Dialogue on National Restoration Plans and knowledge gaps encountered drafting it

Document Information

Grant Agreement number:	101052342
Project acronym:	Biodiversa+
Project full name:	The European Biodiversity Partnership
Biodiversa+ duration:	7 years
Biodiversa+ start date:	Start date: 1st October 2021
For more information about Biodiversa+	Website: http://www.biodiversa.eu/ Email: contact@biodiversa.eu Twitter: @BiodiversaPlus LinkedIn: Biodiversa+

Deliverable title:	D4.12 Report on 4th dialogue on national restoration plans and knowledge gaps encountered drafting it
Authors:	Jérémie Orliac, Thibault Prévost, Catherine Julliot (MTECT)
Work package title:	WP4 Connecting R&I programs, results and experts to policy
Task or sub-task title:	Subtask 4.1.1: Consultations and dialogues with environmental policy makers, R&I policy makers, managers, experts and relevant stakeholders
Lead partner:	MTECT
Date of publication:	September 2025
Disclaimer	Funded by the European Union. Views and opinions expressed are however those of the author(s) only and do not necessarily reflect those of the European Union. Neither the European Union nor the granting authority can be held responsible for them.

Cover page illustration: © [Pixabay - https://pixabay.com/photos/azores-hydrangeas-mountain-pasture-3713859/]

What is Biodiversa+

The European Biodiversity Partnership, Biodiversa+, supports excellent research on biodiversity with an impact for policy and society. Connecting science, policy and practise for transformative change, Biodiversa+ is part of the European Biodiversity Strategy for 2030 that aims to put Europe's biodiversity on a path to recovery by 2030. Co-funded by the European Commission, Biodiversa+ gathers 81 partners from research funding, programming and environmental policy actors in 39 European and associated countries to work on 5 main objectives:

1. Plan and support research and innovation on biodiversity through a shared strategy, annual joint calls for research projects and capacity building activities

2. Set up a network of harmonised schemes to improve monitoring of biodiversity and ecosystem services across Europe

3. Contribute to high-end knowledge for deploying Nature-based Solutions and valuation of biodiversity in the private sector

4. Ensure efficient science-based support for policy-making and implementation in Europe

5. Strengthen the relevance and impact of pan-European research on biodiversity in a global context.

More information at: https://www.biodiversa.eu/

What is the BiodivRestore Knowledge Hub

The BiodivRestore Knowledge Hub was launched on 30 and 31 May 2024 in Paris and aims to establish a pan-European knowledge hub on nature restoration, thereby strengthening the knowledge base for the implementation of the Nature Restoration Law (NRL).

It was set up to build on the success of the "BiodivRestore" ERANET COFUND that was jointly launched by Biodiversa+ and Water JPI/Water4All. It is part of the actions linked to the call for projects, co-funded by the European Commission, and brings together 52 specialists from a range of expertise relating to the restoration of freshwater, terrestrial, coastal and marine ecosystems. Likewise, it is seen as a first step in the European scientific community's contribution to support the implementation of the EU's proposed Nature Restoration Law (NRL), by building on existing initiatives and practices, and in line with countries' needs. The aim is to support countries in the development and implementation of their future national restoration plans through knowledge sharing and shared research activities.

The BiodivRestore Knowledge Hub plans to develop activities related to:

• Development of science-based guidelines/standards/good practices to increase the effectiveness and efficiency of restoration measures by countries;

• Improving general knowledge of the purpose and principles of ecological restoration, success factors, co-benefits associated with ecological restoration and how to manage conflicting interests.

More information at: https://www.biodiversa.eu/engagement/biodivrestore-knowledge-hub/

Table of contents

Executive summary

Representatives from twenty Member States (MS) of the European Union (EU) convened in Paris under the auspices of Biodiversa+ partnership to discuss the implementation of the Nature Restoration Regulation (NRR). The focus of the meeting was on the preparation of the first version of the National Restoration Plans (NRPs) to be delivered to the EU Commission by 1 September 2026.

MS representatives could share, among themselves and with experts from BiodivRestore Knowledge Hub (KH), their advancement and the pressing scientific, technical and administrative obstacles they were encountering.

They laid stress on the challenge of characterising the baseline ecological conditions for habitats and species to be included in their first NRPs. They acknowledged the limitations of the in-situ data currently exploitable within Natura 2000 areas as well as the paucity of information at their disposal outside these areas. They specifically pointed out the lack of data and knowledge on marine areas and freshwater ecosystems. In the short term, they admitted that operational guidelines would be much needed to assist them in mapping habitats, defining pertinent measures to improve their quality and quantifying favourable reference areas (FRAs).

They also identified the need to improve stakeholders' involvement in the planning process. On the communication side, they raised the importance of better conveying to the public the concrete co-benefits of restoration along with the costs of inaction. In this regard, they highlighted that refined cost/benefit evaluation methods would be highly desirable to make their communication strategies more effective.

In the meantime, they emphasised the numerous opportunities opened up by the NRR, among which: the strengthening of the coordination/collaboration between ministries, relevant institutional structures and stakeholders; the building of crosscutting expertise in the multiple fields covered by the NRR; the development of cross-border synergies with the design of joint restoration projects.

In addition, they voiced concerns on the funding of each step of the NRR implementation and called for a better alignment of EU policies and funding to support the restoration of ecosystems.

Introduction

The 2025 edition of Biodiversa+ dialogue event was held on 15-16 May at the premises of the French ministry in charge of the environment in Paris La Défense. Its focus was on the obstacles, and associated theoretical and experimental ways forward, to the implementation of the Nature Restoration Regulation (NRR), EU 2024/1991[1]. An emphasis was put on the development of the first version of the National Restoration Plans (NRPs) to be delivered to the European Commission by September 1st 2026, the date of the NRR enforcement. The need for such a dialogue event had been formulated during the previous year's edition.

