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Policy brief

Nature-based solutions and their socio-economic benefits for Europe's recovery

Enhancing the uptake of nature-based
solutions across EU policies

Institute for European Environmental Policy



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An aerial photograph of a dense forest. A dark road runs vertically through the center of the image. To the left of the road, a stream flows through the trees. The forest is mostly green, with several trees showing yellow and orange autumn foliage. The background of the page is a solid green color.

About this policy brief

This policy brief provides an overview of the socio-economic benefits that nature-based solutions (NbS) can deliver, alongside supporting the achievement of the EU's climate and biodiversity objectives.

The brief describes the obstacles that have prevented the full integration of NbS into EU policy and suggests key tools to enhance the cross-sectoral implementation of NbS and foster synergies between the biodiversity and climate agendas.

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1. BACKGROUND/CONTEXT

On 06 May 2019, the most comprehensive global assessment on the state of biodiversity to date reconfirmed how nature's unprecedented decline is a global emergency on par with climate change (IPBES, 2019). Two weeks later, voters in the European election strongly converged on political manifestos that supported bolder EU action to fight planetary degradation. Recent evidence on the state of biodiversity in the EU however confirmed that while the EU met its 20% emissions reduction target for 2020, those on biodiversity were largely missed (EEA, 2020b; IPBES, 2018b; Maes *et al.*, 2020). Recent assessments¹ confirm the large gap remaining to meet the agreed biodiversity targets. Reaching the new 2030 climate targets will also require a significant increase in eco-system-based mitigation, particularly from Land Use, Land Use Change and Forestry (LULUCF). In 2021, both

¹ E.g., SOER report; Mapping and Assessment of Ecosystems and their Services: An EU wide ecosystem assessment in support of the EU biodiversity strategy; The IPBES regional assessment report on biodiversity and ecosystem services for Europe and Central Asia

UNFCCC COP26 and UN CBD COP15 will set new strategic frameworks for climate and biodiversity, in which it will be critical to keep the 2030 Sustainable Development Goals (SDGs) in sight.

The EU and its Member States are committed to achieving the SDGs by 2030, including targets on climate action and protecting life on land and at sea. The implementation of these goals is highly interdependent, not least as climate change is a direct negative driver of ecosystem change with important knock-on effects on human well-being (IPBES, 2019). The degradation of land and marine ecosystems worldwide already undermines the well-being of at least 3.2 billion people and costs about 10% of annual global GDP in loss of ecosystem services (IPBES, 2018a). On the other hand, there is a growing awareness of the important role that healthy ecosystems can play in mitigating climate change and supporting adaptation that reduces its environmental, social and economic impacts. For example, the UN estimates that ecosystem restoration could remove between 13 to 26 gigatons (for comparison China emits roughly 10 gigatons annually) of greenhouse gases from the atmosphere and generate USD 9 trillion in ecosystem services by 2030². This awareness is not new and was already central to the 1992 Earth Summit from which both the UN conventions on biodiversity and climate change originated³.

The 2030 global and EU commitments for sustainable development, climate action and biodiversity all point to the urgent need for ecosystem restoration. NbS at different scales can provide cost-effective, win-win solutions in a post-COVID-19 recovery by providing employment, and multiple public health and wellbeing benefits. The EU can take a number of important steps to help unlock the use of NbS in Europe and around the world.

Box 1: Definitions of nature-based solutions

The European Commission (European Commission, 2015) defines nature-based solutions as 'Solutions that are inspired and supported by nature, which are cost-effective, simultaneously provide environmental, social and economic benefits and help build resilience. Such solutions bring more, and more diverse, nature and natural features and processes into

² [New UN Decade on Ecosystem Restoration offers unparalleled opportunity for job creation, food security and addressing climate change](#)

³ United Nations Conference on Environment and Development, Rio de Janeiro, Brazil, 3-14 June 1992. <https://www.un.org/en/conferences/environment/rio1992>

cities, landscapes and seascapes, through locally adapted, resource-efficient and systemic interventions.' This definition was recently amended by the following: 'Nature-based solutions must therefore benefit biodiversity and support the delivery of a range of ecosystem services.'

