MERLIN

Rhine Reimagined: A Future-Forward Plan for Nature-Based Management

Regional scalability plan (RSP) for the Dutch Rhine branches



MERLIN

Imprint

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1 For the reader

The plan “Rhine Reimagined: A Future-Forward Plan for nature-based management” describes the long-term vision, key policy and management plans, key stakeholders and long-term actions that help upscale the nature-based solutions needed for sustainable use and ecosystem management. Note that the term “management” in the title reflects river management on the delta-scale, including the design, implementation, and management of individual (nature-based) measures.

Rijkswaterstaat (RWS) is the initiator of this regional scalability plan (RSP) while other key stakeholders were consulted and provided input in this first version. The RSP is targeted at all the relevant stakeholders, for example within RWS the 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. The plan guides the long-term development and the aim is to let core components land in stakeholders’ own long term policy and implementation plans.

The content of this document was developed as part of the MERLIN project (https://project-merlin.eu), funded under the H2020 program of the European Commission. Most of the groundwork was conducted by the Dutch MERLIN project team, consisting of RWS and Deltares colleagues, whereas input from a variety of PAGW colleagues and stakeholders from Provinces of Gelderland and Overijssel and waterboards, was gathered during several workshops in the period 2022-2024. As such this is the first version of this plan and it will be revised as needed during the MERLIN project and beyond.



2 Focus of the RSP

The overarching vision of our regional scalability plan is to foster an ecologically vibrant and resilient river ecosystem. Central to this vision is expanding the space for nature's processes to occur naturally, enhancing hydrodynamic activity within floodplains. As climate change increases the occurrence of severe droughts, the management of the river ecosystem should include storing water during wet periods. A key initiative supporting this goal is the rewetting of floodplains, a practice that not only rejuvenates natural habitats but also underscores the broader ecological value of such landscapes.

Our strategy integrates seamlessly with existing Rijkswaterstaat programs, including Integrated River Management (IRM) and Programmatic Approach Large Waters (PAGW) ensuring a cohesive and comprehensive approach to ecosystem restoration, and at the same time contributing to other river functions. A pivotal element of our plan is to disseminate knowledge about the critical role of nature-based solutions in maintaining ecological balance, thereby garnering broader support for these efforts.

The scalability of our plan hinges on two main pillars:

1. Knowledge Base - This encompasses a deep understanding of nature-based solutions, focusing on both abiotic and biotic processes. It includes insights into ecological benefits and ecosystem services they deliver, and the technical aspects of implementing such solutions effectively.

2. Collaborative Approach - Success in achieving our ecological objectives requires a collaborative ethos, engaging with various stakeholders across different domains. This collective effort is crucial for realizing the vision of a fully functional ecosystem.

A unique opportunity presented by our plan lies in the intersection of ecological restoration with additional benefits, such as drought resilience, nature-inclusive agriculture, and enhancements to public health and well-being. By leveraging these multifaceted advantages, our approach not only aims to restore river ecosystems but also to create lasting benefits for communities and the environment at large.

2.1 Regional characteristics

The Dutch Rhine branches region is a complex area characterised by its unique geographical and socio-economic attributes. This region, predominantly shaped by the river Rhine as it branches out before flowing into the North Sea, is a blend of urban and rural landscapes. The urban areas are densely populated, hosting a range of economic activities, including shipping, industrial operations, sand mining and agriculture in the rural outskirts. The main economic sectors revolve around logistics, due to the regions strategic location for European river transport, agriculture, and increasingly tourism and recreation. The area faces significant challenges, primarily related to water management. These include the risks of flooding due to climate change induced sea-level rise and river discharge fluctuations, increasing droughts as well as the need for sustainable water quality management amidst urban and industrial growth.

Future problems and risks in the context of nature-based solutions (NbS) for the Dutch Rhine branches focus on balancing ecological restoration with economic development, mitigating flood risks while enhancing biodiversity, and adapting to the impacts of climate change. NbS approaches such as rehabilitation of floodplains, wetlands restoration, and green infrastructure development are crucial for sustainable regional development. However, implementing these solutions requires navigating complexities such as land use conflicts, investment needs, and ensuring long-term maintenance and effectiveness.

Landownership in the Rhine branches is diverse. The main river channel is owned by the state, whereas the floodplains can have a large variety of owners, categorized as government (mostly Staatsbosbeheer, RWS and municipalities), nature management organizations (“terreinbeherende organisaties” such as Natuurmonumenten, provincial Landschap) and private owners (predominantly farmers and gravel, sand and clay mining). Apart from who owns the land, RWS is responsible for the water safety management in the whole river area (from dike to dike), and for the water quality according to the Water Framework Directive. The provinces together with RWS are responsible for the

nature quality according to Natura 2000, while the regional waterboards are responsible for the management of the dikes and water in the floodplains.