The event provided a platform for representatives from 20 Member States (MS) to share, among themselves and with experts, their advancement and the pressing scientific, technical and administrative obstacles they were encountering. By highlighting obstacles and root problems, they managed to collaboratively identify pathways forward, knowledge gaps and systemic barriers remaining to be addressed. Six experts from BiodivRestore Knowledge Hub (KH)[2] supported the proceedings and contributed to the discussions.

The event was also a key opportunity to inform BiodivRestore KH work plan, fostering its alignment with the policymakers' present and future needs, as well as to inform Member States' representatives of the existence of the already delivered and upcoming activities from this Knowledge Hub.

1. Where are Member States in the process of planning restoration?

1.1. Defining the current state and dynamics of habitats and species

Natura 2000 as a starting point

Most MS started developing their NRP through the scope of already existing data from the Nature directive reporting exercises, especially those falling under article 17 of the Habitats Directive (HD) and article 12 of the Birds Directive (BD). While some MS had nation-wide habitat mapping schemes beyond Natura 2000 (N2000) areas, most reported having either scarce or accidental/fragmented data on habitats outside these areas.

In addition, several MS representatives assessed the quality and the exploitability of the existing data related to habitat condition as somewhat unsuitable for the purpose of the NRPs, as these data could be: 1) not up to date (because of capacity or funding shortages); 2) unreliable or incomparable (because of the bias or discrepancies introduced by expert judgement and/or heterogeneous methodologies); 3) hard

---

gathering/processing (because of their scattering across different places/databases, under various digital and non-digital formats).

Even in the cases where the data were considered reliable and exploitable, several MS representatives identified persistent difficulties/challenges, among which: the characterisation and mapping of species' habitats; the definition of relevant measures to improve their quality; the quantification of favourable reference areas (FRAs). More generally, most MS representatives highlighted the lack of ecosystem approach inherited from the previous directives requirements (focused on particular habitat types or on particular species) and the challenge of building suitable databases on that heritage for evaluating ecosystem restoration measures.

Venturing beyond Natura 2000

MS representatives shared many examples of ways forward to overcome the limitations inherited from N2000 data and methods. Four dimensions were explored: pre-existing national monitoring schemes, modelling, citizen science, national registry/platform setup for restoration.

A few MS reported having in place, or in project, monitoring schemes on a national level (developed independently from EU law reporting schemes). Some of these schemes were aimed at characterising structural functions of habitat types or documenting stressors. However, these initiatives were limited in scope or maturity, with funding on the wane in many cases. Most MS representatives considered it too soon to think about monitoring or adaptive management, as they were not at all at that stage (far behind that, as restoration plans were still to be elaborated and the identification of restoration measures were still ahead).

Some MS mentioned the use of modelling to (at least partially) address the lack of in-situ data – e.g. inferring habitat type or condition from satellite imaging and bioclimatic data, or quantifying FRAs from generic/isolated vegetation and animal species data. Yet MS acknowledged the limitations of such approaches and the need to acquire more data on the field.

Citizen science emerged also from the discussion as a useful, albeit limited, contribution to the restoration endeavour. Several MS had developed elaborate citizen science-based schemes to monitor the abundance of some "charismatic" and/or "easy-to-recognise" species like birds, butterflies, bats, flowering plants (with data gathered over several decades for some). Such schemes were hailed as a "brilliant tool for public engagement" yet requiring a robust support framework of professional experts with appropriate financial means to ensure their long-term viability. In some instances, citizen science approaches failed due to serious shortfalls in volunteer supply with adequate knowledge and/or a lack of sustained rigour/discipline in the collection of field data.

Some MS emphasised the benefit of developing centralised databases on a national level to keep track more systematically and thoroughly of ongoing restoration projects (as funded or supervised by public entities, profit or non-profit organisations, casual citizens). A few MS supported, or were about to support, the setup of such platforms/registries, yet over a limited scope (e.g. forest management) and with restricted means. Although such initiatives could help save resources and learn quickly from existing projects, they remained especially challenging, as centralising and maintaining relevant databases for long-term use required substantial additional resources (at least in the short term) as well as strong coordination effort.

1.2. What capacities?

Resources and coordination within ministries and agencies

Most MS representatives reported experiencing personnel constraints and fatigue in the process of developing their NRPs, with "increasing responsibilities for the same number of people". Most of these people worked in ministries or agencies and were already committed to various duties (e.g. ensuring fulfilment of HD art. 17 and BD art. 12). Setting new/additional priorities in this context often meant giving up or postponing important tasks. To help them manage the elaboration of their NRPs in the short term, several MS asked for technical support from the European Commission, notably via dedicated Technical Support Instruments (TSI).

In addition to these personnel constraints, several MS representatives reported remaining in early stages of institutional setup, with unclear attribution of responsibilities and insufficient coordination between agencies. Some emphasised significant uncertainty around the designation of competent authorities, particularly concerning the division of roles between environmental and sectoral ministries or agencies. These unclear governance structures contributed to delaying the formulation of coherent strategies and stakeholder engagement processes, ultimately affecting the design and implementation of the NRPs. Strengthening inter-ministerial collaboration and clarifying institutional mandates were considered as critical next steps in this context.

Scientific and technical expertise

Implementing the NRR required the development of a long-term expertise (whether scientific or technical). Several MS representatives stressed on enduring challenges in the mobilisation of professional experts, among which: the (up)levelling of this expertise (to ensure comparability and reproducibility of the data to be collected over the next decades); the ageing of some communities holding niche expertise in highly valuable domains; the mere reluctance of some experts to get involved in the process, for reasons that might differ from one country to another (lack of time, inadequate financial resources, unhappy experience with previous reporting exercises…); the complexity of certain tasks requiring cross-cutting skills and/or substantial financial means. All this pointed to the need of allocating significantly higher resources to education and training in the multiple fields covered by the NRR.

