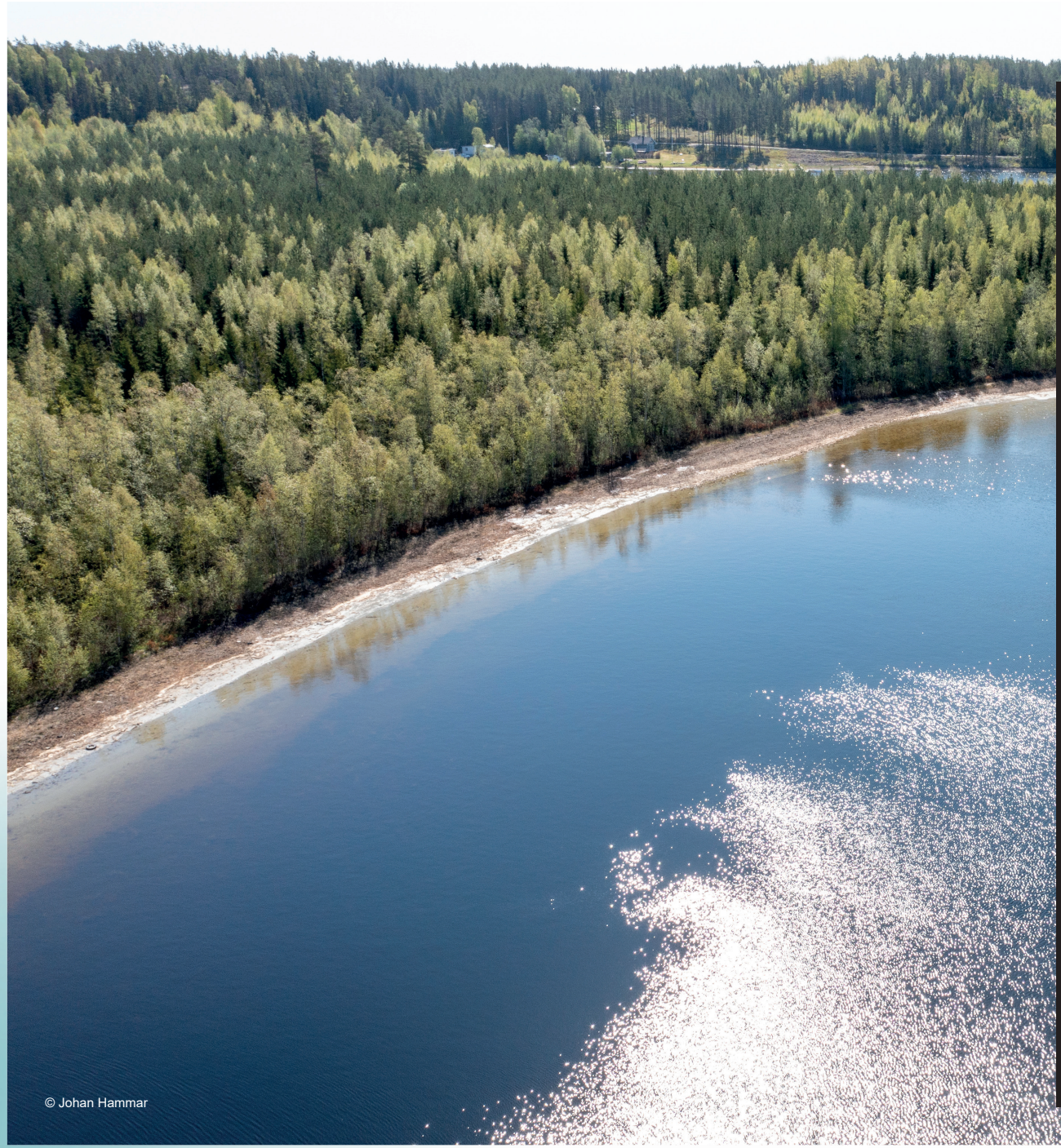
10 KEY PRINCIPLES FOR EFFECTIVE MARINE AND COASTAL RESTORATION

SETTING THE SCENE FOR SUCCESS IN THE EU

MARCH 2025

ONE PULSE AT A TIME.



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INTRODUCTION

THE NATURE RESTORATION LAW HOLDS HUGE POTENTIAL TO REVIVE OUR MARINE LIFE.

Our seas provide us with invaluable benefits every day, keeping the pulse of our planet and people in check. They are crucial in mitigating climate change, boosting our health and well-being and providing livelihoods for coastal communities. But with vital marine habitats like seagrass meadows, wetlands, and estuaries disappearing in the EU, the pulse of our seas drops and in turn, they increasingly struggle to sustain the benefits they bring to people. They need our impulses, more than ever.

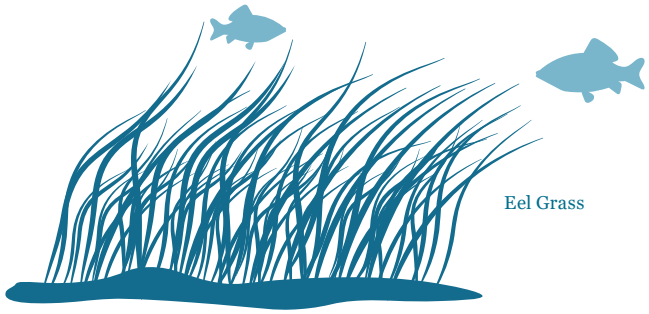
The newly adopted Nature Restoration Law (NRL) holds huge potential to revive our marine ecosystems and this publication aims to support Member States in effectively implementing it. The report identifies key principles for successful marine and coastal restoration, based on best practices that civil society witnessed on the ground. It makes marine restoration easier to navigate thanks to numerous case studies and a comprehensive step-by-step checklist. While there is a limited number of completed marine restoration projects in the EU, the ones identified in this publication closely follow the 10 key principles outlined.

The publication is a must-read for everyone working in the field of marine and coastal restoration, especially policy-makers and project managers planning and executing national- and regional-level restoration plans.

It is time to revive the ocean, one pulse at a time!

BACKGROUND

MORE THAN
40%
OF THE EU POPULATION
LIVES IN COASTAL REGIONS



Eel Grass

The seas and coastal areas of the European Union are facing profound ecological challenges as a result of human activities, such as overfishing, pollution, habitat destruction and climate change. Biodiversity in EU waters is declining,[1] which is not just an environmental concern but also a societal challenge. It endangers the health of millions of people, the livelihoods of coastal communities who directly depend on marine resources and the ecosystem services our seas and ocean can provide.

Over **80% of the EU's marine protected areas still allow harmful activities like mining**, dredging and destructive fishing practices, jeopardising their ecological integrity. Additionally, Europe is losing marine and coastal habitats such as wetlands, estuaries, sand dunes and seagrass meadows due to human development, pollution and increasing water acidity, to name a few causes. As well as supporting marine life, these habitats are crucial in mitigating climate change and buffering coastlines against its impacts, including inundation and storms. Yet marine and coastal ecosystems are also most at risk from climate change, according to the first European Climate Risk assessment.[2] This threatens water and food security, coastal infrastructure and human health, with clear repercussions on the blue economy.

More than 40% of the EU population lives in coastal regions. The current state of EU seas calls for urgent and effective nature restoration projects to help revive our ocean, restore its biodiversity, and ensure the resilience of coastal and marine environments in a changing climate. The EU's new Nature Restoration Law, which entered into force in August 2024, is a key instrument that can help reverse nature loss and support climate mitigation and adaptation. As an integral part of

1 WWF, Living planet report; 2022,https://www.wwf.eu/campaigns/livingplanet/; EEA Climate Risk report, 2024,,EEA Report No 1/2024 ; EEA, Healthy seas, thriving fisheries: transitioning to an environmentally sustainable sector, August 2024

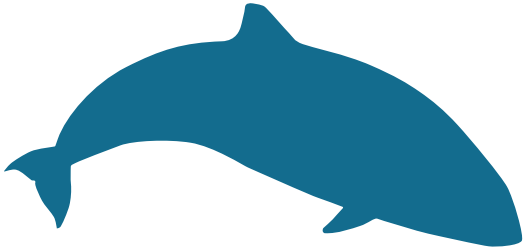
2 https://www.astrid-online.it/static/upload/euro/european-climate-risk-assessment-report-unedited.pdf

the European Green Deal and the EU Biodiversity Strategy for 2030, this ambitious legislation aims to restore to a healthy state at least 20% of Europe's degraded sea areas by 2030, and all ecosystems in need of restoration by 2050.

