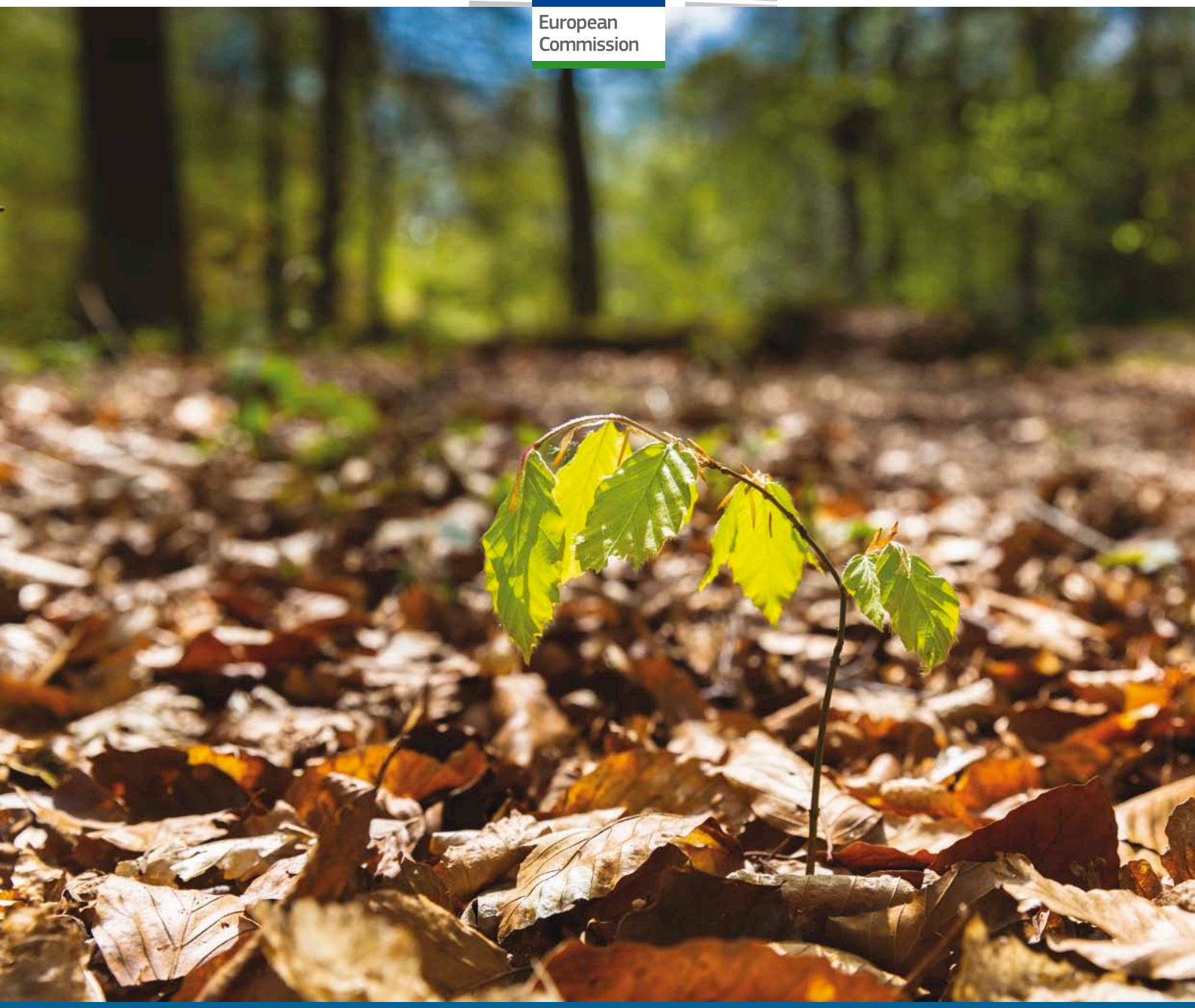
European Commission



Restoring nature

For the benefit of people, nature and the climate

Environment

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1st edition

This document should not be considered as representative of the European Commission's official position.

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Key message

In 2020, the EU adopted a new Biodiversity Strategy for 2030 setting out a comprehensive package of commitments and actions to put Europe's biodiversity back on the path to recovery by 2030. The Strategy calls on the Commission to put forward a proposal for legally binding EU nature restoration targets to fill the gaps in the existing regulatory framework and promote the restoration of degraded and carbon-rich ecosystems. Doing so will also give a major boost to Europe's other key environmental challenge, that of climate adaptation and mitigation as well as disaster prevention.

Loop of the Lech river, near Epfach, Upper Bavaria, Germany.

Frans Timmermans, Executive Vice-President of the European Commission in charge of the European Green Deal, and Commissioner for Climate Action Policy

Virginijus Sinkevičius, European Commissioner for Environment, Oceans and Fisheries

Foreword

It's easy to be fooled by nostalgia and think everything was better in the past.

But if someone tells you that birds and bugs were far more common when they were young, they're probably telling the truth. The science is clear about declining trends for biodiversity, which have now reached crisis levels everywhere, including in Europe. Human activities are causing a massive transformation of natural landscapes. Agriculture and forestry practices are becoming more intensive, our cities and infrastructure keep spreading, and nature is pushed further out of our lives.

These are just a few of the main drivers behind the loss of the very foundation of life on our planet. Climate change is an additional pressure, threatening nature, society, and our own livelihoods.

The climate and biodiversity crises are closely interlinked, and we need to tackle them together. The only way to limit global heating to 1.5°C is reversing nature loss AND halving emissions – both in this decade.

This is why the EU Biodiversity Strategy for 2030 commits to a range of actions that are good for nature, climate and people. It is an ambitious plan to protect and manage our natural heritage, while restoring a wide variety of degraded ecosystems across the Union. Nothing removes carbon more efficiently and cheaply from the atmosphere than nature itself – our forests, wetlands and seas. So we should focus our efforts on ecosystems with the greatest potential for removing and storing carbon and reducing the impact of natural disasters. That means benefits for people, nature AND the climate.

After 30 years of international and EU biodiversity policy and legislation, we know very well how to protect and restore ecosystems on land and at sea. We know about the huge benefits of nature-based solutions in a time of climate change. Now, we must implement them.

Much of our economy depends on nature. In fact, over half of global GDP does. Not tackling nature degradation now, even if it has a price, will only make the problems worse and costs higher. Investing in nature restoration is a smart investment for our society, nature and the climate, and it's time to roll it out on a far larger scale.

This brochure therefore illustrates how it can be achieved. It shows that restoration is already happening across our continent, that it is feasible, and that it works.

The payback from restoration is many times higher than the costs, as healthy ecosystems bring benefits to multiple sectors. Farmers benefit from improved soil quality and more assured pollination, communities from better flood protection, clean water and cooler cities, fishermen from recovering fish stocks, and the forestry sector from more resilient forests.

Nature restoration is not a luxury for good times – it's a vital investment in a sustainable future. We hope that the examples and success stories presented here will inspire many more, because we will need many more for the future stability of our planet.

