Germany), the individual measures and the entire federal program also include a comprehensive, structured monitoring program, which is linked with scientific research covering both natural and social sciences. Furthermore, the knowledge gained from monitoring will be used in an adaptive learning framework to continually feed into improving the planning and implementation of the nature-based solutions.

Consequently, the large transboundary river cluster also sees that it is key for long-term success that politics, administration, and society recognise the importance of the more natural functioning of such rivers and their environmental and societal impact, and therefore lead to high support for restoration action and related joint

tasks and boards. To this end, nature-based solutions and transport-related concerns need to be seen as equally important, while waterways and their floodplains are restored, including by dismantling grey infrastructure that is no longer needed.

Scaling up

Process

The process of scaling up is considered as the way of working together with the other domains to achieve the goal of large transboundary river ecosystem improvement. This requires that disciplines such as ecology, navigation, river engineering and flood protection work together. Links should be established to organisational innovations, such as integrative project teams with a stakeholder advisory board. Inclusion of both known and new stakeholders, e.g. from ecotourism and recreation, and the integration of Green Deal Goals into the planning process from the very start will help with the identification of new important topics and stakeholders.

To meet this objective of working together, the ecosystem improvement needs to be supported by the society at large. Therefore, to open and optimise participation processes, forming a blueprint for participation processes for nature-based solution measures and for more broadly in restoration activities in other fields were highlighted to be scaled up. Pairing such scaling up with the development of a communication strategy and public relations work adapted to different social groups was seen complementary to help achieve the goals of restoration.

Finally, there were some thoughts in the RSPs on financing the scaling up, which is of central importance. Establishing processes and financial instruments which create monetary and non-monetary incentives can help secure long-term sustainability of restoration activities (e.g. land subsidies for renaturation, making sustainable management financially viable, sponsorships, awards, using restoration related materials to enable circular economy, etc.). Economic alternatives need to be available to motivate stakeholders and landowners (particularly farmers) to enable land use change to be harmonised with restored floodplains and rivers.

Restoration techniques and tools

The large transboundary river cluster identified multiple restoration techniques and tools. Among them were the following:

- upscale the available knowledge and state-of-the-art methods to conceptualize, implement and monitor NbS, and to provide strategies for optimising ecosystem improvement serving multiple goals (such as biodiversity, climate regulation, drought and flood resilience).
- assess and thus ensure the economic viability of measures not only based on their monetary costs, but also on delivering ecosystem services. To this end, develop methods and provide guidance for application for implementing partners.
- develop and upscale techniques so that benefits between different objectives of the EU Green Deal and/or ecosystem services can be maximized and trade-offs between them can be minimized. Ideally, this will be done using knowledge-based decision support tools, which integrate experiences from the monitoring.
- develop and provide tools that will support decision-making processes for a systematic, ecosystem-based quality improvement, and therefore provide technical and scientific support for the core objective (improving the river-floodplain habitat network and its biodiversity) and better operationalize it, e.g. via technically justifiable prioritisations.
- scale up technical knowledge on NbS, on abiotic and biotic processes, ecological benefits and ecosystem services, and practical restoration measures, e.g. riverbank restoration and reconnection of side arms.
- develop land use models together with local communities and farmers, building on the traditions of floodplain farming, including exploring technical solutions for water discharge to floodplains, inland water retention, profitable agricultural production adapted to water retention, and shorter retail chains to improve profitability. Such models will need to consider relevant CAP subsidies, and incorporate forms of community cooperation, stakeholder involvement and governance solutions for achieving sustainable landscape uses.

Monitoring

For scaling up, a coherent and adaptive monitoring scheme is required for measuring success and to enable a science-driven learning strategy. What success means can vary from reduction of river-bed incision to re-establishment of former or creation of new habitats for flora and fauna and maintaining "good ecological status", among others.

Monitoring should not only be targeting natural science and engineering related aspects, like biodiversity, abiotic conditions, flood risk management disciplines and river engineering, but also socio-economic and legal factors and ecosystem services. In this regard, developing the foundations of monitoring (e.g. what to monitor and how, new techniques for monitoring and evaluation, e.g. using remote sensing, artificial intelligence,

automated data acquisition) and guidance for implementing it can be ways of scaling monitoring up. Bringing in and engaging with other scientific partners, such as universities and research centres and co-developing and co-implementing monitoring can foster new innovations and sharing of monitoring related costs.

For large transboundary rivers, monitoring and measuring of higher retention potential, in terms of floods but also in terms of nutrients (e.g. N and P), kilometres of restored riverbanks, hectares of reconnected side arms, hectares of reconnected wetlands, and greater awareness about the benefits of nature-based restoration measures among the policymakers and the general population are some aspects to consider in scaling up.

Opportunities

A plethora of opportunities were identified among the large transboundary rivers. A central opportunity lies in the combination of ecological and other benefits, such as improvement in the ecological status and complemented with e.g. adaptation to drought, nature inclusive agriculture, tourism, and health and wellbeing. As the weather events related to climate change become more common, so does awareness about the need to mitigate and adapt to them. Besides tangible benefits, scaling up restoration provides an opportunity to broaden out stakeholder engagement, find alternative funding and form new alliances. Projects, such as MERLIN, have a role in creating an evidence-base and demonstrating successful cases of these multiple benefits being realised in practice to then be replicated elsewhere.

If restoration is written into new or revised legal frameworks, it will have a significant impact on plans, strategies and activities. Therefore, being active to foster a pro-restoration political environment for such legal and policy developments can create opportunities, such as existing laws already do on some conservation types and programmes (e.g. Natura 2000, Habitats and Birds Directives). Not only can new policies and laws create room for new collaborations, but they can also increase the resources allocated to restoration. For example, the implications of the European Green Deal ought to lead to integration of non-monetary aspects (such as ecosystem services) into economic decisions, and thus better cost-benefit-ratios for NbS and more implementation.

Besides opportunities arising from legal frameworks, the recent COVID-19 pandemic has helped the public to realise the significance of local natural environments, boosting domestic tourism. Supply-chain issues during COVID-19 and now the war in Ukraine – particularly with fertilisers – may cause farmers to seek nature-based solutions as an alternative.

Applicability

Restoring large transboundary rivers – e.g. by riverbank restoration, reconnection of sidearms, re-shaping of groynes – should result in reducing riverbed incision and thereby decrease desiccation of the surrounding floodplains. Therefore, such measures are not only applicable but urgent.

Though in many places, restoration is already at least partially established, understanding of NbS and how to design and implement such multifunctional measures remain limited. This only emphasizes the potential value of the MERLIN case studies.

Yet, implementation of restoration in large rivers is resource intensive. How scarce resources are distributed may limit applicability, but also increase the impetus to develop cross-sectoral collaboration. To do so, it would be greatly beneficial if there was one shared vision between different actors and within management and administration.

3.3.3 Why

The MERLIN project uses the European Union Green Deal Goals as a framework for aligning restoration action across the case studies and justifying restoration. Each of the large transboundary river case studies were asked to identify and elaborate on the primary and secondary Green Deal Goals that they would contribute to by scaling up restoration. The results are in the below two tables, with a small number of examples from the case studies. The case studies also elaborated on further benefits of scaling up, with a brief synthesis at the end of this section.

Primary Green Deal Goals

Green Deal goal	Mentioned by how many case studies (out of 6 in total)

Flood and Drought resilience	6
Climate regulation	5
Biodiversity net gain	5
Sustainable transport	3
Zero pollution	2
Health & well-being	2
Sustainable food systems	1
Inclusivity	1

In the large transboundary rivers cluster, the key points of the primary Green Deal Goals were elaborated to be:

- biodiversity net gain – a rewetted floodplain as part of an ecological robust river ecosystem will increase biodiversity and give an enormous boost to the functioning of the river ecosystem.
- flood resilience – increase in the number and/or areas of floodplains will increase the room for the rivers and will thus contribute to flood resilience.
- drought resilience – altering the water management of floodplains will help to increase freshwater storage.

For the Blue Belt case study in Germany, the reasoning for restoration is as follows:

Next to biodiversity, the most important issue will be the trade-off with navigability of the waterway. The requirements for shipping will pose major conditions and will be a trade-off for many restoration activities. Yet, there can be synergies. Shipping itself might be considered a “sustainable transport” mode, so there is a direct link. Moreover, there are major linkages specially to issues of water availability and scarcity (flood and drought resilience), pollution and climate regulation. Since all of these connect to certain degrees also to biodiversity and restoration (some of the measures can have positive effects for climate regulation and shipping) the ambition is to find ways to maximize co-benefits. The goal is to develop tools and procedures to support this and find win-win-solutions.

Secondary Green Deal Goals

Green Deal goal	Mentioned by how many case studies (out of 6 in total)
Health & well-being	4
Inclusivity	4
Financing the transition	4
Circular economy	3
Sustainable food systems	3
Zero pollution	2
Green Growth	2
Sustainable transport	2
Climate regulation	1

For example, thoughts from the Hungarian Tisza case study for financing the transition were:

While transforming water management infrastructure and encouraging farmers to move towards water retention-based farming practices will require public funding, the aim is to also attract significant private capital. Farmers (especially young ones) may be open to investing in new, environmentally friendly production

methods that open new markets for them. By switching to extensive farming, a farmer can save money by reducing the use of expensive fossil and other industrial inputs. Innovative use of the landscape opens opportunities for innovative bankable solutions. For example, increasing climate resilience reduces weather-related damage, which may attract the attention of insurers and integrators.

Benefits of scaling up

Case studies identified environmental, stakeholder and business-related benefits in their interim RSPs. Among environmental benefits were the following:

- increased biodiversity, as rewetting floodplains, reconnection of decoupled side arms and wetlands, re-establishment and creation of habitats for flora and fauna all contribute to reduce biodiversity loss; nutrient retention and nutrient cycle will improve.
- improved ecosystem service delivery in the form of flood and drought risk reduction, also contributing towards climate change adaptation and mitigation as groundwater levels will raise and retention capacity for floods will increase; improved status of waterbodies, species and habitats.
- reduction of intensively farmed arable land and increase in areas under more natural conditions.

For stakeholders, the benefits from scaling up the restoration of large transboundary rivers were versatile. These included various health and wellbeing related benefits, such as recreation, cultural services, sports, fishing, and opportunities for experiencing nature. Engaging stakeholders in scaling up was also seen to result in broader social acceptance and consensus-building. Participatory planning methods can help form new alliances for river and floodplain restoration and more direct anchoring and addressing of problems and opportunities on the ground. Such participatory approaches could also speed up decision-making processes and implementation as opposition is expected to decrease because of participation. Scaling up was also expected to garner further scientific interest (e.g. in monitoring, but also in social sciences) and knowledge transfer services.

For businesses, potential benefits varied from those related to clay and sand mining companies, insurance sector and risk management via prevention of disasters (e.g. floods), tourism, sustainable agriculture, and fisheries.

3.3.4 Where

The large transboundary river case studies varied in the “where” to upscale. For some, upscaling meant the wider catchment area, and for others upscaling is a restoration measure that can be replicated elsewhere on similar sites. Below are brief descriptions of the respective upscaling areas for restoration as follows:

- In the Netherlands: The area includes the rivers Rhine and Meuse in the Netherlands and its branches.
- In the Austrian Danube: On national level, Austrian Danube stretch (especially free-flowing stretches); for other large rivers having the same dimensions as the Danube. The scaling up area is focused on the Danube section in Austria, which is defined as the Upper Danube. The upper Danube reaches from the source of the Danube (Germany) to Bratislava (Slovakia).
- In the Romanian Danube: Upscaling area runs from the lower course of the Danube River downstream of the Iron gate dams to the Danube Delta.
- In Hungary: The Tisza River basin, which is the largest sub-basin of the Danube catchment (157,186 km^2) and connects five countries: Romania, Ukraine, Slovakia, Hungary, and Serbia. Hungary has the second largest area of the Tisza Basin that covers almost 30% of the catchment.
- In Germany: The Blue Belt program comprises all federal waterways that are not canals. Focus is on "secondary waterways" (where inland transport is low) where restoration measures can be potentially upscaled. In the core network of waterways (high transport level, such as the Rhine), restoration will be based on "stepping stones“, smaller scale measures and a stronger use of NbS. The upscaling-activities could affect the entire catchment.

Policy and legal context

For the large transboundary rivers, both the national and international scales are relevant in the policy and legal contexts. The role of the (environmental) ministries is key besides the regional level administration. Drafting of new legislation can provide opportunities for scaling up or clarify practices related to spatial planning and land use change, among others. However, having a heavily centralised decision-making system for water management can also be a barrier if that prevents local communities from participating effectively in water management.

Land tenure is mixed along the large rivers. Though some land is publicly owned, a significant portion is owned or managed by farmers (also varying in size of managed land), which can pose difficulties in implementing NbS because of perceived clashes of interests.

A challenge for restoration and scaling up is the short-sightedness of policymaking and subsidies which is an obstacle to more natural water management. Overcoming these kinds of challenges is key for achieving restoration in the long-term but bringing change in such policy contexts can be slow. The Common Agricultural Policy (CAP) has led farmers to prioritise draining areas which would otherwise be waterlogged, and alternative incentives are needed to improve farmers' willingness to retain water on their land.

3.3.5 How and who

In terms of the "how" to scale up and "who" to do what, the case studies address aspects related to collaborative partnerships, the role of case study boards and local communities, monitoring and evaluation systems, and finally funding and financial instruments. Each of these are further elaborated below.

Collaborative partnerships

Different collaborative partnerships and arrangements were identified in the RSPs. Partnerships are key in getting everyone on the same page and working towards the same shared goals. With the international aspect in large transboundary rivers, it is important to also include partnerships which cross governance borders (regional, national, and international agencies and organisations working together). Generally, the national government and/or provincial government were considered to have the higher-level responsibility/oversight over implementation, but in practice implementation may also be down to water maintenance associations, communities, municipalities, and NGOs.

Therefore, partnerships should not be limited to the public sector, but also include implementation and scientific partners to facilitate exchange of expertise and monitoring. The inclusion of stakeholders (e.g. from the fields of ecology, navigation, river engineering, and relevant business sectors) and participation in collaborations is important. National or regional task forces and expert groups can be a way of gathering actors and sectors, which together can help overcome barriers. Forming a restoration strategy with elements that consider economic development needs can also be an expression of partnership.

Collaborations help educating society about the importance of wetlands and therefore can help increase the involvement of local communities and the public in restoration action. The role of NGOs (local, regional, national) in awareness-raising can be particularly important.

Case study boards

The role of case study boards was seen in a similar manner across the large transboundary river case studies. The main purpose is to gather multiple relevant stakeholders around the same table, hear their input to the case and thus ensure different perspectives are considered in the planning and implementation. Among these were colleagues of those responsible drafting the interim RSP, other regional and municipal authorities and public agencies including ministries, financing and implementing institutions, and stakeholders from all fields of interest via the stakeholder board (navigation, NGOs, local communities, ecotourism, recreation, etc.), though in some cases NGOs (e.g. WWF regional offices) are responsible for driving the restoration work to go ahead. These actors play a role in managing infrastructure and natural resources, dealing with permits and legislative support, raising awareness, and providing scientific support.

The key purpose of the case study board is to give feedback on the provided measures and support in finding ways for these measures to be implemented. Scientific stakeholders are needed to provide justification for restoration, while having a high-profile advisory body supporting the restoration can serve as an interface to politics and society, thus also applying political pressure to decision-makers to support restoration.

Involving specific sectors (e.g. agriculture and fisheries) is important, and this ranges from individual farmers, fishers and landowners to associations looking after the interests of these stakeholder groups. Similarly involving scientific and research organisations is seen as relevant.

Local communities

The role of local communities is to participate and to provide advice on local-level restoration. The goal is that via participation, locals' interest and willingness towards restoration will ideally improve, which is central for the success of the restoration measures.

Farmers, the regional administration of agriculture, water management, and municipalities play a key role in land use change. These local-level actors are also a part of local communities and can sometimes represent local interests to higher level decision-makers.

Local civil society organisations and the population are also important actors in and of themselves, as they can articulate their expectations of the landscape, but their participation in planning and implementation is also important for the channelling of cultural traditions and local self-determination.

Local community members (e.g. members of NGOs, local politics, employees in the local administration, concerned public) are often the actual idea generators and drivers of implementation at grassroots level. They have local knowledge (concerning the spatial, political, social and economic situation in the region) and give important guidelines how to proceed and where to focus and how to minimize problems. Their participation is, however, in large parts not mandatory and takes place mostly during informal meetings or during feasibility studies. Given their importance, there ought to be more emphasis on integrating these local knowledge holders into restoration more and improve their participation.

Monitoring and evaluation systems

The importance of monitoring was articulated well by the case studies. Monitoring and evaluation systems were seen as a way to ensure that new knowledge and lessons learned from these particular MERLIN cases could inform future restoration and lead to improvements in how restoration is done. Thus, monitoring helps with establishing best practices, presenting long-term effects and results, and supporting adaptive management and vice versa.

Continuous measuring, documenting and communication of the ecological, economic and social results of spatial interventions and land use change are key for upscaling, as such data can form the evidence-base and justification for further restoration action and funding.

Monitoring was seen to fall on various local, regional, and national public actors, universities and other scientific partners, engineering offices with expertise in the field, but also depending on who is currently responsible for restoration. The monitoring responsibility and developing monitoring framework were also seen to fall on NGOs (e.g. WWF offices).

Funding and financial instruments

The case studies identified a variety of different funding and financial instruments relevant for scaling up. Both public (national and EU funding) and private funding (whether from circular economy initiatives or insurance and risk management) are seen as sources for funding. The national government, or specific ministries for environment, energy and/or climate and municipalities were most mentioned in the RSPs. More typically for large rivers, public funding is considered to remain the main source of funding, with the justification that river restoration and the improved condition of rivers will provide benefits for the public. Where there are no funds or resources available for buying up land from private landowners, even more emphasis needs to be on cooperation with these individuals.

For private funding, sand mining companies, private foundations and NGOs were also mentioned. Again, if e.g. farmers will receive benefits from river restoration, then they could also be a source of funding.

The Hungarian case study provided the example of "Living Tisza" trademark system of Nagykörű, which is well known and of high reputation in Hungary. Developing other similar local trademark systems could facilitate market access of floodplain farming products, further promoting local tourism. Globally, the WWF network is developing methods of Bankable Nature Solutions.

3.4 Financial review on the RSPs

In early March, a review of the interim RSPs prepared by the MERLIN case studies was conducted by the Work Package 3F team (Ecologic, Deltares, JHI, WU). The main intention was to update understanding of the case studies as regards their expressed views on upscaling and how to finance it. The hope was to outline (if roughly) to what extent the case studies are already thinking about funding and finance as part of the RSP drafting exercise and identify less elaborated aspects that could eventually be strengthened through specific elements of the MERLIN Financing Workflow. Further, the goal was to spot commonly mentioned target audiences, expected benefits and business opportunities being associated to the restoration upscaling, and the sources of funds being considered to pay for it.

Note: at the time the review was carried out, the draft RSPs for cases 3, 6 and 15 were not available, and have thus not been considered in this synthesis. Further, by the time of preparation of this synthesis, the WP3F partner assigned to review the RSP for the Polish case study had not provided its inputs, and thus this case has also not been considered. After an initial exchange with the peatland cluster in Scotland in April 2023, this review will be complemented.

The following are some key insights from the review.

3.4.1 Funding and Revenues

Some interim RSPs mention private funding in the form of donations or grants, including possible co-financing from mining companies, philanthropic donor grants, possible in-kind contributions, or NGO funds. However, most RSPs with a funding plan focus on public funding mechanisms, including revenues from water licenses, national grants, or EU policy/regulation like the Just Transition Mechanism, the CAP, or the LIFE programme. The potential challenges associated with relying on public funding, especially for the long-term, appear to be generally recognized.

Moreover, the majority of RSPs suggest a funding gap, as they either do not have a clearly/systematically outlined funding plan or note the need for additional funds. Several RSPs do formulate ideas on how to raise revenues. These include:

- opportunities related to eco-tourism (case studies 2; 7a; 7b; 8; 9; 13; 14; 16)
- mining: peat (case study 14), sand and clay (case study 4)
- energy production via windmills and solar parks (case study 14), or biogas (case studies 1; 11; 16)
- agricultural opportunities, aquaculture/fisheries (case studies 8; 10), agricultural production (case studies 4; 8; 9; 13), and enhanced agricultural productivity through increased pollination (case study 16)
- opportunities from collaborating with the insurance sector as an investor for nature-based solutions (case studies: 7a; 8; 9; 10; 11)
- revenues from carbon- and biodiversity offsetting (case study 16) - in the UK, possibly enabled by the Peatland Code and the Biodiversity Net Gain strategy

Overall, the RSPs highlight the need for further analysis of the role of the corporate sector and local business opportunities.

3.4.2 The RSPs and WP3F

The level of interest in looking for non-public funding sources to pay for restoration upscaling appears to be varied. Some RSPs show a high level of interest in identifying and exploring alternative financial sources. Other RSPs focus on currently tapped public funding sources and make no explicit mention of private funding. Some RSPs indicate an interest in private funding in the future, but without a priority at present. Overall, the level of interest in seeking non-public funding sources seems to depend on:

- the stage of the project
- the availability of public funding
- the specific opportunities and barriers in the local context

Generally, the MERLIN Financing Workflow could potentially contribute to improving the scalability plans through a range of its elements, including:

- conducting cost-benefit analyses (CBA) to demonstrate the benefits of restoration to policymakers and other stakeholders
- identifying potential beneficiaries and revenue streams
- identifying funding sources from both public and private actors
- developing a business case to attract private players
- designing a financial strategy
- fine-tuning stakeholder engagement
- reflecting on the key profiles to make up the restoration upscaling team

Here, a modular approach to using the workflow seems reasonable, where case studies could consult and implement the specific elements of the guidance that address aspects that are ‘weaker’ or less thoroughly elaborated in their draft RSP. This idea will continue to be explored within WP3F and discussed at this year’s cluster meetings.

4 Conclusions & recommendations

This chapter gives an overview of the most prominent conclusions as gathered from the individual interim RSPs and is based on the lead authors' (Kaisa Pietilä, Tom Buijse and Ellis Penning) interpretation of these results.

4.1 Conclusions

Until now, the term restoration has been used in the RSPs to improve the ecological functioning and biodiversity in natural areas. Yet, with climate change and the heavy use of landscapes for human benefits the question arises if 'restoration' is still an appropriate term or whether it might put readers on the wrong page? After all: going back to a historical reference is not realistic anymore due to global change. So, what could be a good alternative for the term 'ecosystem restoration'? It might seem that we are fussing over semantics, but in light of changing environmental conditions for freshwater ecosystems, the degree to which these have been modified in the past, and the time horizon of the RSPs, using the term 'restoration' no longer feels appropriate. Higgs et al. (2014) address the changing role of history of restoration ecology and propose shifting to valuing historical knowledge in guiding scientific interpretation, recognizing key ecological legacies, and influencing the choices available to practitioners of ecosystem intervention under conditions of open-ended and rapid change. Walker et al. (2004) used the terms 'adaptability' and 'transformability'. Depending on the status of the freshwater ecosystem, it might still be restorable ('adaptability') or a new target for improvement needs to be defined taking the consequences of irreversibly changed boundaries' conditions into account ('transformability').

Now that we have these interim RSP prepared by the MERLIN case study partners with instruction but without feedback we need to consider to which extent they are the sufficiently ambitious and transformative. In the current versions of the RSPs, the visioning parts still need more storytelling and wider, potentially daring viewpoints to be both realistic but also a major step forward. This is an aspect to address in the coming period in the discussions within the clusters and a start for furthering the RSPs to a final version. The interim RSPs have been prepared by each case study individually without exchange with other case studies. An important next step is to read the other RSPs particularly within the same cluster and to provide each other with questions and feedback.

In the 'how' section, the true 'how' is not always explained very specifically. We recommend also to further specify what is needed to truly answer the question of 'how to do it' in more detail. For example, monitoring is not yet dealt with in great detail: both in terms of what is to be monitored and how this links to the needed institutional and financial backing for such activities.

Terms like 'stakeholder', 'parties involved', and 'actors' are used in different manners and clear definitions are lacking, making it sometimes difficult to interpret these aspects in individual RSPs.

The interim RSPs are not yet clear in how these RSPs can be embedded in a more 'official' line of work, e.g. a programme that is led by the national authorities to work on large scale improvements of ecosystem functioning in line with EU Green Deal goals and related (inter-)national policy goals. In other words, the 'transferability' and 'adoption' of the visioning and thinking expressed in the RSPs requires further clarification in terms of a responsible entity for the entire period up to 2050.

4.2 Recommendations

The following recommendations can be made to further improve the RSPs:

- A better understanding of the impact of hydrometeorological events under future climate change on ecological functioning of the ecosystem at hand is needed to really judge the impact of catchment-wide water quantity and quality management. In addition, the use of ecosystem services and the related demands from sectors need to be included in the RSPs to link these relations to the envisaged success of freshwater restoration.
- The role of current and new national and European legislation in relation to upscaling restoration efforts is not yet well explored, nor is there a lot of clear thinking yet on how to deal with unforeseen future climatic societal changes. We recommend to further look into adaptation pathways (e.g., Haasnoot et al., 2013) as a method to be able to better manage freshwater ecosystems under changing conditions.
- The role of citizen science is mentioned multiple times in RSPs, sometimes also as a means to 'reduce costs of monitoring', yet it should be noted that well organized citizen science activities also deserve sufficient attention and detail in order to be successful and beneficial to the overarching goals.
- Many of the teams working on the RSPs are still lacking knowhow in important disciplines such as those related to the social, financial, economics and legal domains. Yet, we recognise, also in the optimisation strategies that these disciplines can bring important new insights to strengthen the way forward. It is

therefore recommended to look further into strengthening the alliances with colleagues from these disciplines. Similarly this is true for topics such as the potential for carbon sequestration and monitoring of the needed input to make the business case for such ecosystem services.

- → It is central to identify who can adopt the RSPs as a long-term primary responsible organisation for the actual realisation of the plan.
- → Experience from implementing flood risk reduction programmes that take changing discharge regimes into consideration can help to think in larger spatial scales and longer time scales.
- → To scale up, it may help to consider the appropriate operational scales which are suggested by Friberg et al. (2017) as the three "Operational Restoration Unit (ORU)" levels (Figure 4). In ORU1, the restoration project deals with only one side-stream, striving to achieve the Water Framework Directive (WFD) goal of Good Ecological Status in that Water Body, e.g. by a local measure of changing channel platform. Here, only the restoration measures and effects within this one stream's catchment are considered. In ORU2, the restoration measure is the re-meandering and floodplain reactivation of the lower portion of the river (red stretch) to comply with the goals of the Habitats Directive (HD). Here, the ORU is set to be the entire catchment upstream, including ORU1, as the upstream reaches will affect the restored area. However, the benefits of the restoration within ORU2 may also extend downstream. In our example, the flood risk in the city downstream may be reduced through water retention, thus addressing the Floods Directive (FD), and nutrient retention may improve, resulting in a higher quality of the water entering the ocean [Marine Strategy Framework Directive (MSFD)]. Thus, expanding ORU2 to ORU3 will increase the benefits, even though the actual restoration only happens within ORU2

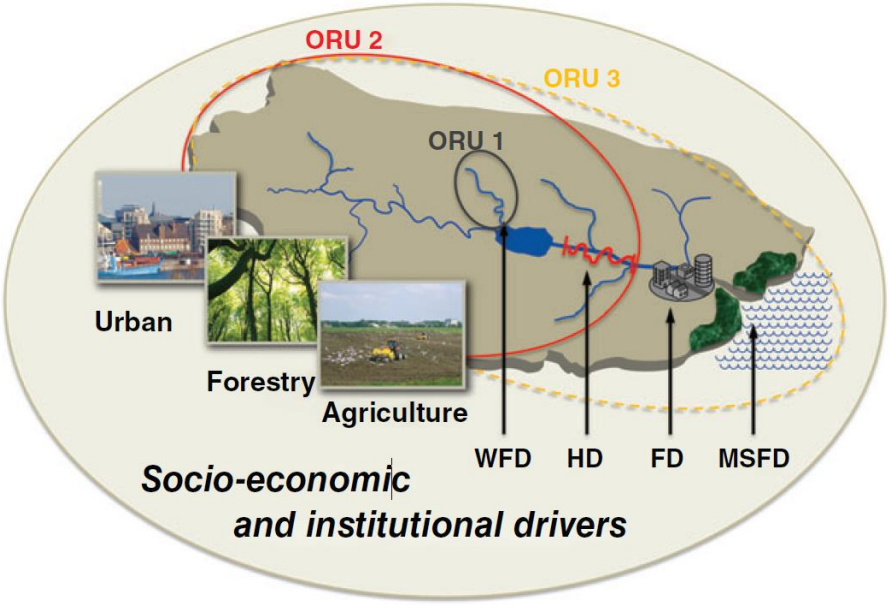


Figure 4 An Operational Restoration Unit (ORU) sets the spatial borders of specific restoration project(s), and encompasses the wider institutional and socio-economic drivers that directly or indirectly affect the project (source: Friberg et al. 2017).

4.3 Next steps towards final Regional Scalability Plans

In the further work towards the final RSP the following recommended steps can be made:

- → Use a time horizon of 2050 for the RSPs in the visioning and express the visioning in a clear narrative relevant for the local situation to inspire those reading the RSP.
- → In this visioning, better understand and express the impact of climate change, demographic change and related change in land-use on the biophysical domain, especially related to the impact on water quantity in the area of interest and the foreseen increase in frequency and intensity of hydrometeorological events (floods and droughts).
- → Better define the role of monitoring, the needed types of monitoring and the related institutional and financial arrangements to ensure sufficiently long time series of monitoring to be able to properly evaluate the impact of the restoration efforts.
- → Provide sufficient capacity building or expansion of the team's expertise in terms of different disciplines to ensure a holistic approach that includes both the bio-physical and socio-economic domains, with good understanding of also the legal and institutional embedding of the actions.

- Find ways to improve coordination among different public administrations operating on the same land, improve linkages between water-related legislation and agricultural practices, e.g. by promoting collaborative partnerships and case study boards.
- Identify which organization can adopt the RSP as the primary organization responsible for the implementation of the plan.
- Improve on the thinking in/understanding of overarching needs at basin level, including in terms of how to manage conflicts of interest and trade-offs (e.g. socio-cultural and environmental trade-offs in dam removal).
- Further explore the role of different financial mechanisms and the role of both EU-based opportunities and national/regional funds and financial resources for this, including CAP etc.; ensure that the incentives and benefits are clearly communicated to stakeholders.
- Identify the key landowner types and the best ways to collaborate and integrate them into scaling up activities.

5 Individual Draft Regional Scalability Plans

5.1 Cases within the cluster peatland and wetlands

5.1.1 Case study 1 Kvorning wetland (Denmark)

Authors: Linda Udklit (NST), Annette Baattrup-Pedersen (AU), Martin Nissen Nørgaard (NST)
AU: Aarhus Universitet
NST: Naturstyrelsen

Main questions and aspects to be addressed	
Who is this RSP targeted? Who is meant to read your RSP and use it? If exact target audience is still unclear, define what type of an actor you are targeting.	Mainly the MERLIN consortium and end-receivers of the output from MERLIN.