By 1 September 2026, all EU Member States are required to submit their National Restoration Plans (NRPs) to the European Commission, which will then assess these plans for how well they align with the NRL's requirements. Following a stepwise approach, the plans will cover the period up to 2050, with intermediate deadlines for the targets under Articles 4 to 13. Member States are required to provide a description for the period up to 2032 and a strategic overview for the period beyond (Article 15(1) and (2)).

'Restoration' means "the process of actively or passively assisting the recovery of an ecosystem in order to improve its structure and functions, with the aim of conserving or enhancing biodiversity and ecosystem resilience, through improving an area of a habitat type to good condition, re-establishing favourable reference area, and improving a habitat of a species to sufficient quality and quantity."[3]

3 Article 3 (3), definitions, REGULATION (EU) 2024/1991 OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL of 24 June 2024 on nature restoration and amending Regulation (EU) 2022/869



Baltic Harbour Porpoise

GOAL 2030

TO RESTORE TO A HEALTHY STATE

20%

OF EUROPE'S DEGRADED SEA AREAS

GOAL 2050

TO RESTORE TO A HEALTHY STATE

ALL

OF EUROPE'S DEGRADED SEA AREAS

The plans must include specific actions to halt and reverse the decline of biodiversity, improve the status of protected areas and enhance ecosystem services. For the restoration of coastal and marine ecosystems, this means quantifying the area to restore by referring to the habitat types listed under the EU Habitats Directive (the Annex I habitats) and the other marine habitats listed in the regulation's Annex II (the NRL's annexes are listed in Annex III of this report). The NRL also mandates regular reporting and monitoring to ensure progress in restoration and accountability. Urgent actions are required and the work must start now.

As EU Member States prepare their national restoration plans, we must stay focused on genuine actions that are backed by science and avoid the risk of greenwashing. These efforts must be well coordinated across borders to ensure the connectivity of marine habitats for better restoration outcomes across sea basins. Embracing a holistic approach that integrates marine restoration within existing EU policies – such as the Common Fisheries Policy, Birds and Habitats Directives, Maritime Spatial Planning Directive and the Marine Strategy Framework Directive – is essential, along with ensuring active participation from local communities and stakeholders. Monitoring and data collection will be crucial to adaptively manage restoration projects and measure their success, which will depend on continued political will, adequate funding from both public and private sectors, and regional collaboration.

This publication is designed to assist Member States in the effective implementation of the NRL. By outlining key criteria that restoration projects should include, it supports policy-makers and project managers in the process of planning and executing national- and regional-level restoration plans.

GUIDING PRINCIPLES FOR EFFECTIVE MARINE AND COASTAL RESTORATION

1. **STARTING STRONG:** Use baseline studies to identify a reference point for healthy ecosystem and assess restoration needs

2. **UNCOVERING ROOT CAUSES OF DEGRADATION:** Identify ecosystem threats and drivers for the planning process

3. **UNITED SEAS:** Scale up regional dialogue with connectivity mapping and transboundary cooperation

4. **CHOOSING APPROPRIATE MEASURES:** Prioritise passive restoration where ecosystems have the potential to recover naturally without direct interventions

5. **SETTING CLEAR OBJECTIVES:** Define restoration targets and related measures for success

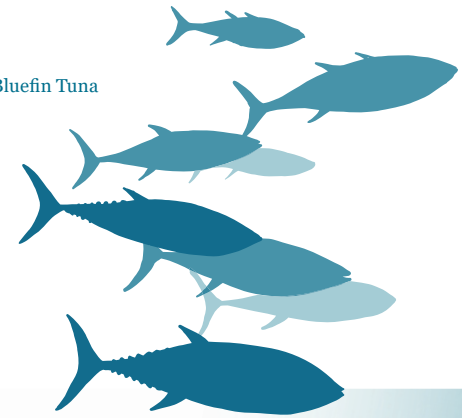
6. **EMPOWERING VOICES:** Stakeholder engagement through inclusive governance and open communication

7. **TOWARDS RESTORATION TARGETS:** Monitor progress for tangible improvement and results

8. **AVOIDING PAPER PARKS:** Close policy gaps to prevent greenwashing

9. **LONG-TERM COMMITMENT:** Non-deterioration strategies to maintain economic and social benefits

10. **ADJUSTING STRATEGIES:** Adaptive management in an era of climate change and evolving conditions



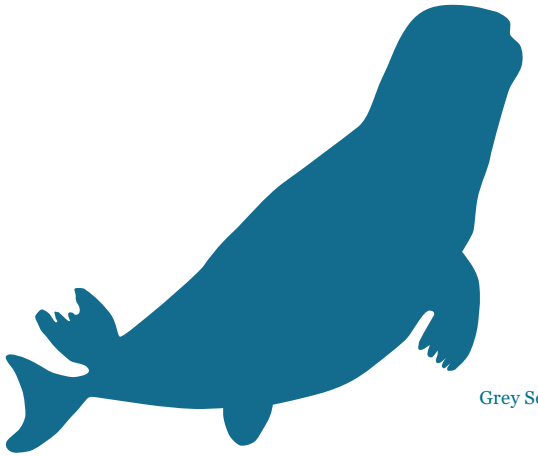
Atlantic Bluefin Tuna

METHODOLOGY

Based on peer-reviewed literature about restoration in EU marine and coastal areas, and by examining WWF's existing marine restoration projects in the EU, we have developed key principles for efficient restoration. Collectively, they provide a framework for planning, implementing and evaluating marine ecosystem restoration projects, ensuring that restoration interventions are effective, sustainable and scientifically sound.

Marine and coastal restoration is a relatively new area, and data can be fragmented and difficult to compare across different projects. Some projects have only started recently, with their intended results yet to manifest, and for some it will take many years before the outcomes become evident and comparable with others. However, many projects have already demonstrated successes and have the potential to be scaled up.

As such, the principles presented in this publication should not be taken as exhaustive or complete, but considered a starting point – the "must have" – for successful restoration projects based on current best practices. As more nature restoration projects get under way, and with improved reporting mechanisms as required under the NRL, these and other guidelines for effective restoration may need to be updated.



Grey Seal

1. STARTING STRONG: USE BASELINE STUDIES TO IDENTIFY DEGRADED ECOSYSTEMS AND ASSESS RESTORATION NEEDS

National Restoration Plans must identify degraded areas in need of restoration. They should establish a scoping study and baseline assessment to determine the current degree of ecosystem degradation, either with existing data or in case of data gaps with historical knowledge to determine a reference point to reach a healthy ecosystem again.

Atlantic Cod

Baseline studies to identify degraded ecosystems are essential to determine a reference point – that is, the desired conditions and targets for individual restoration projects for future monitoring – as well as the measures needed to get there.

Baseline data collection must be undertaken based on available science by assessing existing environmental conditions. This includes assessing species present on site, the state of habitats, water properties (chemical and physical) and any degradation issues. The NRL also provides a binding timeline for Member States to ensure progress toward understanding the condition of habitats and closing knowledge gaps.[4]

Historical data must be considered to close knowledge gaps, as irreversible impacts such as local extinctions and habitat loss may have occurred in previous decades. Gathering people's knowledge to address remaining gaps is crucial, especially at sea where many ecosystems have only been explored relatively recently. **Historical data prevents the so-called "shifting baseline syndrome", where each new generation considers already degraded ecosystems to be normal.** For instance, in the marine environment the size of the fish caught decades ago or the species that used to be present in the area can provide indicators of population health and habitat losses.

4 NRL. Article 5(7): "Member States shall ensure that the condition is known of the following areas: (a) by 2030, for at least 50 % of the area daistributed over all habitat types in groups 1 to 6 listed in Annex II; (b) by 2040, for all areas of the habitat types in groups 1 to 6 listed in Annex II; (c) by 2040, for at least 50 % of the area distributed over all habitat types in group 7 listed in Annex II; (d) by 2050, for all areas of the habitat types in group 7 listed in Annex II."

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Denmark: The 'Ocean Calling – Havet Kalder' project

RESTORING MEMORIES OF THE SEA FOR A BASELINE ASSESSMENT

Generational amnesia, or shifting baseline syndrome, describes how each generation perceives the degraded environment they inherit as normal, often unaware of past (and lost) ecological richness. In Denmark, this phenomenon is particularly evident in the declining health of its marine ecosystems. To confront this, the 'Ocean Calling – Havet Kalder' project, running from 2021 to 2023, aimed to reconnect Danes with the lost biodiversity of their seas, **focusing on marine nature that has deteriorated over the last 100 years**.