IUCN defines nature-based solutions as 'actions to protect, sustainably manage, and restore natural or modified ecosystems that address societal challenges effectively, and adaptively, simultaneously providing human well-being and biodiversity benefits.' (IUCN, 2020)

2. NATURE-BASED SOLUTIONS, AN IMPORTANT SOURCE OF JOBS

The unprecedented economic crisis arising from the COVID-19 pandemic makes the creation of jobs an urgent priority. Globally, 1.2 billion jobs in sectors such as farming, fisheries, forestry and tourism are already dependent on the effective management and sustainability of healthy ecosystems. (ILO, 2020) NbS can be used to sustain or enhance the jobs and productivity of those working in these sectors.

The socio-economic benefits created by NbS, make these **cost-effective solutions to address multiple societal challenges while generating economic opportunities and employment**. NbS, such as greening cities, can make areas more attractive to new investors, residents and visitors (Faivre *et al.*, 2017), while creating new green jobs in a variety of sectors (WWF and International Labour Organization, 2020). Nature-based activities such as afforestation, agroforestry, the creation of green spaces and management of protected parks and areas can all generate a wide range of jobs from low-skill entry level to high-skill jobs (Raymond *et al.*, 2017). For example, the Natura 2000 protected area network is estimated to provide 4.4 million jobs. Another famous example is the largest restoration project in Europe, Emscher Landscape park in Germany, which in almost 20 years has generated an estimated 85,892 jobs (WWF and International Labour Organization, 2020). Studies have shown that NbS projects, for example coastal habitat protection, have the potential to produce many more jobs per investment than traditional infrastructure projects such as in coal, gas and nuclear power generation. (Edwards *et al.*, 2013; Garrett-Peltier and Pollin, 2009) The ILO has produced a report on the intensity of jobs created for different types of NbS investments. (ILO, 2020)

In addition to creating jobs, NbS can significantly reduce costs to governments and individuals. For example, the health benefits of NbS can decrease the financial burden on health services (Robinson and Breed, 2019). Given the cost of air pollution and poor mental health are estimated to be around €166 billion and €600 billion respectively a year, these savings could be considerable (Delft, 2020; Charveriat *et al.*, 2021).

NbS can also help to achieve social and environmental justice goals, which is high on the European agenda, especially amidst the COVID-19 pandemic, which has highlighted existing inequities. For example, NbS can reduce health inequalities by ensuring a fair distribution of health benefits from green spaces which are especially important for vulnerable communities who are disproportionately impacted by chronic health conditions and have lower access to green spaces (Raymond *et al.*, 2017). Jobs from NbS can also be deployed throughout the territory, including in marginal and economically disadvantaged regions, and particularly in areas which are particularly vulnerable to climate change as these hotspots will need additional investment to adapt to climate change.

Case study 1: Zagreb's public space greening project - *Nature's solutions to unemployment*

In 2005, the city of Zagreb in Croatia launched an education and training programme aimed at **reducing unemployment while maintaining its green spaces**. Zagreb has a number of parks, such as Medvednica and Park Maksimir, which require significant resources and skills to preserve and clean. The programme trains long-term unemployed people to work full-time maintaining green spaces in exchange for free training programmes on a range of skills that can help them re-enter the local labour market. Participants can choose courses ranging from high school education to vocational training in areas like health, construction, office administration and catering.

From 2005-2015, **over 3,000 unemployed people** have participated in the programme with around 30% subsequently finding employment. This has helped with **poverty reduction** and has **increased motivation and self-confidence** amongst participants. Through the project, around 300 people were annually involved in maintaining green public spaces and removing illegally disposed waste from forests, lawns and waterbodies which has become an important threat to biodiversity in the region. As such, the programme effectively shows how solutions like nature preservation in cities can deliver important social benefits through reskilling.

Source: https://citiesatwork.eu/images/green_jobs_for_social_inclusion_FINAL.pdf

Case study 2: HYDROUSA – *Nature's solutions to water scarcity*

HYDROUSA is an EU Horizon 2020 Innovation action project which promotes regenerative, nature-based solutions to water scarcity. Taking inspiration from nature, they develop innovative approaches to help the Mediterranean and other water-scarce regions develop **circular water management and treatment models which simultaneously boost their local economies**.

This nature-based project started in 2018 and brings together 28 partners from a range of different groups including research institutions, water utilities, NGOs, companies and municipalities.