What is being scaled up?

a) Describe the vision for what you are scaling up.	In Denmark, a total of 100.000 hectares are supposed to be taken out of production by 2030 mainly by "replicating" the Kvorning project (CS1) – i.e., peatland restoration. This means that former agricultural land will be re-established by recreating the natural hydrology as far as possible. A smaller part of the 100.000 hectares will, however, "only" be taken out of production (not re-wetted), e.g. for extensive grazing.
b) Describe what you are scaling up: technologies or techniques, processes, models or tools, and monitoring/evaluation aspects that you will scale up.	A process evaluating how to screen potential areas for peatland restoration (focus on hydrology, carbon content in the soil and cost efficiency) including IT and GIS tools that can be applied for the screening. Tender including pre-investigations and detailed project implementation conducted by external advisors – framework established and continuously evaluated. Process for environmental screening and getting permissions in relation to effects on nature/Natura 2000.
c) Describe the opportunities (in SWOT and optimization strategy) and their relevance regarding the timeline till 2050.	The main aim is to reduce CO2 emissions/capture carbon. On top of that, there is also a wish to improve biodiversity, environment and promote public access/recreational value of the open land in Denmark.
d) Describe the applicability of your measure regarding changes in the local and global environmental and socio-economic contexts and the timeline till 2050.	Applicable. The approach developed and used in DK can give valuable input in other regions as well. DK is particularly strong in governance – how to include stakeholders and have their support. Reports with more detail on Danish, and over time also in English.

Why to scale-up?

e) Describe the main (GD) goals that the scaling-up plan addresses and how you plan to make most of them.	• Climate regulation • Health & well-being • Inclusivity • Biodiversity • Values/frame for cost effectiveness has been set (maximum of 1,147 € per t. CO2 reduction). This amount can only be exceeded (and only by a maximum of 2 times the initial maximum) if

	several GD goals are targeted (on nature, environment and climate adaptation). I.e. CO2 is the main target, and lower cost effectiveness on the CO2 reduction can only be accepted if eg. the project will also significantly improve biodiversity and stimulate a reduction in nutrient loss to the aquatic environment.
f) Describe additional (GD) goals that have potential for the scaling-up and how you could make the most of them.	• Flood resilience • Drought resilience • Zero pollution goals • Sustainable food systems (Farm2Fork) • Sustainable energy For example, when conducting land consolidation, we can do our best (minding the projects being voluntary for the landowners to participate in) to support grazing (and thereby production of "nature meat") of the project areas upon implementation. We can consider biomass harvesting (minding any existing nature, accessibility etc.) in the project areas prior to implementation to mitigate P loss to the aquatic environment by removing nutrients in the biomass. This may also improve the potential for biodiversity net gain and contribute to biogas production.
g) Describe the expected benefits in terms of biodiversity and ecosystem services delivery, climate change mitigation and adaptation.	The benefits expected are: 1) reduced carbon emissions by rewetting the area 2) reduced nutrient loss to the aquatic environment 3) improved biodiversity 4) the benefits for hydrology have not really been considered – but might be a co-benefit. For MERLIN purposes we have assessed this benefit also for WP1.
h) Describe the expected benefits in terms of stakeholder engagement.	The stakeholder engagement is expected to help create a feeling of "ownership" to the project, in the local communities. It will also help incorporate local knowledge and ideas into the project, as well as keep the stakeholders updated on the project. I.e. information goes both ways. By creating and supporting stakeholder engagement locally, this may also stimulate the willingness at a more regional scale to participate in these kinds of projects.
i) Describe the expected benefits in terms of business opportunities.	Benefits include e.g. land consolidation (i.e. farmers exchanging lowlands for arable land closer to their farm where the agricultural output may be better). For example, the Kvorning area (and the same applies to other areas as well) is already suffering from high water tables with negative effects for the agricultural production. There is also a possibility for grazing and production of "nature meat" and a possibility for creating guided walks etc.
j) Describe other benefits that result from the scaling-up.	Building/upscaling knowhow/expertise

Where does the scaling-up take place?

k) Describe the catchment/landscape area (bio-physical context).	The upscaling of peatland restoration in Denmark targets low-lying soils with a carbon content > 6% but preferably (and with a higher cost efficiency) > 12%. Remember from e) that the cost efficiency is part of the prioritization. Typically, these soils are found in river valleys and former bogs etc. where there has been peat extraction and/or farming.
l) Describe the main policy actors, their interests, and decision-making processes (policy context).	Government: Aiming to reduce national greenhouse gas emissions. Farming associations, contributing to reducing the emissions from the sector and avoiding/reducing a possible, future tax on CO2e emissions.
m) Describe relevant legislative issues, and formal and informal land tenure.	Legislative issues: • Compensation on §3 protected areas (§3 in the Nature protection act) • GLM8 in relation to the direct payment ○ Competition on land for different purposes (renewable energy, Climate projects, food production,

	nature/biodiversity, recreational purposes, urban development, infrastructure etc.) Above mentioned issues are elaborated in the Optimization strategy. • The extend and detail level of the environmental screening (meaning the process could easily last more than a year in total) could very well turn out to be a hurdle to reach the national goals (of taking 100.000 hectares out of production by 2030). Also compared to the fact, that we are doing nature restoration, it might seem a bit over the target. The land is primarily privately owned.

How the scaling up happens?

n) Describe what kind of collaborative partnerships will be built/what kind of advocacy strategies are needed in the context of this RSP.	Collaboration between governmental agencies, municipalities and the agricultural sector. Also research institutions/universities continuously improve the data we base our projects on including the expected CO2 reductions etc. A national task force and a national expert group representing the abovementioned sectors, have been established to help address and overcome barriers.
o) Describe the role and responsibilities of the case study board.	The role and responsibility of the CSB in Kvorning is to improve the benefits of the project in a local context (e.g. support facilitation of public access etc.) and help embed the project in a local landscape strategy (wider scope than the Kvorning project boundaries). The CSB members represent different interests in the landscape, such as hikers, ornithologists, hunters and local residents.
p) Describe the role of local community members.	
q) Describe the role of monitoring and evaluation systems.	Traditionally, monitoring is not really prioritized in Denmark. Rather the focus is on pre-investigations to foresee possible side effects (e.g. nutrient loss to the aquatic environment) and to assess if negative effects on biodiversity can be expected – particularly in Natura 2000 areas. There is no post-monitoring planned for either of the planned peatland restoration projects.
r) Describe what the funding plan is like. Are new financial instruments needed?	The regional upscaling is governmentally funded and part of the Finance Act.

Who scales up?

Describe the main actors, their roles, and responsibilities	
s) who to involve?	• Nature Agency, Project leads on the local projects (Performing/implementing) and coordinating on a national scale. • Environmental agency, Environmental screenings and supporting with GIS/It tools • Municipalities, Local knowledge and support and permissions/dispensations related to changing the state of any existing nature and other permissions related to spatial planning and changes in the landscape • Agricultural sector, supporting and encouraging individual members to engage, in order for the sector to reach its CO2 goals • Private engineering consultants, engaged to conduct thorough pre-investigations, detail design of projects etc.
t) who funds?	The Danish government
u) who implements?	The Danish Nature agency
v) who monitors?	Not planned in general that peatland restoration in Denmark is post-monitored. Sometimes universities, municipalities or others decide to do follow-up monitoring in specific areas/cases.

Final thoughts

Overarching question: What prevents effective and large-scale restoration?	
w) Describe the policy barriers that need to be removed and overcome in order to scale up. x) Describe how your scaling-up plan addresses these barriers.	Described in point “m” and in Optimization strategy. A national expert group and a national taskforce has been established to address- and support overcoming barriers.

5.1.2 Case study 3 Beaver reintroduction (Sweden)

Authors: Frauke Ecke (SLU), Daniel Thorell (SFA), Daniel Palm (SLU)
SFA: Skogsstyrelsen (Swedish Forest Agency)
SLU: Sveriges Lantbruksuniversitet (Swedish University of Agricultural Sciences)

Main questions and aspects to be addressed	
Who is this RSP targeted? Who is meant to read your RSP and use it? If exact target audience is still unclear, define what type of an actor you are targeting.	County Administrative Boards of Sweden, Swedish Environmental Protection Agency, Swedish Agency for Marine and Water Management, Swedish Water Authorities, Swedish Forest Agency.

What is being scaled up?

a) Describe the vision for what you are scaling up.	By 2050 Swedish wetlands and riparian zones show structural and functional ecosystem health.
b) Describe what you are scaling up: technologies or techniques, processes, models or tools, and monitoring/evaluation aspects that you will scale up.	What is scaled up: Beavers as NbS Monitoring of beaver distribution and environmental impact is scaled up
c) Describe the opportunities (in SWOT and optimization strategy) and their relevance regarding the timeline till 2050.	• Need for narrative of the pros and cons of beavers in the environment to create acceptance of the NbS at local, regional and national level • Enhance knowledge on the role of the NbS for human wellbeing • Cost comparison between the NbS and common and established alternative restoration practices • Involvement of additional stakeholders (e.g., anglers) • Hydrological modelling that shows flood risk and drought mitigation in NbS- and non-NbS systems • Establishment of “leaky dams” that imitate the NbS in regions where beavers are not established, yet • Development of economic compensation for private landowners affected by the NbS • Inclusion of large landowners in co-learning activities • Use of remote sensing in documenting the complexity of the NbS in comparison to traditional wetland (incl. riparian zone) restoration
d) Describe the applicability of your measure regarding changes in the local and global environmental and socio-economic contexts and the timeline till 2050.	The NbS is free of charge (the beavers are doing the job for free) and therefore insensitive to economic shifts. Pressure for land exploration might reduce the size and number of wetlands and riparian zones to be restored by the NbS.

Why to scale-up?

e) Describe the main (GD) goals that the scaling-up plan addresses and how you plan to make most of them.	GD goals: Biodiversity net gain, Climate regulation, Flood and Drought resilience, Health and well-being, Zero pollution. A main prerequisite for the NbS is that beavers are managed sustainably and that they are allowed to establish in sites/areas where they do not make any harm (e.g., damage to infrastructure).

f) Describe additional (GD) goals that have potential for the scaling-up and how you could make the most of them.	• Inclusivity: Multiple stakeholders are affected by beaver dams and can be included in education. Potential for capacity building among sectors and stakeholders. • Sustainable food systems (Farm2Fork): Sustainable hunting of beavers as a natural resource by using both meat, fur and castoreum.
g) Describe the expected benefits in terms of biodiversity and ecosystem services delivery, climate change mitigation and adaptation.	Beaver activity in the landscape increases biodiversity. Huge opportunities to "refill" the local and regional species pool of endangered species by the NbS. Young beaver dams are likely as source of GHG emissions, an effect that however will cease with age. Beaver dams can buffer floods by regulating environmental flow and keeping water higher up in the catchment during periods of high precipitation and hence contribute to flood reduction further down in the catchment. Beaver dams contribute to raise the groundwater level and hence to mitigate drought risk.
h) Describe the expected benefits in terms of stakeholder engagement.	Multiple stakeholders are affected by beaver dams and can be included in education towards understanding the benefits of the NbS.
i) Describe the expected benefits in terms of business opportunities.	Limited. Ecotourism might benefit (watching beavers and birds).
j) Describe other benefits that result from the scaling-up.	Catchment integrity

Where does the scaling-up take place?

k) Describe the catchment/landscape area (bio-physical context).	The Vindelälven catchment comprises the 450 km long river Vindelälven and drains 12 650 km2 from the mountains to the Baltic Sea. It is part of the UNESCO biosphere reserve Vindelälven-Juhtátdahka. Beavers are well established in parts of the catchment.
l) Describe the main policy actors, their interests, and decision-making processes (policy context).	County Administrative Boards of Sweden, Swedish Water Authorities, Swedish Forest Agency, municipalities
m) Describe relevant legislative issues, and formal and informal land tenure.	According to Swedish law, landowners are allowed to destroy a beaver dam without permission as long as outside the beavers' reproduction season. This freedom has resulted in acceptance of the NbS and low controversy. Beavers can be hunted (season hunting) without a quota. As long as only a limited number is hunted, there is no threat to the population. This is however not regulated in any way. There is no national beaver management plan. If infrastructure is threatened (e.g. railway), there is no controversy or conflict. In such a case the dam will be removed without conflicts among stakeholders.

How the scaling up happens?

n) Describe what kind of collaborative partnerships will be built/what kind of advocacy strategies are needed in the context of this RSP.	The success of the RSP relies of mutual understanding for benefits and potential costs of the NbS.

o) Describe the role and responsibilities of the case study board.	The case study board is represented by multiple relevant stakeholders (forest sector, county administrative boards), anglers. Their role is partly advisory and partly policy implementing.
p) Describe the role of local community members.	Their role is advisory, but important to reach acceptance of the NbS and of its upscaling.
q) Describe the role of monitoring and evaluation systems.	Monitoring and evaluation systems are key to evaluate the impact of the NbS (benefits and costs).
r) Describe what the funding plan is like. Are new financial instruments needed?	The NbS is free of cost unless there is a need for translocation of beavers across catchments. Resources are needed for the monitoring.

Who scales up?

Describe the main actors, their roles, and responsibilities	
s) who to involve?	County Administrative Boards of Sweden, Regional Water Authorities, Swedish Forest Agency, Anglers Association
t) who funds?	No funding needed for establishment of the NbS but funding needed to monitor the NbS. If there is a need for a management plan, the development of such a plan incl. recommendations will also need resources.
u) who implements?	No implementation needed since truly NbS. However, further establishment and acceptance can be facilitated by for example the Swedish Forest Agency.
v) who monitors?	County Administrative Boards of Sweden potentially supported by municipalities.

Final thoughts

Overarching question: What prevents effective and large-scale restoration?	
w) Describe the policy barriers that need to be removed and overcome in order to scale up. x) Describe how your scaling-up plan addresses these barriers.	Not sure if there are real barriers. Communication among and consulting of the involved stakeholders are however needed to accomplish a successful upscaling.

5.1.3 Case study 5 Kampinos (Poland)

Authors: Anna Wilińska (KPN), Anna Andrzejewska (KPN), Małgorzata Siuta (KPN), Paweł Trandziuk (SGGW), Julian Rudziński (KPN)
KPN: Kampinoski Park Narodowy (Kampinos National Park)
SGGW: Szkola Glowna Gospodarstwa Wiejskiego (Warsaw University of Life Sciences)

Main questions and aspects to be addressed	
Who is this RSP targeted? Who is meant to read your RSP and use it? If exact target audience is still unclear, define what type of an actor you are targeting.	KPN, Water Management Authority, Local Authorities: municipalities, poviats, Mazovia Voivodeship, local NGO's, Wetland conservation NGO's, other national parks, landscape parks, Regional Environment Protection Directorate, Polish Forests, local communities, Science Institutions

What is being scaled up?

a) Describe the vision for what you are scaling up.	In 2050: • majority of mazovian wetlands an peatlands and all wetlands and peatlands in KPN are restored and are in good condition. • Green-blue infrastructure is widely accepted by society and commonly implemented. • Society understand importance of wetlands and peatlands for safety, health and wellbeing as well as for biodiversity, and climate change mitigation.
b) Describe what you are scaling up: technologies or techniques, processes, models or tools, and monitoring/evaluation aspects that you will scale up.	• Processes – Engage, influence and advice and collaboration: building up social awareness and support for wetlands restoration, education of society and local officials, education and cooperation from local authorities, joint projects (KPN and local authorities), scaling up and widespread KPN experience and knowledge of implementing wetlands restoration, attempt to multiply projects on a micro scale. • Technology – scaling up effective restoration technologies, that have proven themselves in KPN case study. • Tool – scaling up the use of hydraulic modelling for planning wetlands restoration. • Monitoring – scaling up understanding of importance of monitoring and widespread KPN's knowledge and experience.
Describe the opportunities (in SWOT and optimization strategy) and their relevance regarding the timeline till 2050.	Kampinos wetlands are protected under KPN as a highest nature protection form in Poland – long term site designation for nature protection. Depopulation and buying-up land programme in KPN – freeing new lands for wetlands restoration. Experience from previously implemented wetlands restoration. -> implementation of project in micro scale in local municipalities in cooperation with municipality authorities. We will support/implement/promote projects in cooperation with municipalities in the KPN buffer zone.
Describe the applicability of your measure regarding changes in the local and global environmental and socio-economic contexts and the timeline till 2050.	The scaled-up measures address both local, global and environmental and socio-economic context aiming stop biodiversity loss and to mitigate droughts, floods, torrential rains, heats in the local context of growing population and housing pressure on wetlands and their surroundings.

Why to scale-up?

Describe the main (GD) goals that the scaling-up plan addresses and	Biodiversity net gain, Climate regulation, Flood and Drought resilience, Health and well-being, Zero pollution goals.

how you plan to make most of them.	We are planning to make most of it through educating, raising water level on wetlands and restoring specific habitats.
Describe additional (GD) goals that have potential for the scaling-up and how you could make the most of them.	Sustainable food system – sustainable pasture. Financing the transition – carbon crediting for restored/protected wetlands. Green growth – jobs on implementing wetlands restoration and paludiculture. Inclusivity – education, consulting and involving local communities in wetlands restoration/protection.
Describe the expected benefits in terms of biodiversity and ecosystem services delivery, climate change mitigation and adaptation.	stop biodiversity loss, mitigating the impact of floods, droughts, heats, stop GHG emissions from dried wetlands and start capturing GHG, better water quality
Describe the expected benefits in terms of stakeholder engagement.	Social acceptance of wetlands restoration, Polish Water Authority, Municipalities and other institutions actively implements wetlands restoration actions.
Describe the expected benefits in terms of business opportunities.	ecotourism, reduction of agriculture losses from droughts and floods, development of paludiculture, carbon credits
Describe other benefits that result from the scaling-up.	landscape restoration and protection, improvement of ecosystems resilience, change in law that encourage wetlands restoration.

Where does the scaling-up take place?

Describe the catchment/landscape area (bio-physical context).	KPN and its buffer zone + Mazovian Voivodship
Describe the main policy actors, their interests, and decision-making processes (policy context).	Polish Water Authority, Municipalities, Poviats, Mazovian Voivodeship, Regional Environment Protection Directorate Need of change in spatial planning law that will stop building up open/agriculture/dry wetlands areas and protect space for wetlands and rivers.
Describe relevant legislative issues, and formal and informal land tenure.	weak spatial planning law – housing development spread, ongoing buying-up lands programme in KPN, private landowners hinder wetlands restoration, need for a system of subsidies for protected/restored wetlands.

How the scaling up happens?

Describe what kind of collaborative partnerships will be built/what kind of advocacy strategies are needed in the context of this RSP.	Collaborative partnership of KPN + Polish Water Authority + Regional Environment Protection Directorate + local authorities Education of society on importance of wetlands, Consultation/involvement of local communities in wetlands restoration actions. big scale (nationwide) strategy for wetlands restoration and protection.
Describe the role and responsibilities of the case study board.	CSB will be a platform for decision making process in a collaborative partnership based on expert consulting. Need for new leaders of wetlands restoration (other than KPN) for advocacy and lobbying towards wetlands restoration. Part of the CSB will join the Biosphere Reserve Management Board as a working group.
Describe the role of local community members.	Local communities will involve in wetlands restoration sharing their local knowledge and skills. Communities will be looking after local existing and restored wetlands. Local leaders of wetland conservation and restoration will emerge.
Describe the role of monitoring and evaluation systems.	Monitoring the effects of the implemented measures will be the basis for selecting the most effective wetland restoration solutions. Monitored wide set of indicators will serve to prove the effectiveness and need of wetlands restoration and to prevent the possible negative effects of these changes on nature.
Describe what the funding plan is like. Are new financial instruments needed?	Currently funding is based on grants, but we aim to get wetlands restoration funding grants independent. There is a need for new financial instruments:

	carbon credits, subsidies for wetlands, insurance – link to WP3 i 4, transfer of funds from building and conservation of melioration to wetlands restoration.

Who scales up?

Describe the main actors, their roles, and responsibilities	
who to involve?	Water Management Authority, Local Authorities, Local NGO's, Wetland conservation NGO's, landscape parks, Regional Environment Protection Directorate, Polish Forests, local authorities, science institutions.
who funds?	It will differ from case to case. Currently, funding is based on grants and the aim is to become grant-independent. Mainly EU grants and Polish grants. There is a need for new financial instruments as mentioned in letter r).
who implements?	It will differ from case to case. KPN, Water Management Authority, local authorities, Local NGO's, Wetland conservation NGO's, landscape parks, Regional Environment Protection Directorate, Polish Forests, science institutions.
who monitors?	Science institutions, KPN and other nature and environment protection institutions, local communities/leaders.

Final thoughts

Overarching question: What prevents effective and large-scale restoration?	
Describe the policy barriers that need to be removed and overcome in order to scale up. Describe how your scaling-up plan addresses these barriers.	Spatial planning law and water management law are not sufficient law basis for wetlands protection and restoration and even creates a threat. Realize the vision overcoming policy barriers by education and involvement of local institutions responsible for spatial planning, water management etc.

5.1.4 Case study 6 Hutovo Blato peatland (Bosnia-Herzegovina)

The interim RSP has not been submitted.

5.1.5 Case study 12 Lima (Portugal)

Authors: Patricia María Rodríguez-González (ISA-ULisboa), Francisco Lourenço Cerqueira Correia (CPML)
CMPL: Municipio De Ponte De Lima (Ponte de Lima municipality)
ISA-ULisboa: Instituto Superior De Agronomia Universidade de Lisboa (School of Agronomy – University of Lisbon)

Main questions and aspects to be addressed	
Who is this RSP targeted? Who is meant to read your RSP and use it? If exact target audience is still unclear, define what type of an actor you are targeting.	Public administration (e.g. Community of municipalities, APA-ARH – environmental and basin district, ICNF-nature conservation-forests administration), private companies such as those related with water resources management (e.g. EDP – electricity company in charge of dam upstream). Landowners – due to territory structure (very small properties) would need thousands of people, in some cases a few are in associations (such as forestry associations), but not covering the whole area to be upscaled... (not sure how to manage this)

What is being scaled up?

a) Describe the vision for what you are scaling up.	Scaling the restoration of freshwater ecosystems
b) Describe what you are scaling up: technologies or techniques, processes, models or tools, and monitoring/evaluation aspects that you will scale up.	At a medium/long term, an integrative study of the whole Estorãos Basin including both biophysical (e.g. different aspects of the basin that is not yet sufficiently studied) and socioeconomic interactions (land use- water cycle) may help to improve the restoration strategy towards upscaling of the restoration effort. Another important aspect is the incorporation of a systematic assessment and monitoring in the regular management of target ecosystems, to allow an evidence-based adaptive decision-making.
c) Describe the opportunities (in SWOT and optimization strategy) and their relevance regarding the timeline till 2050.	• Promote coordination of basin district administration (Estoraos) and the community of municipalities in the Estoraos Basin with CMPL who is the manager of the Paisagem Protegida, a significant portion of downstream part of the Estoraos basin • Potential involvement of Higher Education institutions in the Region • A new upcoming National Strategy for the Rehabilitation of Rivers and Streams (EN3R) was announced and if the upcoming EU restoration law comes into force, both under development, may provide a positive legal framework if effectively applied. In the first case, the EN3R may help to improve evidence-based procedures (monitoring and assessment) in restoration • Big private companies have not been traditionally involved in conservation of ecosystems in the area, yet it could be a possibility to be explored considering exploring carbon credits (during Stakeholder meeting, one company was receptive – EDP)
Describe the applicability of your measure regarding changes in the local and global environmental and socio-economic contexts and the timeline till 2050.	

Why to scale-up?

Describe the main (GD) goals that the scaling-up plan addresses and how you plan to make most of them.	Inclusivity, Biodiversity net gain, Flood resilience, Drought resilience, Health and human wellbeing, Sustainable food systems, Green Growth

Describe additional (GD) goals that have potential for the scaling-up and how you could make the most of them.	Zero Pollution, Financing the transition.
Describe the expected benefits in terms of biodiversity and ecosystem services delivery, climate change mitigation and adaptation.	Improve fluvial communities' composition (e.g. reduce biological invasions), habitat functioning (e.g. thermal regulation of aquatic habitat) … [incomplete]
Describe the expected benefits in terms of stakeholder engagement.	Improve transparency and participation of affected social actors
Describe the expected benefits in terms of business opportunities.	
Describe other benefits that result from the scaling-up.	Improve in quality of life, wellbeing of local population and potential increase attractiveness for visitors.

Where does the scaling-up take place?

Describe the catchment/landscape area (bio-physical context).	It would cover the catchment of Estoraos (tributary of the right margin of Lima), and the downstream part fo Lima from the confluence of Estoraos to sea
Describe the main policy actors, their interests, and decision-making processes (policy context).	Public administration (e.g. Community of municipalities, APA-ARH – environmental and basin district, ICNF-nature conservation-forests administration), private companies such as those related with water resources management (e.g. EDP – electricity company in charge of dam upstream). Landowners?? – due to territory structure (very small properties) would need thousands of people, in some cases a few are in associations (such as forestry associations), but not covering the whole area to be upscaled… (not sure how to manage this)
Describe relevant legislative issues, and formal and informal land tenure.	Management plan of the Paisagem Protegida The management Plan of the Lima Natura 2000 site (ZEC Rio Lima) is under development Basin Management plans by ARH Norte Land tenure – most private, small size of properties (challenge for territory management)

How the scaling up happens?

Describe what kind of collaborative partnerships will be built/what kind of advocacy strategies are needed in the context of this RSP.	Build long term alliances with stakeholders by relying on previous experience (LIFE FLUVIAL, CMPL long term management experience, MERLIN CSB…)
Describe the role and responsibilities of the case study board.	Major role (leading and promoting partnerships) will be by Municipality of Ponte de Lima, to engage the other target entities CSB will be consulted for the proposal of RSP discussion, notably those that are highly affected or interested.
Describe the role of local community members.	The need of incorporating local members of the community to collaborate and be aware of the actions taken will be crucial for the success of the plan.
Describe the role of monitoring and evaluation systems.	

Describe what the funding plan is like. Are new financial instruments needed?	New financial instruments are needed.

Who scales up?

Describe the main actors, their roles, and responsibilities	
who to involve?	Public administration (e.g. Community of municipalities, APA-ARH – environmental and basin district, ICNF-nature conservation-forests administration), private companies such as those related with water resources management (e.g. EDP – electricity company in charge of dam upstream). Landowners?? – due to territory structure (very small properties) would need thousands of people, in some cases a few are in associations (such as forestry associations), but not covering the whole area to be upscaled… (not sure how to manage this)
who funds?	
who implements?	Public administration / private companies in agreement with landowners??
who monitors?	

Final thoughts

Overarching question: What prevents effective and large-scale restoration?	
Describe the policy barriers that need to be removed and overcome in order to scale up. Describe how your scaling-up plan addresses these barriers.	w) Lack of coordination among different public administrations operating at the same land (e.g. deficient coordination in the implementation of key Directives such as WFD and HD Difficulties associated to land property (“minifundio”) with multiple landowners in mosaic of small pieces of land, and strong attachment to land and to decisions taken to their management. Additionally a structural problem in Portugal is the lack of owners identification for those lands (a process ongoing by the Portuguese administration) y) Promote inclusivity, transparency and involvement of stakeholders Continue the process of identifying owners in the region (CMPL is participating)

Firstly socio-economic and policy barriers

Insufficient monitoring and assessment leading to Lack of evidence based decision making

Environmental transversal issues such as Biological invasions, megafires

5.1.6 Case study 14 Oulujoki (Finland)

Authors: Katri Rankinen (Syke), Kristian Meissner (Syke), Anna-Kaisa Ronkanen (Syke) Kaisa Pietilä (Syke), Tiina Ronkainen (Tapio) and Isra Alatalo (Tapio), and Seppo Hellsten (Syke)
Syke: Suomen Ymparistokeskus (Finnish Environment Institute)
Tapio: Forestry consultant

Main questions and aspects to be addressed	
Who is this RSP targeted? Who is meant to read your RSP and use it? If exact target audience is still unclear, define what type of an actor you are targeting.	The MERLIN consortium, end-users, stakeholders, The Ministry of Agriculture and Forestry, and the Ministry of Environment

What is being scaled up?

a) Describe the vision for what you are scaling up.	About one third of Finland's land area is peatland, and in 2021 energy derived from peat supplied up to 7% percent of Finland's total energy consumption. Due to a decline in demand for energy peat, the active peat production sector has decreased rapidly in recent years. Climate-related reasons, including carbon neutrality targets, have contributed to the decline and will eventually stop peat extraction for energy. In Finland, approximately 2000–3000 ha of previous peat extraction areas is converted to new land uses each year: 75% is afforested, 20% is cultivated and 5% has been converted to wetlands. Some areas also have special uses, e.g., windmill parks. In total Finland has about 110000ha of peatlands that require after-use measures.
b) Describe what you are scaling up: technologies or techniques, processes, models or tools, and monitoring/evaluation aspects that you will scale up.	A process for defining optimal after-use that reduces GHG emissions, carbon loading and either enhances biodiversity or restores previous peat extraction sites.
c) Describe the opportunities (in SWOT and optimization strategy) and their relevance regarding the timeline till 2050.	The main aim is to reduce 1) nutrient and carbon loading from the site to waters and 2) greenhouse gas emissions and to 3) increase carbon storages. There is also an option for increasing biodiversity (especially birds) and recreational value.
d) Describe the applicability of your measure regarding changes in the local and global environmental and socio-economic contexts and the timeline till 2050.	The method is very applicable to other peat mining sites in the area, up to 26 000 ha (area of peat extraction sites in the northern Finland). There are options to expand to other peat extraction sites in Finland and Northern Europe.

Why to scale-up?

e) Describe the main (GD) goals that the scaling-up plan addresses and how you plan to make most of them.	• Zero pollution goals • Climate regulation • Biodiversity There is a trade-off related to water level regulation, as the optimal water level for nutrient leaching regulation is higher than the

	optimal level for greenhouse gas regulation. Effects of the choice of either water level on bd are less well known.
f) Describe additional (GD) goals that have potential for the scaling-up and how you could make the most of them.	• Flood resilience • Drought resilience • Sustainable energy The area is not flood or drought prone, but there may be benefits is some other areas where the method is upscaled. Options for sustainable energy may become via solar panels or windmill parks.
g) Describe the expected benefits in terms of biodiversity and ecosystem services delivery, climate change mitigation and adaptation.	The expected benefits expected are: 1) reduced carbon emissions by rewetting the area 2) reduced nutrient loss to the aquatic environment 3) improved biodiversity 4) the benefits for drought/flood regulation.
h) Describe the expected benefits in terms of stakeholder engagement.	Stakeholder opinions are gauged in early stage of the project. Creating and supporting stakeholder engagement locally may also stimulate the willingness at a more regional scale to participate in these kinds of projects.
i) Describe the expected benefits in terms of business opportunities.	Options for energy production via windmill and solar energy parks. Some options for nature tourism and hunting.
j) Describe other benefits that result from the scaling-up.	Building/upscaling knowhow/expertise, technological innovation potential, CO2 emission measurements and comparison of environmental impacts of different restoration methods.