Stepping up action to reverse the loss of biodiversity in Europe

Thanks to coordinated Europe-wide action, legislation and funding, the EU has succeeded in slowing down the rate of biodiversity decline over the last 30 years and prevented many of its most threatened species and habitats from being lost forever.

However, although it is proven that species and habitats are doing better in Natura 2000 sites and protected areas, the EU has not actually managed to halt or reverse the loss of its biodiversity. The latest assessments show that still more nature is deteriorating than improving. There are many reasons for this ranging from changing land uses to agricultural intensification, hydrological modifications, urbanisation and pollution.

The wider environment outside protected areas in particular is becoming increasingly hostile and uninhabitable for biodiversity. Protection alone – although crucial – is no longer enough to reverse the loss of biodiversity in Europe. Too much of our nature has already been destroyed or degraded over the years. Stepping up restoration efforts is therefore essential.

A major concerted effort is now needed to bring nature back to good health across the EU, in protected areas and beyond. This should be done on a sufficiently large scale to ensure the sustained long-term recovery of biodiversity, for the benefit of nature, the climate and people.

Recognising this, the EU Biodiversity Strategy for 2030 commits the Commission to propose legally binding targets to restore degraded EU ecosystems, in particular those with the most potential to remove and store carbon and to reduce the impact of natural disasters.

Climate change and biodiversity loss – two parts of the same challenge

The degradation of Europe's ecosystems has major consequences not only for biodiversity but also for our own health and wellbeing. Healthy ecosystems provide us with a wealth of ecosystem goods and services such as water purification, crop pollination, flood protection, carbon storage and sequestration. Their monetary value is considerable and virtually irreplaceable.

Peatlands and wetlands, for instance, can store and sequestrate carbon as well as mitigate the effects of extreme weather events, such as floods. However, if they are destroyed, the opposite happens and they release large quantities of greenhouse gasses, thereby contributing even further to a changing climate.

Biodiversity loss and climate change are two crises that are intrinsically linked and depend on each other for their successful resolution. The more biodiverse and healthy the ecosystems, the more resilient they will be to climate change and the more effective in preventing and reducing the risk of disasters.

This has been acknowledged at the highest level. The latest IPCC report of February 2022 calls for the implementation of urgent actions for the restoration of degraded ecosystems to mitigate the impacts of climate change, notably by restoring degraded wetlands, rivers, forests and agricultural ecosystems.

The EU's climate policies also emphasise the crucial importance of natural sinks to capture and store carbon and the need to restore ecosystems to good condition using nature based solutions to help Europe mitigate and adapt to climate change.

Sunrise with fog over heather landscape, Kampina Nature Reserve, Oisterwijk, The Netherlands.

Using nature-based solutions

The European Climate Law binds the EU to become climate neutral by 2050 and to reduce net greenhouse gas emissions by at least 55% by 2030, compared to 1990 levels.

Both the Climate Law and the EU's Strategy on Adaptation to Climate Change fully recognise that working with nature is one of the most cost-effective and efficient ways of adapting to climate change and reducing the risk of extreme weather events and natural disasters.

Such solutions can also be used to address many other societal objectives, such as improving water quality and retention, reducing coastal erosion and nutrient runoffs, etc. In short, they not only help to reduce social and environmental vulnerabilities but can also bring multiple other co-benefits for society, human health and the economy. Moreover, because of their innovative nature, they have proven to be more cost-effective than traditional measures involving heavy 'grey' infrastructure.

Floods: a high cost for society

In July 2021, several European countries were affected by severe floods. At least 243 people died. The flooding also led to widespread power outages, forced evacuations and damage to infrastructure and agriculture in the affected areas. The floods are estimated to have cost up to €2.55 billion in insured losses, with the total damage costs being much higher at a minimum of €10 billion.

In the aftermath, scientists highlighted the direct link with climate change and the fact that many of these rivers had been so severely altered that they could no long absorb excess rain water.

Recognising the high social and financial costs of flood events, several authorities are now investing millions in restoring their rivers and natural floodplains to re-establish their natural functions. The paradox is that the cost of protecting these areas in the first place would probably have amounted to only a fraction of the amount now required to repair them and could have saved lives.

The ecosystems benefits of different ecosystems

Ecosystem type	Types of benefits identified
Peatlands and wetlands	Flood alleviation; carbon storage and sequestration; water quality improvements; recreation and other cultural services; paludiculture production.
Coastal and other saline wetlands	Storm surge mitigation; protection against coastal erosion; carbon storage and sequestration; water filtration; recovery of fish stocks; recreation and other cultural services.
Forests	Timber and non-timber forest products; carbon storage and sequestration; water and soil quality; flood prevention; protection against natural disturbances (droughts, fires, pests, avalanches); recreation and other cultural services.
Grasslands and agro-ecosystems	Food and fibre; water quality; flood management; soil quality; erosion control; pollination; climate regulation; cultural services (recreation, landscape, aesthetic values).
Steppe, heath and scrubland	Erosion control; water quality; flood management; fire prevention; food and fibre; pollination, cultural services (recreation, landscape and existence values).
Rivers, lakes and alluvial habitats	Fresh water; fisheries; wastewater treatment; water quality; flood management; soil quality; cultural services (landscape, aesthetic, inspirational and recreational).
Marine ecosystems	Carbon storage and sequestration; climate regulation; erosion control; water quality; food and fibre; fish stock regeneration; recreational services.
Urban ecosystems	Health and wellbeing; cooling and insulation (e.g. against urban heat island effect); recreation; food and fibre; flood risk reduction; water quality; air quality, noise reduction, property value increase.

What does restoration mean in practice?

Restoration is a process aimed at assisting the recovery of an ecosystem that has been degraded, damaged or destroyed. The types of restoration measures needed will necessarily vary from one ecosystem to another and in function of its current state of degradation, species composition and sensitivity to change.

In general, restoration can involve either passive or active measures. Passive restoration could, for instance, involve protecting an area from human pressures and allowing it to recover of its own accord. The act of removing the pressures and threats on the area is enough in itself to enable the ecosystems, and their habitats and species, to recover naturally over time.

Active restoration is more often needed where the ecosystems have been heavily degraded or where regular management is needed (e.g. for semi-natural habitats like hay meadows). In addition to eliminating the source of degradation, active restoration will kick start the recovery process. This could, for instance, involve restoring hydrological conditions, removing invading scrub, adapting management and land use practices, or reconnecting a river with its surrounding floodplain.

In some cases, the habitat may not only need to be improved but also re-established, for instance in the case of areas that have been transformed into an entirely different type of land use. Re-establishment is especially important when the existing habitat or ecosystem is simply too small to be viable over the long term, where an important part of its original range has been lost, or where two areas can be reconnected to form a larger, more resilient, and robust whole.