Their innovative solutions will be implemented in six demonstration sites on three Greek islands:

1. **Lesbos**. Here, natural anaerobic processes and constructed wetlands will be used to **treat household sewage in a completely circular system** where all by-products can be re-used. Biogas will be used to fuel cars, sludge will be used as fertiliser and clean water will then be used to irrigate agricultural land. Some of this nutrient-rich wastewater will then be used to maintain a rich **agroforestry** ecosystem so that a variety of products, from forestry trees for food and timber to superfoods for essential oils, can be cultivated with no fertiliser input.
2. **Mykonos**. Here, two **rainwater harvesting systems** will be used: one in a remote area to cultivate oregano and another in a residential area to collect rainwater from rooftops to meet household water needs, recharge groundwater stores and irrigate lavender fields.
3. **Tinos**. Here, a **desalination system** will be created which mimics mangrove plants to produce salt and irrigate crops. On another part of the island, an array of nature-based solutions will be designed to **upgrade an eco-tourism facility and make it self-sufficient** in meeting its own energy, water and food needs.

The solutions showcased by these islands can be modified to fit the local needs of others. In fact, 26 more islands around the world are planning to join the project and adopt their own circular, nature-based, water solutions.

Learn more at: <https://www.hydrousa.org/>

3. CLIMATE ADAPTATION AND NATURE-BASED SOLUTIONS

In the face of climate change, which is already increasing both the frequency and strength of some future extreme weather events (Forzieri *et al.*, 2016), NbS can significantly contribute to disaster risk reduction (DRR), improve water management and contribute to long-term food security.

3.1 Disaster risk reduction

Natural hazards can be triggered or amplified when natural processes are changed or deregulated. NbS can restore and stabilise these, thereby decreasing the risk and intensity of disasters. For example, nature-based solutions can reduce the risk from flooding and flash floods through improving storm water management and watershed restoration, which in turn lowers the risk of rivers flooding and run-off into sewage systems (Raymond *et al.*, 2017). Restoring coastal ecosystems, can increase coastal area resilience to storms, coastal flooding, storm surges and coastal erosion (Seddon *et al.*, 2020). Additionally, nature-based solutions are often cheaper than traditional hard engineering approaches such as dykes, dams, storm barriers and sea walls (Debele *et al.*, 2019). This traditional "grey" infrastructure is usually very specialized and not very versatile, so changing environmental conditions and levels of disaster risk present a major challenge to these measures, as well as a budgetary risk to managing authorities. NbS cannot replace grey infrastructure but rather should be integrated with it so that more traditional methods of disaster risk management are complemented or enhanced. (European Commission, 2015)

3.2 Resilient cities

Beyond DRR, NbS can make cities more resilient and habitable in the face of future climate change. Urban vegetation, particularly tree cover, can help to cool the air through evaporation while simultaneously providing shade helping to mitigate the urban heat island effect. In addition, studies have generally shown urban trees provide significant direct economic and well-being benefits, not to mention enhanced biodiversity, water conservation and climate change mitigation. (Song *et al.*, 2018)

3.3 Water management

Creating green spaces and water bodies within cities, or conserving existing ones, can increase water availability through increased filtration, evapotranspiration and storage and can increase water quality by removing harmful

chemicals (Oral *et al.*, 2020). NbS have also been used to increase the efficiency and circularity of water systems, bringing down water production costs (Oral *et al.*, 2020).

3.4 Food security

NbS in agriculture can simultaneously protect nature and increase productivity through innovations in agroecology and ecological intensification. These solutions can replace man-made inputs, such as fertilisers and pesticides, by improving the delivery of natural ones like natural pest control, pollination, water quality regulation and enhanced soil fertility (Maes and Jacobs, 2015).

Box 2: RECONNECT – Nature's solutions to disaster resilience

RECONNECT is a project using nature-based solutions to reduce natural hazard risk across Europe. Running from 2018-2023, RECONNECT aims to create and support several projects championing solutions which can be up scaled and replicated. Two of these effectively **illustrate the potential of nature-based solutions to increase disaster resilience while creating a range of co-benefits**:

1. **Seden Strand, Denmark.** This area threatened by sea level rise putting 142 private homes and 66ha of agricultural land at high risk of flooding. Moreover, it is part of the Natura2000 network as it is home to a many of important bird and some toad species. By promoting the natural rehabilitation of salt meadows, the project will simultaneously protect people, crops and habitats while improving access to nature.
2. **Portofino Natural Park, Italy.** This area's unique landscapes are increasingly threatened by extreme rainfall events, flash floods and mudslides. To increase resilience against these, interventions that regenerate natural processes, such as re-forestation and natural engineering, are being implemented. In addition to protecting cultural heritage and real estate, these solutions have also reduced injuries from slipping in the park, helped integrate nature and climate change adaptation in planning, and improved collaboration between park authorities and other local stakeholders.