The project conducted a historical analysis of iconic species and habitats once thriving in Danish waters – eelgrass, stone reefs, sharks and more. By revealing the scale of biodiversity loss, it offered an understanding of the current state of Denmark's marine environments and highlighted solutions to reverse this decline. Beyond research, a public campaign and storytelling initiative sought to inspire action and foster hope that some of the lost nature can be restored.

Danes were encouraged to share their experiences of the ocean, becoming active participants in the baseline assessment. Personal stories, photos and videos documented how the sea has changed over time, raising public awareness of historical marine richness. This has led to a **better understanding of the consequences of historical degradation on both marine ecosystems and people, and what solutions exist to restore the habitats and reverse biodiversity decline in an inclusive manner.**

The project demonstrated the value of strong baseline assessments that extend beyond project monitoring and evaluation to include historical records. Heightened public awareness of the issue is an essential component of successful stakeholder buy-in and engagement in nature restoration. With a stronger connection to the ocean's past, **Danes are now more invested in ensuring that their seas can once again thrive for future generations**.

2. UNCOVERING ROOT CAUSES OF DEGRADATION: IDENTIFY THREATS AND DRIVERS FOR THE PLANNING PROCESS

During the preparation phase of National Restoration Plans, Member States will need to understand the causes of habitat or ecosystem decline, such as the pressure coming from human activities, invasive species or climate change. Without assessing these drivers of degradation, restoration efforts are unlikely to succeed.

Uncovering the root causes of degradation to identify threats and drivers for the planning process is essential. For instance, marine and coastal restoration must consider land-sea interactions, since activities on land significantly impact marine environments, especially through rivers and freshwater systems. A well-known example is nutrient runoff from agriculture, which affects rivers and, consequently, coastal waters. Restoration planning must consider these connections – particularly species migration, sediment flow and pollution sources – to support lasting ecosystem health from rivers to seas.

This aligns with existing processes such as ecosystem-based maritime spatial planning, which should include a comprehensive examination of land-sea interactions.[5] Similarly, improved continental water quality in line with the Water Framework Directive[6] can further strengthen marine ecosystems.

Destructive activities such as some fishing practices, pollution and nutrient runoff are drivers of degradation, but the root cause of these can be linked to policy and societal norms.

While dealing with these root causes may be beyond the scope of restoration efforts, it may be possible to address the effects. For example, there is growing evidence that top-down control by predatory fish can reduce local effects of eutrophication.[7,8] Similarly, restoring or constructing wetlands to serve as natural nutrient filters can improve water quality and reduce eutrophication in coastal areas downstream.[9]

Restoration projects must assess **drivers and root causes of degradation in the planning phase and the project design must address them directly or indirectly or overcome their effects. In general, we recommend establishing highly protected, representative scientific reference areas** because they are a valuable aid in untangling the impacts of multiple stressors in a given sea basin.

5 Article 6 of the Maritime Spatial Planning directive sets up 8 thematic minimum requirements for Member States when drafting the maritime spatial plans, some of them are further developed in subsequent articles including article 7 "Take into account land-sea interaction"

6 According to the latest EEA report on the State of Water, less than 30% of surface waters, such as rivers and lakes, are in good chemical status and less than 40% are in good ecological status.

7 Donadi, S. et al. (2017) 'A cross-scale trophic cascade from large predatory fish to algae in coastal ecosystems', Proceedings of the Royal Society B: Biological Sciences. Royal Society, 284(1859). doi: 10.1098/rspb.2017.0045.

8 Ostman, O., Eklof, J., Eriksson, B. K., Olsson, J., Moksnes, P.-O., & Bergstrom, U. (2016). Top-down control as important as nutrient enrichment for eutrophication effects in North Atlantic coastal ecosystems. Journal of Applied Ecology, 53(4), 1138-1147. https://doi.org/10.1111/1365-2664.12654

9 Paludan C, Alexeyev FE, Drews H, Fleischer S, Fuglsang A, Kindt T, Kowalski P, Moos M, Radlowki A, Stromfors G, Westberg V, Wolter K. Wetland management to reduce Baltic Sea eutrophication. Water Sci Technol. 2002;45(9):87-94. PMID: 12079128.

Finland: 'RANKKU' and 'RANKKU 2' projects

REVITALISING FINLAND'S COASTAL HEALTH THROUGH LAND-SEA CONNECTIONS

In southwestern Finland, high nutrient runoff from agriculture and forestry has led to the degradation of coastal waters, impacting the health of the Baltic Sea. To address this, WWF-Finland launched the "RANKKU" and "RANKKU 2" projects, funded by the Finnish government's Water Protection Enhancement Program and the Lassi Leppinen Foundation. These projects **tackled the often-overlooked intermediate catchment areas**, where runoff in adjacent areas flows directly into the Baltic Sea. The projects aimed to improve water quality, restore habitats and bolster coastal biodiversity in western Uusimaa region **by addressing root causes of degradation to deliver long-lasting results**.

One primary intervention was the creation of multifunctional wetlands in agricultural and forestry landscapes. These wetlands were **designed to capture and filter nutrients and sediments before they reach the Baltic Sea, mitigating eutrophication at its source**. Additionally, the wetlands serve as dynamic habitats for local flora and fauna, creating a biodiversity-rich landscape that supports various plant and animal species. The strategic placement of these wetlands, including in low-lying, waterlogged fields prone to flooding, illustrates **a comprehensive approach to nutrient management that addresses both immediate water quality needs and long-term ecosystem stability**.

The projects also restored eelgrass meadows – vital marine habitats that provide nursery grounds for young fish, improve water clarity and naturally sequester carbon. By carefully replanting eelgrass in historically significant areas, the projects supported the recovery of this key ecosystem, which has long suffered from nutrient-related water turbidity and declining clarity. By selecting restoration sites where eutrophication effects from nutrient runoff could be mitigated, **the projects aligned land-based nutrient management with marine habitat restoration, highlighting the importance of connecting source control work with restoration**.

© Iiris Kokkonen

Stakeholder involvement – from landowners to local municipalities to public engagement – was key to the projects' success and long-term sustainability. By involving the community, the projects ensured the work was grounded in practical knowledge, aligned with community needs.

The "RANKKU" and "RANKKU 2" projects **demonstrate the importance of targeting the drivers of degradation and ensuring a connected approach between land and sea**. By addressing nutrient runoff into the Baltic Sea through capturing nutrients on land and improving water quality via restoration at sea, the projects are improving Finland's coastal health and ensuring resilience for the future.

3. UNITED SEAS: SCALE UP REGIONAL DIALOGUE WITH CONNECTIVITY MAPPING AND TRANSBOUNDARY COOPERATION

Marine life transcends national borders, and the long-term success and viability of restoration efforts depends on coherent and coordinated actions among Member States. Dialogue at the regional level makes restoration outcomes stronger and more sustainable.

Marine species and habitats are interconnected through migration corridors, nutrient flows and ecological relationships, making **transboundary cooperation and connectivity mapping essential components of any successful restoration plan**. Before any marine restoration decisions are made, it is crucial to engage in consultations across maritime territories. The selection of species, habitats and areas for restoration should be considered in a broader spatial context, often across entire seascapes, to promote ecological connectivity. Marine life transcends national borders, and the long-term success and viability of restoration efforts depends on coherent and coordinated actions among Member States. Dialogue at the regional level makes restoration outcomes stronger and more sustainable.