The end goal: healthy ecosystems in a good condition

The ultimate objective is for the ecosystems to reach a good condition. Good condition is a general concept – just as if one were to restore the health of a person that has suffered illness and exhaustion. It simply means that all the elements that make an ecosystem function properly are restored to good working order, so allowing the ecosystem to reach its full potential.

In the case of an ecosystem, this means restoring both its quantity and its quality, especially as regards its physical state, its chemical state, its species composition, its structure, and its ability to function as a complex interconnected habitat taking into account external influences. The restoration process begins as soon as the restoration measures have been put in place, but this does not immediately result in the ecosystems reaching a good condition. It could take some time before the ecosystem reaches that stage.

This is because different habitats recover at different rates. Experience has shown that a river or floodplain, for instance, might take a few years to reach its full ecological potential. A natural forest, raised bog or dry grassland, on the other hand, could take several decades or more to regain the full complex mix of plant and animal species that characterise it.

Restored sites should also be protected from degrading again to ensure they reach and are maintained in a good condition. The EU Biodiversity Strategy commits EU Member States to protect 30% of the EU territory for nature by 2030, of which 10% should be strictly protected. Restoration should therefore work hand in hand with this protection target to maximise the benefits.

Saltmarsh and tidal channel, St. Peter Ording, Schleswig-Holstein Wadden Sea National Park, Germany.

Typical restoration measures

Ecosystem type	Examples of restoration measures	
Peatlands and wetlands	• Halt peat extraction; block drainage ditches; restore hydrological water levels; remove encroaching scrub and trees, resolve pollution.	
Coastal and other saline wetlands	• Change the coastal defence systems to allow salt marshes to re-establish themselves and act as buffers during storms; restore the natural dynamics of the dune ecosystems.	
Forests	• Diversify the age structure and tree species composition; protect large, old and senescent trees; progressively convert monocultures and replace fast growing exotics with native tree species better adapted to local conditions; increase amounts of dead / decaying wood, block drains, create open clearings; restrict large-scale clear-felling operations and introduce 'close to nature' forest management practices.	
Agro-ecosystems	• Promote more extensive farming practices, such as grazing and mowing, compatible with farmland biodiversity. On arable land introduce biodiversity-rich landscape features such as flower strips, hedgerows, pockets of trees, fallow land, small ponds etc.; reduce fertiliser and pesticide use; convert to agro-ecological practices like organic production or agro-forestry; remove invading scrub; reintroduce extensive farming in newly restored grasslands; rewet peatlands under agricultural use.	
Steppe, heath and scrubland	• Remove invading scrub and alien species and re-introduce recurrent management practices that support the conservation of the habitats and species present; reconnect small sites with one another to create large healthier and more resilient ecosystem units; introduce erosion control measures.	
Rivers, lakes and alluvial habitats	• Remove lateral and longitudinal barriers to improve the flow of the river and improve its connectivity up and down stream; re-meander the river to allow more natural river flow; reconnect the river with the surrounding flood plains.	
Marine ecosystems	• Restore marine habitats such as cold water reefs or Posidonia beds by prohibiting destructive practices such as bottom dredging or free mooring; use selective fishing gear and create no go zones to act as fish nurseries; replant seagrasses and rebuild cold water reefs in which marine biodiversity can shelter and develop.	
Urban ecosystems	• Introduce green features into the urban landscape (shady tree lines, green roofs and walls); create sustainable urban drainage systems and reduce areas of impermeable concrete; increase green areas such as urban forests and parks and use natural vegetation to provide shelter for biodiversity; reduce use of fertilisers and pesticides; remove alien species.	

Where is restoration needed?

Due to its diverse climate, topography and soil conditions, the EU has a rich and diverse range of natural ecosystems. Amongst these, forests, croplands and grasslands are by far the most widespread, reflecting centuries of different land uses, especially farming, that have shaped our landscape and our biodiversity.

Within the eight broad ecosystem categories present in Europe, habitats exist that are particularly rich in biodiversity, or host rare or threatened species that are protected by existing conservation policies. It makes sense therefore to give them priority for restoration in order to improve their condition where they are still relatively intact or to re-establish them where they have been already lost.

Obvious targets for restoration are those habitats capable of storing and sequestering large quantities of carbon – such as peatlands, old growth forests, or intact seagrass beds, or that can help mitigate extreme climate events – such as wetlands and free flowing rivers.

More heavily modified ecosystems – such as cropland, intensive grassland, forest plantations and urban areas – should also be improved to achieve the Union's climate and biodiversity objectives. Even if such modified ecosystems are not intrinsically rich in biodiversity, improving their health, resilience and biodiversity will render them more self sustaining and resilient to catastrophic events, such as floods, droughts, fires, disease.

It will also help reduce the existing pressures on biodiversity by creating a less hostile environment which will in turn generate a whole range of other environmental, social and economic benefits that are currently not available.

Restoring farmland, forests and urban ecosystems

There are many benefits to be had from improving modified ecosystems. A shift from intensive farming for instance to more extensive agro-ecological farming practices will help to improve soil conditions, reduce nutrient pollution and the need for fertilisers. This will make agriculture more resilient to climate change and environmental risks, while also creating jobs, for example in organic farming, rural tourism and recreation. It will also increase the pollinator population.

Because agriculture is also a major producer of greenhouse gasses, there is an urgent need to reduce such emissions. Carbon farming involves farming practices that not only sequester atmospheric carbon into the soil but also avoid the release of greenhouse gasses from organic soils. This is achieved by rewetting and improving soil conditions , leading to a more fertile agro-ecosystem harbouring a richer biodiversity.

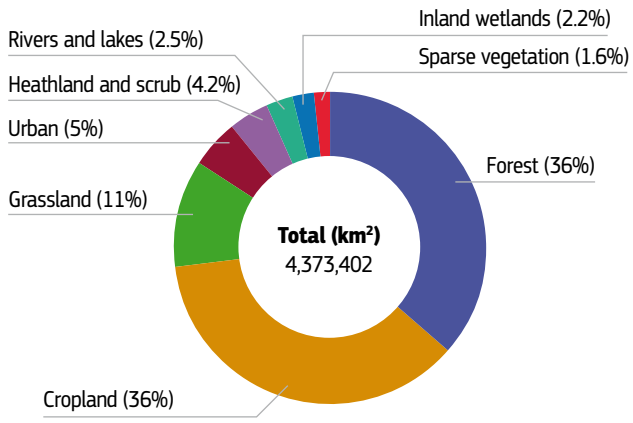
A shift from commercial forest operations to more 'close to nature' forestry techniques and integrated forest management practices will help to stabilise the soil, purify the air and water and reduce the impact of natural disasters, such as wildfires and pest or diseases. They will also ensure Europe's forests play a central role in climate mitigation since they will be better able to capture and store carbon.

In the urban environment, biodiversity-rich green spaces – such as urban parks and forests, urban wetlands, community allotments, tree-lined avenues, green walls and roofs – can help render cities more sustainable, liveable and resilient.