Cross-border synergies, required "where possible" by Art. 14.17 of the NRR, were deemed relevant for countries sharing terrestrial or marine ecosystems, as they could lead to the design of joint restoration projects, harmonised monitoring protocols, shared scientific data, coordinated management objectives and shared funding schemes. Cross-border collaboration could also contribute to identifying and addressing cumulative pressures, ensuring connectivity across habitats, and avoiding duplication of efforts or conflicting restoration actions. Such coordinated efforts could be key to achieve ecological coherence and maximise the impact of restoration strategies at both landscape and seascape scales. As reported post event, the Alpine Convention was working on a plan for a transnational cooperation in nature restoration, with the first objective of proposing a strategic overview for EU countries to be included in the respective textbox of their NRPs. To operationalise even more this recommendation, the establishment of biogeographical regional platforms could be proposed, or a re-alignment of the Biogeographical seminars organised for years by the EC.

2. Stakeholder engagement in the NRPs

2.1. Progress and strategies related to stakeholder involvement

Art. 14.20 and beyond

In most MS, a pre-consulting process was under way, involving the competent ministries or agencies and restoration experts, with discussions organised in thematic groups (some of which focused on specific articles of the NRR). In some MS, but not all, NGOs and industry representatives were included at this stage. Several MS had, or were about to, put in place networks of experts and stakeholders similar to the National hubs encouraged by Biodiversa+[3]. These structures were deemed as an efficient tool to foster and support consultation processes. In one instance, an "innovative citizen panel assembly" was being experimented with in an effort to consider grassroots feedback.

In most cases, the next step implied a public consultation process through webinars (aiming to gather hundreds of participants, requiring professional facilitation and excellent knowledge of the topics) and possibly (although less frequently) in-person local consultations. Most consultations were carried out on a national scale; a few were targeting localities. In general, the later stage of public consultation seemed to focus on explaining and asserting what had already been (or was about to be) decided through the pre-consulting process. It was unclear whether the NRPs could be amended at this later stage given the short timeframe of the NRP development (and final approval). In general, KH experts re-emphasised that complying with art. 14.20 should aim at improving ground stakeholders' support in the first place, making sure they felt recognised and given enough voice to collaborate in the forthcoming NRR implementation processes.

On the limitations of communication strategies about NRR/NRP benefits

The communication itself about the multiple benefits brought by the NRR and the NRPs still leaves room for improvement. Some MS representatives suggested that more resources should be allocated to it. BiodivRestore KH experts stressed the importance of raising awareness around the benefits of nature-based solutions. Several MS objected that these benefits were poorly understood. Was it due to the way the numbers were presented on these benefits? Was it because these estimates were considered too hypothetical, unrealistic or too remote as a reality? That "we need to find other ways to communicate to people, to businesses and to policymakers about these benefits" was a widely shared conclusion.

2.2. Barriers and opportunities

On the commitment of the primary production sector

Many MS representatives reiterated the key role the farming, fishing and forestry sectors were called to play in the successful implementation of the NRR. In these sectors, restoration measures were more seen as a constraint than as an opportunity. Making restoration compatible with primary production represented a daunting challenge in the short term. Some MS were openly reluctant to question the "competitiveness" of their own sectors (at least in the short term). Still, relieving pressures on ecosystems

---

[3] https://www.biodiversa.eu/2024/08/13/guide-for-the-establishment-of-national-hubs/

was acknowledged as crucial to avoid higher-impact adverse effects on these very sectors in the longer term.

Voluntary approaches were also discussed. Some MS reported that the latter could gain momentum when spurred by local professionals trusted by their own communities and acting as "ambassadors for change". However, most participants underlined the need for some financial incentive / compensation schemes to be in place to make systemic change possible. A robust financial framework, simple underlying procedures (requiring virtually no additional paperwork), long-term visibility and clear enforcement rules were considered to be among the key prerequisites for those schemes to be successful.

On the supportive action of the public administration

Legally accountable institutions for the NRR implementation, mainly central government services in charge of the environment and their line management, were still unsure about the operational targets to meet and the corresponding resources to provision. Identifying existing restoration projects and available means was a necessary step (yet far from sufficient). Estimating costs and benefits of restoration efforts (e.g. co-benefits for climate mitigation or adaptation) was deemed crucial although huge knowledge gaps remained unanswered regarding these estimates.

For many MS, the NRP would have to go through an approval process including many ministries that are, by their focus, less dedicated towards "pro-environmental" objectives and measures. Even Ministries in charge of the environment, constrained by limited budget and much political pressure, could not be as supportive as expected. In both cases, the urgency to find compromises should include a focus on localities and specific measures building trust from key stakeholders, via scalable/reproducible experimentations able to yield concrete benefits in the short term.

2.3. Planning for and beyond the first NRP

"Working with what we have"

A lot of effort was being allocated to the ecological side of planning, but significant effort was also being devoted to the engagement of stakeholders. The inventory of available resources, data and support organisations/structures was considered to be a priority. The new projects specifically launched to acquire new data would not be mature enough to feed the first version of the NRP. However, most MS seemed to be in a good way to gather significant feedback on their approach from concerned stakeholders to inform their planning process. The funding of each step of the implementation remained a huge barrier: existing projects, fundings and earmarked subsidies for biodiversity would help, but would not be enough. Private funding was encouraged by the EC and sought out in many MS, albeit with caution, as most private investors expected high returns on their investments in the short term.

In the process, some dimensions of the NRR were de facto given less priority. For instance, marine areas, and to a lesser extent, freshwater ecosystems were being sidelined for the time being. Lack of knowledge, lack of resources or both were most often cited as the main reasons for such decisions. Some degraded/polluted areas or habitats would not be the priority target of restoration measures in the first NRP because more systemic changes would have to occur first on the main stressors within the

associated habitats (e.g. transition towards less intensive / agroecological farming practices). In general, planning while facing a lack of consistent ecological data was deemed particularly challenging.