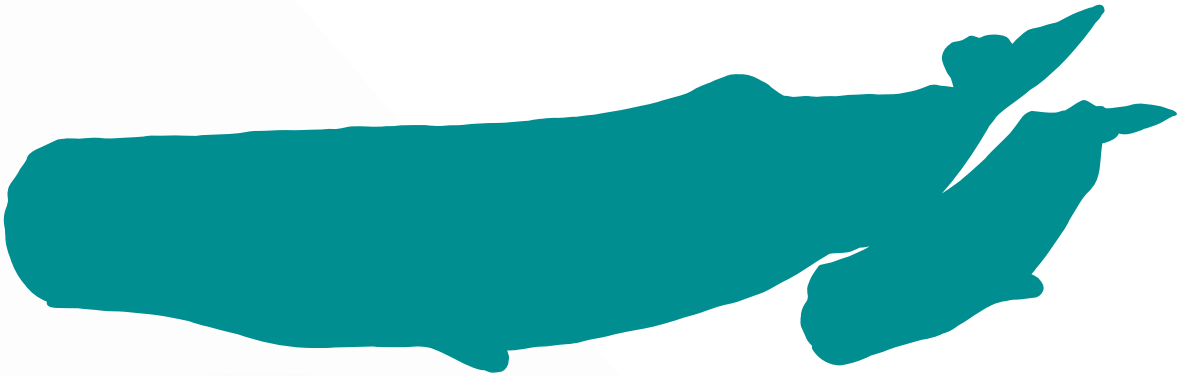
It is important to prioritise recovery of native species since they are usually already well adapted to local conditions, meaning they are more likely to thrive and support the restoration of wider ecosystem functions and resilience. However, effective restoration goes beyond individual species or habitats. Projects should aim to restore the integrity and functionality of the entire ecosystem within a given seascape, including species interactions, climate resilience, habitat connectivity and ecological processes. A single species is often not a good indicator of the health of an ecosystem, which contains many species and communities with complex interrelationships and functional properties. It is the combined results of all of these which make up an ecosystem, and which together are responsible for providing so-called ecosystem services, such as food, carbon sequestration, coastal protection against storm surges, and more.

Cross-border collaboration is critical to ensure restoration actions are not isolated and to identify areas that contribute to ecosystem resilience, such as migration corridors or ecologically connected marine protected areas. A project situated near a national border, for example, is unlikely to succeed if it does not address threats from neighbouring waters. Regional sea conventions, such as HELCOM for the Baltic, OSPAR for the Atlantic, and the Barcelona Convention for the Mediterranean, are instrumental in facilitating cross-border cooperation and aligning national restoration efforts with regional objectives.

Aligning the NRL with the Maritime Spatial Planning Directive and the Marine Strategy Framework Directive can support regional collaboration and ecosystem-wide planning to reach good environmental status of our seas.

Marine restoration projects are deeply embedded in larger ecological, cultural and socio-economic landscapes, meaning activities beyond the immediate restoration area can significantly influence their success.[10]

Sharing best practices and aligning strategies across regional sea basins can allow Member States to scale up projects and pool resources to strengthen marine ecosystem resilience and enhance the overall impact of restoration initiatives.



Sperm Whale

10 https://cdn.ymaws.com/www.ser.org/resource/resmgr/docs/Standards_of_practice_to_gui.pdf

SEAGRASS CAPTURES CARBON UP TO

35 TIMES FASTER

THAN TROPICAL RAINFORESTS,

ACCOUNTING FOR

10 % OF THE OCEAN'S CAPACITY TO STORE CARBON, DESPITE OCCUPYING ONLY

0.2% OF THE SEA FLOOR.

TURKEY, GREECE, FRANCE AND TUNISIA

RESTORING BLUE FORESTS IN THE MEDITERRANEAN (WWF INITIATIVE)

The Mediterranean Blue Forests project, a cross-border initiative led by WWF and launched in 2023, aims to restore seagrass ecosystems in Turkey, Greece, France and Tunisia which are threatened by human activities such as fishing, leisure boating activities when anchoring or pollution with excess nutrients.

These 'blue carbon' ecosystems are estimated to hold over half of the region's seagrass cover and are crucial for carbon sequestration, biodiversity and supporting the livelihoods of coastal communities. Seagrass accounts for 10 per cent of the ocean's capacity to store carbon, so-called "blue carbon", despite occupying only 0.2% of the sea floor, and it can capture carbon from the atmosphere up to 35 times faster than tropical rainforests.[11] Working through the Mediterranean Posidonia Network, the project aims to align restoration strategies and share best practices to maximise regional impact.

The initiative focuses on advocating for policies to protect seagrass ecosystems, fostering regional cooperation, implementing protective measures and developing solutions to reduce harmful practices. It also seeks to diversify local incomes and test blue carbon finance mechanisms to scale up conservation and restoration efforts effectively.

By 2027, the project aims to restore or improve the health of at least 150,000 hectares of seagrass while reducing coastal communities' dependence on activities that harm these ecosystems. This collaboration sets a precedent for sustainable action, addressing environmental and socio-economic challenges across the Mediterranean.

11 Fourqurean, J., Duarte, C., Kennedy, H. et al. Seagrass ecosystems as a globally significant carbon stock. Nature Geosci 5, 505–509 (2012). https://doi.org/10.1038/ngeo1477; getated coastal habitats in sequestering CO2. Front. Ecol. Environ. 9, 552–560 (2011); Serrano, O., Gómez-López, D.I., Sánchez-Valencia, L. et al. Seagrass blue carbon stocks and sequestration rates in the Colombian Caribbean. Sci Rep 11, 11067 (2021). https://doi.org/10.1038/s41598-021-90544-5

4. CHOOSING APPROPRIATE MEASURES: PRIORITISE PASSIVE RESTORATION

Once the root causes of ecosystem degradation are identified, restoration projects must implement targeted measures to reduce the negative impacts of human activities. This is where passive and active restoration approaches come into play.

Passive restoration focuses on halting harmful human activities, allowing ecosystems to recover naturally over time. In contrast, active restoration involves direct human interventions, such as replanting vegetation, introducing juveniles or removing invasive species.[12]

In marine ecosystems, passive restoration often shows greater benefits, but balancing both approaches can maximise long-term sustainability and ecological resilience.[13] Passive restoration should be prioritised as it often offers a more cost-effective[14] and sustainable path: rather than relying solely on active interventions, we should focus first on the reduction of human pressures like pollution, physical disturbance and over-exploitation.

Scaling back damaging activities gives ecosystems the space to regenerate naturally, avoiding the risk of restoration areas being mere "paper parks" without any specific measures or only weak ones. We are already witnessing success in marine projects where seagrass meadows left to recover naturally not only regenerate more quickly but also reduce local economic dependence on environmentally harmful practices.

However, in some instances, passive restoration is not enough. Active restoration can be a key tool where ecosystems have been severely degraded or are beyond the natural recovery threshold, such as in areas with significant habitat loss or where populations of a species have been critically diminished. In these situations, direct interventions like replanting seagrass or other vegetation or establishing biogenic reefs are necessary to jumpstart recovery.

Seagrass and Sea star

12 Reference in the Nature Restoration Law, ANNEX VII
"List of Examples of Restoration Measures Reffered to in Article 14(16)"
13 Jones HP et al (2018), Restoration and repair of Earth's damaged ecosystems, Proc. R. Soc. B, 285, 20172577
14 Restoration measures for coastal habitats in the Baltic Sea: cost-efficiency and areas of highest significance and need. HELCOM ACTION (2021)

1995 – 2022

FISH SIZE HAS INCREASED **1.5x**

MEAN WEIGHT HAS INCREASED **2.9x**

THE FISHING YIELD HAS INCREASED **7x**

111 G

321 G

1995 — 2022

Long term monitoring of fish assemblages in marine reserve of Couronne. Results of experimental fishing (4 x 500m trammel net)

France: Côte Bleue Marine Park

ACTIVE INVOLVEMENT OF STAKEHOLDERS: THE SUCCESS OF PASSIVE RESTORATION WITHIN NO-TAKE ZONES

Established in 1983 in the northwest Mediterranean close to Marseille, France, the Côte Bleue Marine Park (PMCB) is a marine protected area, part of the Natura 2000 network, which spans 9,873 hectares and 42km of rocky coastline.

The Côte Bleue Marine Park covers two strictly protected no-take zones – Carry-le-Rouet (85 hectares, established in 1983) and Cap Couronne (210 hectares, established in 1996) – where fishing, dredging, anchoring, and scuba diving are prohibited. These measures have allowed the ecosystem to passively restore itself, while active restoration efforts, including artificial reefs and 17.5 km of protective barriers, have supported fish stocks and safeguarded sensitive habitats like seagrass meadows and coralligenous reefs. Together, these actions have led to the recovery of fish populations, benefitting both biodiversity and fisheries by increasing the number, size, and variety of local species.

The involvement of stakeholders in the Côte Bleue was a crucial component of the marine park's success story. For example, involving fishers in management and monitoring has ensured artisanal fishing activities are sustainable. Several studies have shown the tangible effects of this co-management, with the 'reserve effect' (i.e. the increase in fish size, density, biomass as well as species richness[15]) being demonstrated by the return of the dusky grouper as well as the brown meagre fish in no-take areas. The fishing yield has also increased sevenfold since the creation of the no-take reserve of Couronne.