The spatial extent of the Dutch Rhine branches region can be defined by its biophysical characteristics and administrative boundaries, covering the area where the river Rhine divides into its three branches—the Waal (including the Biesbosch area), the Nederrijn-Lek (unto Hagestein), and the IJssel—before entering the North Sea. This includes parts of the provinces Gelderland, Overijssel, Utrecht and Zuid Holland. The region encompasses medium-sized cities (100,000 – 200,000 inhabitants) like Zwolle, Arnhem and Nijmegen, and integrates a mix of natural landscapes and urban centres (Figure 1).



Figure 1: The three Rhine branches: Waal, Nederrijn/Lek and IJssel.

The eco-hydro-morphological systems that rivers are, need time to adjust to nature-based solutions (measures) and nature-based management practices. So, while we aim for an impact on the long-term and define that long-term as 30 years (focus of this RSP), the complete realisation might take much longer.

Important is to keep monitoring key elements of the river system, to ensure that effects are developing in the direction of the goals, and if not, to re-evaluate if either the goals or the measures need adjustment. That is the core of nature-based management, be online with your system (monitor & evaluate), and be adaptive.

2.2 Justification for the region

The selection of the region for MERLIN purposes is strategically aimed at addressing the need for integrated river management across the entirety of the Dutch Rhine branches. This decision is rooted in the understanding that a comprehensive approach, which includes both non-tidal and tidal freshwater segments of the river, is essential for effective management and sustainability of the river system. The rationale behind encompassing the whole Dutch Rhine branches stems from the necessity to implement an integrated management strategy that can address the complex challenges faced by the river system, including ecological, hydrological, and human-use aspects. The boundaries for this region were carefully justified, taking into consideration governance and policy factors, ensuring alignment with policy frameworks and the operational area of RWS. This approach reflects a holistic vision towards river management, recognizing the importance of governance structures and policy directives in shaping effective and sustainable river management practices.

2.3 Linkages and synergies with other initiatives

To reach the impact and outcomes, we aim to collaboratively build on and extend existing policy plans, strategies and long-term implementation plans from the national or regional stakeholders. Below the most important plans we take into account are listed and briefly explained.

PAGW: The Programmatic Approach Large Waters (PAGW, figure 2) uses an ecosystem approach, integrally tailored to other river-related and social functions, aiming for a healthy and resilient river ecosystem that offers numerous opportunities and possibilities for human use, such as shipping, agriculture and recreation. It is a long-term program (until 2050), funded by the national government (Deltafonds), executed by RWS, Staatsbosbeheer and RVO, and contributing to Water Framework Directive goals and Natura 2000 goals. Several river restoration projects are currently developed. [Home | PAGW]

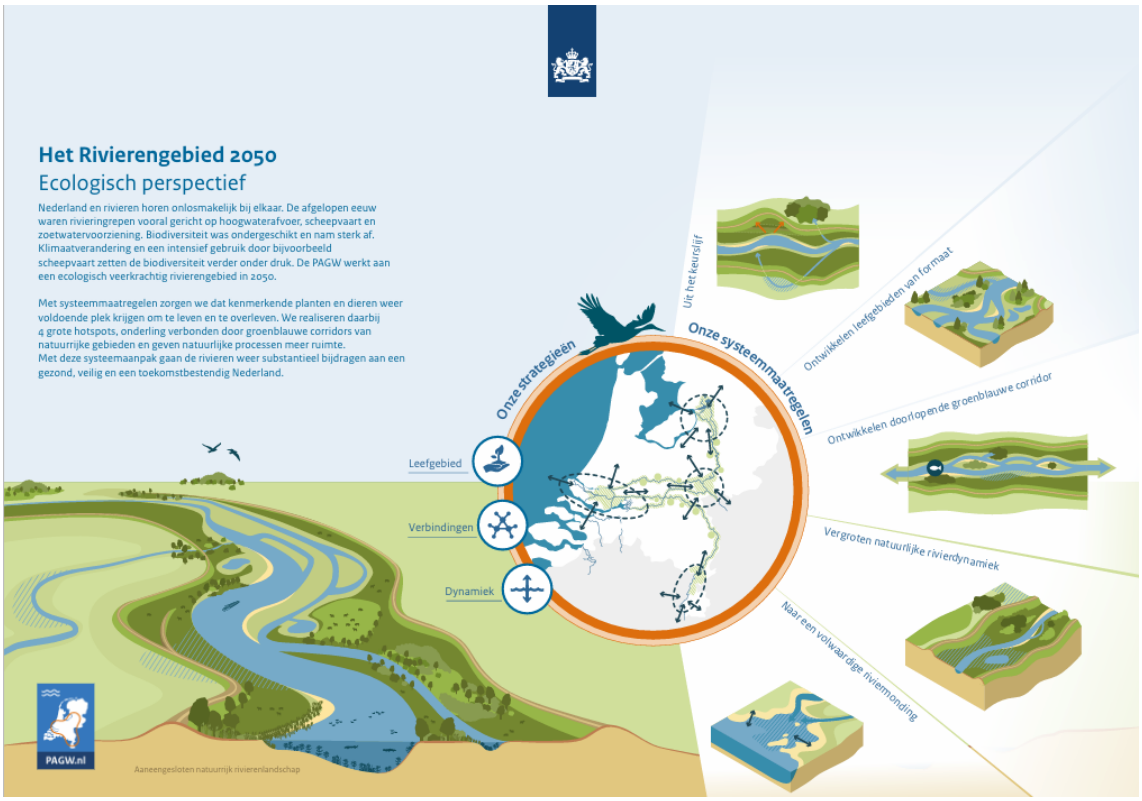


Figure 2: Infographic of the PAGW for the large rivers Rhine and Meuse. From www.pagw.nl