Where does the scaling-up take place?

k) Describe the catchment/landscape area (bio-physical context).	The upscaling of after use measures for peatland mining areas targets all such active and decommissioned areas due to the political decision to stop peat extraction. In Finland the area of active peat extraction sites was 65 000 ha in 2005 and currently about 110000ha require definition of after-use measures.
l) Describe the main policy actors, their interests, and decision-making processes (policy context).	The government aims to reduce national greenhouse gas emissions and increase carbon storage and increase biodiversity.
m) Describe relevant legislative issues, and formal and informal land tenure.	Peat extraction requires an environmental permit (Environmental Protection Act /ympäristönsuojelulaki 527/2014). State and municipal authorities ensure that extraction is carried out responsibly and in an environmentally friendly manner. The environmental permit obligations end when production has ceased, and the area has been converted to a new land use. However, the Environmental Protection Act does not apply to the physical alteration or structural pollution of the environment, nor to land use and nature protection, which are regulated separately.

How the scaling up happens?

n) Describe what kind of collaborative partnerships will be built/what kind of advocacy strategies are needed in the context of this RSP.	To scale to the international level the International Peat Society, individual energy companies and landowners, and different local projects around carbon sequestration are important.
o) Describe the role and responsibilities of the case study board.	The role and responsibility of the CSB is to improve the benefits of the project in a national context and help embed the project in a national landscape. Also, ministries and peat producers help with project result uptake.

p) Describe the role of local community members.	The local community members represent different interests in the landscape, like ornithologists, hunters, and local residents.
q) Describe the role of monitoring and evaluation systems.	Monitoring of different restoration and after use methods are not systematically performed in Finland yet. Currently, restoration is done with the implicit hope of good results.
r) Describe what the funding plan is like. Are new financial instruments needed?	The following financing instruments are used: JTF Just transition fund, (i.e. EU Structural Funding)

Who scales up?

Describe the main actors, their roles, and responsibilities	
s) who to involve?	Peat extraction companies start the process of after-use and their extraction method control the state of the site. Landowners of peat extraction sites and/or after-use sites make final decisions of after-use/land use. Landowners may be companies, societies or private persons. Environmental authorities may recommend different after-use measures, but there is no prescriptiveness to follow the recommendations.
t) who funds?	Peat extraction companies are required to have plans and budget to manage the site according the environmental permit in such a way that permit can be revoked, e.g. area is vegetated or transferred to another land use restore the site (in environmental permit). Later landowners may apply funding to advance particular after-use measures.
u) who implements?	Peat extraction companies, possible using contractors.
v) who monitors?	Environmental authorities monitor/follows implementation. Environmental monitoring continues at the national monitoring sites, no specific monitoring of environmental impacts at the after-use sites.

Final thoughts

Overarching question: What prevents effective and large-scale restoration?	
w) Describe the policy barriers that need to be removed and overcome in order to scale up.	Described in point “m” and in Optimization strategy.
x) Describe how your scaling-up plan addresses these barriers.	A national expert group and a national taskforce has been established to address- and support overcoming barriers

5.1.7 Case study 17 Forth (UK Scotland)

Authors: Iain Sime (NatSc), Niall Provan (Forth River Trust), Amy Pickard (UKCEH), Justyna Olszewska (UKCEH) and Ewan Lawrie

Amy Pickard, Justyna Olszewska (UKCEH), Peter Hunter (USTIR), Ewan Lawrie, Iain Sime (NatSc), Niall Proven, Alison Baker, Sandra Stewart (Forth River Trust), Keith Matthews (JHI)

JHI: James Hutton Institute
NatSc: Scottish Natural Heritage
UKCEH: UK Centre For Ecology & Hydrology
USTIR: University of Stirling

Main questions and aspects to be addressed	
Who is this RSP targeted? Who is meant to read your RSP and use it? If exact target audience is still unclear, define what type of an actor you are targeting.	Stakeholders, NGO's and GO's Stakeholders, NGO's, GO's

What is being scaled up?

a) Describe the vision for what you are scaling up.	The overall vision is that of a cohesive partnership between stakeholders, local authorities, Government bodies, non-government organisations and local communities. This is to enable landscape-scale change in terms of works to improve biodiversity, natural flood management and climate resilience measures across the Forth catchment and Scotland as a whole, while simultaneously allowing stakeholders the means to live, work and thrive on the land in compromise with these goals. This paves the way for the scaling-up of biodiversity net-gain and NFM projects deemed to be most effective in reaching nationally set targets, ultimately seeing the protection and re-establishing of vulnerable species and habitats while successfully mitigating against the effects of climate change. We are also scaling up to address the vision and challenge of climate change within the Forth catchment. The impacts of climate change on rivers and peatlands by 2050 is obviously uncertain – but we anticipate increased river water temperatures and changes in rainfall and discharge effecting peatland function. Upper catchments will be a blend of upland woodland and restored, functioning peatland, along with healthy naturalised river systems protected from pollution and climate pressures. These reaches will represent the ideal spawning habitat for Atlantic salmon, trout and sea-trout, as well as being able to support other currently threatened aquatic species such as the European eel and freshwater pearl mussel. Mid-lower catchment will consist of traditional farmland as is present today with compromises made for biodiversity gain and flood and drought resilience. More riparian woodland and bank protection using willow (Salix species) will result in low levels of sedimentation in the river, improving nursery habitat for Atlantic salmon and also preventing unnecessary land loss for farmers and stakeholders through erosion. Reconnected floodplains will create expanded wetlands that not only contribute to the storing and slowing of floodwaters during high rainfall events, but also form vital habitats for wading birds, amphibians and insects. Any barriers to fish migration in these areas such as historical weirs will either be removed, or fish passes installed where appropriate. This will allow migratory species such as European eel, Atlantic

	salmon and sea trout to have access to as much habitat as possible in each river system, increasing potential breeding opportunities as more natural river habitat is accessible for migration. These areas will effectively blend urban spaces with nature, allowing for the protection of local communities from flood events as well as benefits towards their health and wellbeing through improved habitats and ecosystems accessible in their local area. This will also foster a connection between local people and their river, which secures a long-term interest in the preservation of the river and these habitats.
b) Describe what you are scaling up: technologies or techniques, processes, models or tools, and monitoring/evaluation aspects that you will scale up.	We envisage the techniques will be suitable for scaling up. For peatland restoration, the measures are already being widely applied, with monitoring in our case study evaluating their effectiveness. For river restoration, the techniques are more novel, particularly in improving connectivity with floodplain wetlands, and applicable to scaling up. Technologies and restoration techniques will continue to be scaled up to be as sustainable as possible, with means for materials to be sourced locally and nationally rather than internationally, reducing the carbon footprint of projects to align with net-zero goals currently in place. Payment processes for stakeholders and landowners will be scaled up to ensure the sacrifice of land for biodiversity net gain is financially viable. The NFM techniques used throughout the MERLIN project in CS17 are in some ways being tested and measured as to how effective they are in varying circumstances or being used in slightly different scenarios from previous implementations within our organization, for example implementing 'leaky dams' on a range of different landscape inclinations. We will be able to assess and monitor the effectiveness of these varying circumstances for NFM interventions, and as the techniques are scaled up across the catchment, it will be easier to make the best and most effective decisions regarding NFM implementation. Input from UKCEH on their thoughts on aspects of monitoring that can scale up as a result of MERLIN.
c) Describe the opportunities (in SWOT and optimization strategy) and their relevance regarding the timeline till 2050.	The fostering of positive relationships with stakeholders/landowners is fundamental in the continued delivery and upscaling of works across the Forth catchment. The most seamless upscaling will occur on areas of land where the landowner is aware and trusting of the working practices of those delivering the restoration works and has experienced tangible benefits as a result of the works be it in flood/drought resilience, or financially through farm payment systems. Focusing on this and using it as a means to showcase successes to other landowners is vital in combining localised efforts into a catchment-wide restoration initiative. Further cultivation of relationships between upstream and downstream residents and stakeholders is very relevant, as it ensures that all parties are aware of each other's individual issues and how best compromise can be reached to achieve biodiversity, NFM and climate resilience goals. The Forth is unique within MERLIN as it covers both peatland restoration and river/small streams restoration in the one case study. This allows an opportunity over the course of the project to monitor and evaluate the effectiveness of both peatland and river restoration, but more importantly to assess the combining influence of both peatland and river restoration in the same catchment. It is hoped that monitoring information, gathered throughout the MERLIN project demonstrating the combination of these restoration efforts and how they cumulatively impact flood resilience and biodiversity net gain, can then be used in the future onwards to 2050 to inform ongoing improvements across the catchment. It also has the potential to inform and influence other landscape scale projects that are being initiated elsewhere in the Forth catchment (e.g. with

	Nature Restoration Fund) and also seek to integrate peatland, river and woodland restoration at scale. Continuation of efforts to monitor and understand our catchments and how rivers typically interact with the landscape, starting with landowner accounts and interpretations then backed up by data collection, will provide the basis for works carried out to 2050 and beyond. Tying in with overall sustainability, a detailed understanding of the catchment allows the correct Nature Based Solution to be implemented in the correct area and the correct time. This will involve a sharing of collated data across multiple organisations to co-ordinate efforts and minimise unnecessary expenditure of resources, such as two organisations not in collaboration researching the same subject. The monitoring and showcasing of successful restoration projects, with the ability to demonstrate accurate metrics applicable to NFM goals will be vital in encouraging local authorities (councils) to invest further in NbS for NFM, as opposed to frequent "grey-bank" techniques currently utilised. These typically involve heavy machinery and concrete intervention which does not align with sustainability and net-zero goals, and are often very expensive, easily costing into the millions of pounds per project. Opportunities to synergise the current payment systems into one accessible and transferable funding application system is again integral to the long-term timeline, with at present a lot of work-hours being spent understanding and negotiating multiple different funding streams. Addressing the issue of long term buy-in from landowners due a lack of funding beyond the completion of a project – upscaling measures would hope to address this by implementing payment systems for maintenance and upkeep e.g. maintaining fencing, maintaining flow attenuation measures, cutting vegetation on a bi-annual basis etc. This gap in funding (beyond publically available funds) for restoring nature in Scotland has been estimated to be between £15-27 billion until 2032 (GFI, eftec, Rayment Consulting, 2021). This gap will obviously be even larger with a scalability timescale of 2050 (though it has not been estimated). More specifically for some of the main Green Deal objectives of the Forth case study, the finance gap to 2032 for restoration of 'clean water' in Scotland has been estimated to be £3 billion, and the gap for the protection and restoration of biodiversity at £8 billion (GFI, eftec, Rayment Consulting, 2021). So there is considerable need for, and therefore opportunity to encourage, the development of new finance models that will provide and facilitate the necessary private and green finance to help achieve our goals. Work is underway such as the anticipated successor to the Investment Ready Nature Scotland initiative, and there may be an opportunity to collaborate within the Forth and the case study. GFI, eftec, Rayment Consulting (2021) The Finance Gap for UK Nature
d) Describe the applicability of your measure regarding changes in the local and global environmental and socio-economic contexts and the timeline till 2050.	In terms of the present day, changes are in motion with the single farm payment system for Scotland undergoing revision in 2024. The way in which the new system takes environmental issues into account will ultimately dictate how quickly and effectively changes can be made on a catchment-wide and national level. Peatland restoration is the furthest forward in terms of landowners knowing how they can capitalise on restoration works, however many are holding off on the completion of projects until the new farm payments system is established despite this. Once established (likely 2026 onward before fully implemented and understood) this will pave the way for continued efforts for restoration efforts to occur. Payment systems such as Peatland Code will be further developed, while payment-by-result style systems may fall into place for projects such as river restoration and wetland creation/restoration which at present do not have funds to cover

	them beyond initial capital costs. This is currently limiting the amount of post-works site management and monitoring that can be carried out due to lack of funds beyond the completion of the project, which also results in a lack of buy-in from landowners where long-term maintenance is required for the restoration efforts to remain useful.

Why to scale-up?

e) Describe the main (GD) goals that the scaling-up plan addresses and how you plan to make most of them.	Biodiversity net gain is the overarching GD indicator into which the rest slot. The methods that are used to up-scale this GD indicator may change marginally throughout the timescale to 2050, however what needs to be done to combat habitat loss is well established and is not the barrier needing to be overcome to progress works on a wide-spread scale. Climate regulation upscaling will see wide-scale identification of peatland sites, both suitable and unsuitable for the current funding schemes available to restore them, to create a huge dataset measured in hectarage of restorable sites. This, combined with large-scale monitoring efforts across restored and un-restored peatland sites, will set a clear foundation from which to progress onwards in terms of net-zero goals, climate resilience and peak flood/drought resilience. Flood and drought resilience go hand-in-hand, with flow attenuation measures also helping to maintain water on the landscape for longer, helping to combat rivers reaching unsustainably low levels. The catchment have many attenuation measures such as leaky dams, wetland scrapes and woodlands in both the upper and lower reaches of the catchment to combat these periods. Zero pollution goals in regards to agricultural pollution may be addressed in the long-term by a general increase in landowner awareness of both pollution issues and the impact they have on river habitats in particular, and also a generally increased knowledge base about broader environmental issues and the techniques used to combat them. By engaging with as many landowners as possible now, it is laying the foundation for future engagement with the next generation of farmers that will be managing the land in the decades to come. There are increasing efforts underway to improve and develop means to financing the transition to a green economy and the restoration of nature. Within that we anticipate opportunities for MERLIN to contribute and encourage those, such as the anticipated next stage in Investment Ready Nature Scotland (aiming to develop more mature means of encouraging private investment) and working with the NGO body Fisheries Management Scotland who are appointing a green finance manager to develop a means of encouraging further private investment in river restoration. Circular economy – there is a requirement for good and experienced workforce to plan and implement the restoration measures in the Forth, and similarly across Scotland. Using the opportunities within MERLIN, and in other initiatives such as PeatlandACTION, will increase this skill base and contribute to the capacity of the sector to develop and contribute to nature restoration beyond the MERLIN project. There will be opportunities for MERLIN to contribute to this effort and encourage increased resilience and capacity in the nature restoration sector.
f) Describe additional (GD) goals that have potential for the scaling-up and how you could make the most of them.	Inclusivity – a weakness identified in our case study is that our case study groups do not represent landowners/managers (see comments on landowner situation is Scotland), and we engage with landowners as potential restoration sites are identified. But envisage future partnerships to address this issue – see box 'n'. Due to the nature of landownership, and top-down driven nature of

	restoration targets, scaling up with inclusive involvement of such stakeholders is envisaged to remain a significant challenge. Health and well-being goals may be addressed on a local scale, as works that take place may allow for more local interest in the newly created habitats. Works carried out during MERLIN, for example wetland creation, from now until 2050 and beyond will become fully developed and vibrantly biodiverse habitats, and therefore these areas will be of value to the physical and mental wellbeing of local people who will be able to enjoy them.
g) Describe the expected benefits in terms of biodiversity and ecosystem services delivery, climate change mitigation and adaptation.	Upscaled biodiversity efforts will assist in improving the overall resilience of a catchment to the effects of climate change, with species populations reinforced by habitat connectively as opposed to vulnerable, fragmented habitats. Efforts to improve habitat connectivity and improve climate change mitigation measures will protect aquatic species in periods of intense heat and drought. Atlantic salmon is particularly vulnerable to rising water temperatures during summer months. Slowing the flow during periods of intense rainfall is also vital to salmon, as it ensures that peak flows are unable to dislodge vast quantities of spawning gravels during spawning season, ensuring the survival of a greater number of salmon eggs. Climate change mitigation and adaptation can be implemented across many measures, such as greater numbers of riparian tree planting and restoration of degraded peatland. These provide benefits on both the local scale in terms of habitat and water retention on the landscape, but also have much wider implications in lowering carbon emissions to combat climate change directly. These measures are also anticipated to make an important contributions to flood and drought management.
h) Describe the expected benefits in terms of stakeholder engagement.	Stakeholder engagement will allow for the implementation of restoration measures and implementation of all wider relevant GD indicators on a catchment-wide scale. A very small percentage of land in Scotland is publicly owned or owned by conservation organisations, so having stakeholders (particularly private owners) on board through the process is vital to further restoration efforts. The more landowners that are involved in restoration efforts now and are able to start to gain the benefits for their business, the more landowners in the future will be likely to be willing to sign up with organisations carrying out NBS and have restoration work carried out on their land.
i) Describe the expected benefits in terms of business opportunities.	As contracts for conservation projects become more widespread and progress from organisations undertaking this work as an extension of their core work in other sectors such as the building trade into its own industry, business opportunity for contractors will increase. There is a perceived bottleneck at present for peatland restoration at present, due to the capacity of existing skilled restoration contractors. The ever increasing number of contracts available for restoration and national efforts to increase the skill based (which MERLIN can be part of) aims to allow a greater diversity of contractors to take advantage of these business opportunities. The increased number of contractors and contracts available will streamline the funding process, allowing as many funds to be granted where they are needed as possible.
j) Describe other benefits that result from the scaling-up.	A primary benefit of upscaling is the continuation of a culmination of efforts to reach this stage in restoration efforts, contributing to a wider national and international goal - it ensures these efforts and the momentum gained isn't lost.

Where does the scaling-up take place?

k) Describe the catchment/landscape area (bio-physical context).	The Firth of Forth catchment is a diverse landscape, encompassing many different types of sub-catchment with a wide variety of pressures facing each one.

	Catchments in the south of the catchment in the Lothian council areas have the highest quantity of man-made barriers to fish passage (weirs), many due to remnants of industry that was heavily prevalent in these areas. Many local communities now see these barriers as culturally significant and aesthetically pleasing, meaning total removal of the barriers isn't feasible across much of the rivers in this area. This means an overall lack of in-stream diversity compared to other areas of the catchment. Sediment is also impounded at these barriers, impacting the natural fluvial processes of the river. The industry mentioned in these areas still has a lasting effect on the water quality of the river, with mine-water seep being a large issue, introducing heavy metals and chemicals to the river. The highly populated nature of this area also means there are a multitude of sewage outfall issues. The west, north-west and northern parts of the catchment are less populated and less industry dominant, so face fewer issues in this regard. Pressures in this part of the catchment stem from agricultural processes, with excess nutrient input and riverbank erosion caused by livestock poaching and introduction of dung into rivers. Large scale forestry operations also affect the water quality of these areas, with large Sitka spruce monocultures planted within the direct vicinity of rivers having an impact when these blocks are clear felled. Despise these issues, these areas have some of the best water quality in the catchment, but are exposed to other unique issues, such as landslides which occurred in 2019 which lead to a large scale flooding event and vast amounts of sediment transport. The western and north-western areas of the catchment fall within the Loch Lomond and the Trossachs National Park. The National Park authority doesn't own land within the park, but provides funds to landowners and conservation charities to further conservation efforts in the area. Large scale catchment-altering impacts such as the 2019 landslides, likely over a 1 in 250-year flood event, will likely become more prevalent, so increased tree planting on hillsides which are currently bare and overgrazed by livestock is a requirement to mitigate against these issues.
l) Describe the main policy actors, their interests, and decision-making processes (policy context).	Primary policy makers are the Scottish Government, with their biodiversity and conservation arm, NatureScot, providing funds to conservation organisations to combat habitat loss and climate change. In addition, the Scottish Environment Protection Agency, Scotland's environment regulator, also has a strong interest as they oversee the River Basin Management Plan, setting objectives for ecological restoration to 2026. The most important policy context at present is the draft Scottish Biodiversity Strategy (currently in draft and published in December 2022), and the Peatland Plan (part of Scotland's Climate Change Plan, which has an objective of reducing our carbon emissions by 80% by 2050). These two plans and strategies set the national context for decisions about restoration of rivers and peatland in the Forth case study. There is a slight lack of clarity at present, as the implementation plan for the Scottish Biodiversity Strategy, will not be published until 2023.
m) Describe relevant legislative issues, and formal and informal land tenure.	Legislative issues: Land tenure in the Forth catchment is varied, but predominantly consists of private landowners. This can then be split up further into individual tenants, meaning there can be several permissions to be gained before work can commence on different areas of the catchment. Some areas of land are owned by government organisations such as Forestry and Land Scotland, who along with operating commercial forestry operations also contribute to native-woodland planting. Some other areas are owned by conservation charities such as the Royal Society for the Protection of Birds (RSPB) and the Woodland Trust.

How the scaling up happens?

n) Describe what kind of collaborative partnerships will be built/what kind of advocacy strategies are needed in the context of this RSP.	Organisational partnerships Long term partnerships with landowners – small charities and businesses taking on an advisory role on behalf of landowners/stakeholders Monitoring and presenting of sites and restoration efforts to provide advocacy.
o) Describe the role and responsibilities of the case study board.	Continuation and development of the Allan Water Steering Group and the Forth Peatland Programme will allow for ongoing support and engagement from involved parties. As the work in the area continues over the years, a greater emphasis on stakeholder input will help direct the works and best address the issues local people face. However, this is dependent on Scottish Government income for the partners within the MERLIN project and these project groups.
p) Describe the role of local community members.	As above – build a sense of connection between them and "their" river and land. Ensures long term interest and passion for the river and a collective voice to campaign against issues facing the river, or for or against new developments. Local community members will play an active role in the ongoing monitoring of the sites, either through formal citizen science projects, informal surveying of works, and voluntary action to help support the works. Community interest and input will always outlast funding streams.
q) Describe the role of monitoring and evaluation systems.	Input from CEH?
r) Describe what the funding plan is like. Are new financial instruments needed?	Current funding model involves multiple types of application for different funding streams. This increases the time required to apply for funding as the processes differ greatly from one funding source to the next. A new streamlined funding process that makes it easier for NGOs to apply for funding for longer term restoration projects will lead to a greater amount of projects being delivered. In addition, and to address the considerable gap in funding for nature restoration, new financial instruments that readily facilitate green finance investment in nature are required. At present there are two principle financial instruments, with Scottish Government investing £250m for peatland restoration up to 2030, and investing £65m for nature restoration up to 2026. Beyond those timescales, it is hoped that those financial instruments will be extended and increased.

Who scales up?

Describe the main actors, their roles, and responsibilities	
s) who to involve?	As above – NGO's, GO's, relevant conservation charities, Local Authorities, Stakeholders NatureScot - Main funding supplier for restoration projects in Scotland, implementation partner for peatland restoration SEPA – a non-departmental public body of the Scottish Government. Ensures that the environment and human health are protected, and that Scotland's natural resources and services are used as sustainably as possible and contribute to sustainable economic growth. SEPA assess the quality of our environment by monitoring our air, land and water and use our findings to advise government, industry and the public on environmental best practice. MERLIN research and monitoring partners UKCEH - an independent, not-for-profit research institute that provides the data and insights that researchers, governments and businesses need to create a productive, resilient and healthy environment. Creating and delivering MERLIN monitoring plan in the Forth Catchment. James Hutton Institute - a research organisation delivering fundamental and applied science to drive the sustainable use of land and natural resources. For MERLIN James Hutton works on

	transformation (Work Package 4), designing strategies for transformation that can 'mainstream' restoration across sectors, in order to deliver societal benefits and contribute to Europe's Green Deal objectives. University of Stirling – research partner for MERLIN, currently implementing The Forth-ERA programme to establish a digital twin of the Firth of Forth catchment by combined data streams from networks of sensors, satellite observations, and models. The Forth-ERA platform will support new and innovative approaches to environmental monitoring, management and regulation supporting use-cases across a variety of thematic areas. NGOs e.g. Forth Rivers Trust – organisations with the staff and knowledge required to be able to carry out ongoing stakeholder relationship development, project development, funding applications, project delivery, monitoring and evaluation of sites, and community engagement. Project Steering Group – current engagement has been of benefit to the existing projects and further development/expansion of the size and level of impact on projects that the group has will ensure that all affected parties get to represent themselves in the discussions around future projects.
t) who funds?	Scottish Government – NatureScot. Stakeholders? To garner carbon/woodland credits and benefits.
u) who implements?	NatureScot, NGOs
v) who monitors?	NGO's and private contractors – generally have more time and resources to commit to monitoring projects. Dependent on ongoing funding for restoration work monitoring, which is currently not viable.

Final thoughts

Overarching question: What prevents effective and large-scale restoration?	
w) Describe the policy barriers that need to be removed and overcome in order to scale up. x) Describe how your scaling-up plan addresses these barriers.	Integration of funding support to encourage and support land managers to undertake restoration • Explore use of complimentary funding streams to facilitate restoration and monitoring. • Learn from potential related projects within case study are that aim to use coordinated funding streams Capacity of practitioners to plan and implement restoration • Use case study to increase regional capacity and integrate/work with national initiatives Evidence for effectiveness of measures to meet Green Deal objectives, particularly Biodiversity and Climate Change • Monitoring of measures within case study and wider regional and national initiatives

5.2 Cases per cluster small streams and basins

5.2.1 Case study 2 Deba River – Basque country (Spain)

Authors: Miriam Colls (UPVEHU), Arturo Elosegi (UPVEHU), Maite Arroita, Aitor Larrañaga (UPVEHU), Joserra Díaz (UPVEHU), Unai Ortega (UPVEHU), Iñaki Bañares (UPVEHU), Arantza Unzurrunzaga (DFG), and Felipe Álvarez (DFG)
UPVEHU: Universidad Del Pais Vasco/Euskal Herriko Unibertsitatea (University of the Basque Country)
DFG: Gipuzkoako Foru Aldundia (Gipuzkoa Provincial Council)

Main questions and aspects to be addressed	
Who is this RSP targeted? Who is meant to read your RSP and use it? If exact target audience is still unclear, define what type of an actor you are targeting.	RSP is address to the main actors involves in the restoration action. The main ideal is to create a 'protocol' to be apply in future restoration actions and to solve different potential issues that appear during the restoration.

What is being scaled up?

a) Describe the vision for what you are scaling up.	Restoration action is currently limited to a single catchment in a river in Gipuzkoa (Euskadi, i.e., Deba River). At the governmental level, each province has its own regulatory agency for the public water domain and, therefore, the public implementing agents will be different. Beyond Euskadi, each Autonomic Community has its own public administrations in charge of the public water domain and therefore other public executing organisms. However, constant contacts with all of them show that the problems associated with river restoration and, more specifically, dams and weirs demolition are common. In many areas there is a part of the citizens who oppose to such restoration. On the other hand, the cultural value that is being associated with dams and weirs or the environmental risks that the demolition of obstacles may entail are other administrative problems, in the Basque Country and other autonomous communities, for carrying out the scalability plan.
b) Describe what you are scaling up: technologies or techniques, processes, models or tools, and monitoring/evaluation aspects that you will scale up.	There are three basic working groups: a) technical, consisting of engineers and hydraulic specialists, b) scientific, consisting of ecologists, biologists and other experts in the natural environment, c) public stakeholders. To scale up restoration each of these actors must grow in knowledge and experience, while at the same time the relationships between them are strengthened. Technicians and scientists should be in constant contact with national and international river restoration and dam removal groups (e.g. Dam Removal Europe). This will enable the technicians to be aware of and keep up to date with the latest developments in the field of obstacle demolition. As well as consolidating large-scale working groups. However, it will not be possible to implement any restoration action if there is no public awareness of the problems associated with the presence of dams and other obstacles in river habitats. To this end, news related to the associated problems will be published from time to time in different media. This will allow the public to exert pressure on the administrations to act. All of this will be under a process of constant review and learning, based on communication and constant contact between administrations. This will allow successful restoration actions to be used as an example.

c) Describe the opportunities (in SWOT and optimization strategy) and their relevance regarding the timeline till 2050.	Derived from social inclusion, there is an opportunity to help develop greater social awareness and ecological knowledge among the local population. This can help to demand and promote improvements in all other aspects of the greening agreement. In addition, improving the biodiversity and ecological status of river ecosystems can increase the ecological status of the water bodies and, furthermore, improve the ecological status of the water bodies.
d) Describe the applicability of your measure regarding changes in the local and global environmental and socio-economic contexts and the timeline till 2050.	Environmental pollution or loss of biodiversity are some of the challenges that societies must to address. The degradation of natural ecosystems due to above mention impacts affect society and economic through, for instance, flood risk increase or non-circular economies. Dam removal will produce benefits in all these areas.

Why to scale-up?

e) Describe the main (GD) goals that the scaling-up plan addresses and how you plan to make most of them.	Dam removal is mainly focus on improve four major societal challenges: disaster risk reduction, environmental degradation and biodiversity loss, human health, climate change mitigation and adaptation. Additionally, the defend of these challenges with an inclusive governance will help to promote the sustainable development and circular economy.
f) Describe additional (GD) goals that have potential for the scaling-up and how you could make the most of them.	Health & well-being and sustainable food systems are two other GD that can be potentially improved through the demolition of dams and weirs. Indirectly affected by the improvement of river ecosystems quality.
g) Describe the expected benefits in terms of biodiversity and ecosystem services delivery, climate change mitigation and adaptation.	The potential contribution on climate regulation and green growth by means of the reduction of CO2 and CH4 emissions from the impounded areas (replaced by lotic ecosystems). The contribution to the zero-pollution goal, sustainable energy, and green growth by the improvement of river self-purification capacity, as a consequence of increasing hydro-morphologic heterogeneity, which contributes to reduce the pollution. The contribution to the biodiversity net gain caused by improved ecological quality of the river ecosystem ecological and by increased habitat heterogeneity.
h) Describe the expected benefits in terms of stakeholder engagement.	The improvement of the inclusivity resulting from stakeholder engagement, as it will favor the involvement of the different stakeholders involved in the restoration process (municipalities, local authorities, citizens, scientists, etc.).
i) Describe the expected benefits in terms of business opportunities.	The main business opportunities are related to sustainable natural tourism that promotes respect for nature and increased knowledge of the natural environment.
j) Describe other benefits that result from the scaling-up.	River restoration focused on the demolition of obstacles is still in a very early stage. Legislation in this regard is still ambiguous or contradictory. Consequently, another benefit derived, at long term, will be a fairer and more conscious legislation of the natural environment.

Where does the scaling-up take place?

k) Describe the catchment/landscape area (bio-physical context).	When we talk about scaling-up we are thinking at two different scales, regional or autonomic scale and state level. Scaling-up at regional scale means to implement the restoration actions on similar basins of Gipuzkoa or Euskadi. All the catchments of this area present similar bio-physical characteristics to Deba River, high slopes, high precipitation index, and consequently high flood risk, etc. At state level, other Autonomic Communities, have a Mediterranean climate, that is for instance the case of Catalonia where is located our twin-project. These areas have a high drought risk due to the low precipitation. This is the main difference between the both areas that will be carefully consider for the scaling-up.

l) Describe the main policy actors, their interests, and decision-making processes (policy context).	At governmental level, each province has its own regulatory agency for the public water domain and, therefore, the public implementing agents will be different. Beyond Euskadi, each Autonomic Community has its own public administrations in charge of the public water domain and therefore other public executing organisms.
m) Describe relevant legislative issues, and formal and informal land tenure.	In Euskadi the main legislative issues are related with cultural department of the autonomic government, which is protecting dams with a similar status than churches, for instances.

How the scaling up happens?

n) Describe what kind of collaborative partnerships will be built/what kind of advocacy strategies are needed in the context of this RSP.	The main collaborative partnerships will be with experts from different areas that support dam removal. Additionally, ONG and other non-governmental organisms can be key to help raise public and political awareness.
o) Describe the role and responsibilities of the case study board.	Local governments and administrations are key to carry out all the administrative procedures. At the same time, scientific stakeholders explain the arguments and benefits of dam removal. However, the collaboration of strategic stakeholders is key to communicate findings and exits. In that way, the media play a key communication role.
p) Describe the role of local community members.	Local community members could help to diffuse and convince reticent or sceptic citizens through public debate.
q) Describe the role of monitoring and evaluation systems.	Monitoring and evaluation systems is one of the keys for scaling-up dam removal actions. As was mention above, dam removal is in a very early stage. Constant evaluation and monitoring of dam removal effects will help to gather information and evidences in favour of dam removal.
r) Describe what the funding plan is like. Are new financial instruments needed?	Despite up to now, the main issues are legislatives and not economics, future fundings from banks or restoration groups can be considered.