Some MS representatives highlighted that the overall numbers to communicate to the EC were a driver, but not an end in itself. While some key aspects of the NRR were unprioritised, by default or constraint, in order to get closer to the targets by catching low-hanging fruits, a few MS underlined the importance of coordinated effort to make sure to maintain and restore specific ecological thresholds. Besides, many considered prioritising valuable services (water provision, soil integrity) over others in the process.

Passive restoration through stressors removal without direct interventions on the field was subject to differing opinions: while it might release resources (especially human resources) to focus on active restoration elsewhere, its feasibility for effective impact was questioned. "Reducing pressures can lead to too limited impact (see the first stages in the Society of Ecological Restoration (SERE) diagram[4])". But it was acknowledged to be part of the equation.

Time and resources at stake

Despite the short timeframe, planning was and remained a long-term effort, including preparations concerning future revisions of NRPs. New data would keep enriching the planning, and the willingness of stakeholders to engage in the NRPs would remain uncertain. What mattered for some MS for the time being was to set a direction, even though the details of what needed to happen, and where and how, would certainly keep changing. Some MS representatives also pointed out the need to design NRPs in flexible ways (i.e. leaving enough room for future changes/adjustments).

On EU funding, several MS representatives wondered: "a very small part of CAP (Common agriculture policy) is going to the environment and nature, LIFE fund is in danger, how can this be when you have the law [the NRR]?" Most MS representatives admitted the EU strategy was not a coherent whole, nor were homogeneous the interests of the many stakeholders influencing its policymaking. Any improvement in support for the NRR implementation, especially funding, like through the coming new CAP, would be the product of lobbying and political organisation toward putting pressure at every scale.

3. Needs and Biodiversa+ and BiodivRestore Knowledge Hub contributions

3.1. Regulation interpretation

In general, the complexity of the regulation made its appropriation difficult for policymakers and stakeholders. To address this issue, the KH is working on a Foundational exhaustive digest translating the regulation in simpler terms and linking each part to relevant existing guidelines.

The new legal requirements around the establishment of FRAs (as introduced by the NRR) were a conundrum for some MS representatives[5]. The lack of data and the lack of practical experience in defining

---

[4] Gann et al. 2019 (Mapping Current and Future Priorities for Coral Restoration and Adaptation Programs International Coral Reef Initiative (ICRI) Ad Hoc Committee on Reef Restoration 2019 Interim Report) - Scientific Figure on ResearchGate.
[5] In 2004, the EC had stated that FRAs should be distinguished from establishing concrete targets while the NRR set them as an operational target.

FRAs and in the actual re-establishment of lost or heavily degraded habitats added a layer of obstacles to the evident hardship of recreating habitats. If the definition to be used for FRAs from now seemed to be the one from the NRR – a concrete target to make long-term viability of existing habitat types possible again – MS were missing guidance and examples. As no additional guidance seemed to be scheduled by the EC for the time being, the KH suggested providing operational guidelines through its NRP implementation recondation guide. It was also suggested, as a mid-term approach, to combine approaches from previous directives (reporting oriented) and from the NRR (restoration oriented), noting that the reporting oriented approach was far more based on expert judgment and lacked concrete spatial data. The solution might also be context dependent. For instance, as some MS have opposite historical dynamics for deforestation, history would inform the extent of forest to be restored, but it might be an element among others in the strategy. Yet the issue was urgent and important for many MS representatives, as the lack of robust and consistent estimates was a door open to set the target to the lowest and to miss valuable opportunities.

Non-deterioration measures could lead to, or were already causing, trouble and tension with professional activities like farming, leading to exclusion of certain activities in the current economic or bioclimatic conditions. How to apply the regulation in that regard was a hot and not fully clear question. The latter was linked to the general question of infringement, and the way to deal with the legal bonds. The question remained unanswered.

Putting around the table MS that were concerned about specific ecosystems or components (e.g. peatlands) to interpret the regulation could lead to coherent and consistent common pathways implementing the NRR. Some MS wondered how to interpret the regulation for urban systems. Working with other MS might help, in addition to the Foundational exhaustive digest being prepared by the KH.

3.2. Knowledge gaps on ecosystems and restoration measures

Marine areas, as well as freshwater ecosystems, were in most cases highly under-addressed, despite being among the most endangered and the target of two separate EU directives for quite a long time (Marine Strategy Framework Directive (MSFD) and Water Framework Directive (WFD)). Best case, MS had "fairly updated data for all continental habitat types, but no data for marine areas: only general conditions". The issue for some MS was that MSFD and WFD had broad ecosystem and water-body approaches, which were never really connected to the habitat and species approaches of the Nature Directives. Making connections between conditions of water bodies and Annex I habitats and removing stressors from marine areas were among the difficulties raised by some. A KH expert gathered a few documents as reference post event (see Annex 3).

Scaling restoration had never been done at the level required by the regulation. As one MS representative put it: "[it is crucial to address] the needs that will be coming up in 2-3-4 years for the next round of planning, and the prospects for 2040 higher targets that are large-scale restoration, or to address the main pressures". The KH is preparing a *Knowledge gaps paper analysis* to encourage the European research community, programmers and funders to explore these gaps.

In response to questions on lack of baseline data or information about the ecosystems targeted for restoration, KH experts advised to foster approaches like the BACI (Before-After Control-Impact design, see Annex 4).