They can also offer solutions to major urban environmental problems, such as air and water pollution, noise, heatwaves and floods, and provide ample opportunities for recreation, relaxation, social interaction, education and discovery.

Oulanka River, Finland. Woodland predominantly Spruce (*Picea abies*) and Silver Birch (*Betula verrucosa*).

Share of terrestrial ecosystems



The figures are based on data for EU and the UK from 2018. The total EU + UK land area is almost 4.4 million km^2. Marine ecosystems cover an even larger area estimated at 5.8 million km^2.

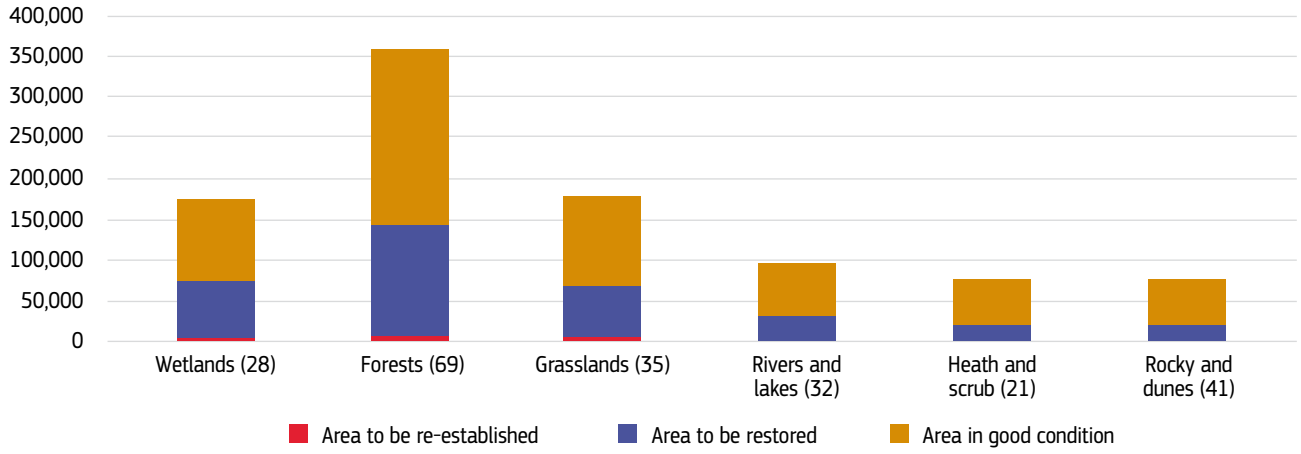
Source: EU Ecosystem Assessment, European Environment Agency 2018

Carbon Farming

Examples of effective carbon farming practices include:

- Restoration of drained peatlands and wetlands that reduces oxidation of the existing carbon stock and increases the potential for carbon sequestration;
- Targeted conversion of agricultural land to fallow or more extensive grasslands;
- Use of catch crops, cover crops, conservation tillage and increasing landscape features: protecting soils, reducing soil loss by erosion and enhancing soil organic carbon on degraded arable land;
- Agroforestry and other forms of mixed farming combining woody vegetation (trees or shrubs) with crop and/or animal production systems on the same land;
- Afforestation and reforestation that respect ecological principles favourable to biodiversity and enhanced sustainable forest management, including biodiversity-friendly practices and adaptation of forests to climate change.

Restoration needs for habitats types listed in the EU Habitat Directive



Source: EEA: Restoration needs of habitats listed in Annex I of the Habitats Directive based on reporting by Member States (2013–2018). Romania is excluded because it reported Annex I areas exceeding the terrestrial area of the country. NB the figures are averages. They include habitats that have a poor or bad conservation status or an unknown status.

Over 230 different habitat types have been included in the Habitats Directive because of their high biodiversity value. Together, they cover almost a quarter – 24% – of the EU land area, and 4.8% of the EU seas.

The European Environment Agency has made an estimate of the extent to which EU protected habitats need to be restored, in order that they reach a favourable conservation status across their natural range within the EU. The figures indicate that around a third of the total area is in need of restoration, or even re-establishment. This represents an average total of around 360,000 km^2, or **around 10% of the total EU land**.

In the marine environment, the area hosting habitats protected under the Habitats Directive and in need of restoration represents an average total of around 121.537 km^2 representing less than 2% of the European marine area.

However, the need for restoration clearly goes beyond Annex I habitat types. Additional restoration measures will also have to be taken, among others, for marine areas, for habitats of species and for heavily modified ecosystems to make them more biodiversity friendly. Rough estimations point to a need for restoration measures on **about 20% of the land and sea by 2030**.

What makes a successful restoration project?

For a restoration programme or project to be successful, several factors have to be considered. The first is the scale of the restoration works: the greater the area over which restoration is done, the more impact this will have on the ecosystem as a whole. Strategic large-scale projects may require significantly more preparation and planning, underpinned by sound science and monitoring, but are also much more effective at reversing biodiversity decline.

Small-scale initiatives, on the other hand, have been shown to have only a limited impact on biodiversity beyond the local area. They are also less sustainable over the long term.

Another essential factor for success is early dialogue between all sectors and stakeholders from the outset. This will help to define common goals and identify potential wins-wins as well as co-benefits for all concerned. It will also make it easier to find acceptable solutions that can achieve the same goal but with fewer trade-offs.

The restoration of natural ecosystems is often a complex operation. Not everything can be predicted in advance, but again the larger the area targeted and the more strategic the restoration project, the more room there is to adapt the approach in function of first results so as to maximise the recovery success.

Not everything can be restored either, hence the need for strategic long-term planning and strong policy integration to prioritise ecosystems that are in most urgent need of restoration and to ensure that the policy response is coherent, providing co-benefits for several sectors at once.

The costs and benefits of restoration

The cost of restoring natural ecosystems will be necessarily significant considering the large areas over which restoration is needed. But the benefits that will be derived from healthy restored ecosystems are expected to be even greater.

Several detailed economic analyses have demonstrated that the monetary value of the benefits derived from restoration are on average 8–10 times greater than the initial investment costs, and this is consistent across all types of ecosystems.

In the case of the biodiversity-rich habitats protected under the Habitats Directive, restoring them to a good condition over 10% of the total EU territory, is estimated to cost in total 154 billion.

By comparison the projected benefits are expected to reach 1,860 billion € – a cost benefit ratio of 1:12 in favour of benefits. The cost of inaction is also much higher than the restoration costs, estimated at 1,700 billion €.

Another important consideration is that, typically, the cost of nature-based solutions is significantly lower than the cost of man-made solutions. Studies have shown that reconnecting a river to its floodplains to absorb excess flood water is far cheaper than building a concrete storm basin further upstream.

The EU has agreed to commit 10% of its budget to biodiversity by the end of 2026 and 30% to climate change over the period 2022-2027. Many opportunities therefore exist under the whole range of EU funding programmes to support large-scale ecosystem restoration projects across the EU.

Pastureland carpeted with Dandelions (*Taraxacum officinale*) after the retreat of spring floods, Biebrza National Park, Podlaskie, Poland.