Learn more at: <http://www.reconnect.eu/about-reconnect/>

4. PUBLIC HEALTH AND NATURE-BASED SOLUTIONS

Nature-based solutions can have substantial positive implications for public health and well-being. Not only by mitigating air and noise pollution, but also by providing additional benefits for mental health and promoting healthier lifestyles.

4.1 Mitigating pollution

Air pollution for example, can cause serious respiratory and cardiovascular diseases and leads to at least 400,000 premature deaths in EEA-39 (excluding Turkey) every year (EEA, 2020a). Green infrastructure and vegetation can mitigate this risk by directly increasing air quality, through capturing, dispersing and depositing air pollutants (Raymond *et al.*, 2017). Green spaces can create oases of better air quality in highly polluted areas such as cities allowing citizens to reduce their exposure to harmful chemicals (ten Brink *et al.*, 2016).

4.2 Promoting healthier lifestyles

Nature-based solutions, like urban green spaces can encourage citizens to be more physically active, which can reduce obesity and the risk of chronic diseases such as cardiovascular disease and type 2 diabetes, reduce obesity and improve mental health (ten Brink *et al.*, 2016). Green spaces, especially in cities, have also been linked to reduced stress levels which can help reduce stress-linked conditions such as cardiovascular disease, infections and depression. The need for physical distancing during the pandemic has highlighted the importance of access to these areas in proximity to people's homes. Such spaces have provided a critical outlet for people in the relative safety of the outdoors to exercise and pursue recreational activities outside of their homes. Spending time in nature also increases exposure to microorganisms that are important to strengthening the immune system (Robinson and Breed, 2019).

4.3 Improved mental health

Access to nature can help reduce anxiety, depression and loneliness (Gascon *et al.*, 2018.). Protected areas, for example, can deliver important mental health benefits to visitors, which have been valued at EUR 5.5 trillion per year globally (Buckley *et al.*, 2019). NbS reduce negative mental health outcomes including dementia, psychosis, neurosis and childhood behavioural disorders (Charveriat *et al.*, 2021).

The vital role of nature in achieving the economic policy objectives of the EU is recognised in the EU's Green Infrastructure Strategy. Nevertheless, few frameworks exist for acknowledging and assessing the value of co-benefits from nature-based solutions and guiding cross-sectoral project and policy design and implementation. This is a missed opportunity as recognising the co-benefits of NbS can help optimise their design to simultaneously contribute to important socio-economic goals which will make them attractive to a broader range of stakeholders (Giordano et al., 2020).

One problem in the past has been a lack of clear quantitative data on the costs and benefits of NbS. However, recent research and assessments show that NbS are very often highly cost-effective measures for climate adaptation and disaster risk reduction, particularly when the many co-benefits are considered. (Reguero et al, 2018)

NbS measures require more—and mostly privately owned—land, and more diverse stakeholder involvement than traditional (grey) engineering and infrastructure approaches to disaster risk management. They may thus require a more proactive, integrated stakeholder engagement to implement successfully. This is a challenge, especially on the larger scale which is required for the most successful deployment of NbS measures. This is an area where EU led capacity building and knowledge sharing would be useful and effective.

Case study 3: Barcelona's sustainable urban planning – *Nature's solutions to urban challenges*

Barcelona is a highly populated Spanish city and a popular tourist destination facing many common urban challenges including air pollution and increased temperatures and extreme weather events. To help tackle some of these challenges, several projects such as the City of Barcelona's Green Infrastructure Biodiversity Plan 2020, the Trees Master Plan 2016-2035 and 'Pla Buits', have implemented a range of nature-based solutions across the city. Cumulatively, these projects:

- Increased **street trees** which made the city more **attractive**, improved **well-being** and **reduced the heat-island effect** in the city.
- Created green corridors which **increased mobility and physical exercise** by enhancing cycling paths and increased storm water retention leading to **decreased flood risk**.
- Protected the peri-urban forest which **decreased air pollution**, and **improved access to green spaces** where citizens can do sports and other activities.
- Maintained hybrid dunes which increased **protection against sea level rise** and floods and made the city's **coastline more attractive**.

- Promoted urban gardens which improved **local food supply**, improved well-being, **social cohesion, and integration** through community activities and **restored vacant areas**.