Related to the latter two points, "what to do with unknown areas?", passive restoration was mentioned, but "how much should we do to reverse the trends?". In general, identifying main drivers of biodiversity loss to be controlled and setting positive biodiversity target change (compared to baseline, pre-action assessment/before or control sites) within an adaptive management framework was advisable. However, no comprehensive or consistent answers were given to this recurring question during the event. Operational guidelines to tackle the lack of data and knowledge on habitats and species were missing and should be better addressed in the future. A dedicated part on the *NRP implementation recommendation guide* would be highly beneficial, *i.e.* as a stand-alone output if it made sense.

Re-establishment of targeted habitats and determining suitable locations required modelling, but it remained difficult to achieve for some. To make the best of existing tools and methodologies, guidance would be welcome. Sharing with MS already experimenting and actively using such modelling approaches would be profitable.

The importance of an international monitoring system (common databases, or at least a common standard) was re-assessed. As of now, MS databases are incomparable and an initiative to overcome this huge obstacle would not happen without a strong political push and financial and technical support from the EU.

The Nature Restoration Regulation Reference Portal[6] and the Biodiversa+ website were mentioned as sources of operational documentation.

3.3. Socio-economic obstacles and related needs

Proper planning and communication to avoid sectoral conflicts were re-assessed as a task all the more complex as many stakeholders, especially in primary production sectors, distrusted EU legislation. It was reminded that high-level administrations were unlikely to be engaged in direct conflicts with landowners, and that conflict management tools adapted to nature conservation already existed, like those experimented with while implementing N2000. There was yet room to manoeuvre at a higher level to avoid losing already existing trust or willingness, or to best navigate inevitable conflicts. The KH is working on a paper and a corresponding policy brief aimed at making an operational typology/mapping of socio-economical conflicts in restoration. These documents might support MS through scientific operational analysis and guidance to anticipate and navigate situations that administrations might go through implementing the NRR.

The estimation of the costs of inaction in a given context, as well as the estimation of costs and benefits of specific actions, composed a decisive knowledge gap. Policy-makers remained indifferent to general numbers like "1€ invested in restoration is 8€ back", especially in a context where they were asked for hundreds of millions. Some MS representatives expressed their need for bioclimatically suitable estimations of such costs and benefits of restoration actions. The KH's paper and policy brief on typology/mapping of societal conflicts would address this issue. They would try to refine these estimates as much as possible, possibly including per-habitat analysis and associated methodologies.

---

[6] https://biodiversity.europa.eu/europes-biodiversity/nature-restoration/reference-portal-for-nature-restoration-regulation

Concluding remarks

The event provided to MS representatives and experts from BiodivRestore KH a unique opportunity for formal and informal exchanges on the multiple challenges posed by the NRR implementation. The following months were assessed as critical for the (future) effectiveness of the NRR, as the combined lack of knowledge, resources and political will might seriously affect the level of ambition of the first NRPs and their subsequent developments.

There was a sense of urgency shared among participants to make the most of existing funding schemes and scientific expertise in the short-term planning phase, so that initial habitat condition diagnoses and proposed restoration measures might be as scientifically grounded and operationally demanding as possible.

Among the most pressing needs identified in the short term were science-based, operational methods for the quantification of FRAs, the mapping of habitats and the design of re-establishment protocols. In the middle to longer term, several unaddressed questions were highlighted: the role to be played by citizen-science in the implementation and monitoring of restoration measures, the contribution of passive restoration to the achievement of the overall NRR goals, the tools and methods to be employed to efficiently address large-scale restoration projects.

BiodivRestore KH committed itself to meeting the most urgent needs expressed, via several guides and policy briefs to be delivered by September 2026.

Something much needed that Biodiversa+ could not address was an alignment between European policies, notably policies aiming to support the production of food on the one hand and the protection of biodiversity and the environment on the other hand. Such an alignment would require reforming the CAP as a priority, especially changing its conditionality rules (and providing long-term support for education and training in parallel), to make agroecological practices the standards of the future EU agrifood system.

Annex 1: Agenda

Agenda of the

Dialogue event on National restoration plans and knowledge gaps encountered drafting it: 15th-16th May 2025

Biodiversa+

Thursday 15th May

Grande Arche de la Défense – Reception Desk: 12h00

1 Parvis de la Défense, 92800 Puteaux

LUNCH

12h00 – 13h00 (Foyer Ségur et Passy ; with participants of KH annual event**)**

PLENARY SESSIONS – (Salle SEGUR)

13h00 – 13h30: Opening

13h00-13h05: **Welcome words**
by Marc Moroni, Vice-director of Research department, CGDD, MoE-FR
- 5 min presentation

13h05-13h20: **Presentation of Biodiversa+ & BiodivRestore Knowledge Hub**
by Rainer Sodtke, Biodiversa+ co-chair
- 10 min presentation
- 5 min Q&A

13h20-13h30: **European Commission expectations for the event**
by Benedicte Blaudeau (EC, DG ENV)
- 5 min presentation
- 5 min Q&A

13h30 – 15h25: NRR interpretation and Concrete feedback from 3-4 MS representatives

13h30-13h55: **NRR key terms (alignment on interpretation); uniform format; existing guidelines**
by Rachel Kristensen & Laura Puertolas
-   10 min presentation
-   15 min Q&A

13h55-14h10: **Favourable reference area definition**
by Kris Decleer
-   5 min presentation
-   10 min Q&A

14h10-15h25: **Member State representatives presenting their obstacles and advances in the process of drafting their NRP**
by:
Baptiste Maury, Head of Biodiversity territorial tools at French MoE
Łukasz Rejt, Ministry of Climate and Environment of Poland
Jonas Gaigr, Nature Conservation Agency of Czech Republic
Elin Forsberg, Swedish Environmental Protection Agency
-   10 minutes presentation per Member State
-   5-10 min Q&A per Member State, + extra time as needed

15h25-15h30: **Presentation of the survey's results, of this Dialogue event's objectives, and of the practical organisation** (group sessions…)
by Jérémie Orliac
-   5 min presentation

15h30 – 15h55: Break time (coffee…)

GROUP SESSIONS

15h55 – 18h00: 3 groups going through both focuses, where you have the word (rooms: **5S32**, **8S32**, **9S32**)

We kindly ask you to think in advance about the sub-questions below. Please, come with notes or enough thinking to make full use of the discussion (groups of 6 representatives, limited time).