Key elements of a successful restoration project

- Use of sound science (e.g. knowledge of site, pressures, existing land uses and restoration requirements);
- Strategic long-term programming to prioritise ecosystems in most urgent need of restoration;
- Large-scale restoration initiatives over a significant area, or even a region;
- Solid cross-sector partnerships to ensure better policy integration that maximise co-benefits and win-win opportunities;
- Active engagement and involvement of all sectors and stakeholders from the outset (including sufficient rewards and compensation opportunities where needed);
- SMART restoration measures based on past practical experience and careful planning;
- Sufficient and sustainable funding over the long term to match the restoration programme;
- Regular monitoring and adaptive management to maximise the impacts, speed of recovery and the chance of success;
- Take the necessary measures to ensure the long-term maintenance in good condition of the restored area.

Converting to paludiculture: an alternative to farming on peatlands

Drained peatlands under intensive agricultural use make up only 3% of the EU's utilised agricultural area but are responsible for 25% of the greenhouse gas emissions from the EU's agricultural sector. Recognising this, the new CAP Regulation for 2022–2027 has banned the further conversion of peatlands and wetlands to agricultural land.

But, in order to reduce greenhouse gas emissions from these areas, it will also be important to restore existing drained peatlands that are being used for arable or intensive grassland farming. This will turn them into net carbon sinks. This does not necessarily mean taking the area out of agricultural production. Paludiculture is a form of farming on wet or rewetted peatlands that cultivates crops adapted to high water levels, such as reed, black alder and peat moss and berries.

These crops can have a higher value both financially and ecologically. They can be processed for use as insulation and construction materials, as bio-refinery products as well as for livestock fodder and fuel, amongst others. Paludiculture is also excellent for biodiversity, allowing the co-existence of typical wetland birds and other species.

Restoring urban biodiversity

Urban ecosystems represent only a small proportion of the EU's total land area, yet this is where the majority of Europeans live and work. Contrary to popular belief, many European cities harbour a surprisingly rich biodiversity, including endangered species, and can play an important role in their conservation. A recent study found that 82% of the EU cities with a population of over 50,000 inhabitants have one or more Natura 2000 sites within their boundaries. In total, 2842 Natura 2000 sites are located at least partly within cities, representing around 10% of the Natura 2000 network.

Until now urban development has been seen mainly as a threat to nature due to its appetite for land. Whilst this remains true, it ignores the important role that cities can play in safeguarding biodiversity and the vital contribution urban areas can make in improving the quality of life and sustainability of the cities themselves. In addition to the ecosystem services they provide, biodiversity-rich green spaces, such as Natura 2000 sites, offer attractive areas for recreation, relaxation and social interaction as well as education and discovery. In the city, nature is 'up close and personal' rather than distant and abstract.

Paving the way for EU-level action

The European Green Deal has set out an ambitious roadmap to transform the Union into a fair and prosperous society, with a modern, resource-efficient and competitive economy, aiming to protect, conserve and enhance the Union's natural capital, and to protect the health and well-being of citizens from environment-related risks and impacts.

As part of the European Green Deal, the Commission has adopted an EU Biodiversity Strategy for 2030 which aims to ensure that Europe's biodiversity will be put on the path to recovery by 2030 for the benefit of people, the planet, the climate and our economy.

The Strategy sets out an ambitious EU nature restoration plan with a number of key commitments, including a commitment to put forward a proposal for legally binding EU nature restoration targets to restore degraded ecosystems.

The previous Biodiversity Strategy to 2020 had set a voluntary target of restoring 15% of degraded ecosystems by 2020, but this target was not met, principally due to the voluntary nature of the commitment. Hence the intention now of creating an EU wide restoration framework with legally binding EU nature restoration targets.

Having legally binding EU restoration targets will also facilitate the integration of this restoration objective into all other EU sector policies, including the EU's climate objectives, and so ensure a more coherent policy response that is capable of generating co-benefits for all. EU level targets will also facilitate the financing of large-scale restoration projects from various EU funding sources.

From national restoration to a global ambition

In order to ensure a strategic and coordinated approach across the EU, Member States will be asked to draw up National Restoration Plans to demonstrate how the EU level targets will be met over the coming decades.

This should be done in a similar way to the ten-year national energy and climate plans being developed under the Clean Energy for all Europeans Package, so that priorities and co-benefits can be identified and a strategic long-term programme set up that is based on sound science and extensive stakeholder dialogue.

This will enable the EU to act with urgency and start restoring ecosystems as soon as possible. It should also pave the way for a broad range of ecosystems in the EU to be restored and maintained by 2050, with measurable results by 2030 and 2040.

The new nature restoration law will also demonstrate global leadership and help to mobilise the international community to take action to reverse the loss of biodiversity worldwide. Later in 2022, the Conference of the Parties (COP15) of the Convention on Biological Diversity is expected to conclude a new global biodiversity framework that includes ambitious restoration targets.

The EU's Biodiversity Strategy for 2030 and forthcoming proposal for nature restoration legislation will send a strong signal to the global community that the EU is taking its commitment seriously. It could also serve as inspiration for other countries to adopt similar ambitious policies on nature restoration.

Meadowland, near Talsi, Latvia.

Majority of Europeans are in favour of EU level restoration targets

European public support for nature restoration has been consistently strong over the years and the engagement to protect and restore nature among citizens, especially among the young, is on the rise.

According to the Eurobarometer survey on biodiversity (2018–2019), over three quarters of Europeans totally agreed that we have a responsibility to look after nature and that doing so is essential in tackling climate change. Respondents also ranked the restoration of nature as one of the most important actions that the EU should take to protect biodiversity.

This public interest is also apparent in the replies to recent public consultation on the forthcoming restoration initiative under the EU Biodiversity Strategy to 2030. Of the 104,471 replies received, 95% fully agreed that the EU should set legally binding targets for Member States to restore degraded ecosystems.

The UN Decade for Restoration – 10 years to restore our planet

UNITED NATIONS DECADE ON ECOSYSTEM RESTORATION 2021-2030

The call to restore nature is not just a European initiative. It is a global ambition. To draw attention to the urgent need to restore natural all around the world, the UN General Assembly declared 2020 the 'Decade of Ecological Restoration'. Led by the United Nations Environment Programme (UNEP) and the Food and Agricultural Organisation (FAO), the Decade aims to build a strong, broad-based global movement to ramp up and build political momentum for restoration.
https://www.decadeonrestoration.org/strategy