IRM: The Integrated River Management (IRM) program involves collaboration between the national government, provinces, waterboards, and municipalities to create a future-proof Meuse and Rhine River system. It seeks to balance flood safety, nature, water quality, freshwater availability, and navigability to ensure the system's multifunctional use and sustainable management. More about IRM can be read at [Deltaprogramma](https://www.deltaprogramma.nl/documenten/vragen-en-antwoorden/wat-is-het-programma-integraal-riviermanagement) and [MER-Nieuws] (https://www.magazinesrijkswaterstaat.nl/mer-nieuws/2021/98/irm).

Gelders panorama voor de rivieren: This is a policy vision of the Province of Gelderland for a future proof river system in Gelderland, including nature, healthy living environment and local economy. This vision is the basis on which the province together with partners such as Rijkswaterstaat, waterboards, municipalities and civilians, will strive for integrated river projects with spatial quality. Gelders Panorama voor de Rivieren (gelderland.nl)

Delta Program: The national government, provinces, municipalities, water boards, Rijkswaterstaat and various social organizations work together on the Delta Program in which is described how the Netherlands is protected against flooding and ensures sufficient freshwater, now and in the future. In

addition, the government is working on a climate-proof and water-robust design of our country. Nature and ecological water quality are not yet explicit goals in the Delta Program. Home | Deltaprogramma

Nationaal Programma Landelijk Gebied (NPLG): This program focuses on the development and management of rural areas in the Netherlands, aiming to balance agricultural productivity with environmental and landscape conservation goals. The river floodplains are not part of the NPLG, but can be of influence when they adjacent to NPLG projects. Landelijk gebied: aanpak stikstof, natuur, water en klimaat | Rijksoverheid.nl

Levende Rivieren: An initiative by the World Wide Fund for Nature (WWF) together with other NGOs, focusing on restoring natural processes and habitats in river landscapes to promote biodiversity and healthy ecosystems. Visies Ruimte voor Levende Rivieren én de natuur in de delta | Ruimte voor Levende Rivieren

For more detailed information on these programs and initiatives, you can explore the respective websites and resources provided by the organisations involved. The most relevant documents are given in Chapter 9 (References and relevant material).

3 Stakeholders of the RSP (who)



3.1 Current stakeholders

The stakeholder community builds on running policy and implementation programs, as well as links to the research community (universities and research institutes).

Table 1 shows the main stakeholders that are most involved in managing the river and its floodplains. The column involvement status shows whether the stakeholder is already actively involved in the upscaling process initiated by MERLIN.

Table 1 Current identified stakeholders

ID #	Name of stakeholder	Sector	Involvement status	Scale (level)	Ownership
1	Bureau Stroming	Environment	Already involved	National	Private (Commercial, investor, etc)
2	Cascade, vereniging van zand- en grindproducenten	Sand and Gravel mining		National	Network
3	Deltaprogramma: Rivieren	Cross Sector	Already involved	National	Public
4	Dienst Landelijk gebied - RVO	Cross Sector	Already involved	National	Public
5	Overijsselse Natuur en Milieufederatie	Nature and environment	Already involved	Regional	NGO
6	Municipalities	Cross Sector		Municipal	Public
7	Hengelsport Federatie Sportvisserij Nederland	Recreational Ffisheriesy		National	NGO
8	Ministry of Agriculture, Fisheries, Food Security and Nature and Food (LVVNV, national)	Agriculture, fisheries, nature, Natura 2000	Already involved	National	Public
9	Ministry of Infrastructure and Water Management (IenW, national)	Water management, flood protection, navigation, Water Framework Directive	Already involved	National	Public
21	Farmers (individual landowners)	Agriculture		Local	Private
11	Province Gelderland (regional)	Nature, Natura 2000, recreation, economy	Already involved	Regional	Public
12	Schuttevaer	Inland navigation		National	Private (Commercial, investor, etc)
13	Staatsbosbeheer	Forestry, nature	Already involved	Regional	Public
14	Stichting ARK Natuurontwikkeling	Environment, nature,	Already involved	National	NGO
15	World Wide Fund for Nature (WWF)	Environment, nature		National	NGO
16	Waterboards (regional)	Environment, water management	Already involved	Regional	Public
17	RWS-Oost Nederland	Water management, navigation, Water Framework Directive	Already involved	Regional	Public
20	Free Nature (managing free range cattle/horses)	Environment, agriculture, nature		National	NGO
22	Drinking water companies	Water resources		Regional	Private

The different levels of stakeholder engagement are shown in Figure 3. At the moment, we are at the collaboration level with most stakeholders (Table 1). With the Provinces of Gelderland, Overijssel and Staatsbosbeheer we are at the level of cooperation.