As a result, fishers have a more positive view of management measures, as these species also leave the no-take areas and become available to the fishing community. The wider community has also benefited from educational discovery courses, which are organised to explore the marine area and local fishery. Local public authorities and professional fishers have committed to work together to maintain long-term maritime economic activities.

15 Medpan, MPA Success story: No-take zones has been created within the marine park of the Côte Bleue by fishermen to restore biodiversity and resources

2021-2026

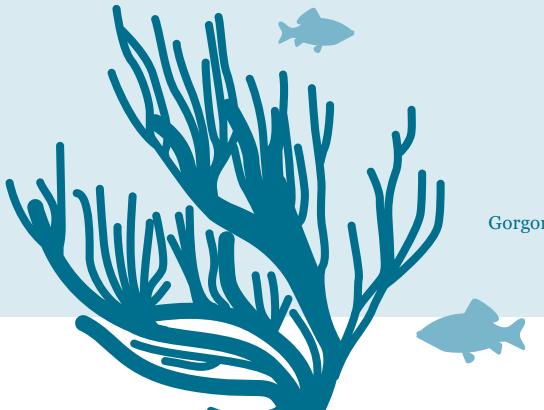
30,000 HECTARES

TO BE RESTORED IN
CATALONIA

IN PROGRESS

14 AREAS

PERMANENTLY CLOSED TO
FISHING



Gorgonia

Spain – LIFE Ecorest project

RESTORING DEEP SEA HABITATS

Marine habitats have been widely degraded as a result of intensive fishing practices. The LIFE Ecorest project (2021-2026) aims to restore 30,000 hectares of deep-sea habitats off the coast of Catalonia in the northwestern Mediterranean Sea. Active restoration is conducted in 14 designated areas that have been permanently closed to fishing to protect nursery areas and sensitive habitats for commercial fish species. These areas were agreed between the fishing sector, scientists and fisheries managers.

Restoration actions focus on recovering threatened, endangered or vulnerable sessile structuring organisms of high ecological value such as Gorgonia, black corals, stony corals, sea pens and several species of sponges that are incidentally damaged by fishing operations. These species have been reintroduced within fishery closure areas, considering their original natural habitat and potential changing climate conditions. Restored areas are monitored annually to assess restoration effectiveness and the long-term impacts on biodiversity and ecosystem services.

Stakeholder engagement is key to the project and long-term restoration goals. A multidisciplinary and highly participatory governance approach is used to develop project strategies and ensure restoration experiences are integrated into national policies, including fisheries law and marine spatial planning strategies.

This project is led by the Institute of Marine Science of Barcelona in coordination with a multistakeholder group that includes the University of Barcelona, Biodiversity Foundation of the Ministry for Ecological Transition and Demographic Challenge, Girona Fishing Guilds Federation and WWF-Spain.

5. SETTING CLEAR OBJECTIVES: DEFINE RESTORATION TARGETS AND RELATED MEASURES TO GET THERE

Defining clear and well-structured targets is essential for enhancing habitat conditions, species diversity and ecosystem services in restoration projects. These targets should align with the SMART criteria (Specific, Measurable, Achievable, Relevant and Time-bound) to ensure the project is designed for effective implementation and long-term success.

Setting measurable goals can guide restoration efforts through all stages, from design and development to monitoring and evaluation. Targets can also be compared against baseline conditions (environmental as well as socio-economic), enabling progress to be measured.

Scientific knowledge plays a critical role in shaping restoration targets. Optimal planning requires a solid understanding of the current ecological conditions of the project site as the first step (see principle 1 on baseline assessment). Where complete data is unavailable, consulting experts and stakeholders can fill in gaps without delaying the process.

Restoration targets should align with the specific ecological needs of the area, ensuring that the chosen measures and interventions are tailored to local conditions and based on scientifically validated approaches.

It is important to differentiate between mature projects with strong foundations and experimental ones that push boundaries in less-studied ecosystems. Mature projects provide best practices and valuable lessons on what works and what does not. However, replicating these methods in all contexts may not always lead to success, highlighting the need for adaptive management (see principle 10 on adaptive management). This allows for flexibility, as ecosystems can vary significantly. For instance, some experimental projects, especially in overlooked ecosystems like deep-sea habitats where historical data is limited, may require new techniques and innovation, with room to evolve over time as more scientific data and experience are gathered. This creates added challenges in setting targets.

In defining restoration objectives, legal and ownership frameworks also play a key role. Different areas, especially in coastal zones, may include both public and private lands, requiring a clear understanding of legal constraints and consistency across ownership boundaries. The goals of the project also need to reflect concerns of local communities, landowners and other stakeholders.

In addition, consistency with other EU policy requirements – such as the Common Fisheries Policy, the Marine Strategy Framework Directive, the Maritime Spatial Planning Directive and others – can reinforce restoration measures. For instance, establishing restoration targets in line with existing legal frameworks, such as those outlined in Natura 2000 and the Marine Strategy Framework Directive, can guide efforts in environmental protection and management.

6. EMPOWERING VOICES: STAKEHOLDER ENGAGEMENT AND INCLUSIVE GOVERNANCE THROUGH OPEN COMMUNICATION

The knowledge and support of those who are interested in or impacted by nature restoration projects must be taken into consideration in all phases of a project, and onboarding such as training should be provided when needed.

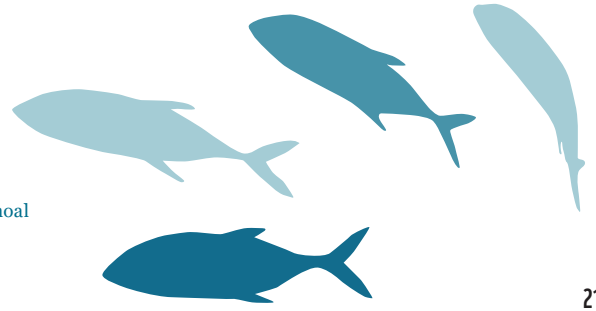
While the NRL contains relatively weak obligations on stakeholder engagement, it is backed by specific provisions of the Aarhus Convention on information sharing and public participation and subsequent case law.[16] Under Article 7 of the Aarhus Convention, parties are required to create an appropriate, fair and transparent framework for the public to participate during the preparation of plans relating to the environment.[17] Stakeholder engagement provides access to valuable local or Indigenous knowledge, records about the state of the natural environment, species and habitats, and, often, historical information on the state of the environment. Additionally, stakeholder engagement promotes stewardship and ownership, increasing the likelihood of success.

For the best outcomes, it is vital to identify and engage with all groups of stakeholders as required by the NRL. This involves actively considering information from public consultation, including the needs of local communities.[18] This should start from the very beginning of the restoration planning process, in line with maritime spatial planning or integrated coastal zone management plans when appropriate. This ensures an open and participatory process, at a level appropriate for the planned project. Projects should include mechanisms for maintaining transparency and keeping stakeholders informed throughout the process, including its final evaluation.

It is vital that every restoration project is well communicated during all of its phases. Local communities, other users of marine areas and the general public must be informed on:

- Planned actions
- Expected results
- Actual impacts – both environmental and social.

Open communication is essential to avoid misunderstandings and opposition. It also strongly contributes to maintaining the durability of positive results when the project has finished.



Shoal

16 https://environment.ec.europa.eu/law-and-governance/aarhus_en
17 To see more information on the steps to take please consult: https://wwfeu.awsassets.panda.org/downloads/wwf---nrp_final-web.pdf

18 Ibid.; NRL, Article 14. Para 3

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SWEDEN: ÅTERSKAPA ÖSTERSJÖNS LIVSKRAFT PROJECT

RESTORING BALTIC VITALITY THROUGH LOCAL ENGAGEMENT

The Baltic Sea is one of the most intensively used seas in the world. It suffers from ecosystem degradation driven by nutrient runoff, pollution, overfishing and barriers to fish migration. Eutrophication has caused widespread algal blooms which harm both human and marine health and have led to oxygen-depleted 'dead zones' on the seabed.

To combat these issues, WWF and local partners launched the four-year "Restore the Vitality of the Baltic Sea" project, funded by the Swedish Postcode Lottery. Focusing on three regions in Sweden – the High Coast World Heritage Site, Stockholm Archipelago and Kristianstad Vattenrike Biosphere Reserve – the project aimed to **restore critical marine and coastal habitats and improve the health of the Baltic Sea through science-driven interventions and local engagement**.

Shallow bays along the Baltic coastline are crucial for fish spawning and nurseries. But they are also heavily affected by pollution, nutrient runoff and overfishing. Predatory fish, like pike and perch, have an important keystone role in the ecosystem but are under increasing pressures in these degraded habitats. To effectively tackle these issues and create long-term solutions, the project engaged stakeholders from the outset.