Who scales up?

Describe the main actors, their roles, and responsibilities	
s) who to involve?	Municipalities, society, media, scientific partners and regulatory agencies in charge of hydraulic domine.
t) who funds?	From public administration. Alternatively private companies. However, must to be consider that one of the problems for company-sponsor type is that if controversy is generated it is more difficult for them to want to participate since they will not want to "dirty" their image. Since dam removal is a controversial issue, private sponsors are difficult to get.
u) who implements?	Regulatory agencies.
v) who monitors?	Regulatory agencies and public stakeholders. We want to highlight the importance of a good monitoring network to evaluate dam removal benefits. Additionally, scientific participation is crucial to interpret and analyze the data.

Final thoughts

Overarching question: What prevents effective and large-scale restoration?	
w) Describe the policy barriers that need to be removed and	As mentioned above, the main obstacles that must be overcome are at the legal level. Despite European legislation try to promote the

overcome in order to scale up. x) Describe how your scaling-up plan addresses these barriers.	dam removal, environmental protection conflicts with other political and legal aspects, such as culture or socio-economic aspects. Thus, is impossibly to scale-up without a political and social awareness.

5.2.2 Case study 11 Emscher (Germany)

Authors: Nadine Gerner (EGLV), Svenja Karnatz (EGLV), Mario Sommerhäuser (EGLV), Daniel Hering (UDE), Andrea Schneider (UDE)
EGLV: Emschergenossenschaft Lippeverband
UDE: Universitaet Duisburg-Essen (University of Duisburg-Essen)

Main questions and aspects to be addressed	
Who is this RSP targeted? Who is meant to read your RSP and use it? If exact target audience is still unclear, define what type of an actor you are targeting.	• Firstly, EGLV internally e.g. operation/maintenance division • Later, also externally e.g. cooperative “Genossenschaft Almende” • EGLV is a large landowner; this RSP could help other landowners as well e.g. other water management boards, “Straßen NRW”, cities and municipalities

What is being scaled up?

a) Describe the vision for what you are scaling up.	Our vision for scaling up includes our implementation measures that all have the potential to be scaled beyond EGLV's catchment area. The three measures include the establishment of flowering meadows, the concept of temporary nature and a citizen science project. • The conversion of intensive meadows to extensive meadows contributes to the preservation of biodiversity. EGLV can make an important contribution here with its own areas. However, all landowners in Germany face the challenge that the maintenance of extensive meadows is more cost-intensive. Finding solutions for the disposal of cutting material therefore has considerable potential to motivate other landowners in Germany to establish more flowering meadows. • The problem underlying the concept of temporary nature affects many landowners in Germany. The successful implementation of the concept in the Netherlands shows a considerable potential for species and nature conservation in Germany as well. The legal changes could bring benefits for many stakeholders, such as cities and municipalities, other water associations and finally the voluntary nature conservation. • The question of how to deal with drought is on the minds of many businesses, cities, municipalities and state politicians. The involvement of citizens as Citizen Scientists in a monitoring of drying waters is therefore not bound to the catchment area of EGLV, but is also planned beyond the area.
b) Describe what you are scaling up: technologies or techniques, processes, models or tools, and monitoring/evaluation aspects that you will scale up.	• With the impl. measure flowering meadows technologies and techniques e.g. reuse of cutting material should be considered, also complete processes like how to mowing will be scaled up. • For a change with temporary nature new processes and monitoring should be established. • For citizen science monitoring/evaluation and tools will be scaled up. With a new app for data collection, a new technology will be implemented.
c) Describe the opportunities (in SWOT and optimization strategy) and their relevance regarding the timeline till 2050.	• To put flowering meadows into practice, large-scale concepts are required, to harmonize the alternative maintenance schemes with other requirements that address dikes and non-used areas (e.g. photovoltaics systems on flowering meadows). Such synergies will be evaluated together with EGLV’s operating and planning departments. Furthermore, legislation on dike stability should be applied more flexible with regard to ecological dike maintenance, i.e. allowing for trees and shrubs to shade the

	streams and for extensive flowering meadows instead of regularly mown grass surface. Consultants should learn how to assess stability of ecologically maintained dikes. • The interpretation of nature and species conservancy laws (i.e. BNatSchG) needs to be adapted, to facilitate synergies between river restoration and nature protection rather than obstructing restoration if single protected species occur. Agreement with agencies will be addressed to classify areas reserved for later use as “areas for temporary nature”. Currently, the risk of delay or stop of river restoration programs forces operators to scare off protected animals before settling down. The project “Beleidslijn Tijdelijke Natuur” from the Netherlands shows that the concept of temporary nature is compatible with EU law. Solutions applied in pilot projects, local agreements with municipal agencies as well as discussions with higher level agencies are planned to modify the static idea of nature protection from a legal point. Therefore, legal professionals are involved as well. • Citizen science is one way to involve people actively in the monitoring of streams and – at the same time – communicate important environmental topics to them. Involving citizens in EGLV generally helps to increase acceptance of restoration projects. -More dialogue, more participation
d) Describe the applicability of your measure regarding changes in the local and global environmental and socio-economic contexts and the timeline till 2050.	• In the case of the flowering meadows, existing cooperation should be actively used in order to carry the results from the MERLIN project further and thus to get more into the implementation with other land owners. More flowering meadows leads to more biodiversity. • Flowering meadows not only contribute to biodiversity but also enhance the landscape in the densely populated region and lead to an increase in the well-being of residents. • The concept of temporary nature leads to fewer conflicts between landowners and conservationists, since the species protection measure and the reuse of the area were discussed in advance. Costs can also be saved through this process. • Citizen science is one way to involve people actively in the monitoring of streams and – at the same time – communicate important environmental topics to them.

Why to scale-up?

e) Describe the main (GD) goals that the scaling-up plan addresses and how you plan to make most of them.	The main green deal goals are: biodiversity net gain, climate regulation, sustainable energy and drought resilience. All of the above GD goals are achieved with the establishment and perpetuation of flowering meadows and the reuse of the cutting material. The concept temporary nature also leads to more biodiversity. Furthermore, the monitoring of drying streams helps with the management of drought resilience.
f) Describe additional (GD) goals that have potential for the scaling-up and how you could make the most of them.	The implementation measures also deal with flood resilience, health and wellbeing, inclusivity, circular economy and green growth.
g) Describe the expected benefits in terms of biodiversity and ecosystem services delivery, climate	• The establishment of flowering meadows directly supports biodiversity. But also, the higher root cover strengthens the dike stability and thus has a direct influence as ecosystem services. The increased activity of the flowering meadows also serves as

change mitigation and adaptation.	local recreation. In addition, more carbon can be stored in the soil. • The more area is transformed, the more benefits there are. • The concept temporary nature also leads to more biodiversity. Especially the pioneer species have possibilities to spread further over 'stepping stones' in densely populated areas. • Through the long-term observation of Citizen Science data, it is possible to generate climate change data which could help to evolve climate change adaptation plans e.g. "Dürremanagement-Aktionsplan".
h) Describe the expected benefits in terms of stakeholder engagement.	All of the implementation measures address different stakeholders which leads to more participation within EGLV.
i) Describe the expected benefits in terms of business opportunities.	• The recycling of the cutting material is done under the assumption of finding cost-effective ways of disposal. For this purpose, an internal economic feasibility study is carried out. • The new cooperative "Genossenschaft Almende" is included in the economic plan of the maintenance concept. • Protected native species can be a challenge for planning. Especially birds and amphibians may colonize areas purchased by EG for potential later demand, e.g. for use as retention or constructed wetland area or for the exchange of land properties. The settlement of protected species may limit later use which lead to increasing costs. • Through the complementary work of the Citizen Scientist, personnel costs can be saved, as there is a general overview of the association area and no additional workers have to go out.
j) Describe other benefits that result from the scaling-up.	Citizen science is one way to involve people actively in the monitoring of streams and – at the same time – communicate important environmental topics to them. Through Citizen Science, engaged citizens have the opportunity to actively engage in relevant environmental issues.

Where does the scaling-up take place?

k) Describe the catchment/landscape area (bio-physical context).	Our implementation measures all have the potential to be scaled beyond EGLV's catchment area e.g.: • Emscher catchment • Lippe catchment • Regionally • In the federal state of North Rhine-Westphalia (NRW) • Beyond
l) Describe the main policy actors, their interests, and decision-making processes (policy context).	Flowering meadows: • District Council of Arnsberg, Münster, Düsseldorf: With the annual dike inspection, the district government checks whether the dikes have a closed grass sward. According to the DIN standard, the dikes are to be mulched intensively. Extensive flowering meadows must be approved. Concept of temporary nature: • Ministry of the Environment, Nature and Transport of the State of North Rhine-Westphalia (MUNV) • District Council of Arnsberg, Münster, Düsseldorf • NGOs (NABU, BUND) The interpretation of nature and species conservancy laws (i.e. BNatSchG) needs to be adapted, to facilitate synergies between river restoration and nature protection rather than obstructing restoration if single protected species occur.

m) Describe relevant legislative issues, and formal and informal land tenure.	Flowering meadows: • With the annual dike inspection, the district government checks whether the dikes have a closed grass sward. According to the DIN standard, the dikes are to be mulched intensively. Extensive flowering meadows must be approved. Concept of temporary nature: • The interpretation of nature and species conservancy laws (i.e. BNatSchG) needs to be adapted, to facilitate synergies between river restoration and nature protection rather than obstructing restoration if single protected species occur.

How the scaling up happens?

n) Describe what kind of collaborative partnerships will be built/what kind of advocacy strategies are needed in the context of this RSP.	• The already existing cooperation in networks, working groups and interest groups, such as the urban biodiversity network or the Biodiversity Supporting Strategy Ruhrgebiet should be strengthened and expanded. Through these networks and conferences, it is possible to reach many interested parties and thus expand the development of flowering meadows beyond the EGLV area. New players must be integrated into the existing networks in order to expand them further. And further investment opportunities should be investigated in newly launched federal and state plans such as the “Action Plan for Nature-Based Climate Protection”. • On the subject of temporary nature, a profitable collaboration with the Ministry is being sought. Cooperation with the nature conservation associations on this topic is also to be expanded so that everyone works hand in hand. In addition, interest groups can be formed with others where regular exchanges can take place and potential can be calculated across multiple stakeholders. • For a successful implementation of the CS project, it is absolutely necessary to roll out a broad participation work and to continue this with various actors. Conceivable here would be an integration of the schools, kindergartens, educational institutions such as NUA and so on.
o) Describe the role and responsibilities of the case study board.	Stakeholder involvement is essential for successful upscaling, including early involvement of the stakeholder board. For the measures an approval e.g. by the ministry is necessary around this at all to convert.
p) Describe the role of local community members.	• For the successful implementation of the flowering meadows, the acceptance of the local residents is necessary. In the past, it became apparent that some felt the flowering meadows were untidy and resorted to mowing the lawn themselves. Signs and citizen participation are therefore necessary and in addition, to make the higher costs understandable to the members. The ecosystem services must be well represented here in monetary terms. • Many allies help with the concept of nature for a time because local politics is also always concerned with large areas and natural succession. Solutions would significantly relieve the authorities.
q) Describe the role of monitoring and evaluation systems.	• Success monitoring often does not take place; however, this is the only way to find out best practice • Long-term effects can be represented • Presentation of success is important to help from each other in other projects

r) Describe what the funding plan is like. Are new financial instruments needed?	The MERLIN project serves as start-up funding to develop concepts that are subsequently economically viable. For example, the project examines how the utilization of cutting material can be economically integrated into the maintenance concept of EGLV (e.g. production of biogas in digestion towers). This can lead, for example, to the adoption of the maintenance of the new cooperative “Genossenschaft Almende”, which perpetuates this project. Especially for the implementation measure flowering meadow are further funding possible because it is currently gaining in importance.

Who scales up?

Describe the main actors, their roles, and responsibilities	
s) who to involve?	First, the various organizational units at EGLV must be involved, such as the planning and organization team, public relations, and the legal department. Building on this, all the stakeholders mentioned so far must be involved at an early stage. Thinking one step further, other universities, associations, landowners, conservation organizations across federal state borders should also be considered. Especially the concept temporary nature will have to be discussed on federal level.
t) who funds?	Initially, EGLV will bear the cost of upscaling, but various subsidies are conceivable. For example, the state government can contribute to the costs of monitoring, the federal government can contribute to the action plan for nature-oriented climate protection in the transformation of flowering meadows, or nature conservation organizations can financially support the roll-out of the Citizen Science project.
u) who implements?	All the actors already mentioned
v) who monitors?	The following would be conceivable: • Biological stations and other external partners • Federal state of North Rhine Westphalia (LANUV) • Universities

Final thoughts

Overarching question: What prevents effective and large-scale restoration?	
w) Describe the policy barriers that need to be removed and overcome in order to scale up. x) Describe how your scaling-up plan addresses these barriers.	See above.

5.2.3 Case study 13 Sorraia (Portugal)

Authors: Henrique Dias (DGADR); Luís Sá (DGADR), Teresa Ferreira (ISA-ULisboa), André Fonseca (ISA-ULisboa), and Leonor Santos (ISA-ULisboa)
DGADR: Direcao-Geral De Agricultura E Desenvolvimento Rural (Directorate-General for Agriculture and Rural Development)
ISA-ULisboa: Instituto Superior De Agronomia Universidade de Lisboa (School of Agronomy – University of Lisbon)

Main questions and aspects to be addressed	
Who is this RSP targeted? Who is meant to read your RSP and use it? If exact target audience is still unclear, define what type of an actor you are targeting.	This RSP is targeted to irrigated Mediterranean lowland river landscapes. This includes all river landscapes with rivers with a considerable dimension and with appropriate soils for agriculture. Given the characteristics of Mediterranean climates, with hot dry summers and cool rainy winters, the farmland has to be irrigated to ensure water availability during the drought periods. There are several sources for irrigation, such as reservoirs, artificial ponds and subterranean water, that need to be transported during the summer time through drainage channels. This RSP is meant to be read by all managers of irrigated Mediterranean flood plains, nature conservation and water administration entities related to floodplains, NGOs and the general public. Water and Agricultural managers of Mediterranean irrigated floodplains would be the exact audience for this RSP.

What is being scaled up?

a) Describe the vision for what you are scaling up.	Mediterranean floodplains can be viewed as a mosaic of agricultural crops and natural infrastructures. Since these floodplains are irrigated, the riparian infrastructures have a fundamental role in regulating ecosystem functions and services, such as nutrient retention and sediment trapping (Cole et al., 2020; Riis et al., 2020). As this refers to a land sharing situation, it is essential to reconcile aquatic, riparian and terrestrial ecosystems within the floodplain, in a way that ecosystem services are both useful for agriculture without being compromised. In other words, ecosystem services should be made available to agriculture, but agriculture should not disturb, decrease nor degrade the provision of ecosystem services and their sustainability. This balance is being established in a context of climate change and water scarcity. References: Cole, L. J., Stockan, J., & Helliwell, R. (2020). Managing riparian buffer strips to optimise ecosystem services: A review. Agriculture, Ecosystems and Environment, 296, 106891. https://doi.org/10.1016/j.agee.2020.106891 Riis, T., Kelly-Quinn, M., Aguiar, F. C., Manolaki, P., Bruno, D., Bejarano, M. D., ... Dufour, S. (2020). Global overview of ecosystem services provided by riparian vegetation. BioScience, 70(6), 501–514. https://doi.org/10.1093/biosci/biaa041
b) Describe what you are scaling up: technologies or techniques, processes, models or tools, and monitoring/evaluation aspects that you will scale up.	The objective is to scale up techniques of river restauration, river functioning, ecological optimization models and tools, and wide range monitoring indicators to enable adaptive management.
c) Describe the opportunities (in SWOT and optimization	Opportunities arise from the need of an effective and efficient regulation of activities that impact water and wetlands. Local

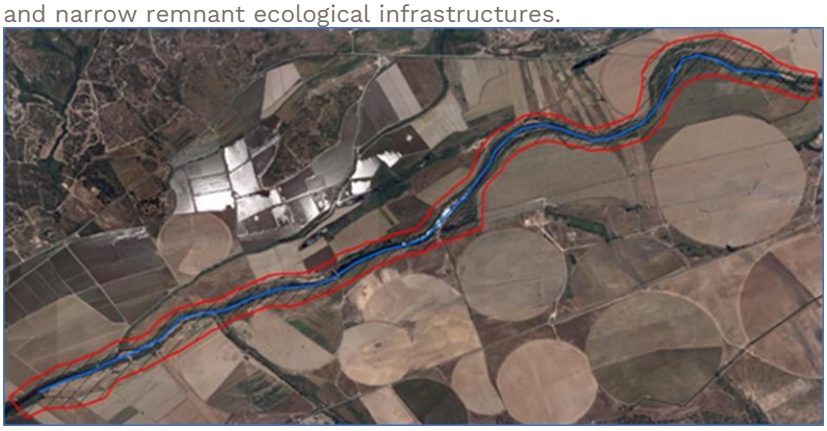
strategy) and their relevance regarding the timeline till 2050.	authorities can improve regulation and land use planning because they hold the competencies for zoning regulations in municipalities. Special Plans are local planning tools that regulate uses and activities. However, these plans present several disadvantages (e.g., limited scope, diversity of purposes and need to be approved by the Regional authorities). In addition, Special Plans are limited to the local scale, thus, they do not solve all problems affecting the wetlands, as floodplain ecosystems are also impacted by catchment scale pressures. By providing a long-term plan for the zoning of regulations, uses and activities until 2050, local authorities become equipped to engage in interadministrative and intergenerational regional development.
d) Describe the applicability of your measure regarding changes in the local and global environmental and socio-economic contexts and the timeline till 2050.	At a global level, as the demand for food production increases, the use of pesticides, fertilizers and crop intensification also increase, competing with environmental constrains. The socio-economic context is permanently shifting and the capacity to swiftly act relies on the ability to quickly adapt to changes of the market and environmental needs.

Why to scale-up?

e) Describe the main (GD) goals that the scaling-up plan addresses and how you plan to make most of them.	Biodiversity net-gain and Sustainable Food Systems (F2F): • natural resources and ecological processes supporting agroecosystems should be maintained. This can only be achieved with the maintenance of the natural infrastructure of the floodplain, specifically in this case, the Blue-Green infrastructure. If regulatory services are compromised, the food systems will be affected.
f) Describe additional (GD) goals that have potential for the scaling-up and how you could make the most of them.	Zero pollution goals: • In the face of climate change, by lowering greenhouse gas emissions in irrigated floodplains, a higher attenuation of the Mediterranean climatic dryness and summer droughts is to be expected. The large-scale maintenance and restoration of the Blue-Green infrastructure will ensure higher nutrient retention services, and thus improve water quality and diminish greenhouse gas emissions. Health and wellbeing: • General public and future generations can become central agents in the active conservation of natural and semi-natural areas, by improving overall accessibility and leisure opportunities Inclusivity: • Related to the development of rural areas
g) Describe the expected benefits in terms of biodiversity and ecosystem services delivery, climate change mitigation and adaptation.	The improved delivery of ecosystems services will be essentially regulatory, because the provisional are already in place, i.e, the floodplain is already in it self a provisional service. The increase in wetland area and riparian vegetation growth contributes to climate change mitigation.
h) Describe the expected benefits in terms of stakeholder engagement.	• A better environment not only for the farmers and general public, but also for future generations. There is also a possibility of increased income from environment protection provided by the CAP regulation. • More jobs in nature conservation and water management.

i) Describe the expected benefits in terms of business opportunities.	In terms of business opportunities, a well-treated soil, or even an improved one, will decrease the costs of soil conservation, water quality treatment, and will provide more and better agricultural products. Nature-based tourism is also a new business possibility.
j) Describe other benefits that result from the scaling-up.	Clear and common guidelines for irrigated floodplains to be used in all Mediterranean areas.

Where does the scaling-up take place?

k) Describe the catchment/landscape area (bio-physical context).	In the case of the Sorraia catchment case study, the floodplain is crossed by rivers and channels. The agricultural matrix features long and narrow remnant ecological infrastructures. 
l) Describe the main policy actors, their interests, and decision-making processes (policy context).	There are two agents to consider as they have different priorities, therefore different decision-making processes. The main actor in terms of provision services are farmers and forest producers. Both produce crop and wood material products and their interest is to produce more in terms of quantity. In terms of regulation, there are administration agents of water and agriculture, and nature conservancy managers. Their interests are more related to environmental conservation, to guarantee water use for all land owners and ensure the sustainability of agricultural practices.
m) Describe relevant legislative issues, and formal and informal land tenure.	In the Sorraia catchment, tenure is private, whereas the water element is public and in need of licensing to be used. Producers are landowners, but have constraints and need environmental permits in order to use the water in their owned land. The water is public and needs permits to be used, which are conceded by the water authorities. The need for these two permits and authorization, public and private, creates a difficult dialogue and conflict of interests.

How the scaling up happens?

n) Describe what kind of collaborative partnerships will be built/what kind of advocacy strategies are needed in the context of this RSP.	• Partnership between agricultural agents and water agents: the agriculture agents include stakeholders (farmers) and agriculture administration; water agents include regional and central water authorities. • The core actions will be built over agricultural authorities and administration management. The agricultural authorities will link stakeholders and their benefit interests to the sustainable use of water and soil resources. • In parallel, the water authorities will give support to the environmental management of the water.

	• General public, including municipalities and NGOs, should be aware of what is going on and be supportive.
o) Describe the role and responsibilities of the case study board.	• Farmer (crop and forest producers): managing the Blue-Green infrastructures of their properties • Agriculture authorities: managing water, river channels and aquatic communities • Water authorities: permits, legislative support, awareness • Academia: will provide scientific support • NGOs and public: awareness, influence, communication • Municipalities: awareness and supportive initiatives
p) Describe the role of local community members.	The public must be aware and participate in the planning and decision making in order to strive for intergenerational inclusivity.
q) Describe the role of monitoring and evaluation systems.	The floodplain is a living organism composed of metacommunities and meta-ecosystems. As such, adaptive management is needed to perform restoration and regain processes and functions of the rivers. Monitoring and evaluation systems will conduct this adaptive management role throughout the years.
r) Describe what the funding plan is like. Are new financial instruments needed?	• Part of the funding comes from year to year management of the water and cropland by the farmers. • The agriculture administration also funds part of the river management. • We need agro-environmental measures to supplement and drive the funding provided by CAP instruments. • Water licensing budgets can also be used for specific actions and structural interventions, such as renaturalization of the river profiles and segments, and building river channels.

Who scales up?

Describe the main actors, their roles, and responsibilities	
s) who to involve?	Farmers and forest producers, water administration, agricultural administrations, local municipalities, farmers and producer associations, academia, general public and NGOs.
t) who funds?	Farmers, EU funds for farming and for forest producers, regional and central funding for farmers, water management funding and municipal funding.
u) who implements?	Farmers, agriculture authorities, water management administration.
v) who monitors?	Water administration through EU Water Framework Directive and agriculture administration.

Final thoughts

Overarching question: What prevents effective and large-scale restoration?	
w) Describe the policy barriers that need to be removed and overcome in order to scale up. x) Describe how your scaling-up plan addresses these barriers.	Weak linkage between water legislation and agricultural practices. Insufficient CAP applicative measures. Stakeholders board will improve the linkage. Science policy leaflets and workshops will encourage bonding between agriculture and water administration. The MERLIN project can be flagged as a case study, linking agriculture and water management to be implemented in every irrigated flood plain. Need for environmental law enforcement capability and fiscalization.

5.2.4 Case study 15 Tzipori (Israel)

Authors: Yaron Hershkovitz and Avital Katz (TAU), Tal Ratner (KRDA) and Michal Grossman (AVIV-AMCG)
AVIV-AMCG: Private consultancy firm
KRDA: Kishon Drainage and River Authority
TAU: Tel Aviv University

Main questions and aspects to be addressed	
Who is this RSP targeted? Who is meant to read your RSP and use it? If exact target audience is still unclear, define what type of an actor you are targeting.	Tzipori project team: Implementation partner (KRDA), scientific partner (TAU), river planers, stakeholders The same as above

What is being scaled up?

a) Describe the vision for what you are scaling up.	Water in the stream will flow freely, throughout the year, without any obstacles or obstruction. Pollution sources (point and non-point) will be addressed and minimized. The water should be suitable for recreation purposes. Local municipalities and decision-makers should understand the importance of clean stream water as the main basis for a sustainable future
b) Describe what you are scaling up: technologies or techniques, processes, models or tools, and monitoring/evaluation aspects that you will scale up.	Adaptive landscape management, including continuous multi-disciplinary monitoring to follow up on the changes in the area. Involving local communities using citizen science. Flood risk management (basin scale). Working in collaboration with local farmers (regional water plan).
c) Describe the opportunities (in SWOT and optimization strategy) and their relevance regarding the timeline till 2050.	The regional water plan relays on the government's decision to restore several streams, including the Tzipori. It is based on the supply of desalinated water as the primary source of water to replace stream water abstraction. Urban development projects will allow better accessibility to the open landscapes in the region. Governmental decision aiming to invest more in the Arab communities will provide more opportunities to enhance the region, shared by Jewish and Arab communities.
d) Describe the applicability of your measure regarding changes in the local and global environmental and socio-economic contexts and the timeline till 2050.	The importance of open landscapes, including inland aquatic ecosystems is increasing due to regional urban development. Together with higher flood risk and expected changes in the distribution and amount of precipitation will affect the unique biodiversity of Israel.

Why to scale-up?

e) Describe the main (GD) goals that the scaling-up plan addresses and how you plan to make most of them.	Israel is not an EU member state and thus is not entitled to funding through the Green Deal. However, we will apply reflooding and reconnecting of the channel to support and enrich biodiversity, enhance flood-risk management, and social well-being. The financing mechanism is supported by different sectors: governmental, private, and external funds.
f) Describe additional (GD) goals that have potential for the scaling-up and how you could make the most of them.	Zero pollution targets are inherent in any project and will be completed as part of the regional water plan. Inclusivity is an important part of the project in whole and is pivotal to its success.
g) Describe the expected benefits in terms of biodiversity and ecosystem	The flooded area will allow local aquatic flora and fauna (invertebrates, amphibia, fish, birds) to reestablish. This will also create an opportunity for residents to enjoy a restored freshwater

services delivery, climate change mitigation and adaptation.	ecosystem and engage in educational activities. While floods are not expected to be affected dramatically by these measures, providing additional habitat to support aquatic life is crucial in the Mediterranean region.
h) Describe the expected benefits in terms of stakeholder engagement.	Local municipalities – Improving roads and accessibility to open fields might increase real estate values. Establishing regional management, connecting local authorities, collaborating to improve regional traffic, large-scale renewable energy projects, etc. Tourism – Plans provide for an unprofitable infrastructure that can be used as a basis for a profit. Farmers – Improving the connectivity between farmers and visitors. Potential for future agricultural tourism
i) Describe the expected benefits in terms of business opportunities.	Establishing regional management and collaborations between local authorities. The program will provide infrastructure for tourism. In addition, it is expected to improve the interface between visitors and local farmers and may form a basis for promoting agricultural tourism.
j) Describe other benefits that result from the scaling-up.	The first large-scale national project can become a new model of stream restoration in the country. Acting with a regional vision makes it possible to influence more people, to motivate more projects - to maximize benefits. Raising awareness of the joint actions in the basin will allow, among other things, to strengthen the "sense of regional belonging", and to improve visitor's experience.

Where does the scaling-up take place?

k) Describe the catchment/landscape area (bio-physical context).	Our case study focuses on the restoration of the Tzipori Watershed. It is a small Mediterranean stream (about 32 km long) in the Lower Galilee (Israel) from the mountains of Nazareth to the sea. It drains an intensively cultivated catchment of ca. 300 square kilometers
l) Describe the main policy actors, their interests, and decision-making processes (policy context).	Ministry of environmental protection, Ministry of Agriculture, water authority, Water and Sewage Corporations, Nature and Parks Authority, Israel Antiquities Authority, Society for the Protection of Nature in Israel, Kishon River and Drainage authority.
m) Describe relevant legislative issues, and formal and informal land tenure.	The working method is cooperation based on joint interests: Agreements between farmers and the drainage authority, which respond to the needs of farmers, in exchange for required changes in the stream-agriculture interface. The Jewish National Fund and the Nature and Parks Authority which are responsible for the management of natural landscape are cooperating based on common interests in the management of the open spaces. The Drainage Law allows the Drainage Authority to direct planning/infrastructure bodies that operate along the river, and if necessary, to receive compensation in favor of river restoration.

How the scaling up happens?

n) Describe what kind of collaborative partnerships will be built/what kind of advocacy strategies are needed in the context of this RSP.	There are several types of partnerships: Catchment-level partnership that was built during the initial master plan, - it is very broad and meets twice a year. A core team - including key stakeholders (for example: KKL-JNF, NPA, regional councils and members of the steering committee), meets once a month, Teams that accompany project planning - including stakeholders from the area, public representatives from nearby settlements, meet

	in accordance with the planning and implementation procedures of projects in the area.
o) Describe the role and responsibilities of the case study board.	The committee is the basin partnership. Its purpose is to create an infrastructure for agreements and cooperation at a basin level
p) Describe the role of local community members.	Members of the local community are part of the planning process. They are partners at a focused local level and help the planning teams understand the needs at a local level. The dialogue with them is the basis for creating community involvement in the project.
q) Describe the role of monitoring and evaluation systems.	The project began with a multi-disciplinary survey which formed the baseline for the understanding of the main stressors that are currently affecting the system. Further monitoring plan will focus on cause-effect of specific restoration actions.
r) Describe what the funding plan is like. Are new financial instruments needed?	The Tzipori restoration project was estimated at 200 million NIS. Of this, NIS 75 million is expected to come as a grant from the Yad Handiv Foundation. The rest must be raised from other sources. Most of the relevant sources are government ministries and government authorities. However, due to the difficulty of promoting a government decision on long-term budgeting for the project, it is necessary to raise annual budgets mainly. In addition to the water plan, which is supported by the water authority. The annual budgets are based on the votes of the state, as well as on strategic collaborations with government officials, local authorities, INPA and KKL, which can contribute to both the investments and the operations required to restore and maintain the river. There is room to examine additional budgetary sources, and perhaps a social bond or the adoption of relevant segments by commercial corporations operating in the neighborhood.

Who scales up?