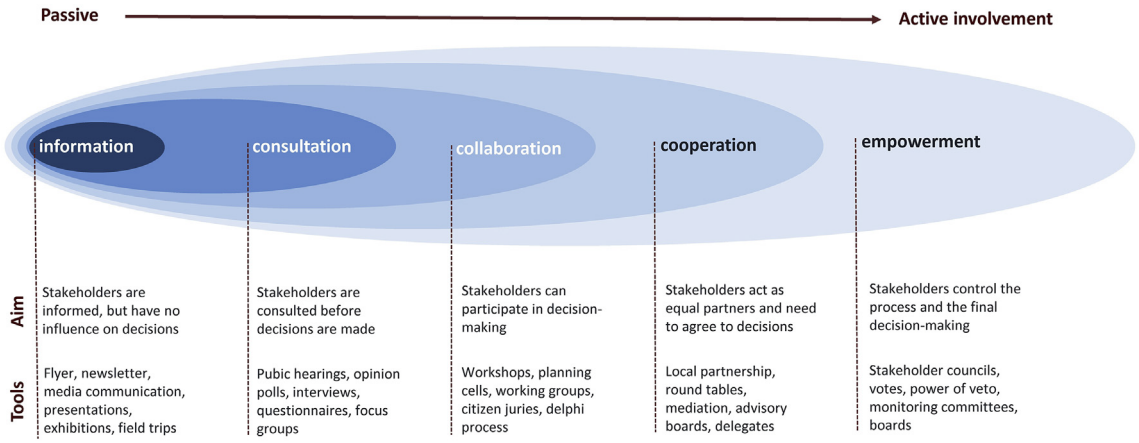


Figure 3: Level of stakeholder engagement (source: Grygoruk & Rannow 2017)

3.2 Further stakeholder opportunities

Stakeholders to be involved in the future are:

- WWF: together with other NGOs, WWF is an effective lobby organization striving for living rivers, where nature is combined with flood safety and inland navigation.
- Gelderse Natuur en Milieufederatie/Gelders Landschap/ Utrechts Landschap: these are “terreinbeherende organisaties”, privately funded provincial nature management organizations. We already have an established cooperation with Natuur en Milieu Overijssel, and aim for cooperations with this type of organization in other provinces.
- Schuttevaer/Koninklijke Binnenvaart Nederland: this is the professional organization of inland navigation.
- Cascade: is the trade association of the surface mineral extraction (sand, gravel, clay, limestone and silver sand) business in the Netherlands. Cascade has 18 members, representing approximately 90% of production in the Netherlands.
- Municipalities: these become important when concrete projects are developed within their municipal boundaries and close to urban areas. There are plenty of possibilities for recreation and connecting urban areas to the river.
- Farmers: these can be important stakeholders in those floodplains where groundwater levels may change, and potentially affecting local farmers.

4 Green deal goals

The EU Green Deal (GD) goals were introduced in the MERLIN proposal . Each case study has identified both primary and secondary GD goals. Primary goals are the main goals that the RSP seeks to achieve. Secondary goals are additional or potential goals to which the RSP can contribute to.

The contribution of the Room for the River program (already completed) and new river programmes (such as IRM and PAGW) to the EU Green Deal goals were discussed in a stakeholder meeting (7 November 2023, please note that attendees had a bias towards nature rehabilitation projects). The stakeholders then selected which Green Deal goals are most important to their situation in the future. The results of this inventory are presented in table 2. In this first inventory, we did not make a difference in primary or secondary goal. The top 4 selected goals were discussed further with the stakeholders. Chapters 4.1 and 4.2 elaborate further on the primary and secondary goals.

During the all partners meeting in Vienna, we sketched out a Theory of Change (ToC) for the Room for the River program (Figure 4), attributing our restoration measures in hindsight to Green Deal goals. This ToC diagram will be used as an inspiration in the development of new restoration measures.