Local landowners were actively involved in restoration initiatives to ensure their knowledge and needs were integrated into the planning process. The collaborative approach helped foster a sense of ownership and promoted transparency around the project. In total, 11 wetlands and six coastal meadows were restored, which serve as spawning and nursery areas for fish and important habitats that increase biodiversity.

Educational activities, citizen science and outreach efforts were vital for the success of the project, helping to raise awareness of the Baltic Sea's degradation and showcasing tangible solutions to restore its health.

On-the-ground restoration efforts included restoring ten fish migration routes, 18 fish spawning areas and 8,000m2 of underwater habitat like eelgrass beds and two stone reef structures, supporting predator fish populations, providing shelter for young fish and other marine life, and reducing coastal erosion. To foster community involvement, students and the general public were invited to take part in restoration activities, report observations from underwater livestreams, or explore exhibitions around the country to deepen their connection with the Baltic environment.

THE PROJECT RESTORED:

10 FISH MIGRATION ROUTES

18 FISH SPAWNING AREAS

8,000m² OF UNDERWATER HABITAT LIKE EELGRASS BEDS

2 STONE REEF STRUCTURES

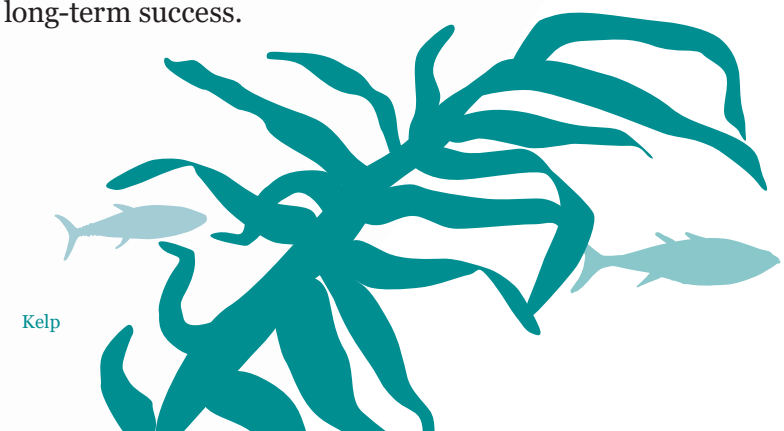
7. TOWARDS RESTORATION TARGETS: MONITOR FOR MEASURABLE IMPROVEMENT

Effective monitoring is critical to ensuring that restoration projects achieve measurable improvements in habitat conditions, species diversity and ecosystem services.

A well-designed monitoring system provides essential data to assess progress against baseline conditions and determine whether restoration efforts are meeting their objectives. By using clear science-based monitoring and evaluation systems, restoration projects can adapt management strategies as necessary, ensuring long-term success.

To support this, restoration projects can draw on existing data and resources on species, habitats and ecosystem health. Useful tools and databases include the European Marine Observation and Data Network (EMODnet), Copernicus Marine Service and the Ocean Biodiversity Information System.

Member States can also consult data from the EU Birds and Habitats Directives and the Marine Strategy Framework Directive, as well as regional sea conventions like HELCOM for the Baltic Sea, OSPAR for the Northeast Atlantic and the Barcelona Convention for the Mediterranean.



Kelp

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PORTUGAL: GULBENKIAN CARBONO AZUL

RESTORING BLUE CARBON ECOSYSTEMS

Seagrass meadows and salt marshes are vital ecosystems for sequestering carbon emissions, yet human activities are impacting their health. Targeted projects that conserve and restore these 'blue carbon' ecosystems are essential to tackling climate change, pollution and biodiversity decline.

The Gulbenkian Blue Carbon project, a collaboration between the Gulbenkian Foundation, WWF and the University of the Algarve's Marine Sciences Centre, is mapping Portugal's blue carbon ecosystems. It seeks to promote investment in their conservation and restoration to capture carbon and benefit biodiversity.

A feasibility assessment is being conducted to evaluate the potential of interventions in protecting and restoring blue carbon ecosystems in the Tagus Estuary. This will provide important baseline information to help define an effective restoration plan and measure improvement toward restoration targets.

Expected to run until the end of 2025, the study will also analyse the area's potential to boost carbon capture and retention and protect marine biodiversity. It will identify co-benefits to local communities and include a legal and policy assessment, stakeholder engagement, communication and capacity-building activities.

8. AVOIDING PAPER PARKS: CLOSE POLICY GAPS TO PREVENT GREENWASHING

Aligning EU policies is key to achieving restoration goals without falling into greenwashing traps.

Greenwashing - i.e. making false or misleading statements about the environmental benefits of a certain practice - is a growing issue in marine restoration. It occurs when industries make claims about positive nature restoration impacts, when in reality their practices do not correspond with a scientific understanding of what genuine restoration entails. Often, such efforts only serve to mask the negative environmental impacts of certain practices. These mitigation measures are presented as restoration practices to facilitate access to some areas or to continue "business as usual". It is critical to distinguish these from genuine restoration efforts, which could be undermined by such misleading greenwashing claims.

For instance, a growing challenge related to this issue is the designation of offshore renewable energy (ORE) areas, such as offshore wind farms. These zones are often promoted as "multi-use areas" that can reduce environmental harm – for example, by supporting algae or mussel farms – and attract some species. Nature-inclusive designs can indeed help mitigate damage and support biodiversity, and should be encouraged. Nevertheless, such projects will to some extent disrupt marine ecosystems, and installations typically require decommissioning every 25 years, complicating long-term ecosystem recovery. In line with the "non-deterioration" principle of the NRL they should therefore not be mistaken for genuine restoration, and not be considered nature restoration zones. Instead, to prevent the unchecked 'urbanisation' of the sea, energy zones must remain separate from designated restoration and nature zones.

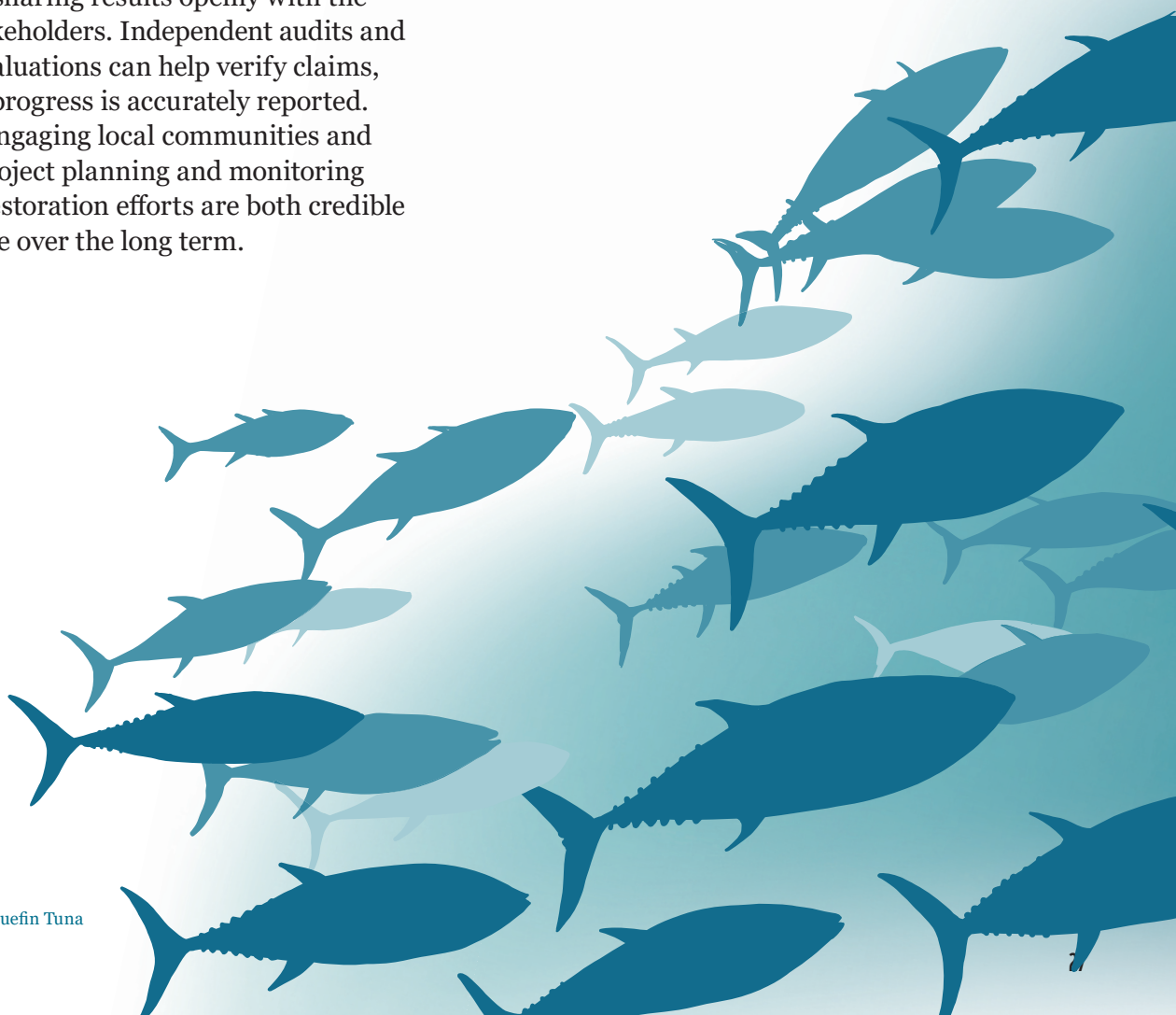
As protection and restoration areas may overlap or be connected, we should not make the same mistakes of having "paper parks" (see Principle 4). True restoration must go beyond superficial measures, ideally addressing the known root causes of degradation and enforcing consistent, robust policies that prioritise long-term ecological recovery.