Focus 1: **How do you perform the baselining of habitat conditions and how to plan the monitoring of deterioration or restoration trends adaptively?** (1 hour)

Sub-questions (related obstacles to be outlined):
- How do you plan to build your baseline (historical and current state, favourable reference area) and monitor for adaptive management of restoration or deterioration trends?
- How do you anticipate the impact of the restoration actions you plan? How do you evaluate the intensity of action needed to reach good conditions or to reverse biodiversity indicators?
- Supposing no more or only little resources will be allocated to the restoration effort, do you have questions about how to efficiently use these limited resources?
- Where do you get information and guidelines for these topics?

Focus 2: **How are you planning to structure the collaboration between stakeholders and to manage conflicts?** (1 hour)

Sub-questions to be addressed, and related obstacles to be outlined:
- Article 14.20: how do you plan to "give effective opportunities to [relevant stakeholders] to participate in the preparation [of your NRP]"?
- What vehicle do you plan to use to make restoration works happen (subsidies, regulation...)? Do you plan to reorient EU funds (CAP, FCP..) to finance restoration actions?
- Your official strategy might be based on outlining win-wins in the process of restoration: are you missing insights on win-wins or trade-offs to be presented in the NRP?

<div align="center">

18h00 END OF DAY

Dinner at 19h30 at the hotel's restaurant (Pullman Paris La Défense)

</div>

<div align="center">

Friday 16th May

Grande Arche de la Défense – Reception Desk: 8h30

1 Parvis de la Défense, 92800 Puteaux

WELCOMING COFFEE

8h30 – 9h00 (Foyer Passy)

PLENARY SESSIONS – (Salle PASSY)

</div>

9h00 – 10h00: **Group Session Restitution**

10h00 – 11h00: **Targeted experts' talks based on the needs outlined the day before**

11h00 – 12h00: **Presentation of BiodivRestore Knowledge Hub workplan (Ondrej Kusbach) and identification on the knowledge gaps addressed through these works, or broader, by Biodiversa+**

<div align="center">

LUNCH – END OF THE EVENT

</div>

12h00 – 13h30: **Lunch (Foyer Passy)**

Annex 2: Participants

<u>Member State Representatives</u>

Ala-Honkola Outi Maarit, Finland, Finish Ministry of Environment

Carré Aurélien, France, PatriNat

Casella Laura, Italy, Italian National Institute for Environmental Protection and Research

Chrysopolitou Vasiliki, Greece, National Museum of Natural History - Greek Biotope / Wetland Centre

Forsberg Elin Kristina, Sweden, SEPA Nature analysis unit

Gaigr Jonas, Czech Republic, Nature Conservation Agency of the Czech Republic

Galea Lara, Malta, Environment and Resources Authority (ERA) of Malta

Gambiroza Patricija, Croatia, Ministry of Environmental Protection and Green Transition

Manta Nicolae, Romania, Romanian Ministry of Environment, Waters and Forests Biodiversity Directorate

Marczin Ors Szilard, Hungary, Hungarian Ministry of Agriculture, Department for Nature Conservation, desk officer for nature conservation development

Maury Baptiste, France, MTE-FR

Moller Kadri, Estonia, Estonian Ministry of Climate

Moniz Dos Santos Maria Gabriela, Portugal, ICNF - Instituto da Conservação da Natureza e das Florestas - Portugal

Nedelnikova Tereza, Czech Republic, Ministry of the Environment of the Czech Republic

Onorbe Esparraguera Manuel, Spain, Spanish Ministry for the Ecological Transition and the Demographic Challenge

Rejt Lukasz, Poland, Ministry of Climate and Environment of Poland, Unit of Nature restoration

Roche Jennifer, Ireland, National Parks and Wildlife Service (Ireland)

Schlaberg Juliana, Germany, German Federal Agency for Nature Conservation

Slaukstins Valdimarts, Latvia, Ministry of Smart Administration and Regional Development of the Republic of Latvia

Van Oosterhout Martin, Netherlands, Ministry of Agriculture, Fisheries, Food security and Nature of the Netherlands.

Viestova Eva, Slovakia, Ministry of Environment of the Slovak Republic

<u>BiodivRestore Knowledge Hub Experts</u>

Cambria Vito Emanuele, Italy, Botanic Garden of Rome, Sapienza University of Rome

Decleer Kris, Belgium, Research Institute for Nature and Forest; Society for Ecological Restoration Europe

Guimarães Laura, Portugal, CIIMAR, University of Porto

Kristensen Rachel, Denmark, Copenhagen University

Puértolas Domènech Laura, Spain, ALBIREM SUSTAINABILITY

Sotirov Metodi, Germany/Bulgaria, University of Freiburg, Chair of Forest and Environmental Policy, Germany

Biodiversa+ Partners

Julliot Catherine, France, MTECT, CGDD

Orliac Jérémie, France, MTECT, CGDD

Prévost Thibault, France, MTECT, CGDD

Sodtke Rainer, Germany, DLR, Biodiversa+ co-chair

Kusbach Ondrej, Czech Republic, TACR

Support:

Durieux Cloé, France, FRB, Biodiversa+ operational team

Laethem Marlies, Belgium, BelSPO, Biodiversa+ operational team

European Commission presence (first day)

Blaudeau Bénédicte, EC DG-ENV
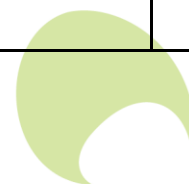
Annex 3 – References Marine and Freshwater