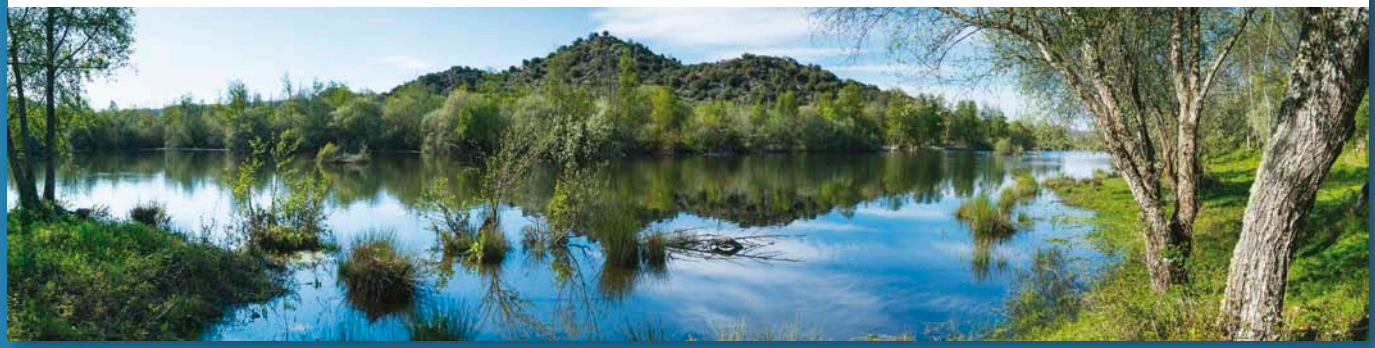
To further support the Decade, a consortium of organisations led by The UNEP's World Conservation Monitoring Centre has compiled a database of over 4000 ecosystem restoration projects within Europe which is available on:
www.restorationfunders.com

Restoring Europe's rivers over at least 25,000 km by 2030

Europe's rivers, lakes and alluvial habitats are subjected to a wide range of pressures including hydromorphological changes, such as canalisation, building of dams and bank reinforcements. The Biodiversity Strategy to 2030 calls for greater efforts to restore the natural functions of rivers and step up efforts to achieve the Water Framework Directive objectives.

The Strategy, in particular, sets the target of making at least 25 000 km of rivers free-flowing again by 2030, primarily by removing obsolete barriers and restoring floodplains and wetlands. Such measures will not only help Europe's freshwater ecosystems thrive again but will also improve their capacity to deliver other valuable ecosystem services, such as flood protection, water purification and recreational opportunities.

In December 2021, The Commission issued guidance to help Member States identify and prioritise the barriers to be removed, highlighting possible EU funding sources for such works. Particular attention is also paid to restoring the biodiversity value of the rivers and their surrounding floodplains, and so making the rivers passable again for rare iconic species such as the Danube salmon, Atlantic sturgeon or European eel.



Case studies

A

PEATLAND:
Restoring Ireland's peatlands

Peatlands are a unique habitat that have formed over millions of years. They host an exceptional array of species of plants, birds and other animals that are often found nowhere else. Peatlands also store huge amounts of carbon within its peat layer which can be 20 metres deep in places, giving it that characteristic spongy feel underfoot.

Ireland hosts a significant proportion of Europe's peatlands. For centuries, this was also the country's main source of energy. Extraction was done on an industrial scale resulting in the loss of most of Ireland's peatlands. But mounting pressure to protect biodiversity, reduce GHG emissions and revert to more efficient energy sources lead the Irish government to announce the phasing out of peat for electricity in 2020. The last peat-fuelled power plant was closed down that same year.

In 2017, the EU LIFE Funded 'Living Bog' project was launched to restore 3000 ha of raised bog in 12 Natura 2000 sites across seven counties. Drains were blocked, water levels raised and invading trees and scrub removed in order to restore the original hydrological and ecological conditions that would allow the bog to recover fully over time.

A key to the success of the project was the extensive engagement with stakeholders which has ensured the acceptance of restoration across the project sites and beyond.

Buoyed by the success of the project, the Irish government, in cooperation with the electricity company Bord na Mona, is now embarking on an even more ambitious peatland restoration programme for the entire country, called the "Peatlands and People" project. It will receive a further 10€ million through a climate action initiative funded by the EU's new Recovery Fund.

B

RIVERS:
Skjern River Restoration – Denmark

Skjern River in western Jutland is one of the largest rivers in Denmark. At its mouth there was once a huge expanse of meadows, reed-swamps, meandering watercourses, fens and shallow lakes, which were a prime habitat for thousands of migrating birds and other wildlife.

In the 1960s, a major land reclamation project was undertaken to straighten and embank the river and turn the surrounding marshland into agricultural land. At first, the crops were fairly successful. But, as time went on, their productivity diminished drastically despite the application of increasing large quantities of fertiliser. The high nutrient levels also led to the silting up and eutrophication of the Ringkøbing fjord further downstream.

In 1987, faced with all this farmland of low quality, the government decided to launch a major restoration project for the Skjern River and surrounding land. This was to become the largest restoration project of its kind in northern Europe, costing some costing 35 million € to which LIFE contributed a part. The river was re-excavated and placed into a more natural meandering river bed over 26 km and some 2200 ha were reconverted to marshland. The water quality quickly improved both here and in the neighbouring Fjord. Wildlife came back in significant numbers almost as soon as the construction works ended.

But the story does not end there. The site also quickly became a magnet for visitors in search of nature. By the end of the project some 350,000–400,000 people were using the new created nature trails. The farmers were also given support to adopt more extensive nature friendly farming practices. A cost benefit analysis of the restoration project concluded that the overall cost of the project will be more than compensated for by the local economic opportunities it is generating.

C

MARINE:
Restoring Posidonia beds in Spain

Posidonia oceanica is a type of seagrass endemic to the Mediterranean Sea. It grows in waters up to 40 m deep where it forms large underwater meadows that act as important refuges and feeding grounds for hundreds of different marine species. Yet, despite their value, over half of Europe's Posidonia beds have been damaged or degraded over the years.

Posidonia beds are not just rich biodiversity hubs, they are also vitally important for other reasons. They protect the coastline from erosion by diminishing the energy of the waves and stabilising sediments. They provide a spawning ground and nursery for juvenile fish, which helps to replenish commercial fish stocks. They also store and sequestrate vast quantities of carbon, estimated at half a million tonnes a year.

The waters around Andalusia host around 6,700 ha of seagrass meadows, 90% of which is now protected in 12 Natura 2000 sites. In 2010, a first EU LIFE project was launched to map and study the conservation needs of Posidonia beds in the region. Measures were also taken to reduce on-going threats in order to allow the habitat to recover naturally.

Several initiatives have also been launched since to restore already damaged Posidonia beds. This includes pioneering work by IMEDEA (Instituto Mediterraneo de Estudios Avanzados) which has been investigating the restoration of Posidonia beds since 2008. Building on this expertise the Red Eléctrica de España transplanted seagrass fragments and seeds grown under laboratory conditions into degraded meadows, using, for example, trenches used to lay submarine electricity cables.

The experiment proved to be a success with 90% of the meadows surviving until the 2nd year. But, the restoration costs remain high. Ultimately, the most effective solution is to protect the remaining healthy seagrass beds so that they can recover naturally on their own.