Fishing is also one key industry that cannot be ignored in marine restoration efforts. Article 18 of the NRL emphasises the need for coordination with the Common Fisheries Policy (CFP). Certain conservation measures under the CFP, such as those in Articles 11 and 18, cannot be adopted by any single Member State but require Member States with fishing interests to agree on collaborative actions.

This process can be slow, as pointed out by a European Environment Agency report,[19] which risks delaying essential restoration efforts with the current timeline. The report noted that the procedures fail to protect many MPAs from fishing in a timely manner and that the interests of commercial fisheries are often favoured over nature conservation. As a result, even though the NRL and CFP aim to support ecological restoration, the need for joint recommendations can risk non-compliance if not properly managed within the tight timelines for drafting restoration plans. The European Commission must actively engage in the process, especially Article 11, to align the slower CFP processes with the urgent need for restoration under the NRL to avoid delays that hinder ambitious outcomes and progress toward restoration targets.

As these challenges apply to other activities at sea, we need a coherent alignment of EU policies, including the NRL, Renewable Energy Directive, Marine Strategy Framework Directive, CFP, MSP and other maritime legislation, to achieve restoration goals without falling into greenwashing traps.

Transparency and accountability must be prioritised, for instance by publishing environmental and social-economic assessments. This can be achieved by establishing clear, measurable goals and timelines, using standardised data collection methods, and sharing results openly with the public and stakeholders. Independent audits and third-party evaluations can help verify claims, ensuring that progress is accurately reported. Additionally, engaging local communities and scientists in project planning and monitoring ensures that restoration efforts are both credible and sustainable over the long term.



Atlantic Bluefin Tuna

19 European Environment Agency (2021): Europe's marine biodiversity remains under pressure

9. LONG-TERM COMMITMENT: NON-DETERIORATION STRATEGIES TO MAINTAIN ECONOMIC AND SOCIAL BENEFITS

Marine ecosystems take time to recover, and sustained efforts are necessary to achieve and maintain restoration goals in the long term.

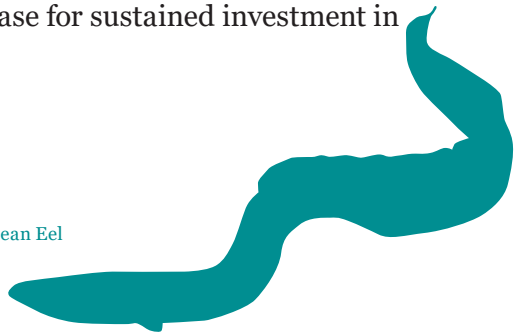
The Nature Restoration law does not have strict rules or clear guidance that fully prevents deterioration of habitats. Instead, the law requires Member States to have an effort-based obligation to "endeavour to put in place" necessary measures to prevent significant deterioration. This means Member States are not strictly required to ensure that no significant deterioration occurs, but rather to demonstrate that appropriate measures have been undertaken to try to avoid it.

Consequently, this framework allows for interpretation and impact-causing activities within restoration areas, as Member States can easily assert compliance by claiming they made efforts to prevent degradation. Due to the nature of these obligations, compliance would need to be assessed on a case-by-case basis.[20]
This weakens the law, thus Member States must seek outcome-based restoration to ensure effectiveness of restoration measures in the long term to reach the 90% restoration target for 2050.

To ensure the long-term success of restoration projects, it is essential to develop comprehensive plans that not only address immediate restoration needs but also prevent further deterioration of sites, safeguard areas in ecosystem-based marine spatial plans and sustain restoration gains. This requires robust strategies that incorporate long-term funding, consistent monitoring, regular evaluation and the flexibility to adapt restoration measures when necessary. Engaging local communities by providing capacity development opportunities when needed and fostering stewardship is also crucial to ensure compliance, as their ongoing commitment helps maintain restored areas and ensures the success of initiatives over time (see Principle 6).

Long-term commitment is also linked with securing sustainable financing. This includes developing sustainable income mechanisms such as revenues that can be created from alternative activities benefiting from restoration i.e. tourism or fishing outside restoration areas without compromising restoration integrity, which is a critical element for achieving lasting restoration outcomes. Funding can come from a diverse mix of sources, including government grants, EU funding programmes and private investments.

Public-private partnerships and green bonds can offer innovative ways to finance large-scale restoration efforts. Looking holistically at existing policy frameworks – such as the sustainable finance taxonomy and its "do not significant harm" component including the fisheries, agriculture and coastal management framework – can align financial and regulatory incentives, ensuring long-term support for restoration activities. Clear socio-economic benefits, such as increased biodiversity, improved ecosystem services and local economic opportunities, further strengthen the case for sustained investment in these projects.



European Eel

20 To see more information on the steps to take please consult the NGOs Guidance and recommendations for ambitious nature restoration plans

Key drivers of biodiversity loss in freshwater habitats

- Dams/ water abstractions (33%)
- Climate change (21%)
- Intense agriculture/aquaculture (19%)
- Urban development (19%)

The decline of coastal & marine vertebrate populations

Coastal and marine vertebrate populations have declined by 52% since 1993

The 60% figure of transitional waters

60% of transitional and coastal waters are failing good conservation status as defined by the European Water Framework Directive

MULTIPLE COUNTRIES: CROATIA, CYPRUS, FRANCE, GREECE, ITALY, MALTA, SPAIN, TUNISIA, TURKEY

RESTORING COASTAL HABITATS: WETLANDS, A NATURAL SOLUTION TO CLIMATE CHANGE AND ECONOMIC RESILIENCE

Restoring Mediterranean Wetlands: a new policymaker's playbook for sustainable management and ecosystem restoration by 2030

Wetlands, often undervalued, provide vital ecosystem services that benefit both nature and people. Globally, they store 40% of the world's carbon, manage water supplies, and act as buffers against extreme weather events such as floods and droughts, potentially saving trillions of dollars annually in damage costs. Their conversion to other land uses (for instance for agricultural use) also has a high price as it transforms these carbon sinks into carbon sources, amplifying climate change impacts.

Rehabilitating wetlands not only supports biodiversity and water quality but also revitalises degraded landscapes crucial for agriculture, fishing and local economies. Restoring wetlands enhances their natural capacity to adapt to and mitigate climate change, offering a cost-effective, long-term solution for ecological and economic resilience in the face of global challenges.

In the Mediterranean, climate change is exacerbating wetland degradation, with rising temperatures, reduced rainfall and more frequent extreme weather events threatening their ecological integrity. To tackle these challenges, the MedIsWet project chose a network of wetlands to restore in the region. Restoring these habitats could significantly enhance their role in capturing carbon, filtering pollutants and strengthening climate resilience.

MedIsWet partners conducted wetland inventories across Mediterranean islands, visiting over 1,800 sites and uploading data to open-access national databases. Collaboration with various teams, who shared objectives and technical practices, ensured best practices were applied and assessed. The initiative fostered significant interest across the Mediterranean basin, building strong relationships with local stakeholders to support conservation and prioritise restoration efforts.