Document	Document typology	Topic	Environment	Ecosystem typology	Target audience	Geographical relevance	
Cebrian E et al. (2021) A roadmap for the restoration of Mediterranean macroalgal forests. Frontiers in Marine Science 8	research article	guidelines/ roadmap	marine	brown macroalgal forests	practitioners/ policy makers	Mediterranean sea	Silvia Bianchelli
Fabbrizzi et al. 2023 The challenge of setting restoration targets for macroalgal forests under climate changes. Journal of Environmental Management 326	research article	areas prioritization	marine	brown macroalgal forests	practitioners/ policy makers	Mediterranean sea	Silvia Bianchelli
Smith et al. (2023) A decision-support framework for the restoration of Cystoseira sensu lato forests. Frontiers in Marine Science 10	research article	guidelines/ro admap	marine	brown macroalgal forests	practitioners/ policy makers	Mediterranean sea	Silvia Bianchelli
National Biodiversity Future Center project	handbook	guidelines	terrestrial, freshwater, marine, urban	all	practitioners/ policy makers	Italy	Silvia Bianchelli
National Biodiversity Future Center project IN PREPARATION	summer school	training	terrestrial, freshwater, marine, urban	all	young researchers, practitioners	Italy	Silvia Bianchelli
MaCoBioS - Marine Coastal Ecosystems Biodiversity and Services in a Changing World	https://macobios.eu/	Various resources and toolbox to support the implementati on of	marine coastal ecosystems	mangrove forests, coral reefs, kelp forests, maërl beds, seagrass beds,	practitioners/ policy makers/rese archers	Northern Europe, Northwestern Mediterranean, and the Lesser Antilles	MaCoBioS consortium

		Nature-Based Solutions for restoration in marine coastal ecosystems		saltmarshes			
FutureMARES - Climate Change and Future Marine Ecosystem Services and Biodiversity	https://www.futuremares.eu/	Resources to provide socially and economically viable actions and strategies in support of nature-based solutions and nature-inclusive harvesting for climate change adaptation and mitigation. Development of solutions to safeguard future biodiversity and ecosystem functions to maximise natural capital and	Various storylines: Norwegian Coast, inter-relationships among kelp, sea urchins and cod Salmon at Hardangerfjord, Norway Restoration of eelgrass (Zostera marina) in the south-west Baltic Sea Conservation of coastal seaweeds, seagrasses, invertebrates and fish in the north-east Baltic Sea Basin scale management & Marine Protected Areas in the Baltic Sea Sustainable mussel culture in the Limfjorden, SW Baltic Sea Restoration of oysters in Dutch coastal waters	Various	practitioners/policy makers/researchers	Baltic Sea, NE Atlantic & North Sea, Bay of Biscay & Iberian Coast, Caribbean & South Pacific, Mediterranean Sea	FutureMARES consortium

		its delivery of services from marine and transitional ecosystems	Saltmarsh, seagrass and kelp habitats in the North Devon UNESCO World Biosphere Reserve Marine spatial planning (broad coverage) Seaweed, mussels, and oysters in the north-east Atlantic and North Sea Diadromous species in the NE Atlantic Ocean, including transitional and upstream waters Nature-based Solutions in the Basque coast of Bay of Biscay: seagrass restoration, protected areas, and sustainable seafood harvesting Kelp forests & biodiversity in northern Portugal Restoration of seagrass (Posidonia oceanica) in the Balearic Islands (NW Mediterranean) Marine Protected Area network for Aegean biodiversity Karpathos & Saria				

			MPAs: seagrasses and meadows, soft/rocky bottom Seagrass meadows and macroalgal forests in the MPA network of the Tuscan Archipelago Habitat-forming macroalgae / corals in the western Mediterranean Sea Conservation / Fisheries Sustainability in the Western Mediterranean from a regional perspective + synergies Basin-wide sea turtle conservation in the Mediterranean Sea Climate change and bioinvasion impacts on reef & canopy-forming macroalgae and shelf fisheries in SE Mediterranean Sea Biogeography and biodiversity change on coastal communities at continental scales Hotspots and refuges for				

			European Seas under the pressures of warming, acidification and deoxygenation Sustainable Seafood Harvesting in the Belize EEZ Ecosystem approach for the Chilean island systems				

Annex 4 – BACI

Before-After Control-Impact Design (BACI). By Laura Guimarães.

As requested, here is a selection of articles presenting and using the BACI designs. They are organised from the most recent up to historical seminal work presenting the design. They cover the design itself and the necessary statistical analysis, the drawbacks, the replication problem and examples of application to ecological restoration of different ecosystems, as well as a discussion of some useful biological indicators of biodiversity.

Globally, the BACI design performs better than the Before-After (BA) design alone, as discussed in some of the articles. However, the identification and selection of appropriate control sites is becoming increasingly complex, especially when relying solely on them. Control sites are required to help establish if the changes observed are the result of the restoration actions or due to other environmental changes. Negative control sites would indicate the pre-restoration state to attain, i.e. a baseline against which change to compare change introduced by a restoration action, while positive controls would represent the best example or target to be achieved with the restoration action. The selection is ever more difficult because, even apart from the match in characteristics, there are no real pristine ecosystems/sites nowadays, different sites accumulate different environmental stressors that need to be addressed first, and restoration to an original state envisaged would often not be achievable, depending on many aspects, including the state of degradation/health departure of the target ecosystem.

Hence, consideration and establishment of a suitable positive differential in the biodiversity level and other health indicators as a target, together with continuous monitoring and adjustment of the actions, are vital for success. When in the absence of a baseline, or with only very old (collected distant in time) data available, it is thus necessary to collect information for long enough before and after restoration to allow the quantification of natural variability (e.g., high and low flows). In this case, the collection of data before implementation of the restoration action, in a BACI or a BA design, needs to be taken into account in the planning of the restoration and is considered intensive monitoring. It requires more resources, but this is crucial for success, as it is the long-term monitoring after the initial restoration intervention.