Describe the main actors, their roles, and responsibilities	
s) who to involve?	Residents, local municipalities, framers, visitors, governmental offices (environment, agriculture), water authority, nature and Parks Authority, Jewish National Fund (JNF-KKL)
t) who funds?	Government, Yad Hanadiv Fund, the open landscape fund, Kishon river and drainage authority (KRDA), Jewish National Fund (JNF-KKL)
u) who implements?	KRDA, JNF-KKL, local municipalities, national roads company
v) who monitors?	Academia, ministry of agriculture, INPA, KRDA (through external contractors)

Final thoughts

Overarching question: What prevents effective and large-scale restoration?	
w) Describe the policy barriers that need to be removed and overcome in order to scale up. x) Describe how your scaling-up plan addresses these barriers.	The implementation of the regional water plan is a perquisite for the success of the project. The unprecedented participation of stakeholders in this project requires a shift in the work process, to allow better transparency and collaboration. This partnership between organizations with different management "DNA" is challenging. By working together, with common interests in mind and a focused set of goals, the scaling-up plan will provide the basis for implementing the regional restoration for the entire basin. This is challenging, yet when completed will become a model for other restoration plans throughout the country.

5.2.5 Case study 16 Scheldt (Belgium)

Authors: Pieter Boets (POV) and Marie Anne Forio (UGent)
POV: Provincie Oost-Vlaanderen (Province of East Flanders)
UGent: Universiteit Gent (Ghent University)

Main questions and aspects to be addressed	
Who is this RSP targeted? Who is meant to read your RSP and use it? If exact target audience is still unclear, define what type of an actor you are targeting.	The target audience is mainly the people involved in policy. For the measures on river restoration, the water managers are the main target whereas for implementation of buffer strips, the target is the Flemish Government but also the farmers associations and even water managers or local policy makers. We hope that the RSP can be used as a good practice example on how to deal with river restoration and implementation of buffer strips, how this can be beneficial for water quality and biodiversity but also for local stakeholders, and what are the obstacles to overcome, ... Although our target audience is not set exactly, it is clear that several stakeholders can benefit from the RSP as it can provide guidelines and set goals for the future. Depending on the target audience, some aspects might need more body and content, including more details.

What is being scaled up?

a) Describe the vision for what you are scaling up.	The vision is that what is implemented at the local basin scale could be implemented at a larger river basin scale and over more km of riverbanks. Thanks to the scaling up, biodiversity will increase, water quality will improve, more natural connections will be made and several other aspects of the water system will be targeted in an integrated way. There will be more a water and land coherent system that can be managed more efficiently for example via an agro-management group.
b) Describe what you are scaling up: technologies or techniques, processes, models or tools, and monitoring/evaluation aspects that you will scale up.	We are scaling up the size of the working area as well as the process and techniques that are used in the current project. In terms of the size, the vision is to have more watercourses restored via meandering, construction of spawning beds, ... and have free fish migration over longer stretches from the main river to the source. For the buffer strips it would be ideal if a buffer is foreseen along all small and large streams since this can increase efficiently in terms of decreasing input of nutrients but also in terms of management. In terms of technique or process used, now an individual approach is used although also more general info markets are organized. Now this is still coordinated by the erosion coordinators of the province and organized at a limited number of locations. It would be useful to have this more centrally organized at several locations, although the danger exists that this personal approach is needed to convince farmers to take part in the project.
c) Describe the opportunities (in SWOT and optimization strategy) and their relevance regarding the timeline till 2050.	Opportunities arise from increasing awareness among local users (e.g. farmers) of the impacts of climate change such as drought and floods which encourages them to use NBS measures to mitigate the impacts of climate change such as planting trees to make the drought and heat more bearable for the cattle. This will become more prominent towards the future especially given the rapid increase in temperature, longer periods of droughts, ... Furthermore, the increasing occurrence of floods might encourage residents, and local landowners to change their minds and designate high-flood risk areas for nature development. NBS are also generally cheaper than technical solutions. Lessons can be learnt from

	several restoration projects that have been installed or are already finished, and the experience from earlier restoration programs can be used. Furthermore, the presence of a multidisciplinary platform can aid in the identification and incorporation of various NBS measures to enhance ecosystem integrity and connectivity. Intervening at the ecosystem level can provide many opportunities for several ecosystem services and makes the water system more robust within a long-term timeframe.
d) Describe the applicability of your measure regarding changes in the local and global environmental and socio-economic contexts and the timeline till 2050.	Our two measures, river restoration and implementation of buffer strips are highly relevant as weather extremes will increase and strengthen. Restoration and meandering of river stretches provides a buffer against floods and droughts and also allows for species to migrate to other locations when climatic conditions are less favorable. Buffer strips on the other hand help combat erosion and run-off and provide corridors for species to migrate. In addition it can prevent the soil from further degradation and help in increasing the sponge function. These measures will thus still be very relevant in 20 or 30 years. In terms of socio-economic context it is important to find sustainable resources/model to support these ongoing NBS actions in the field. Since land is becoming more and more scarce, wide buffer strips will not be always easy to install and maintain.

Why to scale-up?

e) Describe the main (GD) goals that the scaling-up plan addresses and how you plan to make most of them.	The main goal is to have free fish-migration, natural restoration of small streams with meandering and good hydromorphological, chemical and biological conditions to reach the goals as set by the EU water framework directive. Since these goals are part of the EU regulations to get a good ecological status by 2027, we strongly believe that the scaling -up of the project has high potential given the current challenges and the fact that at the moment we are far from reaching these goals. It is important to have all stakeholders on board and convince especially farmers of the added value of having these buffer strips implemented. The measures can help mitigating climate change but also can help to combat erosion, loss of nutrients and fertile soil, ...
f) Describe additional (GD) goals that have potential for the scaling-up and how you could make the most of them.	Additionally these buffer strips do not only have an advantage in terms of water quality and biodiversity but also provide sufficient other ecosystem services such as pollination, water regulation, ... In addition, in an ideal situation the biomass from these buffer strips could be used as food for cattle, as biomass in a biogas installation or other useful application integrated in circular thinking and economy.
g) Describe the expected benefits in terms of biodiversity and ecosystem services delivery, climate change mitigation and adaptation.	The implementation of both the river restoration and the buffer strips will have a positive effect on both aquatic as well as terrestrial animals and plants. Specifically in the water course, free fish migration will be possible and input of nutrients and sediments will decrease leading to an increase of plant and animal biodiversity and a better water quality. On land, more insects and pollinators are to be expected, but also the loss of fertile soil will be diminished. The system will be better buffered against intensive rainfall and droughts and thus climate change.
h) Describe the expected benefits in terms of stakeholder engagement.	If the current measures are implemented at a larger scale and there are many positive experiences with the measures this could convince/trigger other stakeholders to implement this as well. In addition, examples of best practice become available which could work as a “snow-ball effect” convincing other regions to implement this.
i) Describe the expected benefits in terms of business opportunities.	Opportunities arise from the funding of NBS measures via future projects (research/government/EU...) such as the Blue deal program. Furthermore, researchers from the economic sectors might be interested to study the cost-benefit and economic feasibility of NBS as the information on the economic costs and benefits of implementing NBS may encourage the industry and agricultural sectors. Furthermore, a potential increase in tourist activities will increase economic activity in the region and the potential increase in

	pollination services may enhance agricultural productivity increasing income, although it is difficult to quantify the effect of pollination and agricultural productivity. As stated before the biomass generated via buffer strips could be useful economic product especially given the current increase in price of fossil fuels.
j) Describe other benefits that result from the scaling-up.	If the scale is enlarged this will also result in benefits for more downstream river sections where no actual measures are taken. A second aspect is that if buffer strips are implemented at a large scale it becomes much more interesting and economically feasible to manage them and maintain them. This can lead to a business opportunity.

Where does the scaling-up take place?

k) Describe the catchment/landscape area (bio-physical context).	These buffer strips are actually useful in the entire Scheldt River basin although these buffer strips are most “needed” in areas with erosion problems and thus a high slope. Typically this is the southern part of East- and West-Flanders. We started with a focus on the Zwalm River basin, but extend the search for buffer strips even within MERLIN to the Upper Scheldt river basin and more specifically the Maarkebekken. The mean annual flow at the mouth of this 22 km long Zwalm River is 1.21 m3 s-1, with the mean summer low flow being 0.53 m3 s-1 and the mean high flow 2.43 m3 s-1. The streams in the Zwalm River basin range from nearly pristine headwaters to impacted reaches near the mouth of the Zwalm River. Specifically, the physical habitat quality is still excellent in the forested upstream spring areas, but ranges from moderate to very poor in the middle and downstream sections of the river basin due to flood control weirs, straightened river channels and artificial embankments. Although five wastewater treatment plants (WWTP) are operating in the basin and two more are planned, at least 40% of the basin inhabitants still live in scattered population clusters which are not connected to the centralized sewer (VMM 2019). Moreover, the Zwalm River basin is sensitive to erosion and 74% of the basin is agricultural land, resulting in significant agricultural runoff.
l) Describe the main policy actors, their interests, and decision-making processes (policy context).	The main water managers are the Flemish Environment Agency, the Province and the local communities. The policy is partially determined by the Flemish government and the local politicians that translate the regional policy into local policy. On the other hand, also the province determines some policy with regard to the extraction of water, and the legal distances that one need to respect with regard to the use of fertilizers and pesticides near the watercourses. The implementation of buffer strips is highly influenced by the current policy with regard to agriculture. The common agricultural policy needs to be set for the next few years but at the moment it is not decided yet because of decisions that need to be made at the Flemish level with regard to buffer strips next to watercourses but also the problems with N and the new manure action plan (MAP).
m) Describe relevant legislative issues, and formal and informal land tenure.	• The EU water framework directive • Nitrates Directive • The law on unnavigable watercourses • The common agricultural policy • At the local scale: VLAREM - Flemish Regulations on Recognition regarding the Environment

How the scaling up happens?

n) Describe what kind of collaborative partnerships will	The MERLIN project and the outcomes/results need to be demonstrated towards policy makers and need to be used to

be built/what kind of advocacy strategies are needed in the context of this RSP.	convince them that this approach works. A cooperation at the local scale involving farmers is needed but also at the regional scale specific policy or legislation is needed to be able to implement actions at the large scale. Additionally subsidies might be necessary or long term goals and long term engagement to be able to implement these measures on the long run.
o) Describe the role and responsibilities of the case study board.	The case study board has the possibility to give feedback on the provided measures and to provide tips and tricks to get these measures implemented. At the same time it is expected that the representatives being present in the case study boards are spreading the information and the possibilities for implementation that are demonstrated to the case study board.
p) Describe the role of local community members.	The local stakeholders/farmers are involved since they are very important for the success of the implementation measures. They are asked on a voluntary basis if they are willing to implement the measures given that a compensation is provided for the buffer strips being implemented. Besides the farmers, also local nature organizations, such as Natuurpunt, are involved especially with regard to river restoration. They can help to provide land on which measures can be taken to increase restoration or rewet.
q) Describe the role of monitoring and evaluation systems.	There is currently a good monitoring and evaluation network in place by the Flemish Environment Agency. However due to cuts in budget the number of monitoring stations has decreased over the last decade. An additional difficulty is that the net effect of the measures (e.g. buffer strips) are not always easy to measure with the current monitoring system. There are still several impacts originating from discharge of households, droughts, diffuse pollution form agriculture, … With the current monitoring system the single effect of implementation of a buffer strip cannot be disentangled from the other pressures still being present.
r) Describe what the funding plan is like. Are new financial instruments needed?	Currently such measures are financed based on projects or based on funding provided by the Flemish Government. However, this funding is not always secured and not lasting on the long-term as it depends on current policy. Therefore, there is a need for more sustainable way of implementing and financing these measures. Current financial instruments can be used as long as there is a long-term plan and engagement for the next 20 years.

Who scales up?

Describe the main actors, their roles, and responsibilities	
s) who to involve?	The farmers and farmers organizations but also the water managers, nature organizations and politicians.
t) who funds?	Ideally the Flemish Government provides a budget to set up the agreements with farmers on the long-term, given that there is also long-term policy provided.
u) who implements?	Local water managers and land owners, erosion coordinators and local actors such as farmers.
v) who monitors?	The Flemish Environment Agency.

Final thoughts

Overarching question: What prevents effective and large-scale restoration?	
w) Describe the policy barriers that need to be removed and overcome in order to scale up. x) Describe how your scaling-up plan addresses these barriers.	Currently the lobbying from agriculture is still very strong and it is difficult in the current political landscape to have these buffer strips implemented at a larger scale. A recent proposal by the current minister of environment on implementing buffer strips along watercourses at a large scale was not withhold. According to the farmers organizations this would mean the end of farming in Flanders. So besides policy, also a good compensation and a decent perspective for farmers on the long term needs to be provided so

	the necessary budgets need to be secured and an agreement needs to be found. In the current political landscape, it is very difficult to have an agreement on this. In addition, there are a lot of different owners of the land next to a watercourse which makes the management of these buffer strips once installed remains unarranged. Maybe, the scaling up be implemented in more and longer strips which makes it maybe economical interesting to have the management done by an agro-management group.

5.3 Cases per cluster large rivers

5.3.1 Case study 4 Room for the Rhine branches (Netherlands)

Authors: Marieke de Lange (RWS) and Gertjan Geerling (Deltares)
RWS: Ministerie van Infrastructuur en Waterstaat (Ministry of Infrastructure and Water Management)

Main questions and aspects to be addressed	
Who is this RSP targeted? Who is meant to read your RSP and use it? If exact target audience is still unclear, define what type of an actor you are targeting.	This RSP is targeted toward colleagues of the Dutch Programmatic Approach Large Waters (PAGW) program and of the new Dutch Integrated River Management program (IRM) in 5 to 10 years. This is the same group that is meant to read and use this RSP.

What is being scaled up?

a) Describe the vision for what you are scaling up.	Ultimate goal is an ecological robust and functioning river ecosystem. This includes more room for natural processes, and allowing more hydrodynamics in the floodplains. The implementation case of rewetting floodplains is part of this. This vision will be incorporated into other programs of Rijkswaterstaat, such as IRM and PAGW. Spread the information on the importance of rewetting floodplains as part of a good functioning ecosystem.
b) Describe what you are scaling up: technologies or techniques, processes, models or tools, and monitoring/evaluation aspects that you will scale up.	The upscaling has two main aspects: 1) What = technical knowledge on nature based solutions, on abiotic and biotic processes, ecological benefits and ecosystem services. 2) How = the way of working together with other domains to achieve the ultimate goal.
c) Describe the opportunities (in SWOT and optimization strategy) and their relevance regarding the timeline till 2050.	Main opportunity lies in the combination of ecological benefits and other benefits, e.g. adaptation to drought, nature inclusive agriculture and health and wellbeing.
d) Describe the applicability of your measure regarding changes in the local and global environmental and socio-economic contexts and the timeline till 2050.	The knowledge that we collect is applicable to all river ecosystems, in Europe and beyond.

Why to scale-up?

e) Describe the main (GD) goals that the scaling-up plan addresses and how you plan to make most of them.	The main GD goals that the scaling-up plan addresses are: • Biodiversity net gain – a rewetted floodplain as part of an ecological robust river ecosystem, will increase biodiversity and give an enormous boost to the functioning of the river ecosystem. • Flood resilience – increase in the number and/or areas of floodplains will increase the room for the rivers and will thus contribute to flood resilience. • Drought resilience – by altering the water management of floodplains it will help increase fresh water storage.

	• Sustainable transport – not applicable to rewetting of floodplains, but applicable to the RfRB program, where longitudinal dams improved shipping channel and improve fish habitat.
f) Describe additional (GD) goals that have potential for the scaling-up and how you could make the most of them.	Additional GD goals that have potential for scaling-up and that have not been mentioned in our SWOT as applicable include the following: • Climate regulation – floodplains have the potential for locking in carbon and create a more robust ecosystem additionally • Health and well-being – more and more diverse nature contributes both to more recreational space for local inhabitant and thus improves health and well-being • Sustainable food systems (F2F) – nature inclusive agriculture • Inclusivity – the inclusion of all the stakeholders, local inhabitants and communicating everything at the right time, is something that has potential in the scaling-up. This is already taking place in the PAGW and IRM programs. • Financing the transition.
g) Describe the expected benefits in terms of biodiversity and ecosystem services delivery, climate change mitigation and adaptation.	The expected benefits are an increase of biodiversity, as rewetted floodplains will give a boost to the ecosystem in spring. In terms of ecosystem service delivery the expected benefits are related to recreation and flood prevention. The latter is also a benefit related to climate change adaptation. Drought prevention can also be an expected benefit related to climate change adaptation, as floodplains can store water.
h) Describe the expected benefits in terms of stakeholder engagement.	Including all stakeholders at the correct moment and creating more participation from local inhabitants creates a larger support base for the project, thus a larger chance of success.
i) Describe the expected benefits in terms of business opportunities.	Business opportunities are with clay and sand mining companies.
j) Describe other benefits that result from the scaling-up.	Not yet identified.

Where does the scaling-up take place?

k) Describe the catchment/landscape area (bio-physical context).	The area includes the rivers Rhine and Meuse in the Netherlands and its branches.
l) Describe the main policy actors, their interests, and decision-making processes (policy context).	On a national level the main policy actors are the Ministry of Infrastructure and Water Management and the Ministry of Agriculture, Nature and Food Quality. On a regional level this includes the administration of the provinces, mostly the Provinces of Gelderland, Overijssel, Utrecht (Rhine branches) and possibly the Provinces of Brabant and Limburg (Meuse).
m) Describe relevant legislative issues, and formal and informal land tenure.	A relevant legislative issue that is happening right now is the possible implementation of the new Environment and Planning Act. With the Environment and Planning Act, the government wants to simplify and merge the rules for spatial development. So that it will soon be easier to start construction projects, for example. This act has been delayed multiple times however, so no indication on the impact of this new act can be given at this time. Regarding land tenure, at the moment the floodplains along the large rivers belong to a variety of owners, although Rijkswaterstaat is often a large owner. With the land that belongs to farmers, or is in use by farmers, it is likely to be more difficult to implement nature based solutions.

How the scaling up happens?

n) Describe what kind of collaborative partnerships will be built/what kind of advocacy strategies are needed in the context of this RSP.	In the type of collaborative partnerships that needs to be built, the borders between national and regional governmental agencies need to fade in order to achieve the goals set. This is something that is already happening in the PAGW and IRM program, where different levels of national and regional governmental organizations are working together.
o) Describe the role and responsibilities of the case study board.	The case study board both provides input into the plans made for this case study, and ensures that we look at the case at different angles and look at it with different perspectives.
p) Describe the role of local community members.	Local communities are key stakeholders for successful design and implementation of nature based solutions. Stakeholder involvement is an important part of the new Environment and Planning Act.
q) Describe the role of monitoring and evaluation systems.	The role of the monitoring and evaluation systems are to ensure that the knowledge that we obtain from this case is transferable and that others (both in the Netherlands and elsewhere) can learn from our mistakes and improve what we will be doing.
r) Describe what the funding plan is like. Are new financial instruments needed?	Funding is from the national government. However, in those cases where land needs to be bought, additional funding, or cooperation with the current land owner, is needed.

Who scales up?

Describe the main actors, their roles, and responsibilities	
s) who to involve?	Colleagues of PAGW (especially rivers team), IRM, Provinces of Gelderland, Overijssel, Utrecht, Waterboard Vallei & Veluwe, Waterboard Rijn & IJssel.
t) who funds?	The national government, additional funding from sand mining companies, Postcodeloterij.
u) who implements?	The national government and/or provincial government.
v) who monitors?	Rijkswaterstaat and PAGW

Final thoughts

Overarching question: What prevents effective and large-scale restoration?	
w) Describe the policy barriers that need to be removed and overcome in order to scale up. x) Describe how your scaling-up plan addresses these barriers.	Shortage of money, negative lobby from other sectors (shipping, farmers). Increase involvement of the policy makers at the Ministry of Infrastructure and Water Management.

5.3.2 Case study 7a Danube (Austria)

Authors: Silke-Silvia Drexler (BOKU), Andrea Funk (BOKU), Iris Kempter (VIAD), Robert Tögel (VIAD)
BOKU: Universitaet fuer Bodenkultur Wien (University of Natural Resources and Life Sciences, Vienna)
VIAD: Via Donau Osterreichische Wasserstrassen Gesellschaft MBH (Viadonau)

As you begin drafting the RSP and its summary in English, start with clarifying and thinking about the following:

While you think about the target audience and key user/reader of your RSP, you will also need to think about what "region" means in your case: what scale makes sense for the scaling up? This will also depend on what you are scaling up, if you are scaling up multiple different aspects, and if you are prioritizing some aspects over others.

> The scale can vary, but in general the whole measures implemented at the Danube east of Vienna can be scaled up for the Upper Danube or all waterways with regulating structures. Breaking it down/going into detail: different types of measures can be scaled up: the "model" of restoration measures (e.g. riverbank restoration, reconnection of sidearms); the "process" of restoration measures like the integration of various disciplines (e.g. ecology, navigation, river engineering, flood protection); the "organizational innovation" of implementing restoration measures through the integrative project team with the stakeholder advisory board (answers the question in box b on page 4)

Are there already existing plans, strategies or guides that you can use or make links with in this RSP you are drafting? There is no need to reinvent the wheel – if something already exists that you can build on and improve, that is great! If some plans or strategies exist but there are barriers to using them or linking to them, include these in your RSP and think about how those barriers could be overcome.

> Action Programme Danube until 2022 (in german) (https://www.viadonau.org/fileadmin/content/viadonau/06Unternehmen/Dokumente/2015/2015-06-01_Aktionsprogramm_Donau_bis_2022.pdf)
>
> Any plans/strategies where barriers exist????

Main questions and aspects to be addressed	
Who is this RSP targeted? Who is meant to read your RSP and use it? If exact target audience is still unclear, define what type of an actor you are targeting.	National Government, international water agencies responsible for management of large rivers

What is being scaled up?

Relevant questions:

What would successful scaling up look like, and what is "success" in the context of this regional scaling-up? This could be different than in your case study! What are the (measurable) outcomes and (long-term) impacts of scaling-up?

> "Success" through restoration measures: reduction of river-bed incision; re-establishment of former/creation of new habitats for flora and fauna; maintaining "good ecological status" as defined by the Water Framework Directive (2000/60/EC) >> for the whole section of the Austrian Danube/Upper Danube
>
> Measurable: higher retention potential (in terms of floods, but also nutrients like N and P), kms of restored riverbanks, ha of reconnected sidearms, ha of reconnected wetlands (as mitigation measure for climate change, e.g. drought), greater awareness about benefits of nature based restoration measures in politics and the population

What opportunities identified in the SWOT and aspects of the optimization plan could be used in the scalability plans? What are the linkages between project strengths (identified in SWOT) and the need to improve biodiversity and ecosystem services delivery, stakeholder engagement and business opportunities?

To check the stakeholder involvement/engagement regularly especially in terms of including stakeholders from new fields (e.g. eco-tourism, recreation). Integrating the Green Deal Goals in the planning process to screen on new important topics like for example drought resilience in relation to climate change. To focus more on NBS in implementation and awareness rising and highlight the benefits of NBS among authorities but also among the broad public. The follow up on circular economy by selling removed stones from restoration works. Proceeding with the work on a new action plan for the Austrian Danube to provide stability and long-term perspectives.

Second question??

Will the measure you plan on scaling up now be applicable and suitable also in 2050? Have the planned measures been assessed both for their current and future applicability or do you need scenario studies to improve understanding of the potential impacts of e.g., climate change, land-use change and demographic change? Ensure that relevant sectors are included in the scenario modelling.

The most binding aspect is the legal framework. If any laws will be changed or adapted this will also have an effect on plans, strategies etc. dealing with future visions. Political changes on national level therefore can always affect the scalability plans.

Scenario studies on climate change, land-use change and demographic change can be relevant, but mostly for the Danube areas outside the National Park. The National Park is subject to strict legal frameworks (Natura 2000 area, habitat and birds directive) which contribute to conservation and preservation of the area.

a) Describe the vision for what you are scaling up.	Successful restoration of the Austrian Danube stretch through an integrative approach by including all relevant disciplines and experts from the beginning on to keep the “good ecological status” (WFD).
b) Describe what you are scaling up: technologies or techniques, processes, models or tools, and monitoring/evaluation aspects that you will scale up.	The process of river restoration (including all legal, ecological, river engineering, nautical and flood risk management disciplines); in detail: • the “model” of restoration measures (e.g. riverbank restoration, reconnection of sidearms); • the “process” of restoration measures like the integration of various disciplines (e.g. ecology, navigation, river engineering, flood protection); • the “organizational innovation” of implementing restoration measures through the integrative project team with the stakeholder advisory board
c) Describe the opportunities (in SWOT and optimization strategy) and their relevance regarding the timeline till 2050.	Siehe opt. strategy
d) Describe the applicability of your measure regarding changes in the local and global environmental and socio-economic contexts and the timeline till 2050.	Restauration measures like riverbank restoration, reconnection of sidearms, re-shaping of groynes etc. should lead – together with other measures – to a reduction of deepening tendencies of the riverbed and thus decreasing water levels in the surrounding floodplains. Thus, facing local and global environmental changes the measures should not only be applicable in the future but crucial.

Why to scale-up?

e) Describe the main (GD) goals that the scaling-up plan addresses and how you plan to make most of them.	Biodiversity net gain, climate regulation, flood resilience, drought resilience Again, ongoing restoration measures to reconnect sidearms remove riverbed regulations; create habitats; raise groundwater level etc.

f) Describe additional (GD) goals that have potential for the scaling-up and how you could make the most of them.	Health and wellbeing, zero pollution goals, sustainable food systems, sustainable transport, inclusivity, circular economy, financing the transition, green growth creating recreation space through restoration; retention of nutrient through reconnection of wetlands; circular economy through selling removed stones
g) Describe the expected benefits in terms of biodiversity and ecosystem services delivery, climate change mitigation and adaptation.	Biodiversity: reconnection of decoupled sidearms and wetlands, re-establishment and creation of habitats for flora and fauna, contribution to reduce biodiversity loss; ES: The measures contribute to (a) regulating services, e.g. flood protection and nutrients retention, (b) cultural services, e.g. sports, fishing, experience of nature, and (c) supporting services, e.g. hydrological and nutrient cycle, provision of habitats and thus enhancing biodiversity in general (habitats, flora, fauna) Climate change mitigation and adaptation: through reconnection of sidearms more retention areas in case of floods; contribution to drought mitigation as reconnection of sidearms raises the groundwater levels
h) Describe the expected benefits in terms of stakeholder engagement.	The integrated approach of including stakeholders and experts from all disciplines concerned (ecology, navigation, flood management, river engineering, tourism) is well excepted and established and was successfully copied for restoration measures at other large rivers.
i) Describe the expected benefits in terms of business opportunities.	• Knowledge about benefits of NBS has reached the private sector. Insurances for example see the benefits of investing in the prevention of disasters. • To reduce their expenses in case of the occurence of a disaster (e.g. flood) they provide money to prevent such events as they contribute with funding to restoration of rivers.
j) Describe other benefits that result from the scaling-up.	

Where does the scaling-up take place?

Where are you planning this scaling-up? Are there some spatial or space-specific factors which contribute towards a successful scaling-up or that represent barriers?

On national level > Austrian Danube stretch (especially free-flowing stretches); for other large rivers having the same dimensions like the Danube

k) Describe the catchment/landscape area (bio-physical context).	The scaling up area is focused on the Danube section in Austria, which is defined as the Upper Danube. The upper Danube reaches from the source of the Danube (Germany) to Bratislava (Slovakia). In this stretch the Danube has the character of an alpine river with a flow velocity of about 8-9 km/h due to the average slope of 0.4‰ which is in comparison to the neighboring countries quite steep (Bavaria: 0.02‰ and Hungary: 0.06‰). It drains more than 96% of Austria's territory and the largest tributaries are Inn, Enns and March (ICPDR, 2006). The discharge ranges from 600 m³/sec (low flow) to 11,000 m³/sec (100-year flood) while the medium flow varies between 1,500 to 1,900 m³/sec. The flow velocity is about 1-3 m/sec and the last major flooding event was in June 2013 with a discharge of 10,100m³/sec which was not much less than the historical event in 1501 with 14,000 m³/sec (https://www.donauauen.at/en/facts/nature-science/the-danube). In the middle of the 19th century first regulation measures were implemented on the one hand to facilitate navigation and on the other hand to protect the surrounding farmlands from flooding. Later, in the early 20th century the focus shifted to energy generation. Thus, the former natural character with meandering, braided and canyon sections was clearly impaired and today the Danube has 10 hydropower plants in the Austrian part. With these interventions, connectivity of habitats, sediment transport as well as the spatial extension of the Danube's wetlands were immensely reduced (Jungwirth et al., 2014).

	In 1996 the Donau-Auen National Park was established including parts of Vienna as well as the area in Lower Austria up to Bratislava to safeguard the sensitive ecosystem.
l) Describe the main policy actors, their interests, and decision-making processes (policy context).	• Federal Ministry for Climate Action, Environment, Energy, Mobility, Innovation and Technology (governance, regulation etc., climate & environment, mobility), • Federal Ministry for Agriculture, Forestry, Regions and Water Management (governance, regulation etc., flood protection) • viadonau – Austrian Waterway Management Company (inland navigation, water & flood protection) • ICPDR - International Commission for the Protection of the Danube River (governance, regulation etc.) • Donau-Auen National Park (environment, climate)
m) Describe relevant legislative issues, and formal and informal land tenure.	• Federal Waterways Act (BGBl I no. 177/2004) • Water Framework Directive (2000/60/EG) • Natura 2000 (Birds Directive 79/409/EWG & FFH Directive 92/43/EWG) • Flood Risk Directive (2007/60/EC) • Federal, municipal and private territory

How the scaling up happens?

How are you going to ensure that this RSP you are drafting is implementable and helps also other stakeholders to put master planning into practice?

Close collaboration of all involved stakeholders (see also the integrative approach established over the last 25 years); feedback loops, informal meetings and workshops with implementing parties (e.g. ministry, viadonau) but also scientific input

How do you envision the role of the local communities? How can they play their part in the scaling-up from the very beginning?

Through information and further “spreading the news” >> awareness rising

n) Describe what kind of collaborative partnerships will be built/what kind of advocacy strategies are needed in the context of this RSP.	Implementation partners – scientific partners (exchange of expertise, monitoring etc.)
o) Describe the role and responsibilities of the case study board.	Involved in decision making process of restoration measures; involved in discussions
p) Describe the role of local community members.	To be informed about next restoration activities, involvement through stakeholder board
q) Describe the role of monitoring and evaluation systems.	Will help to check whether the implemented restoration measures have a positive or negative impact on biodiversity, Regular monitoring will help to adapt the scalability plans and developed strategies to include the latest scientific results
r) Describe what the funding plan is like. Are new financial instruments needed?	Public (national and EU); private sector (again insurances, companies through recirculation of removed stones)

Who scales up?

Who can you collaborate with? How do you collaborate with stakeholders? See table 1 (next page) for possible scaling-up strategies.

Ministry, local communities, stakeholders of all disciplines involved (ecology, navigation, river engineering, etc.)

Through information, workshops, feedback loops (Tab.1)

How will you engage the case study board? Will your project inform, consult, or collaborate with them? Do they provide funding? For more information on these roles, please see the guidelines for stakeholder mapping (e.g. Figure 4) in the Merlin nextcloud storage.

Through integration into upcoming restoration measures and collaborative decision making in the forum.

Through information.

How to involve private sector or is upscaling mainly done by public sector using public funding?

Mainly done through public funding (national, EU-level).

New funding opportunities private sector: through recirculation (selling of removed rip-rap), including insurances (awareness rising that prevention is better than repair works

What kinds of educational elements (implemented in the short-to-medium term) may ease the scaling-up in the long term? Are there networks or formal/informal knowledge exchanges at regular intervals between scientists, practitioners and those involved in decision-making?