10. ADJUSTING STRATEGIES: ADAPTIVE MANAGEMENT IN AN ERA OF CLIMATE CHANGE AND EVOLVING CONDITIONS

Adaptive management is essential for reaching a project's goals - especially in a dynamic marine environment - and will ensure resilience in the long term.

Marine environments are dynamic systems affected by multiple factors, including climate change, pollution, invasive non-native species and various human activities. As well as being important for reporting and evaluating progress, regular monitoring can help identify unexpected environmental changes – such as species mortality, changes in water oxygen, reduced water transparency, increased pollution and others. With regular monitoring, we may identify new trends and adjust the management of a given restoration site. Such adaptive management improves the chances of restoration success by mitigating risks before they escalate.

In this regard, it is key that upcoming national climate adaptation strategies, implemented by Member States under the European Climate Law, are aligned with National Restoration Plans under the NRL. Nature Restoration Plans must follow adaptive management principles by taking evolving climate conditions into account. Climate adaptation plans, in return, must promote nature-based solutions and ecosystem-based adaptation to achieve restoration and climate targets of respective legislation.

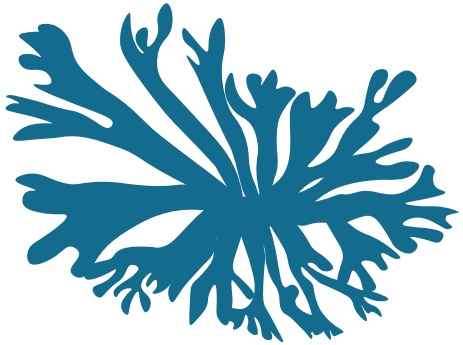
In addition, other EU files such as disaster risk assessment reports developed by Member States and/or the European Commission should provide a comprehensive analysis of how protecting and restoring key ecosystems can contribute to effective disaster risk management. These reports must underscore the synergies between ecosystem restoration and disaster resilience, serving as a critical resource for policymakers and national authorities responsible for restoration projects. This includes demonstrating the role of adaptive management in building resilience to climate change impacts, such as mitigating extreme weather events, reducing vulnerability, and enhancing ecosystem services that buffer against climate risks, also to limit economic and social risks.

By clearly linking adaptive management practices with climate adaptation goals, the Nature Restoration Plans – considering restoration measures as nature-based solutions or ecosystem-based adaptation strategies – can offer a more robust framework for integrating ecological restoration into broader climate strategies, ensuring that restoration efforts deliver tangible, measurable benefits in addressing the dual challenges of climate adaptation and disaster risk reduction.

THE WAY FORWARD

Restoring our marine ecosystems is crucial for safeguarding biodiversity, enhancing climate resilience and securing the well-being of coastal communities across Europe. The EU's Nature Restoration Law comes at a pivotal moment when many ecosystems are nearing critical tipping points. We cannot afford to waste time; urgent action is required to revive our ocean.

This is no time for ineffective plans, or mere 'box ticking' exercises. To ensure success, we need clear principles for marine ecosystem restoration, emphasising the urgency for Member States to deliver their Nature Restoration Plans promptly. These plans must be ambitious and robust, with the European Commission playing a vital role in holding Member States accountable.



Bladderwrack

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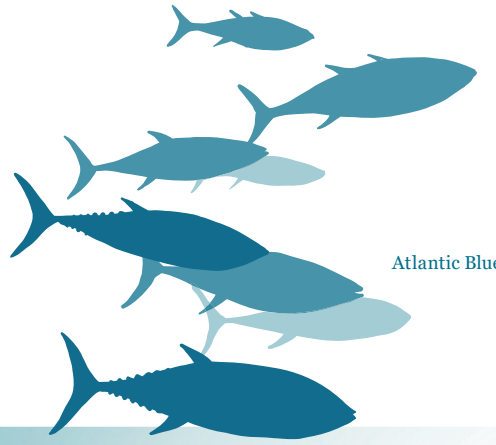
CHECKLIST TO REACH THE 10 KEY PRINCIPLES FOR EFFECTIVE MARINE RESTORATION:

Starting strong: Use baseline studies to identify a reference point for healthy ecosystem and assess restoration needs

- ☐ Collect all available scientific data.
- ☐ Consult people for historical data.

Uncovering root causes of degradation: Identify ecosystem threats and drivers for the planning process

- ☐ Assess root causes and drivers of degradation.
- ☐ Include an analysis of land-sea interactions in your assessment.



Atlantic Bluefin Tuna Tuna

United seas: Scale up regional dialogue with connectivity mapping and transboundary cooperation

- ☐ Work in a transboundary manner (within regional sea conventions or other regional forums) before adopting a National Restoration Plan.
- ☐ Identify key ecosystem connectivity components like migratory corridors (this is also reflected in the approach of ecosystem-based Maritime Spatial Planning).

Choosing appropriate measures: Prioritise passive restoration where ecosystems have the potential to recover naturally without direct interventions

- ☐ Investigate passive restoration first.
- ☐ Consider active restoration as a second option with a switch to passive restoration in the longer run.

Setting clear objectives: Define restoration targets and related measures for success

- ☐ Ensure your targets are SMART.
- ☐ Align targets with the specific ecological needs of the area and tailor measures and interventions to local conditions.
- ☐ Provide targets based on science to define accurate monitoring and success criteria.

Empowering voices: Stakeholder engagement through inclusive governance and open communication

- ☐ Communicate through all phases of the project with local communities, other users of marine areas and the general public.
- ☐ Share planned actions, expected results and actual impacts – both environmental and social.

Further Reading

Towards restoration targets: Monitor progress for tangible improvement and results

- ☐ Have a monitoring system to assess progress against baseline conditions and determine whether restoration efforts are meeting their objectives.
- ☐ Use available data sources.

Avoiding paper parks: Close policy gaps to prevent greenwashing

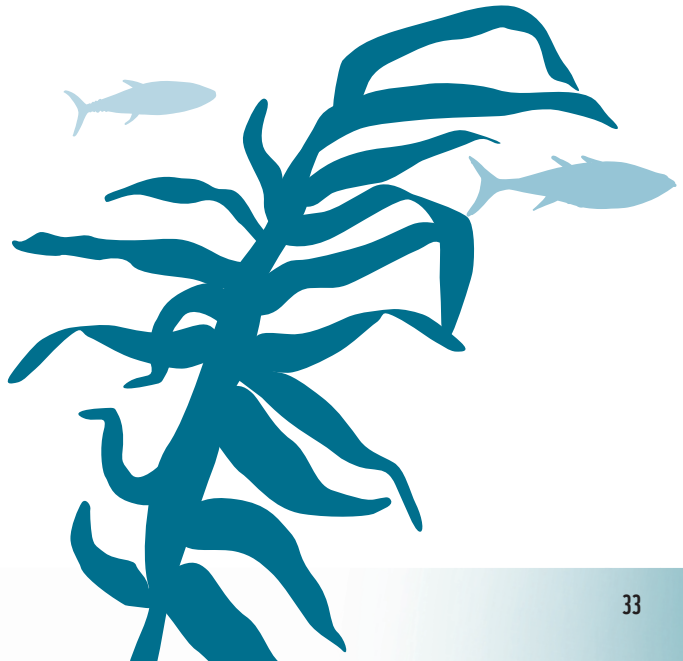
- ☐ Align CFP joint recommendations, timelines and objectives with NRL.
- ☐ Do not allow offshore renewable energy zones to be designated as restoration areas.
- ☐ Look at other sectors' impacts when designing restoration areas.
- ☐ Prioritise transparency and accountability, for instance by publishing environmental and socioeconomic assessments.

Long-term commitment: Non-deterioration strategies to maintain economic and social benefits

- ☐ Ensure your plans not only address immediate restoration needs but also prevent further deterioration of sites.
- ☐ Ensure areas are safeguarded within an ecosystem-based marine spatial plan which sustains restoration gains.
- ☐ Address long-term financial needs.

Adjusting strategies: Adaptive management in an era of climate change and evolving conditions

- ☐ Include adaptive management mechanisms to factor in dynamic systems changes such as climate change, pollution, expansion of non-native species and other human activities' impacts.
- ☐ Ensure climate change adaptation plans are aligned with NRL.



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OUR MISSION IS TO STOP THE DEGRADATION OF THE PLANET'S NATURAL ENVIRONMENT AND TO BUILD A FUTURE IN WHICH PEOPLE LIVE IN HARMONY WITH NATURE

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