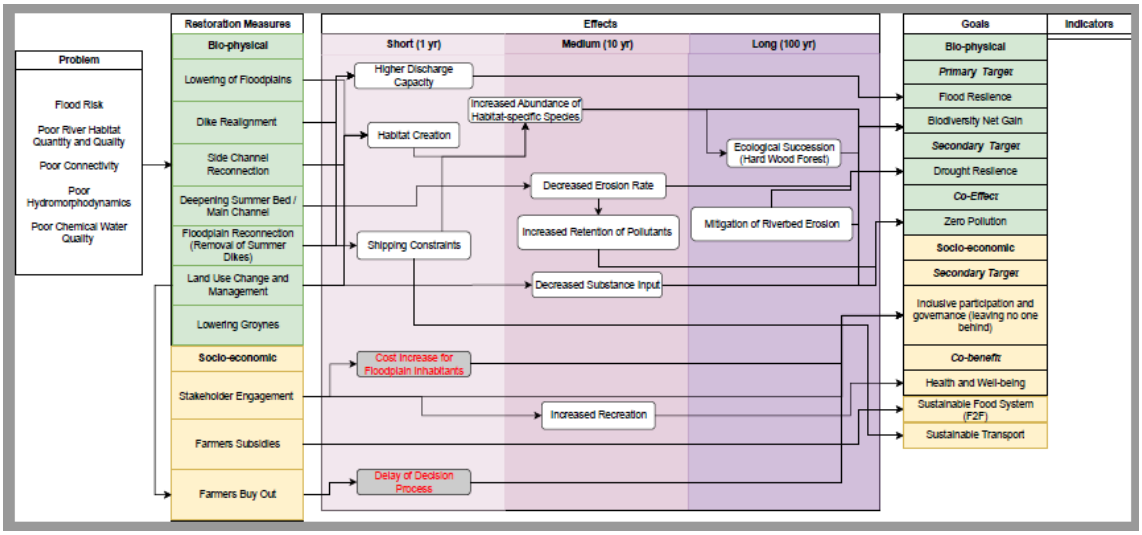


Figure 4: Theory of Change for the Room for the Rhine program (developed by MERLIN team with help of Laura Pott).

Table 2 Results of the stakeholder inventory

Green deal goal	Times selected by stakeholders
Biodiversity net gain	27
Drought resilience	25
Health and well-being	18
Sustainable food systems & Land use	16
Inclusive participation and Governance	13
Flood resilience	13
Climate regulation	12
Sustainable transport	11
Zero pollution	6
Financing the transition	5
Circular economy	1
Green growth	0
Sustainable energy	0

4.1 SMART Green Deals relevant for the region: primary goals

From the inventory by the stakeholders, acknowledging their bias towards nature, we consider the following four Green Deal goals as primary goals for our case. These are discussed here in order of times selected.

Biodiversity net gain: This is considered as the most important goal by all stakeholders. An ecological robust and healthy river ecosystem will increase biodiversity and give an enormous boost to the functioning of the river ecosystem. It will also contribute to meeting Natura 2000 and Water Framework Directive goals.

Health and wellbeing: The discussion on health and wellbeing with stakeholders revolves around the intersection of nature, recreation, health, and societal use. The importance of green spaces and outdoor activities, particularly emphasised during the pandemic, is acknowledged. Balancing public access to nature while preserving its intrinsic value poses a challenge, with considerations for zoning and designated disturbance-free zones. Various recreational activities such as swimming, birdwatching, and dog walking demand diverse infrastructural adaptations in natural areas. There's a growing need for recreational facilities like parking lots and trails, alongside concerns about littering and the necessity for enforcement. Ultimately, there's a call for mindful planning to prevent prioritizing recreation at the expense of environmental conservation.

Inclusive participation and governance: This is now more important since it is a requirement under the new national Environmental Law (‘omgevingswet’). 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.

Climate regulation: Floodplains have the potential for locking in carbon and create a more robust ecosystem additionally.

4.2 SMART Green Deals relevant for the region: secondary goals

The following Green Deal goals are considered as secondary goals. These are also discussed in order of times selected.

Drought resilience: This was considered the second most important Green Deal goal by our stakeholders. In times of climate change, droughts are occurring more frequently. By altering the water management of floodplains it will help increase freshwater storage.

Sustainable food systems & land use: Land use change in floodplains is an important part of the future Integrated River Management Program. Nature-inclusive agriculture in floodplains is receiving more attention.

Flood resilience: Increase in the number and/or areas of active floodplains will increase the room for the rivers and will thus contribute to flood resilience.

Sustainable transport: This is applicable to the RfRB program, where nature development and commercial shipping can have conflicting interests. Innovative solutions such as longitudinal training dams improved shipping channels and improved fish habitat, and proved to be still functioning in times of low water discharge.

Zero pollution: This includes description or modelling based estimate of (reduced) pollution. When focussed on floodplains, the historical polluted sediments and present agricultural activities (manure spreading, pesticide use) are of interest.

Financing the transition: New insights in cost benefit analysis for Nature-based solutions are developed in the MERLIN project. These will be of use in our case as well. Up till now, mostly public funds are used to finance river restoration projects. In future, new funding sources will be sought.

The remaining Green Deal goals: circular economy, green growth and sustainable energy, were not prioritised by our stakeholders and are not further discussed here.

5 From general goals to actions

In this chapter we describe the actions needed to achieve the long-term goal as defined for the Rhine Branches in Chapter 1. We use an abridged version of the theory of change to connect the goal (impact), outcomes and preconditions (chapter 8), needs (chapter 4) and stakeholders (chapter 3) to concrete actions. Next, we list the actions needed on short and long(er) term in three main groups building on the RSP focus: collaborative action, knowledge base and implementation.

5.1 Theory of change

The theory of change allows you to reflect and oversee the steps needed to reach the (ultimate) impact (goals). In the table below the elements of the theory of change (ToC) are listed and placed in the context of the Rhine branches RSP. The paragraphs that follow will go into the details of outcomes and preconditions and activities needed for regional upscaling.