Again stakeholder forum and advisory board

How are you planning to engage different/more stakeholders and ensure all relevant stakeholders are represented?

Regularly checking the stakeholder involvement/engagement, especially in terms of including stakeholders from new fields (e.g. eco-tourism, recreation).

Are there legislative changes that can “make or break” the scaling-up? Are you able to influence new/changing legislation?

Changes in politics

Possibilities for influencing politics decisions via inclusion in the generation of national implementation plans etc.

Describe the main actors, their roles, and responsibilities	
s) who to involve?	• Ministry of Climate Action, Environment, Energy, Mobility, Innovation and Technology and viadonau: funding and implementing institutions • Donau-Auen Nationalpark • Stakeholders from all fields of interest via the stakeholder board (navigation, NGOs, communities etc.)
t) who funds?	Ministry of Climate Action, Environment, Energy, Mobility, Innovation and Technology; EU-funds
u) who implements?	viadonau
v) who monitors?	Scientific partners (universities); engineering offices with expertise in this field, in the area of the National Park the NP-team

Final thoughts

Overarching question: What prevents effective and large-scale restoration?	
w) Describe the policy barriers that need to be removed and overcome in order to scale up.	Maybe the long time period to receive the respective permissions?

x) Describe how your scaling-up plan addresses these barriers.	

5.3.3 Case study 7b Danube (Hungary)

Authors: Tamás Gruber (WWF HU), Andrea Samu (WWF HU) and Tibor Erős (Balaton Limnological Research Institute, Hungary)
WWF HU: WWF Vilag Termeszeti Alap Magyarorszag Alapitvany (WWF Hungary)

Main questions and aspects to be addressed	
Who is this RSP targeted? Who is meant to read your RSP and use it? If exact target audience is still unclear, define what type of an actor you are targeting.	Since water utilisation is the key of so many differernt interests, target group of the upscaling strategy varies between lots of different sectors and various stakeholder groups among which are the water administration, research institutes, (hydrologic engineering, nature conseration engineering, sediment mangement, ecology, geography, etc.), protected area management bodies, local municipalities, forestrys, ministries, institutions which are responsible for international harmonization of river management. Some actors who will be specified later in the „main policy actors" chapter.

What is being scaled up?

a) Describe the vision for what you are scaling up.	Our vision is that following results and behaviours will be reality until 2050: • People are aware of the ecosystem services of wetlend ecosystems and have successfully worked out strategies and methods of such nature based solutions which can restore the natural dynamics of riverine ecosystems. These solutions are widely supported by goverments and business sectors as well. • Only such activities are allowed in floodplains and the river which are in line with natural processes and dynamics of such ecosystems. • NBS based restorations are commonly accepted and integratively planned restoration works are finished or in process. • Sediment balance is in better state (river management bodies' consider a jointly developed sediment management plan), more natural hydromorphological processes are ongoing. • Freshwater biodiversity is on a recovery track and people can use new opportunities from new economic modells based on natural river dynamics.
b) Describe what you are scaling up: technologies or techniques, processes, models or tools, and monitoring/evaluation aspects that you will scale up.	Among good practices to be scaled up from the Liberty island case study would be the proper preparation of the project implementation not only with proper planning but also to set up a case study board from relevant stakeholders and build a strong cooperation between them. In case of the Libetry Island it was realized in the frame of a Life project and it was a well-functioning partnership that is a guarantee that an upcoming project idea can be developed. Many restoration measures are already included in the existing plans or strategies (e.g. river basin management plan of Hungary, which includes potential measures in rivers and on the floodplains), these should be started to push toward the implementation on the selected river section. A pre-condition of that is not only nature conservation sector including NGOs push the restoration needs, but there is another sector or some active municipalities or communities on board, which have political power and influence. An essential part of the way forward is to learn lessons from the Middle-Danube Austria site downstream Vienna where the proposal planning and also the technical implementation is on the way and there are good experiences. Organizing bilateral talks, field visits by inviting diverse key stakeholders is a way forward. The first steps in it will happen during the implementation of the MERLIN project.

	In case of this restoration site biomonitoring was implemented during and after the restoration measures. This monitoring should be upscaled not only to more indicators but also to being able to monitor the change in the whole river system, not only on small sections. JDS is a good tool but probably it could be more focused on restoration actions, the pre- and post-restoration phases. Also, a long term monitoring program on restored side-branches would be and use of lessons learnt in upcoming restoration projects. A more diverse and innovative set of restoration measures could be realized for the entire floodplain which responsive on new challenges and address the question, how far it is possible to let the natural dynamics work again. Potential measures are listed in the river basin management plan's annexes and are also selected and tailored to water bodies of the Danube, which is a good starting point. Without mentioning details the measures need to handle the main channel and the active floodplain as a complex system. Upscaling from economic point of view is to identify costs and benefits as accurate as possible. Scenarios of degradation or restoration of side-branches and all other riverine habitats should be accompanied by CBA analyses. A pre-condition of CBAs is gathering the missing data and information, not only biological ones, but on the services which the restored river systems provide to the society. This was also not conducted by the case of Liberty island, since at that time extended CBA-s were not in advanced stage of elaboration but in upcoming cases can serve as a good tool to show policymakers multiple benefits of the restorations. Economic optimization requires developing integrated restoration and NbS based proposals considering strongly the cost-benefit aspects in order to make them attractive to others than public funds. There are many aspects which belongs to healthy rivers and these aspects need to be important components of the proposals in order to make them interesting for the private sector investments. Liberty Island case study is a good starting point for scaling up which raised the attention of the wider group of local stakeholders and also the wider public to the added values of river and side-arm restoration.
c) Describe the opportunities (in SWOT and optimization strategy) and their relevance regarding the timeline till 2050.	Opportunities may arise once from policy level which should materialize in enabling such projects which restore river ecosystems but bring clear arise of more ecosystem services – it is just like the Liberty Island which was a biodiversity and reconnection restoration focused project but covers an improvement of other Green Deal indicators as well. Another opportunity is to make cooperation case studies with companies which would develop not only sponsorship but could create an income from nature based business models. in a such timeframe an education and involvment programs for local inhabitants can be realized, they should be aware of values of rivers and floodplains and are also able to make a living by tourism or otherutilization of the economic potentials of modern floodplain landscape management, improvement of the local economy (active particiaption of wide stakeholder groups which is necessary for reaching results which are widely known and approved. It is a great opportunity in progression of tourism: those types of this sector should common which utilize intact nature (eg. rowing, hiking) and slow tourism is popular (pubic transport, more days, minimalistic or no infrastructure). This is the case by the Liberty Island as well where an education trail could be seen if somebody is rowing in the sidearm. Many restoration measures are already included in the existing plans or strategies (e.g. river basin management plan of Hungary, which includes potential measures in rivers and on the floodplains). Integrated planning is a base of a successful upscaling.

d) Describe the applicability of your measure regarding changes in the local and global environmental and socio-economic contexts and the timeline till 2050.	Sidearm reconnections along the Hungarian Middle Danube section is supported not only by ecologists but also water directorates, local inhabitants, anglers, tourists. However under nowadays condition of frequent low water regimes and riverbed deepening proper planning and innovative solutions are necessary for the implementation. It is clearly a political will which would support such a detailed planning and implementation as well. To push this forward, work of NGO's and clear need of releant stakeholders and inhabitants is necessary. On global level it is a clear trend: making rivers more natural again to mitigate impacts of climate change and biodiversity loss are now trackable on EU policy level. Proper planning, implementation and funding are the greatest shortcomings. River ecosystems are key in global processes: as climate change materializes in particular in hydrological cycles, this is the point where we can interrupt the negative spiral. Also, biodiversity loss is the biggest and fastest in wetland ecosystems so to restore them is also a key to stop to loose these ecosystems rich in giving high quality ecosystem services. All economic activities are in danger of lack of water: agriculture, forestry and drinking water are among most problematic ones and to substitute natural ecosystems in irrigation or production of food and drinking water costs an enormous amount of money. So the reconnection of sidearms would be the most urgent and quickest and very minimum step which should be taken until 2050.

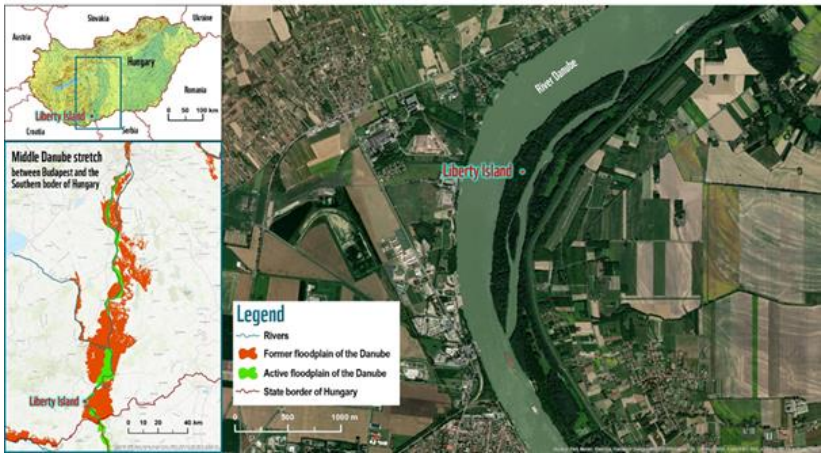
Why to scale-up?

e) Describe the main (GD) goals that the scaling-up plan addresses and how you plan to make most of them.	The most urgent and significant goals which already include lots of other advantages are the improvement of biodiversity net gain, flood/drought resilience, climate regulation, health and wellbeing and inclusivity. Deterioration of species and ecosystems are the biggest threat of nowadays' world since lots of ecosystem services are lost. This is why targeting of improvement of biodiversity will bring the most benefits including the regulation ecosystem services which control eg. the climatic processes. Climate change is one of the consequences of various human activities and it acts through accelerated hydrological processes. This could be mitigated by restoration of riverine ecosystems and measured by the indicators of resilience and climate regulation. Regulative ecosystem services are those which get the less attention, their mportance is not handled properly and for most people it is not directly linked with natural ecosystems. Physical and mental wellbeing is also a base to live a prosperous life and higher awareness is necessary for people to know that intact ecosystems are one of the best oppportunities to achieve this goal. This can't be achieved without commited people, so inclusivity, education and involvment of all possible interest group is inevitable.
f) Describe additional (GD) goals that have potential for the scaling-up and how you could make the most of them.	Since on the Middle Danube section navigation is an important sector, sustainable transport should be also a goal (see sectoral briefings in WP4, Merlin) and supporting sustainable food systems based on riverine ecosystems play also an imprtant role to increase the diversity in food supply. It is highly important to utilize those areas again where water is present and water levels are varyng throughout the year – it can provide not only food but a proper income for local inhabitants.

g) Describe the expected benefits in terms of biodiversity and ecosystem services delivery, climate change mitigation and adaptation.	Restoration of sidearms increases aquatic biodiversity, ensures richer angling and various tourism opportunities. It is also possible for drinking water wells to function (again). It sustains (clean) water supplies by increasing the water infiltration and storage capacity of wetlands/soils and the recharge of aquifers. Mitigates drought by releasing water from natural storage features, including soil and groundwater, surface water and aquifers. Prolongs the life of polders by reducing siltation. It helps in regulation of water quality and mitigation of impacts of catastrophic flood events and may serve in drought as cooling agent. Also, the bigger wet areas could be bigger sink of CO2.
h) Describe the expected benefits in terms of stakeholder engagement.	Early and active participation of wide stakeholder groups which is necessary for reaching results which are widely known and approved. Stakeholders need to have the opportunity to influence decision making and they need to be reached with the proper communication tools, via proper communication channels. If this is ensured, people will be committed to maintain results of restoration projects, they won't come up too late with (counter)arguments. Also, local people know the best their residence and the neighborhood and they can enrich the project with significant observations or ideas. Although sometimes the local people motivation is missing, or can't think big / long term, but explain why new ideas can't be compiled. This behaviour can also only be changed by a thorough stakeholder involvement approach. Best way of this is if stakeholders own land on the restoraton sites is when it remains theirs and they get new tools andknowledge how to manage the land further with new conditions.
i) Describe the expected benefits in terms of business opportunities.	Restoration of side-branches of Danube has limited business opportunities. The main reason is that these are on protected or N2000 sites where there are no or there is limited economic activities. The lands around the side-branches and on islands are under forestry use or are out of commercial use, or agriculture lands. There are some territories along the river which are in safety zones bank-filtered drinking water base. Even if commercial use is limited on the active floodplain the local communities, the inhabitants who live close to the river or the tourists are belong to the river and its adjacent habitats. The most significant human uses are fishing, kayaking, canoeing, typical weekend activities, bird watching, etc. Some of them depends on the ecological, hydromorphological status of the Danube, for others it is indifferent whether this is a living river or a channelized main riverbed. This is also one reason of the degrading ecosystems, although the good natural conditions are usually more attractive for everyone. These natural conditions are still not properly trusted or prreserved and many stakeholders are not aware of their value, and parallel a lot of potential of the good natural status is not exploited. (Exploitation doesn't mean overuse via human activities). But there are some spots which are already too popular and number of visitors might be extreme high during concentrated periods, e.g. summer months. The main business opportunity is preserving the ecosystem services or improving their status by river and habitat restoration and by increasing the public awareness of living rivers' values and ownership of some symbolic spots along the river. During exploiting the business opportunities it might be considered that some core zones of restoration need to be closed from visitors (locals or tourists), or could only be visited by guides, or opened for scientific monitoring. It is recommended to assess the business opportunities on two levels, 1st is the restoration spots where the local actors could cooperate, the 2nd level is the whole dimension of the scalability plan where the aggregated potential and impacts could be assessed. Intensive consultation and decision making support approach is necessary since a lot of aspects need to be considered during the improvement of any business opportunities. The role of corporate

	sector needs to be analysed and the corporate sectors' involvement could be a tool to overcome the barriers caused by the pure sectoral thinking approach explained later (main policy actors, their interest and decision making process). Besides, all the business opportunity related activities need to be significant aspect during the development of funding mechanisms, which are explained in the answers to a later question.
j) Describe other benefits that result from the scaling-up.	If similar NBS-based restorations would start simultaneously on more places, advantages would be visible already on the short term. Also, since riverine ecosystems are connected, complex and dynamic, best planning is the catchment-level planning because changes on one section could affect the whole river system and also, improvement on one section can bring local benefits but achieve benefits for a longer section needs integrative and wide scale planning. Therefore, it would be important to agree on this also with Austrian Danube section to increase those opportunities.

Where does the scaling-up take place?

k) Describe the catchment/landscape area (bio-physical context).	The Danube has a drainage area of approximately 800,000 km2 and a mean discharge of 6,500 m3 s-1 at its mouth. From source to mouth the Danube drains 19 countries, which makes the Danube basin the most international catchment in the world (http://www.icpdr.org/main/danube-basin). Large-scale river regulations starting from the second half of the nineteenth century, and paralleled by massive agricultural and industrial activities in the twentieth century, have substantially changed the natural Danubian riverscape. The extent of floodplains has been reduced by nearly 70%, and the integrity of remaining floodplain habitats is further threatened by disconnection due to river engineering works that provide flood control, navigation, and hydropower generation. The studied Danubian segment is situated in the Middle-Danube, Southern Hungary. In this reach, the Danube has a mean annual discharge of 2400 m3 s-1. The average slope is about 5 cm km-1, with 0.8-1.2 m s-1 flow velocity at mean water level. In this segment of the river the banks are relatively natural, interrupted with embanked rip-rap shorelines of ~ 100-1000 m long sections. The floodplains in Southern Hungary are still the largest functioning floodplains in the Middle-Danube together with its transboundary Croatian counterpart. A major part of the floodplain belongs to the Danube-Dráva National Park, which was established in 1997. MERLIN case study number and name: 7b - Middle Danube, Hungary Case study cluster: large transboundary rivers Country: Hungary 

l) Describe the main policy actors, their interests, and decision-making processes (policy context).	The main policies which are relevant on the scalability plans' aspects are the Birds and Habitat Directive, the Water Framework Directive (WFD) and the Flood Directive (FD). The main policy actors are the institutions which are responsible for the implementation of these directives, namely Ministry of Agriculture, Ministry of Interior and on local levels the water management and the national park directorates. Interest of protected area mgm bodies: maintain current conditions where these are adequate and compile restoration projects on own-managed territories; Avoid conflicts with any stakeholders; keep number of stakeholders and discussions with them on the minimum, required level; Interest of WFD responsible bodies: develop the status of water bodies and develop program of measures (structural and non-structural) to reach the better status; to generate available funds for developing and compiling projects for the implementation of the program of measures; Interest of FD responsible bodies: develop the program of measures to keep flood risk on the potential minimum; take all these measures ahead of any other sectors' aspects by maintaining and justifying that the flood risk is extreme big and to manage them is a top priority; generate funds for developing and compiling projects for the implementation of the program of measures; take a priority to grey measures which have impacts on short term (during funding scheme is provided and there is political support); do not implement cross-sectoral approach; The decision making process is fully sectoral, each responsible ministry take into consideration their own aspects and avoid conflicts with others; The available funds are limited and all of them are channelized in sector specific projects. The WFD and FD responsible bodies are in one institution (General Water Mgm Directorate) where the WFD department is weak, the FD department is the strongest, consequently the significant funds are allocated to flood risk management measures, which usually maintain the business as usual, avoid green measures and / or complex solutions.
m) Describe relevant legislative issues, and formal and informal land tenure.	The policy framework doesn't seem necessary to be modified either on national or on EU level, but the harmonization of the implementation of activities to reach the policy targets is necessary and essential. This is a missing element which might also get closer the sectors which are responsible for the policies mentioned in the previous answer and which have significant impact on the rivers' status. The legislative conditions basically are not barriers of develop and implement projects for improving hydromorphological and habitat conditions, although the project proposals which might have risks on the current conditions (e.g. might cause degradation of habitats in long term) usually get the green light and the risks of implementing them is underestimated. The land tenure and land availability were not assessed so far on the whole territory of the scalability plan dimension (Danube downstream Budapest), the reason of it is that this is a huge area and this is a criteria to be considered on concrete project sites. The whole Danube stretch is in the N2000 network and there are sites which are protected or strictly protected, so principally all of them are ready for any kind of restoration actions. The active floodplain is mainly managed by water management directorates, protected area management bodies or publicly owned forestry companies. The rest of the lands are private ones or handled by municipalities.

How the scaling up happens?

n) Describe what kind of collaborative partnerships will be built/what kind of	Two main types of partnership are necessary. The 1st type is a coalition of stakeholders who are ready to act if any threats on Danube appears: e.g. programs or projects appear including

advocacy strategies are needed in the context of this RSP.	infrastructure developments or implementation of grey measures. The number of stakeholders who might be active in it is quite moderate and mainly the NGOs have a role to establish and maintain such a coalition. The stakeholders to be involved in it are mainly NGOs or experts on any field of monitoring. The 2nd type of the partnership is a one which coordinates the work of stakeholders who are / need to be active during the implementation of restoration programs and projects. The first level of this partnership is composed of stakeholders who are already partners is restoration projects, have experience and principally interested in improving the hydromorphological status of Danube and habitats along it. Who are already on board with smaller or bigger engagement. During the 1st steps this partnership needs to be confirmed. The 2nd level of the partnership is the stakeholders who are still not engaged with restoration goals or by their current management scheme threaten them. During the 2nd step these stakeholders need to be invited in the partnership. This is a more difficult step and the level of these stakeholders' involvement should be based on later decisions. The partnerships also have geographical and policy scale. On geographical scale especially local partnerships need to be established and confirmed which are composed of stakeholders who have responsibility and dominant role in concrete restoration projects. These could be relatively small and compact partnerships which not necessarily know about each other and can work independently. On policy scale such partnership needs to be established which can develop and create the horizontal conditions of upscaling restoration. The horizontal level also covers policy, funding, maintenance and not lastly this level needs to provide strong commitment on mainstreaming restoration along Danube and support to generate small-scale local partnerships. For the development and implementation of advocacy strategy a core group of stakeholders need to be gathered in a team. These stakeholders need to have some responsibilities on the most important upscaling elements in order to maintain their motivation. This core group needs to involve experts from time to time. The advocacy strategy needs to tackle rather the horizontal level than the local ones and cover those elements which are identified as weaknesses and threats during a swot analysis. Mainly weaknesses and threats, because this can reach reducing or removing the barriers of mainstreaming restoration. The advocacy strategy needs to also bridge the knowledge gap and lack of experience, and support the dissemination of best practices especially from international examples. (e.g. lessons learnt from the Middle-Danube Austria pilot site)
o) Describe the role and responsibilities of the case study board.	For Liberty island case study it was not set up separately because among the project partners were present all relevant sectors. Buti f there is not possible to involve everyone into a project than a case study board can ensure zhat everyone's aspects are taken into account and it can be ensured that everyone can take part in the decision making. Therefore, it's role would be a professional control and guidance but also taking decisions when there are some critical issues to be solved throughout the case.
p) Describe the role of local community members.	They can ensure that their local knowledge and needs will be integrated into he local projets as much as possible from an early stage. They can have a role as landowners and also in use of public space to maintain project results.
q) Describe the role of monitoring and evaluation systems.	Detailed monitoring of the effects of freshwater restorations is still a rare exception in Hungary. Ideally, this should contain a before-after-control-impact design, which could unequivocally reveal the effects (possible benefits) of restoration. Even if no control sites can be set up, a before-after monitoring system would be a prerequisite

	to evaluate the effectiveness of restoration. Monitoring elements (i.e. indicators) should include both the environmental characteristics of the sites and the structure and functioning of biotic communities. Ideally, a three year before restoration monitoring and at least five to ten year after restoration monitoring scheme should be applied for the reliable evaluation of restoration effects. Key biotic components should contain WFD biota elements (i.e. fish, macroinvertebrates, algae and macrophytes). Depending on the extent of the restoration, monitoring changes in the riparian zone or even larger spatial extent is necessary.
r) Describe what the funding plan is like. Are new financial instruments needed?	The pilot site has practically no funding plan, because the Middle-Danube Hungary site is not an implementation site in project MERLIN. From this reason funding plan will not be developed in the project duration. The whole scalability plan also doesn't have a funding plan at this stage, because at the beginning other pillars of the scalability plan are developed. The SWOT analysis explained thoroughly that a financial instrument should be developed if the results of the pilot site proposed to be mainstreamed in the future. The reasons identified in the SWOT are: • Strengths: The targeted habitats and species are among the priority ones in the EU (Bird and Habitat Directive) and due to that the EU financial instruments, especially the LIFE program provides available sources for restoration activities on them. Other funds can also be reached, e.g. operational program from structural funds. Another available financial resource on the Lower-Hungarian-Danube years ago was the World Bank, when a pilot site of a World Bank funded project was on this river stretch. • Weaknesses: The strengths mentioned above are also reasons of some weaknesses. These funding sources didn't require cost-benefit analysis, or other types of financial sustainability assessments in a detailed manner. The result of it is that once the public fund is available and the projects are donated and the own-contribution is provided, then the lead partner and the project partners are not interested in developing alternative funding opportunities or long term and strong financial viability of the maintenance and post-management of the project results. Due to that the afterlife management of the projects' results from economic point of view don't satisfy some rationale and important aspects. Conclusion: Alternative financial sources need to be identified and funding mechanisms need to be developed. All these need to consider, beside the restoration aspects, the economic criteria relevant on single project sites and the dimension of the whole scalability plan. A jointly developed (see partnership and stakeholders answers) and detailed cost-benefit analysis (CBA) could be among the first steps of the development of financial instruments. The CBA needs to consider the ecosystem services of restored and living rivers as significant elements. The alternative financial instruments need to identify the role of both private and public sectors in mainstreaming the restoration, but it is also probable that a strong political will and engagement would be necessary, since instead of it no CBA can be a proper decision support tool. The financial instruments need to reflect on the interest of the stakeholders who directly or indirectly use the rivers (the water). During the development of any financial schemes it needs to be a principle that no private interest might be overriding and the expectations against natural and environmental conditions of the society, just like the local communities has been changing in the previous decades or compared to the era of the river regulations. The new expectations are also as strong or even stronger that the old ones.

Who scales up?

Describe the main actors, their roles, and responsibilities	
s) who to involve?	
t) who funds?	
u) who implements?	
v) who monitors?	Involvment of scientists working in the academic era is necessary or at water authorities or private environmental companies must be responsible for the proper execution of monitoring and evaluation of restoration effects.

Final thoughts

Overarching question: What prevents effective and large-scale restoration?	
w) Describe the policy barriers that need to be removed and overcome in order to scale up. x) Describe how your scaling-up plan addresses these barriers.	The policy framework doesn't seem necessary to be modified either on national or on EU level, but the harmonization of the implementation of activities to reach the policy targets is necessary and essential. The decision making process is fully sectoral, each responsible ministry takes into consideration their own aspects and avoid conflicts with others; The available funds are limited and all of them are channelized in sector specific projects. The legislative conditions basically are not barriers of develop and implement projects for improving hydromorphological and habitat conditions First of all the scalability plan doesn't only tackle the policy barriers mentioned in the previous points, but try to cover a holistic view. Answers on how: • establishing strong collaborative partnership • to identify motivations of the key stakeholders and select the joint motivation points • to increase public awareness and engagement of communities in order to influence decision making approach • to improve funding mechanisms and involve corporate sector • knowledge sharing and using international experience / best practices

5.3.4 Case study 8 Danube (Romania)

Authors: Iulia Puiu (WWF RO), Albert Scrieciu (GEOECOMAR), Cătălin Anton (WWF RO) and Camelia Ionescu (WWF RO)
GEOECOMAR: Institutul National de Cercetare-Dezvoltare Pentru Geologie si Geoecologie Marina – GEOECOMAR (National Institute for Research and Development of Marine Geology and Geoecology)
WWF RO: Asociatia WWF Romania (WWF Romania)

Background

Global warming has recently been the subject of heightened efforts by countries around the globe to mitigate its effects. Adaptation actions are particularly relevant because they provide certain local communities with protection from the impacts of global warming. Nature and ecosystem services have gained increased importance in implementing viable solutions to climate change than engineering solutions initially used to combat negative impacts.

A large-scale spatial approach and over a sufficiently long period of time can be a correct approach to follow in the context of climate change in order to realize the benefits of nature-based solutions (NbS).

In addition, if wetlands are restored in a multi-contextual approach, carbon sequestration zones might be created as well. Although this approach is clearly more cost-effective, it also contributes to the socio-economic and health well-being of local communities through adaptation to environmental conditions.

Policymakers still face challenges when it comes to restoring riverbeds and wetlands with NbS, but such practices have gained popularity over the last few years. In order to apply NbS more widely and for a longer period of time, there must be heightened awareness and improved technical capacity.

There is a pretty strong case for using these solutions on a large scale based on effective practices at the local level. As a result, regional scale-up over a medium to long period can be an effective solution for mitigating large-scale climate change.

Context

In the past 40 years, 80 percent of the wetlands along the Danube River have disappeared, and industrial growth and unsustainable agricultural practices have seriously damaged the ecosystem. Pollution and changes to the natural course of the river were two of the problems identified. These negatively affected the environment and threatened the organisms living in this habitat, eventually leading to their extinction.

Researchers and scientists, as well as authorities, NGOs, and the general public, have focused a lot of attention on the Danube River in recent years. The Danube river basin covers about 800,000 square kilometers and covers 10% of the continent's surface. In total, 19 countries are located in its territory, making it the most international river basin on earth. It is also home to 81 million people, making it the most populated.

Romanian Danube Floodplain

The Danube Floodplain has always played the role of natural protection against floods caused by flash floods and rapid run-offs, and the decrease in its surface, along with torrential rains caused by climate change, has triggered massive flooding in Europe since 2002. This results in the loss of habitats for many species, the disconnection of ecosystems, and, by extension, the loss of biodiversity. This used to be a source of wealth.

A long-term strategic framework will improve the management of cross-border waters, prevent floods, and maximize biodiversity benefits. It could result in the creation of a network of more stable and species-rich aquatic ecosystems that provide additional benefits to local communities and reduce both the adverse effects of various human activities and extreme weather events.

Therefore, maximizing the scale at which the case studies were conducted is a suitable approach. By using the NbS, a unitary approach on a large scale can help develop a strategic vision that will assist in restoring the ecosystem. This will help reduce flood risks in the entire floodplain. Implicitly, it will mobilize all stakeholders so they can be informed, consulted, and involved in establishing the necessary tools for managing integrated areas.

The up-scaling of the Danube floodplain can mean, first and foremost, the improvement of knowledge about integrated water management among the Danube countries, by restoring floodplain areas, integrating classical and "green" infrastructures, and adopting natural retention measures. All of these activities will be carried out in partnership with all stakeholders. This cooperation is crucial in the planning and sustainable implementation of such projects over the medium and long term. Harmonization of economic activities with the environment, directed flood activities, and ecological reconstruction of former lakes in the Danube Floodplain are among the viable measures to prevent floods in the area. This process would restore the hydrological and ecological balance of the area: rewilding would be beneficial not only from the standpoint of fisheries, but also from the side of nature conservation and ecotourism.

As the bridge links the river and floodplains, reconstruction is essential to reduce major flood risks in inhabited areas. This will benefit the local economy, such as fishing, tourism, and water purification. The current document represents an up-scaling of the entire Danube Floodplain and is called the Regional Scalability Plan (RSP). The scaling process is proposed to be implemented by 2050.

Main questions and aspects to be addressed	
Who is this RSP targeted? Who is meant to read your RSP and use it? If exact target audience is still unclear, define what type of an actor you are targeting.	The process of expanding and scaling up is the process of extending successful policies, programs, or projects over time to reach a larger audience. A regional scalability plan for the Danube Floodplain region is intended to address all stakeholders in the region. However, the current document is especially useful for those who are responsible for developing and implementing sectoral plans and strategies in devolved public institutions. The county councils or local administrations are referred to here as well as the sectoral authorities in the fields of water, agriculture, fish farming, navigation, forests, protected areas, etc. Additionally, this document can serve as a guide for networks in a variety of economic fields.

The scale makes sense for the scaling up

Based on this targeting of a key audience for our RSP, we define the Lower Danube Floodplain, or lower course of the Danube River.

Existing plans, strategies or guides

Floods Management Plans
Basin Management Plans
Danube River Basin Management Plan
Floodplain Evaluation Matrix (FEM) - Danube Floodplain project
Ecological and Economic Resizing Plan of the Danube Floodplain
Protection plans for protected areas on existing Natura 2000 sites in the analyzed area.
National Strategy for Fisheries and Aquaculture
Other sectoral plans andstrategies (agriculture, navigation, etc.)

Fostering the strengths and addressing the weaknesses of our case at a bigger scale and longer timeframe

Strengths:

The restoration project is designed in two stages, taking into account not only the improvement of conservation status but also the benefits of local business (fish farming and other potential businesses), flood risk mitigation, and the needs of local communities (fishing access).
During the intervention, the surrounding areas and other sectors are considered, especially the business processes that have been developed or are being developed. A restoration project is also a measure that could improve the status of a water body in the River Basin Management Plan.
During previous stages of the restoration project, risks in implementation have been identified and mitigation measures have been included. During the ongoing restoration process, similar risks are considered relevant.