D

FOREST:
Restoring Finland's Forests

In southern and western Finland, natural boreal forests, bog woodlands and esker forests were once extensive, providing vitally important refuges for wild plants and animals. The majority of these forests have since been converted to commercial operations which are generally dense and uniform, and as a consequence, relatively uninhabitable for wildlife.

In 2003, a large-scale forest restoration project was launched under the EU LIFE Fund to improve the conservation status of these three forest habitats within 33 Natura 2000 sites in Southern Finland. At the time, it was the largest forest restoration project of its kind in Finland. The project undertook a series of measures to re-naturalise the forest structure and reconnect isolated patches. This included diversifying the age and size of the trees, increasing the amount dead or decaying wood, and opening up forest clearings.

The project proved to be so successful that it was transformed into a major national restoration programme – the Forest Biodiversity Programme METSO 2008–2025 – with a budget of 30 million € a year. METSO is based on a voluntary approach which encourages private owners to offer their forests up for temporary or permanent conservation. In exchange they receive full financial compensation equivalent to the value of timber.

The METSO objectives are to have 96,000 hectares of forest established as permanently protected areas and to safeguard biodiversity on 82,000 hectares in commercially managed forests by means of fixed-term environmental forestry subsidy agreements and nature management projects.

The programme has been warmly welcomed by forest owners, NGOs, forest companies and authorities alike. It has also prompted the government to launch a second major programme – HELMI – to restore biodiversity in other ecosystems as well.

Examples of restoration projects undertaken across the EU

1

La Bassée wetlands restoration, France
Providing newly created biodiverse wetlands and flood protection for Paris through the restoration of disused gravel pits.
https://bit.ly/36AkeMN

2

Dune ecosystem revival, Netherlands
Restoring dune complexes and salt marshes along the North Sea coast to enhance biodiversity and mitigate coastal erosion
https://bit.ly/3QoSnI8

3

Krkonoše grassland restoration, Czechia
Restoring species rich grasslands and hay meadows in the Krkonoše Mountains and promoting their farm products to tourists.
https://bit.ly/37JiQYG

4

Restoring karst grasslands, Croatia
Reintroducing extensive farming in the Dinaric Karst mountains to restore biodiversity and protect water supplies from underground aquifers.
https://bit.ly/3L7KRaL

5

Restoring Hortobagy's salt steppes, Hungary
Restoring the salt steppes and marshes of the Hortobágy Puszta and re-introducing extensive farming.
https://bit.ly/3JB0aI0

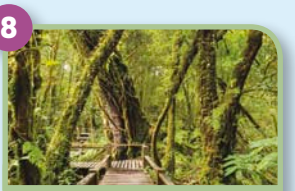
6

Lake Cerknica restoration, Slovenia
Restoring Europe's largest intermittent lake to protect local aquafers and promote nature friendly land uses
https://bit.ly/3wvX2dC

7

Restoration of Natura 2000 sites around Bratislava, Slovakia
Re-establishing a functional network of Natura 2000 sites around the city and promoting sustainable recreational activities.
https://bit.ly/36AlM9z

8



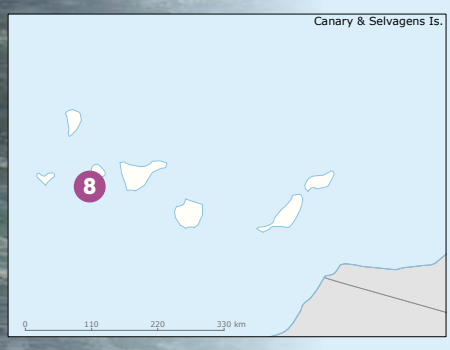
Restoration of Laurel forests on la Gomera, the Canaries, Spain
Ecological restoration of ancient laurel forests following a devastating forest fire in 2012.
https://bit.ly/3wzVqxH

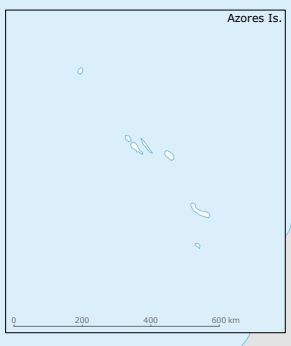
9

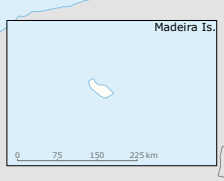
Boreal Baltic Coastal meadow restoration, Estonia
Supporting farmers to restore and manage thier coastal meadows and market their products.
https://bit.ly/3qtq8q0

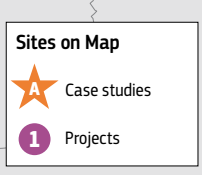
10

Restoring the Vindel river, Sweden
Renaturalising Vindel river and its tributaries to improve biodiversity, water quality and fish spawning grounds.
https://bit.ly/3Nh5OSw









11

Regenerating the Appenine beech forests, Italy
Enhancing the biodiversity of ancient beech forests whilst maintaining a revenue for the local population.
https://bit.ly/3LdTcKl

12

Revitalising the Salt pans of Atanasovsko lake, Bulgaria
Restoring natural processes for the benefit of biodiversity, the local economy and inhabitants.
https://bit.ly/3JyErB3

13

Integrated river solutions, Austria
Integrative planning approaches for the ecological remediation of rivers while also improving flood protection.
https://bit.ly/3JEtbTQ

14

River Alzette renaturalisation, Luxembourg
Renaturalisation works along a 20 km stretch to reduce flood risk, benefit biodiversity and improve water quality.
https://bit.ly/3qwsSDe

15

Restoring the mires and fens of Amalvas Lithuania
Restoring the hydrological and ecological functions of the wetlands to reverse their degradation and improve their capacity to store CO_2.
https://bit.ly/3JIcBT9

16

Coordination action for restoring bogs, Poland
Working in 5 countries to rewet degraded 5300 ha of peatlands to restore their natural function as carbon sinks.
https://bit.ly/3qx2SaV

17

Restoring endemic Juniperus forests, Cyprus
Restoration methods were tried and tested for this rare habitat, resulting in a tripling of its surface area in Cyprus.
https://bit.ly/3uoM6vJ

18

Re-establishing Mahmudia wetlands, Romania
Restoring dune complexes and salt marshes along the North Sea coast to enhance biodiversity and mitigate coastal erosion
https://bit.ly/3wvDBBt

19

Restoring valuable maquis and woodlands in Malta
Planting of trees and shrubs to restore the biodiversity of the island of Comino to counter drought and climate change.
https://bit.ly/3qxRMSS

20

Integrated marine restoration, Northern Cyclades, Greece
Restoring Posidonia beds, reefs and partially submerged marine caves for the benefit of marine biodiversity in cooperation with local fishermen.
https://bit.ly/3JBzUOA

Case studies continued

E

FLOODPLAINS:
Schelde Sigma Plan II – Belgium

The Sigma Plan II is a long-term strategy to manage flood protection and nature restoration within the Scheldt estuary, a highly urbanised area on the edge of Antwerp in Belgium. The Plan includes a list of 50 projects to be carried out between 2006 and 2030, covering 5,000 hectares.