Table 3: Theory of change steps as guideline for our RSP

Impact (long term goals)	An ecologically vibrant and resilient river ecosystem, aligned with the Green Deal goals.
Outcomes and Preconditions (Chapter 8)	Below some short (5 yr) and intermediate (10 yr) term outcomes are preconditions for the longer-term outcomes leading to the impact. • (5 yr) An active and connected NbS focussed stakeholder group in the Rhine Branches • (5 yr) The activities, outcomes and impact of this RSP are incorporated in policy & implementation plans of key stakeholders. • (10 yr) The implementation plans are funded. • (5 yr) Initial rewetting projects successfully implemented • (5-10 yr) active science programmes leading to underpinning of NbS and Nature-based management.
Activities (Chapter 5)	To achieve the impact, we aim to use NbS in integrated river management. We roughly differentiate the activities in the following steps, policy, execution, and bottom-up empowerment: 1. (5 yr) Embedding NbS in existing long-term policy programs: IRM, NPLG, Panorama Gelderland, Deltaprogram 2. (5-10 yr) Embedding NbS in long term “uitvoeringsprogramma’s” (execution programs): PAGW, Water Framework Directive (WFD), N2000 (provincial level). 3. (5 yr) Bottom up embedding NbS, including visions of NGOs: establishing a Community of Practice NbS Rivers, using the WWF manifest for Ruimte for Levende Rivieren (Room for Living Rivers). 4. (5-10 yr) Foster and support building a knowledge base Activities are detailed in the remainder of this chapter.
Needs (Chapter 4)	The individual stakeholders’ needs are known in abstract terms as they are described in stakeholder policies and visions. They have not been actively collected or aligned in a group effort. (Action needed.) The affinity of the stakeholders as a group with the various Green Deal goals is identified.
Stakeholders	See **Chapter 3** about stakeholders.

5.2 Actions collaborative action (upscaling process)

The actions below are based on the stakeholder meetings we conducted involving the core stakeholders mentioned in chapter 3. Key actions are shown in **bold** and sometimes the [source stakeholder] of the action idea is given.

Short term (0-3 yr)

- Direct post-MERLIN
    - **Rewetting after MERLIN: make a list of implementation plans and prioritise on achievability. Call it the short and longlist of rewetting plans. Share and discuss with stakeholders in follow-up meetings**
    - Process after MERLIN: embed the upscaling process in follow-up (EU) projects with a longer time horizon (ResiRivers 2024-2028; NL2120 2024-2034; Life IP NAS; Manabas Coast).
    - Connect with projects that have a timeline 0-5 years post MERLIN, such as Rivierklimaatpark IJsselpoort [Rivierklimaatpark IJsselpoort | Rivierklimaatpark IJsselpoort]

- **Establish a common "restoration plan" incorporating long-term goals of all key stakeholders**
    - To overcome "Fail factor" of competition between implementation programs large influential stakeholders (RWS, Province, Staatsbosbeheer, etc.) should harmonise their goals for Rhine branches up front. And always in large projects.
    - Integrate water and nature management from top to bottom.
    - Let stakeholders with similar goals and energy cooperate on the long term.
    - Collectively realise and implement to reach goals in a strategic way, not only, as currently, in an ad-hoc and serendipity dependent manner.

- Embedding in existing stakeholder goals
    - [stakeholder Staatsbosbeheer]: As MERLIN Green Deal goals are broader, link the rewetting also to existing climate change actions of stakeholders. Staatsbosbeheer has separate actions on climate change.

- Communication
    - [stakeholder Staatsbosbeheer]: Communication strategy, use and inspiring theme such as "drinkable rivers" to communicate.
    - Action: make a communication strategy
    - Policy brief based on MERLIN results for the "recalibration of the Delta Program"

- Policy-oriented actions
    - A policy brief from MERLIN to the EU.
    - Use existing websites to communicate success, foster and support enthusiasm, e.g. sites as "samenwerken aan riviernatuur".
    - Embed in national and regional policies

- Building a community

- Using the Ontwikkel & Beheer Natuurkwaliteit (OBN) knowledge network, discuss links to “veldwerkdagen”
- The attention to nature-based solutions (NbS) is currently fragmented. One of the actions is the establishment of a community of practice for NbS. Could be run in MERLIN and EU ResiRivers for time being, then move to other stakeholders.

Longer term (3-10 yr)

- Upscaling
  - Upscaling: incorporate the Meuse River, establish Meuse stakeholder group.
  - [from ResiRivers]: establish structures for bottom-up approaches, starting with local stakeholders.
  - [Staatsbosbeheer]: To have longer term impact, create synergies with Livelihood. For example, nature-inclusive farms that sign contracts for nature inclusive farming goals with Staatsbosbeheer.
  - Incorporate RWS in the Subsidiestelsel Natuur en Landschap (SNL, Nature and Landscape Subsidy System).