Weaknesses:

At this point in time, there has been hardly any analysis of how the economy, society, and ecosystem affect restoration design and scale.
There is a lack of documentation and assessment of synergies and integration between sectors at this point.
Improvements must be made in the interaction with regulators

Further/new opportunities that the longer timeframe and bigger scale allow

Integrated approaches are promoted in European Union-funded projects, the Green Deal, and community public policy pressure

Developing or revising water management plans, flood risk plans, area management plans, and other zonal and regional strategies

The threats, are there some new ones related to longer timeframe and bigger scale
The individual viewpoints of those involved at the local level, without the involvement of other stakeholders. Unisectoral approaches rather than integrated ones
Inability of other sectors (fishery, forestry) to cooperate in identifying and analyzing synergies.
Due to food and energy crises, the positions of key stakeholders could change regarding upscaling the restoration.

What is being scaled up?

a) Describe the vision for what you are scaling up.	The process of ecological reconstruction involves restoring a degraded, damaged, or destroyed ecosystem. The practice may involve restoring degraded lands, rewilding processes in areas affected by extractive activities or pollution, but it may also refer to the reintroduction of certain species or the restoration of some habitats in places where humans have dramatically reduced the size of populations or occupied areas. For over 20 years WWF-Romania has been proposing this solution based on the multiple benefits provided by wetlands, a solution that has been scientifically proven and tested in several parts of the world.
b) Describe what you are scaling up: technologies or techniques, processes, models or tools, and monitoring/evaluation aspects that you will scale up.	
c) Describe the opportunities (in SWOT and optimization strategy) and their relevance regarding the timeline till 2050.	Participation of stakeholders in the development of flood management plans, especially in mitigating the effects of climate change (droughts, floods). The development of a common working framework involving all stakeholders and incorporating, among others, floodplain and zoning considerations, taking floodplain morphology into account Establishing a monitoring system and increasing activities that enhance wellbeing.
d) Describe the applicability of your measure regarding changes in the local and global environmental and socio-economic contexts and the timeline till 2050.	• Growth of the economy requires attracting investment, diversifying business opportunities, and creating new jobs. • Taking advantage of the economic traditions and activities of the past • Increasing the diversity of ecosystems and biodiversity • Increasing resilience to climate change: more space for rivers will reduce flood risks • Benefits to health (clean water, clean air)

Why to scale-up?

e) Describe the main (GD) goals that the scaling-up plan addresses and how you plan to make most of them.	• Biodiversity net gain: There will be an improvement in the state of biodiversity. A development's impact on biodiversity can be mitigated by requiring developers to provide a significant increase in appropriate natural habitats and ecological features over and above those being affected in such a way. As a result of this, it is anticipated that the current loss of biodiversity through development will be halted and ecological networks will be restored. • Climate regulation: Carbon is stored in the landscape and riverine areas due to their high productivity

	• Flood resilience: In the event of a flood, there is a structure that provides flood protection. A basin-level management plan is also available. • Drought resilience: With the enhancements made through the use of NBS, this system will be able to offer better resilience than before • Health & well-being: Regulatory and visual landscapes are expected to improve • Zero pollution goals: The sources of pollution are located in a limited area • Sustainable food systems (F2F): There is increasing evidence and appreciation for the complex interactions between agriculture and food systems. This is in addition to the interconnecting challenges of food insecurity, biodiversity loss, and climate change, which are driving discussions concerning the transformation of these systems at all levels. On a global scale, there may be a consensus on the need for transformation. • Inclusivity: The participation of stakeholders in meetings is greatly enhanced when they are highly engaged • Circular economy: Stakeholders must be involved in the waste management process • Financing the transition: The availability of various funding schemes from a variety of government agencies • Green growth: There has been a substantial shift in the way pond areas are constructed and banks are being restored.
f) Describe additional (GD) goals that have potential for the scaling-up and how you could make the most of them.	
g) Describe the expected benefits in terms of biodiversity and ecosystem services delivery, climate change mitigation and adaptation.	As biodiversity and ecosystem types diversify, so does the ability to adapt to climate change for the benefit of nature.
h) Describe the expected benefits in terms of stakeholder engagement.	
i) Describe the expected benefits in terms of business opportunities.	If we analyze local economic well-being in terms of attracting new investments as well as creating jobs as a result of these investments, it focuses on diversifying business opportunities. A large-scale approach can encourage traditional economic activities and make use of traditions.
j) Describe other benefits that result from the scaling-up.	

Where does the scaling-up take place?

The study area consisted of the floodplain of the lower Danube River in Romania, bounded upstream (west) by the Iron Gates II dam, and downstream (east) by the Danube Delta Biosphere Reserve limits. The floodplain was defined to include all bottomland areas within the morphological floodplain (post glacial terraces) therefore including lands structurally protected by dykes and having potential to be inundated at different water levels. The entire study area covers 760 km of the Danube River, from km 863 where the Iron Gates II is situated to Isaccea at km 103. First a 20 km buffer along this sector of Danube River was delineated in order to include all potentially inundated floodplains then the final study area of the floodplain was delineated using HAR method. Land cover in most of the floodplain is rural residential and agricultural, with extensive areas drained, cleared and irrigated since 1960's. Urban land cover is limited in the floodplain and mostly confined to the cities of Calafat, Corabia, Bechet, Turnu Magurele, Zimnicea, Giurgiu, Oltenita, Calarasi, Braila, Galati. Much of the lower Danube

floodplain area is designated as Natura 200 sites for their importance to assure a favourable conservation status of species and habitats of community importance.

Constrains include a variety of physical and socio-economic factors that may limit restoration options. In most cases, constrains are structures or land uses that have economic or social benefits that outweigh ecological values. That is, where local or regional communities and authorities place greater value on gods and services provided by human infrastructure than on goods and services provided by a healthy river and its biota, the human infrastructure becomes a constrain on restoration. For example, levees that protect high-value arable lands are often more valued than restoration of floodplain habitats and river processes. Those levees are therefore not considered for removal or setback in a restoration plan and their continued existence becomes a constraint on the kinds of restoration actions that are possible.

Understanding these limits is crucial for setting realistic expectations for the outcomes of restoration efforts, as constrains may in some cases preclude achievement of restoration objectives. Constrains identified through this step of Regional Scalability Plan are important since they can influence the selection of final candidate site and the prospective design of restoration actions that match the local restoration potential a proposed objective.

The socio-economic constrains do not limit potential biological and/or replenish outcomes in the same way that infrastructure constrains do, but they do limit the rate at which restoration can occur and ultimately how many restoration actions will be implemented. Capacity allocated for this study didn't make possible a throughout evaluation of socio-economic constrains, however where such constrain exist, they limit the peace and magnitude of restoration and a transparent process for prioritizing restoration becomes more important, where sufficient time and stakeholders' engagement strategies are a must.

The following information was considered for this step to identify as much as possible known existing constrains and opportunities for wetland restoration and based on the availability of the following data:

- Flood potential – areas of the floodplain lands inundated at a specific height above the river (HAR) that generate an inundation with at least 50 cm of water above the surface.
- Block size - area of sites with high or medium-high potential for restoration was calculated for each river reach. An evaluation of alternatives to expand the block size of different categories of potential restoration sites so that larger non-structural solutions can be created (e.g., appropriateness of adjacent land use) was also hypothesized.
- Land parcel and ownership - private or state-owned lands (where information is available and including existing concessions) and appreciation of land fragmentation was compiled for each potential restoration site by consulting the information available on the website of the National Agency for Payment in Agriculture. We use parcel fragmentation as a rough guess of the potential number of owners that could be affected by the proposed restoration and, consider it as a potential constrain to hinder wetland restoration.
- Archaeological sites - the existence of sites of cultural interest can block and/or delay the implementation of wetland restoration. Consulting the Romanian Archaeological Repertoire (RAR) database of cultural artefacts (http://map.cimec.ro) can give a glimpse of the presence of archaeological sites for every reach, which can delay or hinder restoration objectives.
- Local infrastructure - e.g., dirt/unpaved road to access to lands, bridges, buildings, channels, dykes (other than protection dykes along the Danube), electric lines, etc. that are not already included in the potential restrictions were assessed as an indication of difficulties to wetland restoration implementation. Although some channels used for drainage or irrigation can favour restoration opportunities through reconnection at different flood stages or water sources (e.g. reservoirs). The presence of dykes raises concerns due to their scope and ownership and can favour or constrain restoration. Therefore, through this desktop assessment of local infrastructure we only aim at pointing out of their presence and where evidence exists to suggest potential constrains and opportunities of the most relevant ones.
- Flood Hazard Maps – the data can be consulted to depict the flood extent for three scenarios of flooding risks and hazards for 10%, 1% and 0,1% of probability of occurrence. This information can be used to evaluate presence of high-risk industrial establishments in the floodplain that can block wetland restoration.
- Conservation status – the presence of protected areas in each river reach is presented as an opportunity to wetland restoration.
- Stakeholder input – areas where stakeholders are supporting/opposing wetland restoration are evaluated based on previous studies/reports and considered as either opportunities or constrains to restoration initiatives.
- Restoration opportunities – potential restoration areas identified in existing studies/reports could support further wetland project implementation. Potential restoration approaches are also put forward considering the available information and site visit where possible.

How the scaling up happens?

To be implemented in an effective way, Regional Scalling Plan process will follow the next steps:
1. A suitable time horizon and the appropriate scale of intervention need to be determined up front.
2. Establish suitable scaling pathways by identifying the drivers and spaces for scaling up, as well as the associated costs.
3. Scaling up requires an understanding of the institutional, organizational, and policy contexts.
4. The scaling up process must be defined in relation to partners who can assist or take over the process.
5. Determine which operational instruments (loans, grants, technical assistance, policy dialogue, etc.) will be most appropriate for scaling up.
6. Analyze the pilot project and scaling up process in terms of suitability and impact on the communities.

Who scales up?

Describe the main actors, their roles, and responsibilities	
k) who to involve?	A restoration plan for the Danube Floodplain at scale-up is a challenge both due to its spatial dimensions and to its long-term time frame. Generally, regional authorities and local authorities are responsible for implementation, while institutions with sectoral responsibilities also play a role.
l) who funds?	Due to the fact that the budgets of the authorities are formulated annually, it is challenging to finance the implementation of such a plan. A long-term commitment is necessary for the proper implementation of the RSP.
m) who implements?	See above.
n) who monitors?	As the scaling process progresses, new elements may appear that can interfere with its progress. Monitoring the implementation of the plan is also crucial. In light of that, this plan needs to be reviewed every five years.

Final thoughts

Overarching question: What prevents effective and large-scale restoration?	
o) Describe the policy barriers that need to be removed and overcome in order to scale up. p) Describe how your scaling-up plan addresses these barriers.	Despite the negative impacts of human intervention, especially embankments and land restoration for agriculture, forestry, and aquaculture, the Danube floodplain in Romania continues to offer restoration opportunities. It is possible to identify and prioritize these opportunities at the micro level by using a tool that incorporates various criteria and uses the available data in order to maximize them. This can be applied to analyze and prioritize existing experiences. This Regional Scalability Plan of the Danube floodplain supports the further planning and development of the selected restoration sites by introducing this approach. For floodplain management, it offers the possibility of including more accurate and up-to-date data (e.g. hydrology, land use) and other variables of interest for water quality management or stakeholder preferences for restoration results. Through the activities of involvement and consultation of the public, the analysis of the opportunities for the restoration of the Danube floodplain represents a tool for the development of planning policies that support additional investments in restoration and increase confidence in such efforts. An innovative and perceived approach must be incorporated into the Regional Scalability Plan in order to offer stakeholders a relative advantage over existing sectoral planning. Stakeholders are generally looking for solutions that can be tested on an experimental or

	limited basis and that are compatible with existing practices. Through innovation and collaboration, we believe we can achieve observable and clearly stated results in a short timeframe. The challenge in implementing this document is at the level of decision-makers who have the time and capabilities to implement such projects but find it difficult to reach a consensus within their own organization on the most effective approach to land restoration. Floodplain restoration must, therefore, be addressed systematically in the same way as flood management and water management, for example.

5.3.5 Case study 9 Tisza (Hungary)

Author: Péter Kajner (WWF HU)
WWF HU: WWF Vilag Termeszeti Alap Magyarorszag Alapitvany (WWF Hungary)

Main questions and aspects to be addressed	
Who is this RSP targeted? Who is meant to read your RSP and use it? If exact target audience is still unclear, define what type of an actor you are targeting.	This RSP is prepared for several target groups: 1. The primary users are local / regional NGOs that are open to plan and implement environmentally sound agricultural and sustainable rural development models in the Tisza River Basin in Hungary, with a particular focus on Nature Based Water Retention Measures (NWRM) and biodiversity enhancement in their areas of operation or would help to disseminate them (Upper Tisza Valley Rural Development Association, Foundation for Nagykörű, E-Misszió Association,...). 2. National-level NGOs or networks with similar objectives, such as Hungarian Agroecology Network or the Choose the Water Network will also strengthen this cooperation. In the short term (5 years), it is mainly the planned network of such local, regional, national organisations, that could be able to start replicating the development model of our case study in other areas along the Tisza, with regard to ecological, social and economic sustainability, and the active involvement of local societies. Such a network can build up a critical mass that would force higher levels of decision-making to develop a favourable legislative, administrative and subsidies framework, which could facilitate a change on the Tisza River Basin level. 3. Research workshops investigating the possibilities, benefits and feasibility of NWRM on a theoretical or practical level (Budapest University of Technology and Economics Department of Sanitary and Environmental Engineering, Hungarian University of Agriculture and Life Sciences – MATE, Regional Centre for Energy Policy Research,...). 4. The next level of users is represented by public organisations, which are key actors in water, ecological, social and economic development based on NWRM at the territorial level. These include the 3 water directorates on the Tisza region, 6 national park directorates, municipal and county governments, and local departments of the National Chamber of Agriculture in the Tisza River Basin in Hungary. 5. The top level of users are the national decision-makers, in particular National Chamber of Agriculture, General Directorate of Water Management and the ministries responsible for water, and agriculture. It is essential, however, that it is clear to the government that the sustainable development of the Tisza River Basin and Eastern Hungary is a whole-of-government responsibility and not a matter for individual ministries. 6. In the future, at least an inter-ministerial committee or even a separate state agency should be set up for the complex development of the Tisza River Basin. This should be able to coordinate government work for sustainable development, but should also provide as much opportunity as possible for local stakeholders to be involved in the planning and implementation of territorial interventions. Such an agency does not exist today, but if it did, it would be the primary target group for our RSP.

What is being scaled up?

a) Describe the vision for what you are scaling up.	WWF Hungary's Tisza 21 Strategy focuses on the lowlands of the Hungarian part of the Tisza River Basin. Today the Tisza runs between flood protection dikes and has no connection with most of its former floodplains. However, there are at least 150,000 ha of deep floodplains (active and morphological floodplains), which could be safely reconnected to the river and used for floodplain farming by relatively cheap solutions.

	Our long term goal is to preserve and develop the natural floodplains / river ecosystem along the Tisza River. Our target is that water retention based, nature friendly, sustainable floodplain management system is introduced in the Hungarian part of the Tisza River Water basin, wherever possible, but at least on 150,000 ha, in order to improve biodiversity and provide benefits for local communities. If the vision is realised, measurable outcomes will include: improved habitat condition and the creation of new semi-natural habitats: grasslands, forests, wetlands. The sustainable use of local natural resources will play a greater role in the livelihoods of people in the region and living standards will improve. Damage from climate change, inappropriate land use and water management will be reduced. Overall, the long-term impact will be to improve the ecological status of the Tisza Region, the livelihoods of its inhabitants and increase their resilience to climate change.
b) Describe what you are scaling up: technologies or techniques, processes, models or tools, and monitoring/evaluation aspects that you will scale up.	On the former floodplains of the Tisza river, one of the basic problems is that the structure of today's agriculture (mainly the area based Common Agricultural Policy payments, the technical and market environment) encourage intensive agriculture to use as much land for cash crop production as possible, regardless the natural conditions for agriculture or geographical and hydrological status. Though, retaining water at several areas could improve the local microclimate and benefit the whole landscape, farmers do not retain water on their lands, because that would decrease their incomes. Instead, water is drained via channels into the streams and river Tisza and the landscape is dried out. Hence, there is no space for water retention outside the flood protection dikes. Although, the Tisza could provide the lowlands with water transported here from the mountains, this opportunity is not used now. The water management system focuses on draining the waters away as quickly as possible. Neither the water management, nor the agriculture, nor the nature conservation sector can change the situation alone. There should be an attractive economic alternative to motivate farmers for changing to floodplain farming after restoration or reconnection of former floodplains to the river. In our pilot areas, we are working with local communities (especially farmers) to develop workable land use models that build on the traditions of floodplain farming that were prevalent in large areas of the Tisza region before river regulation. The model includes exploring technical solutions for water discharge to floodplains; inland water retention; profitable agricultural production adapted to water retention; short retail chains. The necessary CAP subsidies are proposed, as well as forms of community cooperation, stakeholder involvement and governance solutions to enable sustainable landscape uses.
c) Describe the opportunities (in SWOT and optimization strategy) and their relevance regarding the timeline till 2050.	Climate change and drying of landscapes make more land users realize problems and understand the significance of water in landscapes. It is clear for many of the stakeholders that the lack of water, heat waves, droughts cause losses in local ecosystems and for farming. The new CAP period from 2023 offers new types of incentives. Green growth can partly be financed by EU subsidies. Several higher level leaders (at water authorities, agricultural decision makers, county level leaders) seem to understand the connection between the condition of the landscape and human wellbeing. Climate change, soil degradation due to intensive agriculture, biodiversity loss are persistent trends and they are also undermining the financial efficiency of environmentally destructive farming. We expect that the combination of the deteriorating environmental conditions and the success of the pilot projects will be able to convince a critical mass of local stakeholders and competent

	decision-makers that NWRM methods are economically effective in adapting to climate change, and thus trigger a profound structural change in agriculture, rural development and water management. The expected harms of inaction are much greater than the potential adverse side effects of interventions (e.g. habitat drying is much more damaging than the expected damage to some current habitats from flooding; agricultural yield increase is higher than the production in the area 'lost' due flooding etc.). Our project goals fit EU Biodiversity Strategy and national biodiversity goals too. Our case study projects focus on success in economic, social and ecological terms at the same time and sustainability. Restoring habitats is directly linked to more environmentally friendly land uses and farming, and does not serve conservation purposes alone. Interactions between economy, society and ecosystems were revealed by former studies and the practice of stakeholders. Many local farmers have already understood the significance of water retention, vapour and microclimate in increasing yields, avoiding damages. Drought causes more losses on national level than floods. It is becoming clear that irrigation is not a viable solution to mitigate droughts. People turned to domestic tourism during and after the COVID, healthy local food, remote rural areas are becoming more popular. Uncertainty in the world is driving more people to buy their food from reliable sources. Farmers may try to build more on NbS because of input supply difficulties. Some local actors may be driven towards alternative sources of finance because of the more difficult availability of subsidies or market sources.
d) Describe the applicability of your measure regarding changes in the local and global environmental and socio-economic contexts and the timeline till 2050.	Intensive agriculture dominates the landscapes of the Tisza Region, mostly producing grain, maize, oil seeds and fibre crops. However, agriculture provides a living for less and less people. The Eastern part of Hungary, including the Tisza Region has to cope with poverty, ageing population in most villages, outward migration from rural areas and concentration of land ownership. Several global and national trends that are expected to remain with us until 2050 also pose challenges. These are partly threats and partly opportunities. Key sectors for our vision are agriculture, forestry, fisheries, hunting, nature conservation, water management, spatial planning (closely linked to industrial policy). Scenario analyses are needed to assess their impact on the vision we want to pursue: • Hungary's population is ageing and declining: by 2050, the population is expected to fall by a further 6% to 8.8 million • A declining population does not automatically mean improved environmental conditions. Even with a declining population, biodiversity in Hungary has deteriorated over the past 30 years • Rural areas, and especially the deprived eastern part of the country, are being depopulated at an accelerating rate, with a shrinking workforce • Agriculture is an attractive job for few young people and there is no replacement for ageing farmers • The impact of the expected increase in migration is questionable: an increasing share of lower-paid jobs is expected to be filled by immigrants • Increasingly, precision agriculture (artificial intelligence, self-driving machines, drones) could displace human knowledge that interacts with the landscape • Increasing share of artificial surfaces taken out of cultivation (urban, industrial areas, roads) • Global supply chains are becoming fragmented, forcing nations to become more economically self-sufficient

	• Climate change and the biodiversity collapse is at a tipping point: if we go through it, changes may follow that today's models may not predict (e.g. extreme cooling instead of a warmer and drier climate in Hungary) • Dwindling resources and increasing consumption, coupled with geopolitical instability, threaten to lead to more and more military conflicts, which threaten peaceful development

Why to scale-up?

e) Describe the main (GD) goals that the scaling-up plan addresses and how you plan to make most of them.	• Biodiversity net gain: The condition of natural habitats in the Tisza Basin is deteriorating and the main causes are water scarcity and intensive agriculture, which is reducing habitats to smaller and smaller areas. We are designing and implementing profitable land use models that will allow more water to enter the landscape, which will improve the biodiversity of habitats linked to agriculture and the condition of protected natural habitats. • Climate regulation: The extent of intensively cultivated arable land will decrease, and so will the amount of carbon released by regular ploughing. New wetlands and forests can absorb more carbon. By retaining water, increasing biodiversity and restoring small water bodies, the 'sponge effect' can be enhanced and the local impact of climatic extremes reduced. Restoring soil condition improves its capacity to absorb carbon and hold water. • Flood resilience: Climate change in Hungary is projected to bring mainly decreasing precipitation, longer dry spells and occasional extreme precipitation, according to models. However, extreme floods may also occur. Since the early 2000s, emergency reservoirs have been built at high cost in several locations along the Tisza to absorb extreme floods. The near-natural model of water retention and landscape use that we want to implement by 2050 would create smaller reservoir areas at lower cost, better adapted to the landscape. This would not only improve the water supply to landscapes, but also make flood control more cost-effective, i.e. create multifunctional systems. • Drought resilience: We develop farming and land use models that make large areas suitable for water retention. This will allow greater amounts of water to be stored on the surface and in the soil from rainfall surpluses, internal runoff and flooding in landscapes, reducing the devastating effects of droughts. • Health and wellbeing: By retaining water and increasing biodiversity, we create more and better quality habitats. We want to showcase some of these through the development of ecotourism. Based on the theory of biophilia, we can say that people's mental and physical well-being is enhanced by proximity to nature. Thus, allowing more people to recreate in near-natural environments will also increase well-being. But even greater benefits can come from increasing the resilience of affected communities to climate change (especially heat waves and droughts) by retaining water and increasing biodiversity. This also directly improves human well-being. • Sustainable food systems (F2F): The floodplain farming model diversifies the structure of agricultural production, thereby improving food security in several ways. First, it shifts farmers away from monoculture cash-crop production towards a more diversified farming structure, building short supply chains that diversify farmers' incomes. Water retention, environmentally friendly farming increases climate resilience, reduces

	dependence on fossil resources. Environmentally friendly farming produces healthier, better quality products, thus improving food quality and indirectly the health of consumers.
f) Describe additional (GD) goals that have potential for the scaling-up and how you could make the most of them.	• Inclusivity: The transformation of land use is being done in a participatory way. Building floodplain management based on water retention at the landscape level requires cooperation between land users, because water knows no parcel boundaries. We can optimise landscape use if as many people as possible work together. Our model therefore brings a new approach to participatory water and land use planning and economic development. • Circular economy: The model strengthens the circular economy by retaining and infiltrating water, thus improving the functioning of small water cycles. It delivers water to the landscape primarily by gravity, by nature-based solutions, rather than through costly, fossil energy-intensive irrigation that damages groundwater aquifers. The use of extensive farming methods reduces the water footprint of agricultural production. • Financing the transition: While transforming water management infrastructure and encouraging farmers to move towards water retention-based farming practices will require public funding, we also aim to attract significant private capital. Farmers (especially young ones) may be open to investing in new, environmentally friendly production methods that open up new markets for them. By switching to extensive farming, a farmer can save money by reducing the use of expensive fossil and other industrial inputs. Innovative use of the landscape opens up opportunities for innovatve bankable solutions. For example, increasing climate resilience reduces weather-related damage, which may attract the attention of insurers and integrators. • Green growth: Extensive land use requires more human labour. Recruiting the right workforce in ageing and depopulated areas is a challenge. The aim is therefore to ensure that landscape management based on water retention not only creates jobs in agriculture, but also opens up new opportunities in other sectors such as local processing, marketing and tourism through diversification and the development of short supply chains. Economic development should also be combined with other rural development interventions to improve the quality of life and encourage young people to stay in the area.

g) Describe the expected benefits in terms of biodiversity and ecosystem services delivery, climate change mitigation and adaptation.	In line with our Monitoring Plan, we expect the following indicators to improve in the sample areas and, in the longer term, in the Tisza River Basin as a whole:
	• Biodiversity net gain:
	  ○ Improve conservation status of HD Annex I listed habitats including wetland and freshwater habitats, focusing on selected indicator species
	  ○ Improve conservation status of HD Annex II and Annex IV listed species including wetland and freshwater species, focusing on selected indicator species
	  ○ Improve conservation status of Annex I listed species in the Birds Directive, focusing on selected indicator species
	  ○ Increase the area of floodplain re-connected to river (ha)
	• Climate regulation
	  ○ Greenhouse gas emissions reduced / carbon sinks increased
	  ○ Modelled for floodplain wetlands using overall extent of wetland-type soils in the study area; pre- and post-intervention land cover on wetland-type soils; pre- and post-intervention condition of areas under wetland vegetation; changes in water table depth within wetland

	soils and area, duration and depth of surface water where it occurs
	• Flood resilience
	  ○ Increase of the area of rewetted wetlands, other than peatlands (ha)
	  ○ Increase of the area of restored rivers and streams (ha)
	  ○ Increase in the volume of channel retention gained as a result of restoration (m3)
	  ○ Increase of the area of developed wetland buffer zones
	  ○ Increase of the storage capacity (m3) of restored rivers and streams
	  ○ Increase of the storage capacity (m3) of wetlands
	• Drought resilience
	  ○ Increase of the area of rewetted wetlands, other than peatlands (ha)
	  ○ Increase of the area of agricultural lands with applied schemes for water retention (ha)
	  ○ Increase of the storage capacity (m3) of restored rivers and streams
	  ○ Increase of the storage capacity (m3) of wetlands
	• Health and wellbeing
	  ○ Increase of the length of active travel routes within or connected to the restoration area (km of routes per km2 of restoration scheme)
	• Sustainable food systems (F2F)
	  ○ Change of the land cover: reduction of intensively farmed arable land, and increase in areas used according to environmental conditions (e.g. grasslands, wetlands, forests)
	  ▪ Land cover (ha per type, e.g. Grass)
	  ▪ Land use (ha per type, e.g. Pasture) primary intended use and any secondary uses
	  ▪ Land tenure (public vs. private land) (ha for each type)

h) Describe the expected benefits in terms of stakeholder engagement.	Local communities must play a key role in changing land use, transforming water management and land use, and using local resources sustainably. This should be achieved through participatory planning methods and broad social involvement. In line with our Monitoring Plan, we expect the following indicators to improve in the sample areas and, in the longer term, in the Tisza River Basin as a whole:
	• Inclusivity
	  ○ Level 1 – Public Access to Environmental Information
	  ▪ Presence of project website, social media, specific app
	  ▪ Number of visitors to website, social media, specific app
	  ○ Level 2 - Public Consultation – Including or additional to the Case Study Board
	  ▪ Information sessions about the site/project
	  ▪ Public consultation processes held
	  ▪ Number of participants in information sessions about the project
	  ○ Level 3 - Public Active Involvement
	  ▪ Ability to join a formal stakeholder forum/board/working group
	  ▪ Surveys to measure representation within engagement and impact of the engagement

i) Describe the expected benefits in terms of business opportunities.	In line with our Monitoring Plan, we expect the following indicators to improve in the sample areas and, in the longer term, in the Tisza River Basin as a whole:
	• Circular economy
	  ○ Water capture (infiltration rate, rainfall storage capacity)
	• Green growth
	  ○ Number of jobs created

	○ Nature conservation area accessible to visitors (unit: ha) ○ Number of people visiting an area • Flood protection and other hydrological ecosystem services ○ Hectares of flood retention zone created ○ Grazing in the wetland (number of cattle or horses, use of animals, where possible expressed as Turn-over, Net and Gross Value added generated)
j) Describe other benefits that result from the scaling-up.	The transition to water retention and the necessary landscape management will require very significant public investment. However, we also rely on funding from land users and investors, as the new type of diverse landscape use will also open up new business opportunities. In line with our Monitoring Plan, we expect the following indicators to improve in the sample areas and, in the longer term, in the Tisza River Basin as a whole: • Financing the transition ○ Breakdown of the total restoration budget by funding source and type [%] ○ Private finance mobilised [€/year] ○ In-kind contributions [€/year]

Where does the scaling-up take place?

k) Describe the catchment/landscape area (bio-physical context).	The Tisza River Basin is the largest sub-basin of the Danube catchment (157,186 km2) and connects five countries: Romania, Ukraine, Slovakia, Hungary and Serbia. Hungary has the second largest area of the Tisza Basin that covers almost 30% of the catchment. Most of the Tisza River Basin in Hungary (46,380 km2) is typically low-lying, flat area with intensive agriculture production and where 3.9 million inhabitants live. Some parts of the basin have rich biodiversity with unique species, like mayfly. There are 305 protected areas, covering 19,000 km2 in the Hungarian part of the Tisza River Basin. The Eastern part of Hungary, including the Tisza Region has a relatively weak economy and a lot of social problems. Before the river regulation and draining works in the 19th – 20th centuries, two thirds of the Pannonian Plain was a floodplain, periodically inundated by the Tisza and its tributaries. People used this opportunity by floodplain farming. They cleaned natural “side-channels” of the river so that the river could flood deeper lying areas of the floodplain. People helped the main river to connect the parts of the floodplain (tributaries, streamlets, lakes, inundated areas) into one single system. Lakes and other wetlands were used for fishing, reed management and the collection of other aquatic plants and animals. The inundation of pastures, meadows and orchards meant natural irrigation for them, increasing the yields. Arable farming was possible in the higher-lying areas, which were rarely or never covered by water. Flooding of a larger area has made the watercourse of the rivers more even, reducing the maximum water level of floods. Floods compensated the Pannonian Plain for the lack of rainfall, improved the local climate of the area and made it possible to sustainably use the floodplain. River regulation in the 19th and 20th century changed profoundly the life of Tisza. The total length of the river was shortened by approximately 30%, from 1400 km to 966 km. Now the river runs between flood protection dikes and lost the connection with most of its former floodplains. The narrowing of the floodplain brought increasing levels and higher risks of floods, which is becoming worse as the floodplain between the dykes is being filled up with sedimentation. The biodiversity has radically decreased, including a radical decrease of the fish population. Key habitats – like marshes, wet meadows, floodplains and gallery forests – lost more than 90% of their area since 1780. Inland excess water outside the dikes

	causes damages to agriculture. The Pannonian Plain is particularly affected by droughts. The Danube-Tisza Interfluve has already become a semi-desert. Biodiversity is threatened mostly by the lack of water, intensive agriculture, invasive species and harmful water management practices (e.g. clear cutting forests in the floodplains). Biodiversity loss and the growing presence of invasive species mean serious problems. Although, the Tisza could provide the lowlands with water transported here from the mountains, this opportunity is not used now. The water management system focuses on draining the waters away as quickly as possible. Six large reservoirs were built in the Further Development of Vásárhelyi's Programme (started by the Hungarian Government in 2001) to decrease flood risk. These are not suitable to decrease drought risk by water retention, because they can only be opened in case of severe flood risks (extreme floods). No regular flooding of them are in the operation plans and nature friendly land use is not generated by them. Nevertheless, irrigation is neither a response for most of the farmers, as only several per cents of croplands can be irrigated. For most of the farmers this solution is just not economical. Hungary is affected by three different climatic influences: continental, Mediterranean and oceanic. The oceanic climate in the west, the dry continental climate in the northeast and the Mediterranean climate in the south are the main influences, which is why Hungary is located in the buffer zone of 3 climate types. This makes modelling the expected impacts of climate change a very difficult task. Research suggests that climate change will exacerbate the damage caused by drought and extreme weather events. The distribution of precipitation is shifting from the spring and early summer precipitation maxima to a wetter winter. Due to climate change and river regulation, water levels and quantities in the river Tisza decrease. The frequency and severity of weather extremes will increase in the Pannonian Plain. Longer and more intense droughts, heatwaves and more extreme floods are projected for the area. Hungary is one of the most vulnerable countries to climate change in Europe. In case no change is made to land use and water management practices, biodiversity will further decrease, the social and economic situation will become worse in the project area.
l) Describe the main policy actors, their interests, and decision-making processes (policy context).	As a key part of realising our vision is to make space in the landscape for water retention, a central question is who uses the land, who are the game changers. In the Pannonian Plain, which makes up the largest part of the Tisza catchment in Hungary, the biggest land user is intensive agriculture, mainly arable farming. Intensive agriculture produces mostly grain, maize, oil seeds and fibre crops. However, agriculture provides a living for less and less people. The Eastern part of Hungary, including the Tisza Region has to cope with poverty, ageing population in most villages, outward migration from rural areas and concentration of land ownership. Climate change-related drying and increasing frequency of weather extremes as trends are evident to an increasing number of the public, farmers and policy makers. However, adaptation to climate change is now being driven by short-term, individual approaches, leading to accelerating depletion of resources (e.g. drilling new or deeper wells, overuse of groundwater aquifers). Decision-makers tend to serve these short-term voter and farmer demands (e.g. by making it easier to obtain permits to drill wells). The government subsidises irrigation (albeit with not very significant amounts) and turns a blind eye to the increasing rate of illegal water abstraction, plans huge water-intensive industrial projects in areas of water scarcity (e.g. giant battery factories), but has no programme for water retention and the necessary land-use change. Many decision makers push irrigation and dams on rivers, rather than Nature based Water Retention Measures (NWRM).