The projects have a dual purpose: to provide flood protection and to restore nature and biodiveristy along the Scheldt river and its tributaries. Ecological rehabilitation targets were defined through scientific research in order to ensure the re-establishment of the estuary's ecological processes and to improve their organisation, vigour and resistance.

Every five years, a new batch of Sigma Plan II projects are set in motion. The first step is to identify and select a location for flood control. Next, the project is developed by a multidisciplinary team of scientists, economists, sociologists, landscape architects and ecologists, with the participation of local government administrations, nature associations, hunters, fishermen.

The selection of projects is also based on a social cost-benefit analysis (SCBA). The SCBA has shown that an approach based on improving the natural infrastructure is cheaper than the construction and maintenance of a storm surge barrier near Antwerp, which was one of the hypotheses that was taken into consideration when preparing the Plan.

The SCBA also valued the flood protection benefits at €740 million, the recreational benefits at €22 million and the ecological benefits/ecosystem services at €130 million (actualised benefits for the period 2010–2100) which demonstrated that the benefits of the Sigma Plan II are higher than the costs. The total cost of the Sigma Plan II over the period 2006–2030 is €469 million (i.e. about €100,000 per hectare).

F

URBAN:
Emscher Industrial Park – Germany

In a bid to revitalise the derelict Emscher area in the Rhurgebiet (Germany's industrial heartland), a major urban renewal and ecological enhancement programme was launched in the 1990s over 800 km^2 within a highly contaminated former industrial and coal mining area. The programme was done in close co-operation with 17 cities of the Emscher region, representing collectively over 2 million inhabitants.

The process was led by the 'IBA Emscher Park Planning Company Ltd' who sought the active participation of public authorities, construction and development companies, architects, ecologists, historians and the general public. Ecological concerns were included in the development process right from the outset. The restoration of the region's remaining natural areas was also one of the programme's five key objectives.

Particular attention was paid to restoring the Emscher river and its tributaries, and to developing a modern sewage and drainage system for the entire area. A unique green corridor was also created connecting all 17 cities using existing water-courses and green spaces. The resulting Emscher Landscape Park is 70 km long and incorporates a wide range of newly restored natural habitats, regenerated brown field sites and recreational areas.

Recognising the historical value of the old industrial buildings and mines, the programme also restored and preserved the remaining relicts of the industrial era, and turned some into useful public space. Overall, this large-scale urban regeneration scheme has not only succeeded in turning a depressed industrial zone into an economically active region again, but, by building ecological concepts into the development process at the outset, it has also created a very attractive area in which to live and work.

G

GRASSLAND:
Restoration of Grasslands in Latvia

As elsewhere in Europe, semi-natural grasslands in Latvia have been disappearing from the landscape at an unprecedented rate. This results not only in a significant loss of biodiversity, but also removes an important part of our cultural identity and heritage. Yet, semi natural grasslands remain an integral part of Europe's agriculture policies. Their products are also gaining more and more appreciation due to their high quality, low environmental impact and enhanced taste.

To redress the losses of the past and increase the economic viability of farming on semi-natural grasslands, the GrassLIFE project was launched in 2017 to restore priority grasslands over more than 1320 ha within 14 Natura 2000 sites. Twelve farms were involved in restoration and a demonstration farm has been set up to showcase different restoration techniques and develop best practices that can be applied on a wider scale.

Mobile grazing units have also been set up to bring the cattle to long-abandoned grasslands and to kick start their restoration. They have received tremendous interest from landowners willing to welcome mobile grazing units to their grasslands.

Recognising that extensive farming practices often struggle to compete with larger more intensive agricultural holders, the project has paid particular attention to finding ways of improving the economic value of sustainable grassland management. A detailed study was undertaken to explore ways of improving the potential added value of grassland products including meat, dairy, honey, grass products, as well as wild medicinal plants and textile. This is now being used to help Latvian farmers improve their economic viability and to showcase products and businesses with high added value that are based on semi-natural grasslands.

H

AGRICULTURE :
Restoring cork oak forests in Portugal

The southern region of Portugal between the Tagus and Sado rivers hosts the largest continuous area of cork oak landscape in the country, covering around half a million hectares. This is also the heartland of cork oak production which has sustained the local economy for centuries and provided farmers with a steady income from both cork and extensive livestock farming.

Well managed cork oak areas are also major biodiversity hotspots and provide many important ecosystem services such as carbon storage, wildfire inhibition and water storage. The main aquifer in the area provides water to 1 million inhabitants living south of Lisbon.

However, over the years significant areas have been degraded or lost through the combined effects of bad management, conversion to fast growing Eucalyptus plantations and land abandonment. This has had major social, economic and environmental consequences.

In 2011, WWF launched the Green Heart of Cork project to protect, manage and restore the cork oak landscapes in southern Portugal in close collaboration with the farmers. Major areas were restored with the help of EU Rural Development Funds and a new 'Payment for Ecosystem Services' (PES) Scheme was set up to support farmers within the watershed who managed their FSC certified forests in accordance with ecological principles.

The PES scheme is still ongoing and receives significant financial support from a major international bottling company that is dependent upon clean water from the aquifer for its production process. The farmers also now receive support from an EU agri-environmental scheme to manage their forests in a more sustainable and nature friendly way.

Further reading

European Commission's nature restoration webpage:
https://ec.europa.eu/environment/strategy/biodiversity-strategy-2030/eu-nature-restoration-targets_en

The EU Biodiversity Strategy to 2030:
https://ec.europa.eu/environment/strategy/biodiversity-strategy-2030_en

EU Biodiversity Strategy Actions tracker: https://bit.ly/3pXGWWr
Targets dashboard: https://bit.ly/3pY8Ykr

European Commission's report on State of Nature (2013–2018):
https://ec.europa.eu/environment/nature/knowledge/rep_habitats/index_en.htm

Brochure on State of Nature in the EU
https://op.europa.eu/en/publication-detail/-/publication/911cf28a-5ad1-11eb-b59f-01aa75ed71a1/language-en/format-PDF/source-191495597

The EU Green deal:
https://ec.europa.eu/info/strategy/priorities-2019-2024/european-green-deal_en

EU Climate Law:
https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX:32021R1119

EU Climate Adaptation Strategy:
https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=COM:2021:82:FIN

Nature Based solutions in Europe: Policy, knowledge and practice for climate change adaptation and disaster risk reduction:
https://www.eea.europa.eu/publications/nature-based-solutions-in-europe

Carbon farming in the EU:
https://ec.europa.eu/clima/eu-action/forests-and-agriculture/sustainable-carbon-cycles/carbon-farming_en

IPCC Nature Leaders Pledge:
https://ukcop26.org/nature/

IPCC 2022 report:
https://www.ipcc.ch/report/sixth-assessment-report-working-group-ii/

IPBES report "Global Assessment Report on Biodiversity and Ecosystem Services" 2019:
https://ipbes.net/global-assessment

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