- Education
  - Provide integrated courses and education material in Dutch for University courses, for post-schooling courses for civil workers and starting consultants.
  - Organise schooling activities.
  - Link to relevant Communities of Practices

- Policy oriented actions
  - Embed in national and regional policies (same as in short term)

5.3 Actions towards knowledge base and adaptive management

- **Monitoring**
  - **In addition to a common restoration plan, create a common (all stakeholders) monitoring plan, encompassing multiple “Green Deal” goals. This to underpin measures and learn for adaptive management.**
  - **[Staatsbosbeheer, Stroming]: Make a list of projects that are candidates for monitoring.**
  - Keep monitoring good examples for a longer time (years)
  - Rijkswaterstaat in SNL
- Building a knowledge base
  - Start with other NbS analogously to rewetting in OBN

5.4 Actions towards implementation

- For robust upscaling, there is a need to buy land property. Land ownership is a key factor.
- A success factor is adaptive (nature) management, managing for multiple goals. However, do not outsource (nature) management. Outsourcing proved to be a fail-factor for biodiversity and related goals.
- Streamlining public funding towards NbS should become as business as usual
- Develop synergy with private funding, e.g. sand and clay mining businesses.

- Financing: utilize the recalibration of the Delta Program to work more inclusively with nature.

5.5 The responsible stakeholders and their roles

The various stakeholder meetings that we organised as part of our implementation case in MERLIN, resulted in the following general lessons learned for effective river rehabilitation projects.

1. All crucial partners should be involved:
    - RWS as river manager,
    - provinces as responsible government for Natura 2000,
    - waterboards as responsible government for dyke- and water management in floodplain,
    - landowners.
2. A driving force:
    - Water Framework Directive
    - PAGW/IRM programme
    - Sand or clay mining
    - Nature-inclusive agriculture

When partners and driving forces are overlapping, e.g. RWS with a Water Framework Directive project in a floodplain owned by Rijkswaterstaat, or a PAGW project in a floodplain owned by Staatsbosbeheer (partner in PAGW), initiating and realising projects become easier.

Based on the stakeholder meetings and experiences from one-on-one meetings, we can identify two main stakeholders who have the power to take responsibility for the identified actions: the PAGW programme and the provinces.

Both stakeholders are positive about implementing nature-based solutions. Enabling factors for them are the incorporation of NbS in national policies, such as the Deltaprogram. This is a top-down approach. The current evaluation of the Deltaprogram is an opportunity from nature and ecological water quality perspective to expand the Deltaprogram with these goals. This RSP will be used for this purpose.

The bottom-up approach is inspiring colleagues about the added value of NbS in river rehabilitation projects. This is done by contributing to a variety of meetings within RWS and the ministry of Infrastructure and Water management, and outside RWS. Another means of inspiration is organizing field trips to successful projects.

6 Proposed timeline

The proposed timeline of our actions is given in table 4.

Table 4: The actions planned in a timeline. Our three key actions are indicated in bold

	Period (2-year interval)						Period (5-year interval)		
Activity	2024	2025-2026	2027-2028	2029-2030	2031-2032	2033-2034	2035-2039	2040-2044	2045-2049
5.2 Collaborative action									
Contribute to evaluation Deltaprogram	x								
Produce a long list of nature rehabilition projects	x	x							
Establish a common restoration plan with key stakeholders		x	x						
Establish community of practice		x	x	x	x	x	x	x	x
Contribute to long term policy			x	x	x	x	x	x	x
5.3 Knowledge base and adaptive management									
Create a common monitoring plan with key stakeholders		x	x						
Develop quality standards for nature management			x	x					
5.4 Implementation									
Develop quality standards for nature management		x	x						
Develop synergy with private companies			x	x	x	x	x	x	x
Develop land ownership strategy				x	x	x	x	x	x

7 Opportunities for financial implementation

The funding needed is largely divided into three main parts:

1. Funding for the upscaling process to achieve the following outcomes
    a) An active and connected NbS focussed stakeholder group in the Rhine branches
    b) The activities, outcomes and impact of this RSP are incorporated in policy & implementation plans of key stakeholders.
2. Funding for the (5-10 yr) active science programmes leading to underpinning of NbS and Nature-based Management.
3. Funding for pilots and full implementation

Ad 1. Opportunities for funding for upscaling process can run in the existing programmes of the various stakeholders:

- PAGW (Rijkswaterstaat, Staatsbosbeheer and Netherlands Enterprise Agency)
- IRM (Ministry of Infrastructure and Water management)
- Water Framework Directive (Ministry of Infrastructure and Water management)
- Natura 2000 (Ministry of Agriculture, Fisheries, Food Security and Nature, provinces)
- Nature program (Ministry of Agriculture, Fisheries, Food Security and Nature)

Ad 2. Opportunities for the second outcome (research) are running programmes of the EU and national initiatives.

- NL2120 (Ministry of Economic Affairs, Deltares, many partners)
- Rivers2Morrow (Rijkswaterstaat and Ministry of Infrastructure and Water Management)
- ResiRivers (Interreg project Rijkswaterstaat)
- De Rijn verbindt (Interreg project Rijkswaterstaat)

New opportunities might be needed to underpin specific knowledge gaps and more holistic effect quantification.