	The big players that dominate agriculture mainly lobby the government through the Chamber of Agriculture, and their main objective seems to be to maintain the status quo, to provide irrigation water to arable crops where possible. The key sectors for achieving our vision are therefore water management, agriculture, forestry, fishery, municipalities, government, local NGOs. Large farmers, agricultural companies have a dominant voice in local land use. Though, small farmers have little power in interest representation, even one small farmer may block NWRM in a basin. Water management is centralized and has a hierarchic stucture, with the Ministry of the Interior on top. Water management is focused on draining the waters as quickly as possible, but has no good answers for droughts. However, a slow change has already started in the water management sector (eg. building reservoirs, widening floodways), what may allow NbS to be included in flood risk management. As the water department is often blamed for draining water, there has been increasing communication recently about how water is being held back in canals and reservoirs. Water retention and introducing a modern way of floodplain farming along the Hungarian part of the Tisza River Basin could provide complex solutions for the interrelated issues: floods, inland waters, drought and economic, social problems. There should be an attractive economic alternative to motivate farmers for changing to floodplain farming after restoration or reconnection of former floodplains to the river. As agriculture is one of the most important sectors in the Tisza Region, sustainable land use patterns and the development of local economies could provide chances to break out of vicious social and economic circles while improving the biodiversity and landscape. However, today's land ownership (land concentration) and use patterns (>300-500 ha), water management systems (channelling of rivers and draining of lands) are obstacles for using the opportunities. The present political structure is rather centralised and leaves little space for bottom-up and NGO initiatives in Hungary. The Hungarian government often criticizes progressive, green EU initiatives like the Biodiversity Strategy, so many of the EU level opportunities can not be used on a local level. Sectoral short term interests often counteract each other and the long term considerations (agriculture vs. nature conservation, large farmers vs. small ones, irrigation vs. water retention, flood protection vs. water retention etc.). For these reasons, we will focus on implementing successful NWRM-based model projects in specific landscapes as a first step in the landscape, but in parallel we will also lobby intensively to change the policy and CAP subsidies framework in a positive direction.
m) Describe relevant legislative issues, and formal and informal land tenure.	The fundamental problem in water management is that the main objective of the water management system (which has been gradually developed since the mid-19th century) is to protect as much land as possible from the damage caused by water surplus. Technical installations and legislation are designed to ensure that floods and inland waters are drained as quickly as possible. If 99 farmers in an area request water retention, but only 1 complains about it, the water authority will divert the water from the area, otherwise it can be sued. The system is barely able to protect against water scarcity: only 2% of agricultural land can be irrigated. Water management is centralised and local communities have minimal say in the operation of the water system. The area based Common Agricultural Policy payments used to encourage intensive agriculture to use as much land for cash crop production as possible, regardless the natural conditions for

	agriculture or geographical and hydrological status. Though, retaining water at several areas could improve the local microclimate and benefit the whole landscape, farmers did not retain water on their lands, because that would decrease their incomes. Instead, water is drained via channels into the streams and river Tisza and the landscape is dried out. Hence, there is no space for water retention outside the flood protection dikes. This will change somewhat from 2023: farmers will not lose payments for waterlogged areas, but there are still insufficient incentives to encourage large-scale changes in land use and to adapt farming practices to environmental conditions. There is a need to maintain this direction of change in the legislation and support system that encourages farmers to retain water. A targeted CAP subsidy system is necessary for NbS and NWRM to make land users these alternatives realistic and incentivize land use change. In this project we initiated a research that will help to understand farmers' motivations and based on that proposals will be elaborated for better targeted subsidies. We will lobby to ensure that these proposals are incorporated into the Hungarian CAP measures. The food economy is underdeveloped and livestock production has declined over the past 30 years. Hungarian agriculture mainly exports raw materials from arable production. There is a lack of markets and economic verticals to make environmentally friendly, small-scale landscape farming profitable. The war in Ukraine, extreme drought and the rising food-security crisis tend make cash crop production more profitable and that may hinder land use change. Land ownership is dominated by large farmers, but with a large number of small farms. Lands are mostly private owned. The land use structure and land use rights are fragmented, and the lack of local community decision mechanisms in land use hinder water retention measures and setting priorities. The culture of genuine participation in public administration processes and in local communities in Hungary is rather weak. To reach success in sustainable ladscape management, a strong collaboration would be necessary between local economic actors, but the culture of collaboration is weak.

How the scaling up happens?

n) Describe what kind of collaborative partnerships will be built/what kind of advocacy strategies are needed in the context of this RSP.	Our long term goal is to preserve and develop the natural floodplains / river ecosystem along the Tisza River. Our target is that water retention based, nature friendly, sustainable floodplain management system is introduced in the Hungarian part of the Tisza River Water basin, wherever possible, but at least on 150,000 ha, in order to improve biodiversity and provide benefits for local communities. A complex paradigm shift would be needed to improve the environmental, social and economic situation in the Tisza region, but this cannot be done in a single step. The theory of change is the following: 1. Implement successful, local, pilot projects in landscapes, where the retention of inland water, the reconnection of floodplains to the river, benefits land users and local communities and helps to reduce the damage of climate change. 2. The success of these examples will convince farmers and decision-makers in other landscapes with water retention potential to adopt such solutions. 3. Changing the technical, legal and support framework conditions is a government responsibility. In order to force the necessary large-scale government action, economic and social actors that build on

	and benefit from the new type of NWRM must become a critical mass. 4. It is the will of key economic players and voters that will force the government to turn around water management, land use, agriculture and rural development. The central element of our vision, the sustainable development of the Tisza Plain based on water retention, must be made a strategic objective. To achieve this, it is necessary to implement legislative reforms, reform the subsidy system and launch major investments in infrastructure. This requires the establishment of an inter-ministerial committee or government commission. The major work on the regulation of the Tisza has taken almost a century (in fact, it is still not complete because of the constant need for new developments). On this basis, the development of a new system based on water retention will be a task of many decades. WWF Hungary will act as the initiator and catalyst of this process. We will involve a growing range of actors, as described in section 'Who is this RSP targeted'. Therefore, these are the main tools in the upscaling process: • Engage, influence and advice national, regional, and local level key actors so that they take active role in promoting the scaling-up. o Building effective communication strategy o Organizing events for target communities o Advocacy/Lobbying o Public communication through traditional and social media o Providing evidence (e.g., economic modelling, monitoring results) of the benefits of the scaling-up The 'champions' will be primarily those successful farmers and local communities that will be able to manage water retention locally and realise economic or social benefits. Widely demonstrated success is the best means to get more communities to adopt NWRM and to build the critical mass that will persuade the top levels of decision making, the game changers, to change strategic frameworks. • Collaboration: forming of strategic partnerships with different stakeholders: o Local / regional NGOs that are open to plan and implement environmentally sound agricultural and sustainable rural development models in the Tisza River Basin in Hungary o National-level NGOs or networks with similar objectives o Research workshops investigating the possibilities, benefits and feasibility of NWRM on a theoretical or practical level o Public organisations, which are key actors in water, ecological, social and economic development based on NWRM at the territorial level We will also disseminate successful solutions through self-developed training tools, expert advice, and through official channels (e.g. the Chamber of Agriculture expert advice).
o) Describe the role and responsibilities of the case study board.	The Case Study Board in the MERLIN Project was established to ensure the active participation of local people in the landscape rehabilitation project in the Bereg pilot area. Similar ones will have to be established for other local landscape rehabilitation projects. A network of these could be linked together to form an advocacy group that could become a lobby organisation for NWRM over time and help bring about structural change at the level of big policy.
p) Describe the role of local community members.	Farmers, the regional administration of agriculture, water management and municipalities have a key role to play in shaping land use. Land use change can only be successful as a result of joint planning with them. They can represent local interests to higher levels of decision-making. Local civil society organisations and the population are also important actors, as they can articulate their expectations of the

	landscape, but their participation in planning and implementation is also important for the channeling of cultural traditions and local self-determination. The role of entrepreneurs in other sectors (mainly food, trade) is indispensable in building successful short supply chains and developing the local economy.
q) Describe the role of monitoring and evaluation systems.	One of the keys to the success of upscaling is to continuously measure, document and communicate the ecological, economic and social results of spatial interventions and land use change. This will be based on the measurements carried out according to the monitoring plan of the MERLIN project, but more sophisticated monitoring can be applied in the future. However, it is essential that the resources devoted to monitoring are commensurate with the expected results. As the upscaling plan looks ahead to 2050, it is not possible to develop a precise plan to address the threats identified. There is a need for scenarios along which the strategy can be iterated: i.e. if external conditions change, the short-term instruments will have to change, but all the time working towards the long-term goal.
r) Describe what the funding plan is like. Are new financial instruments needed?	At the moment, the EU and the Hungarian state spend orders of magnitude more on maintaining economic and technical systems that destroy the landscape's resources and exacerbate climate catastrophes than on the transition towards sustainability. A few small projects may be enough to kick-start the long-term financing of upscaling, but the process can only be viable in the longer term if it brings real financial success to the economic actors and local communities that make the transition to NWRM. In addition, the whole system of public funding for water management and agriculture needs to be reviewed.

Who scales up?

Describe the main actors, their roles, and responsibilities	
s) who to involve?	WWF Hungary started its Tisza 21 Strategy with the target that water retention based, nature friendly, sustainable floodplain management system is introduced in the Hungarian part of the Tisza River Water basin, wherever possible, but at least on 150,000 ha, in order to improve biodiversity and provide benefits for local communities. Hence, we consider WWF Hungary as originating and intermediary organization of the scaling-up process. Although it is a conservation organisation, it carries out interdisciplinary research, networking, community development, policy and lobbying work that is not felt by those in either the water or agricultural sectors. Local / regional NGOs (including farmer organizations) that are open to plan and implement environmentally sound agricultural and sustainable rural development models in the Tisza River Basin in Hungary, municipalities, national-level NGOs or networks with similar objectives; research workshops investigating the possibilities, benefits and feasibility of NWRM on a theoretical or practical level; public organisations, which are key actors in water, ecological, social and economic development based on NWRM at the territorial level can be the adopting organizations.
t) who funds?	There are cost-effectiveness analyses, models, methodologies available for other pilot projects along river Tisza very similar to our ones. CBAs in other cases (eg. in Middle-Tisza case study research) proved the effectiveness of NbS vs. grey measures. NWRM will provide benefits for the public and land users, so costs can be co-financed by farmers and the state / EU. Political decision makers and decisive economic actors can be involved in planning to maximize benefits.

	Complex local economic and social development plans can be based on landscape restoration. E.g. the 'Living Tisza' trade mark system of Nagykörű is relatively well known and has a good reputation in Hungary. The development of this and similar local trademark systems can greatly help the market access of floodplain farming products. Complex regional marketing will be initiated to promote local tourism. The global WWF network is very active in developing methods of Bankable Nature Solutions and are ready to help our initiative with consultation and in finding partners. As NbS decreases losses and increases profits, farmers and insurance companies may be interested too. NbS and NWRM will provide economic benefits for farmers, ecological benefits, on which eco-tourism can be based, and that may help the processing of local products.
u) who implements?	One of the biggest challenges is the ageing and depopulation of the target areas, and the fact that farming and working in the countryside is attracting fewer and fewer people. Landscape management just requires more human knowledge, attention and interaction with the landscape, it cannot be automated. Ageing farmers are less able to absorb the new approach (which builds on the traditional farming traditions of pre-industrial agriculture). The focus should therefore be on creating favourable living conditions for young people in rural areas in their home land and making landscape farming an attractive career for them. This includes not only good livelihoods but also good quality schools, health facilities, community spaces and entertainment. In rural education, the role of centrally imposed curricula should be reduced and pupils should learn more and more about their own environment and about the landscape and farming. Education and upbringing must also represent the value of sustainable coexistence with the landscape. Stakeholder involvement is difficult not only because the state is currently centralising decision-making, creating new systems of feudal dependency every day. Throughout 20th century Hungarian history, the powers-that-be divided local communities and turned people against each other again and again, creating a climate of mutual distrust. Economic and social transformation has brought about a state of anomie. Daily economic and social life is also poisoned by moral disaster and a lack of cooperation. This situation can only be changed little by little, step by step, by building trust and sincere cooperation, and such a process is extremely fragile. Cooperation between people and landscape, between people and people is the long-term guarantee of sustainable farming, not just a change in the subsidy system. If the state fails to support the rebuilding of local communities, if it focuses only on maintaining power, on supporting big landowners and political vassals, then the transition to sustainability is likely to fail.
v) who monitors?	As the originating organization, WWF Hungary will undertake monitoring in areas where it has launched pilot projects and develop the methodology with the involvement of research workshops. New organisations joining the network will monitor their own projects using the methodology. In the future, if the transformation of the Tisza river basin landscape management becomes a state strategy, monitoring should be organised and financed centrally.

Final thoughts

Overarching question: What prevents effective and large-scale restoration?

w) Describe the policy barriers that need to be removed and overcome in order to scale up. x) Describe how your scaling-up plan addresses these barriers.	The most important policy obstacles are decisions taken for short-term gain, which cause resources to be used up at an accelerating rate. Examples include agricultural policies that favour environmentally destructive large-scale agriculture or industrial policies that locate water-intensive activities in water-scarce areas. The 170-year tradition of water management based on drainage and the Hungarian agricultural strategy based on arable raw material production are also policy strategies that urgently need to be reviewed. We are proposing a new water management strategy that works with nature and aims to expand floodplain farming built on nature based water retention measures in the Hungarian part of the Tisza River Basin. A diverse rural economy should be built on sustainable agricultural production by developing short supply chains, with significant improvements in rural living conditions.

5.3.6 Case study 10 Blue Belt (Germany)

Authors: Michael Gerisch (BfG), Elmar Fuchs (BfG), Andreas Anlauf (BfG)
Reviewed: Sebastian Birk (UDE)
BfG: Bundesanstalt fuer Gewaesserkunde (Federal Institute of Hydrology)
UDE: Universität Duisburg-Essen (University of Duisburg-Essen)

Main questions and aspects to be addressed	
Who is this RSP targeted? Who is meant to read your RSP and use it? If exact target audience is still unclear, define what type of an actor you are targeting.	Scalable aspects (and the necessary decisions to implement them) will be addressed to different bodies of the Blue Belt programme (BBD in the following), depending on if the aspects are strategic, organizational or technical: • BBD steering group (for strategic decisions and fundamental orientation) • BBD advisory board (stakeholder board, for aspects that need broad consensus-finding and where mainstreaming into other sectors is needed. But also to ensure that the BBD can be triggered from outside the box) • Scientific-technical expert group of the BBD (for organizational and technical decisions regarding implementation of the RSP, especially with the Waterways and Shipping Administration) The RSP is meant to be read by each of the above bodies. Maybe tailored plans need to be developed for each of the groups.

What is being scaled up?

a) Describe the vision for what you are scaling up.	By the year 2050, the BBD is established in politics, administration and society and is a recognized and widely supported joint task. The restoration of waterways and their floodplains, the dismantling of gray infrastructure that is no longer needed and rank equally with purely transport-related concerns., and the use of multifunctionally effective nature-based solutions have become a matter of course and rank equally with purely transport-related concerns. By 2050, the condition of at least 20% of the floodplains on federal waterways has improved by at least one condition class. The watercourses are passable for migrating fish and sediments. This means that the tributary waterways and ecological stepping stones in the core network of federal waterways are efficient components of the transnational habitat network. The restoration measures carried out on the rivers and floodplains have also made a measurable contribution to climate protection goals. At the same time, the function as a nature-compatible and sustainable recreational and economic area was measurably strengthened. Both the individual measures and the entire federal program are regularly success-controlled by a comprehensive, structured monitoring program, which is linked with scientific research (natural science, but also socio-economic disciplines). Results are used in an adaptative learning-framework to improve planning and implementation of NbS.
b) Describe what you are scaling up: technologies or techniques, processes, models or tools, and monitoring/evaluation aspects that you will scale up.	Techniques • We will upscale the available knowledge and state-of-the-art methods to conceptualize, implement and monitor NbS. Most important for the BBD will be to provide strategies for optimizing restoration for multiple goals (in particular biodiversity, climate regulation, drought & flood resilience). • We want to work towards ensuring that the economic viability of measures is assessed not only on the basis of their monetary costs, but also on the basis of ecosystem services. We will

	develop methods for this & provide guidance for application for implementing parnters Models & tools • We will develop and upscale techniques so that benefits between different objectives of the EU-Green Deal and/or ecosystem services can be maximized and trade-offs between them can be minimized. Ideally, this would will be done using knowledge-based decision support tools, which integrate experiences from the monitoring. • We will further develop and provide tools that will support decision-making processes for a systematic, ecosystem-based restoration and therefore provide technical and scientific support for the core objective of the BBD (improving the river-floodplainb habitat network and its biodiversity) and better operationalize it (e.g., via technically justifiable prioritizations). Processes • The BBD needs broad supported by society. We therefore will work towards opening up and optimize participation processes and to be a blueprint for participation processes for NbS measures, but also for non-BBD-measures (as a role model for restoration activities in other fields) • The social, economic and nature-related importance of the BBD needs to be communicated to the public in order to mobilize participation an increase relevance for other sectors. For this, we will develop a communication strategy and public relations work adapted to social groups, which will be scaled up in a way so that it can be applied for any BBD-restoration project • For the BBD, financing from business and society should have gained greater importance by 2050. In order to get there we want to establish processes and instruments that create monetary and non-material incentives (e.g. land subsidies for renaturation, making sustainable management financially viable, sponsorships, awards, etc.). Monitoring • A coherent monitoring scheme for measuring success and a science-driven learning strategy is being developed. Scaling up in this regard means that this monitoring and learning strategy will be implemented on the spatial extent of the BBD and for each implementation partner. • We will work towards a monitoring that addresses not only classical natural science (biodiversity, abiotic conditions) but also socioeconomic factors and ecosystem services. We will develop basic foundations and provide guidance to implement it on the spatial extent of the entire BBD • We will open up the monitoring also for scientific partners (universities, research centres etc.) and develop and apply new and innovative techniques for monitoring and evaluating biodiversity and ecosystem services (e.g., through remote sensing, artificial intelligence, automated data acquisition)
c) Describe the opportunities (in SWOT and optimization strategy) and their relevance regarding the timeline till 2050.	➢ Ongoing climate change and biodiversity crisis, the “counteracting” of national & EU policy (restoration law, Climate protection regulations) and the necessary implementation actions will lead to a greater needs and awareness to deal with restoration as nature based solution both in politics, but also in different societal groups. This will open up new opportunities for collaborations.

	➢ First signs of this shift in perception are already visible, as since recently, river restoration is legally binding for the waterway and shipping administration (which is responsible for the management of waterways), which means they *must* implement restoration. This has already led to an increase in staff (manpower, knowledge in ecological terms), which will increase implementation power in the near future ➢ "Green economy": Other sectors might see benefits in "working with nature" (but those benefits must be elaborated and communicated well to these groups) ➢ By leaning out the "biodiversity/navigation-bubble": there is a possibility of broader stakeholder engagement, alternative funding & new alliances for freshwater restoration ➢ The implications of the European Green Deal but also sustainability criteria will most likely lead to a stronger integration of non-momentary aspects in economic decisions, for instance ecosystem services. This may lead to better cost-benefits-ratios for NbS/restoration measures compared to now and will increase implementation ➢ The planned monitoring activities fit well in the still increasing importance of biodiversity and natural science as a scientific discipline for universities etc., which will support us in data collection, monitoring, scientific activities, syntheses
d) Describe the applicability of your measure regarding changes in the local and global environmental and socio-economic contexts and the timeline till 2050.	➢ The restoration task is already (formally) established and anchored in the WSV, but understanding of NbS and how/why to develop multifunctional measures is still limited. Therefore, there will be increasing need for our learnings and our proposed measures ➢ Implementing the measure will require lots of resources. Due to the high efforts of the government to achieve the ambitious environmental targets (WFD, N2000, EU restoration law etc.) we assume that funding activities of the environmental sector but also "implementation pressure" will most likely increase ➢ On the other hand: there is and will be a tight financial situation in Water- and Shipping Administration (important: internal competition with infrastructure renewal) and therefore we need to elaborate win-win-solutions. But since the "restoration task" is legally binding (at least to certain degrees) there should be "open ears" for our goals. ➢ Implementation speed is critical, but currently rather slow due to complex decision-making processes, internal dissents regarding restoration tasks (priorities are often shifted towards navigation) and lack of funding or staff: From our view, implementation speed can be increased at least responsible people are working together on one common vision. This is currently not happening, so there is a strong need for a change management within administration (esp. for the upper and medium management level) to further develop understanding, organizational aspects and responsibilities regarding restoration activities ➢ Climate change impacts are still unclear, but they have a high potential for affecting proposed measures. That means: our restoration measure need to be resilient/resistant to climate change impacts (such as droughts)

Why to scale-up?

e) Describe the main (GD) goals that the scaling-up plan addresses and how you plan to make most of them.	• Sustainable transport • Zero pollution • Climate regulation • Flood resilience

	• Drought resilience Next to biodiversity, the most important issue will always be the navigability of the waterway. This means, shipping will be a major framework conditions and a cornerstone for any restoration activity. Shipping itself might be considered a “sustainable transport” mode, so there is a direct link to it. Moreover, there are major linkages especially to issues of water availability and scarcity (flood and drought resilience), pollution and climate regulation. Since all of these connect to certain degrees also to biodiversity and restoration (some of our measures can also have positive effects for climate regulation and also shipping) we will make most of it if we find ways to maximize co-benefits. We will develop tools and procedures to support this and find win-win-solutions.
f) Describe additional (GD) goals that have potential for the scaling-up and how you could make the most of them.	• Health & well-being • Inclusivity • Financing the transition
g) Describe the expected benefits in terms of biodiversity and ecosystem services delivery, climate change mitigation and adaptation.	NbS and restoration will lead to an improvement of the status of water bodies and floodplains, Natura 2000 species & habitats and the nature-typical functions of rivers and floodplains (e.g. retention capacity). So in the first place, the BBD will (and alread is) strongly support EU and national environmental policy. But it will do more of it, because also other ecosystem services will benefit, esp. regarding cultural services, climate change mitigation and health & well-being. Due to large areas covered, there will be a measurable contributions of NbS/resotration to climate protection (fixation of greenhouse gases) and biodiversity improvement (e.g., habitat networks).
h) Describe the expected benefits in terms of stakeholder engagement.	• Broader social acceptance and consensus building • Formation of new alliances for stream restoration • More direct anchoring and addressing of problems and opportunities „on the ground“ • Possibly faster implementation of decision-making processes and measures due to extensive participation.
i) Describe the expected benefits in terms of business opportunities.	This is, at least to date, not a relevant aspect for the BBD. We see, however, the importance to consider business opportunities in the frame of restoration. There could be benefits/new alliances if for example insurances (regarding extreme events, risk mitigation), industry (low water) and fisheries, landscaping companies will contribute to restoration in order to either benefit from it in a monetary way or secure their busines models. To MERLIN: It is still unclear if/how this can be implemented into a restoration programe, that is basically a „government programme“. We could need some advice how to approach this.
j) Describe other benefits that result from the scaling-up.	Scientific interest (e.g. in scientific monitoring, but also socio-economic and political aspects), knowledge transfer services

Where does the scaling-up take place?

k) Describe the catchment/landscape area (bio-physical context).	The „BBD-area“ comprise all federal waterways that are no canals. Focus is on so called "secondary waterways" (where transport is low), where restoration measures can be potentially larger-scaled. In the core network of waterways (high transport level, such as the Rhine) restoration will be based on "stepping stones“, smaller scaled measures and a stronger use of NbS. Our upscaling-activities could also affect entire catchment-scales.
l) Describe the main policy actors, their interests, and decision-making processes (policy context).	• Federal Ministry of Transport, Waterway and shipping administration (WSV): navigation & shipping is in the focus, but also achievement of the WFD (legal task of the WSV), WSV also in the role project owner/manager and therfore central partner

	• Federal Ministry of Environment, Federal Agency for Nature conservation: Biodiversity & conservation, Achievement of Natura 2000 (improving the status of river and floodplain conditions) • Environmental NGOs: Project owner/manager • Municipalities: Project owner/manager • Federal States: Important „regional players“ The decision making process (i.e. the process within the BBD to implement a project) can be schematically described as: 1. Establishment of a consortium, informal participation and collaboration, feasibility studies by potential project partners 2. Formal application to implement the measure towards “the BBD” by a project owner 3. Scientific/technical review by authorities (Scientific-technical expert group of the BBD) 4. Measure modification/optimization by the project owner 5. BBD-technical expert group gives decision proposal 6. BBD-steering group (members: Ministries, expert group) decides on proposal 7. Implementation of the measure 8. Formal/Legal permission to implement Formal & informal participation processes are possible at any stage and mandatory in certain stages (e.g. #8)
m) Describe relevant legislative issues, and formal and informal land tenure.	Issues of land tenure are too context-specific to generalize for the entire national scale. But in principle, availability of land is always a bottleneck for planning and implementing measures. In some cases, the WSV/NGOs/Municipalities are itseld land-owners, which then eases the process. But more often than that land availability limits the process and the size/extent of the measure. Legislative framework is well known and regulated, the responsibilities are clear (although very complex). Important issue in this regard is the often unclear fundamental question by project planners, under which conditions the WSV is actually allowed to implement measures (be it monetary or legal conditions or based on internal policy/objectives/priorization).

How the scaling up happens?

n) Describe what kind of collaborative partnerships will be built/what kind of advocacy strategies are needed in the context of this RSP.	Collaborative partnerships will be most likely formed for each project individually. Conceivable are protected area administrations (such as biosphere reserves, national parks), universities, research institutions, interest groups (representatives of environmental NGOs but also the economic sector), political parties, representatives of the departments. Advocay strategy: Important element of our upscaling strategy is to communicate the ideas with responsible persons within the administration. It is very likely that the RSP will not be received with joy because it means extra work, shifts/ softens the focus oft he BBD and requires a change in thinking. We are therefore interested in an exchange on how to bring in these thoughts most effectively.
o) Describe the role and responsibilities of the case study board.	Advisory Board of the BBD (which is a high-profile advisory body of different NGOs and ministries, serving as an interface to politics and society) could support the upscaling, and could apply the necessary "pressure" to also think about further GD goals within the frame of river and floodplain restoration.
p) Describe the role of local community members.	Local community members (e.g., members of NGOs, local politics, employees in the local administration, concerned public) are often the actual idea generators and drivers of implementation „on the ground“. They know the spatial, political, social and economic situation in the region and give important guidelines how to proceed and where to focus and how to avoid/minimize problems or whom

	to integrate. Their participation is, however, in large parts not mandatory and took place mostly during informal meetings or during feasability studies. Given their importance, there seems to be a need to a more inclusive participation.
q) Describe the role of monitoring and evaluation systems.	The monitoring of the BBD serves to documenting the success and efficiency of individual measures as well as of the entire program. It allows also for deriving best-practice solutions and principles for NbS/restoration. In this way, it is a important conceptual and data basis for a learning framework and for adaptive management. Both need, however, to be further developed and operationalized. To date, mostly abiotic and biotic elements as well as criteria related to navigation are part of the monitoring. However, our plan is to widen the scope using ecosystem services and relate it stronger to Green Deals. Distinct criteria will be developed and applied to do this. Our monitoring should also provides justifications/incentives for the political arena but also for potential donors and stakeholders that NbS/restoration measures are worthwhile, contribute to the achievement of legally binding objectives, but also show that it will not hinder current usages and potentially lead to win-win-situations. In addition, the monitoring is the strongest linkage of the BBD to science & research.
r) Describe what the funding plan is like. Are new financial instruments needed?	There is no explicit “funding plan”, despite the budget of both the Ministries of Environment and that of Transport and the funds of the NGOs or municipalities. The BBD has no control over these budgets or how to generate the money.

Who scales up?

Describe the main actors, their roles, and responsibilities	
s) who to involve?	WSV, BBD scientific and administrative boards representatives of governmental ressorts (e.g. finances, legal departments, socio-economic affairs)
t) who funds?	Public money: BMUV, BMDV, Federal states, Municipalities Private money: NGOs, private foundations
u) who implements?	WSV, NGOs, Water maintanance associations, communities, municipalities
v) who monitors?	BfG, BfN, BAW, UBA, universities & scientific organisations

Final thoughts

Overarching question: What prevents effective and large-scale restoration?	
w) Describe the policy barriers that need to be removed and overcome in order to scale up. x) Describe how your scaling-up plan addresses these barriers.	

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