A related alternative design is the Before–After–Gradient (BAG) approach. The BAG design incorporates distance (as an independent variable), and may thus improve statistical power over control–impact and BACI designs. It allows for the determination of the spatial and temporal extent of change associated with restoration (i.e. lateral and longitudinal).

Overall, to ensure success of ecological restoration in the long term, it is highly advisable to consider the adaptive management framework since the very beginning in the planning of any ecological restoration, from historical data collection and prioritisation to the definition of objectives, implementation of the measures established and ensuing monitoring (crucial basis of adaptive management) and adaptation.

Articles

England, J., Angelopoulos, N., Cooksley, S., Dodd, J., Gill, A., Gilvear, D., Johnson, M., Naura, M., O'Hare, M., Tree, A., Wheeldon, J., Wilkes, M.A. 2021. Best Practices for Monitoring and Assessing the Ecological Response to River Restoration. Water 13(23): 3352, doi: 10.3390/w13233352

Seger, K.D., Sousa-Lima, R., Schmitter-Soto, J.J., Urban Jr, E.R. 2021. Editorial: Before-After Control-Impact (BACI) Studies in the Ocean. Frontiers in Marine Sciences 8: 787959. doi: 10.3389/fmars.2021.787959

Methratta, E. 2020. Monitoring fisheries resources at offshore wind farms: BACI vs. BAG designs. ICES Journal of Marine Science 77: 890–900, doi: 10.1093/icesjms/fsaa026

Christie, A.P., Amano, T., Martin, P.A., Shackelford, G.E., Simmons, B.I., Sutherland, W.J. 2019. Simple study designs in ecology produce inaccurate estimates of biodiversity responses. Journal of Applied Ecology 56(12): 2742-2754, doi: 10.1111/1365-2664.13499

Liang D., Harris, L.A., Testa, J.M., Lyubchich, V., Filoso, S. 2019. Detection of the effects of stormwater control measure in streams using a Bayesian BACI power analysis. Science of the Total Environment 661: 386-392, doi: 10.1016/j.scitotenv.2019.01.125

Pardini, E.A., Parsons, L.S., Ştefan, V., Knight, T.M. 2018. GLMM BACI environmental impact analysis shows coastal dune restoration reduces seed predation on an endangered plant. Restoration Ecology 26(6): 1190-1194, doi: 10.1111/rec.12678

Roni, P., Åberg, U., Weber, C. 2018. A Review of Approaches for Monitoring the Effectiveness of Regional River Habitat Restoration Programs. North American Journal of Fisheries Management 38 (5): 1170-1186, doi: 10.1002/nafm.10222

Smokorowski, K.E., Randall, R.G. 2017. Cautions on using the Before-After-Control-Impact design in environmental effects monitoring programs. FACETS 2: 212-232, doi: 10.1139/facets-2016-0058

Conner, M.M., Saunders, W.C., Bouwes, N., Jordan, C. 2016. Evaluationg impacts using a BACI design, ratios, and a Bayesian approach with a focus on restoration. Environmental Monitoring and Assessment 188: 555, doi: 10.1007/s10661-016-5526-6

Falk, K.J., Elliott, K.A., Burke, D.M., Nol, E. 2010. Early seedling response to group selection harvesting in a northern hardwood forest. Forestry Chronicle 86 (1): 100-109, doi: 10.5558/tfc86100-1

Rochlin I., Iwanejko, T., Dempsey, M.E., Ninivaggi, D.V. 2009. Geostatistical evaluation of integrated marsh management impact on mosquito vectors using before-after-control-impact (BACI) design. International Journal of Health Geographics 8 (123): 35, doi: 10.1186/1476-072X-8-35

Zedler, J.B. 2005. Ecological restoration: guidance from theory. San Francisco Estuary and Watershed Science 3(2):1-31, doi: 10.15447/sfews.2005v3iss2art4

Stewart-Oaten, A. 2003. On rejection rates of paired intervention analysis: comment. Ecology 84:2795-2799, doi: 10.1890/02-3115

Roman, C.T., Raposa, K.B., Adamowicz, S.C., James-Pirri, M., and J.G. Catena. 2002. Quantifying vegetation and nekton response to tidal restoration of a New England salt marsh. Restoration Ecology 10(3): 450-460, doi: 10.1046/j.1526-100X.2002.01036.x

Conquest, L. L. 2000. Analysis and Interpretation of Ecological Field Data Using BACI Designs: Discussion. Journal of Agricultural, Biological, and Environmental Statistics 5(3): 293-296, doi: 10.2307/1400455

Ellis, J.I., Schneider, D.C. 1997. Evaluation of a gradient sampling design for environmental impact assessment. Environmental Monitoring and Assessment 48: 157–172, doi: 10.1023/A:1005752603707

Smith, P.E., D.R. Orvos, and J. Cairns. 1993. Impact assessment using the before-after control-impact (BACI) model: concerns and comments. Canadian Journal of Fisheries and Aquatic Sciences 50:627-637, doi: 10.1139/f93-072

Stewart-Oaten, A., J. R. Bence, and C. W. Osenberg. 1992. Assessing effects of unreplicated perturbations: no simple solutions. Ecology 73:1396-1404, doi: 10.2307/1940685

Underwood, A. J. 1992. Beyond BACI: the detection of environmental impacts on populations in the real, but variable, world. Journal of Experimental Marine Biology and Ecology 161:145-178, doi: 10.1016/0022-0981(92)90094-Q

Stewart-Oaten, A., W. W. Murdoch, and K. R. Parker. 1986. Environmental Impact Assessment: "pseudoreplication" in time? Ecology 67:929-940, doi: 10.2307/1939815