Ad 3. Funding for implementation can be found with national programs funded by public funds, and private funds.

- PAGW, as part of IRM
- Clay and sand mining companies
- Private funds from ‘Postcodeloterij’

8 Uncertainties and assumptions/boundary conditions

In the theory of change as presented in chapter 5, a brief set of outcomes and preconditions are presented that need to be met to achieve the (ultimate) impact. These can be viewed as the boundary conditions. These outcomes are:

- An active and connected NbS focussed stakeholder group in the Rhine branches
- The activities, outcomes and impact of this RSP are incorporated in policy & implementation plans of key stakeholders.
- Initial rewetting projects successfully implemented
- Active science programmes leading to underpinning of NbS and Nature-based Management.
- The implementation plans are funded.

The assumptions or inversely bottlenecks needed to overcome when scaling up recovery measures within the Horizon MERLIN project, can be divided into strategic, operational and context-specific challenges.

Strategic bottlenecks

1. Different target groups and scales of government:
    - There is a difference in focus between local, regional and national/international government agencies. This can lead to a lack of unity in policy implementation and prioritization, which complicates the scaling-up process. For large transboundary rivers the emphasis is more on national and international aspects, while for peatlands, wetlands and small streams the emphasis is more on local and regional authorities.
2. Different time horizons:
    - The variation in time horizons (some visions extend to 2030, others to 2050) can lead to inconsistencies in planning and implementation. This can make it difficult to harmonize long-term goals with shorter-term actions.

Operational bottlenecks

1. Holistic approach:
    - The need to approach recovery activities holistically and integrate all relevant actors is essential, but also complex. Differences in restoration techniques and monitoring between the clusters can lead to challenges in developing a uniform approach.
2. Identification of goals:
    - Identifying and prioritizing Green Deal goals (climate regulation, biodiversity gain, flood and drought resilience) is essential, but also diverse. The wide range of primary and secondary goals can lead to conflicting priorities and reduced focus.

Context-specific Bottlenecks

1. Variation in scale-up locations:
    - There is variation in thinking about where upscaling should take place: within the broader catchment versus comparable locations outside the catchment. Some case studies have concrete ideas, while others are still in the exploratory phase. This can lead to an unequal distribution of resources and efforts.
2. Partnerships and participatory approaches:
    - Involving different stakeholders is crucial but can also be challenging. Different stakeholders may have different interests and priorities, which makes collaboration difficult. Building effective partnerships requires time, resources and careful coordination.

The proposed actions in Chapter 5 contain actions that help mitigate the challenges identified above.

9 References and relevant material

Grygoruk, M., & Rannow, S. (2017). Mind the gap! Lessons from science-based stakeholder dialogue in climate-adapted management of wetlands. Journal of environmental management, 186, 108-119.

Policy plans

Integrated River Management (IRM)

Documenten | Bouwplaats IRM

Ontwerpprogramma IRM: Homepage | Ontwerp Programma IRM (ireporting.nl)

Systeembeschouwing: Waardevolle adviezen voor een toekomstbestendig riviersysteem in Systeembeschouwing Rijn en Maas | Bouwplaats IRM

Effectbepaling nul-alternatief: Effectbepaling nulalternatief IRM - Rijkswaterstaat Publicatie Platform

Gelders Panorama voor de Rivieren

Gelders Panorama voor de Rivieren (gelderland.nl)

Deltaprogram

Home | Deltaprogramma

Nationaal programma landelijk gebied (NPLG)

Gebiedsgerichte en samenhangende aanpak landelijk gebied | Landelijk gebied: aanpak stikstof, natuur, water en klimaat | Rijksoverheid.nl

Implementation programs

Programmatic Approach Large Waters (PAGW)

Home | PAGW

Natuurverkenning grote rivieren: Natuurverkenning Grote Rivieren | Publicatie | PAGW

Ontwikkelingsperspectief: Ontwikkelingsperspectief Grote Wateren eindrapportage | Publicatie | PAGW

Ecologische systeemopgave rivieren: Ecologische Systeemopgave PAGW-Rivieren : Naar klimaatbestendige robuuste riviernatuur in 2050 | Rapport | PAGW

Video's PAGW rivieren: PAGW in het rivierengebied | Video | PAGW ; Rivierengebied PAGW | Video | PAGW

Water Framework Directive

Samenwerken aan riviernatuur (Rijkswaterstaat and Staatsbosbeheer): Leven in en om de rivier | Samenwerken aan Riviernatuur

Integrated initiatives from NGO's

Levende rivieren

Visies Ruimte voor Levende Rivieren én de natuur in de delta | Ruimte voor Levende Rivieren

OBN Natuurkennis

Home - Het Kennisnetwerk Ontwikkeling en Beheer Natuurkwaliteit (OBN) (natuurkennis.nl)

Werkveld ri - Het Kennisnetwerk Ontwikkeling en Beheer Natuurkwaliteit (OBN) (natuurkennis.nl)

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