These solutions also contributed to **climate adaptation and biodiversity goals** by increasing CO2 sequestration and creating and maintaining ecosystems. Moreover, new governance systems and platforms were created to promote **stakeholder participation and cross-sector collaboration**.

Learn more at: <https://oppla.eu/casestudy/117>; <http://www.openness-project.eu/node/81>

5. INTEGRATING NATURE-BASED SOLUTIONS INTO EU POLICY

There is significant potential to integrate NbS into EU policies as well as wider sectoral legislation, and thereby generate opportunities to increase the scale and scope of benefits that NbS can provide. However, only a third of the policies in the European environmental and climate legislative framework either explicitly or implicitly strongly support NbS (Davis *et al.*, 2018).

There are various bottlenecks within the EU policy framework and its implementation that have hindered large-scale uptake of nature-based solutions and the mainstreaming of biodiversity as an agent to reach climate goals:

- **Implementation delays** of EU Directives, in particular the nature directives, Water Framework Directive and Marine Strategy Framework Directive.
- **Lack of mainstreaming** across associated policy realms and conflicting agendas. This includes a lack of coherence among relevant environmental and sectoral policies at the EU level in terms of wording, monitoring requirements and financing instruments, which has led to fragmented governance arrangements offering limited leeway to address climate issues through innovative nature-centred approaches (Davis *et al.*, 2018). Silo thinking misses the complementary values that a focus on nature-based solutions could offer to the EU climate agenda (Tozer and Xie, 2020).
- Although the benefits of biodiversity and ecosystem services are well known, there is a **lack of centralized and comparable data** quantifying these benefits into monetary figures. This limits the popularity of financing restoration and nature-based solutions (Credit Suisse Group AG and McKinsey Center for Business and Environment, 2016; Ding *et al.*, 2017).

- The **non-binding nature of several relevant policies** (e.g. target 2 of the EU Biodiversity Strategy for 2020, the EU Adaptation Strategy, the Green Infrastructure Strategy) have resulted in shortcomings across sectors in the design and application of policy instruments for the active restoration of ecosystems (Naumann, Röschel and Davis, 2018).
- The lack of binding commitment and effective mainstreaming also have knock-on effects on the implementation of the EU's integrated model for biodiversity and climate investment. **Inadequate biodiversity and climate proofing of national and regional plans**, as well as tracking of actual investment, has been inadequate to address the investment gap (Forster *et al.*, 2017; Kettunen *et al.*, 2017; Nesbit *et al.*, 2020).

Nevertheless, the European Green Deal provides an improved research, policy and action framework to mobilise implementation and improve financing for nature-based solutions at the necessary large scales⁴. Especially the EU Biodiversity Strategy for 2030, the Farm to Fork Strategy and the new Adaptation Strategy have significant potential to strengthen and mainstream nature-based solutions delivering biodiversity and climate targets.

6. KEY TOOLS TO ENHANCE THE UPTAKE OF NATURE-BASED SOLUTIONS AND THEREBY DELIVER SIGNIFICANT SOCIO-ECONOMIC BENEFITS

1. **Accelerate implementation of key EU legal commitments** delivering on nature-based solutions, through the nature directives, Water Framework Directive and Marine Strategy Framework Directive. In the case of EU Member States, it would mainly require higher and more targeted investment that meets the identified public investment needs. The Commission should invest in sufficient operational capacity to fulfil more actively its role as guardian of the Treaty and where necessary promote implementation and enforcement.
2. **Adopt ambitious EU legislation for mandatory ecosystem restoration** that does not undermine the above-mentioned implementation commitments but builds on and complements them with the *legally binding* SMART (specific, measurable, attainable, relevant, and time-bound) targets and deadlines for:

⁴ <https://www.iucn.org/news/ecosystem-management/202012/european-green-deal-well-aligned-fast-track-action-nature-based-solutions-says-iucn>

- a) achieving the favourable conservation status of habitats and species covered by the nature directives;
 - b) increasing progress on other commitments under current legislation such as flood risk management under the Floods Directive, resilience in fishing, farming and forestry under the Common Fisheries Policy and Common Agricultural Policy, priority protection and restoration of carbon-rich ecosystems under the Land use, Land-Use Change, and Forestry regulation; and
 - c) National Nature Restoration Plans. A general target based on percentage land/sea area restored should be avoided, as this would probably result in restoration focusing on the lowest cost options, which would not necessarily provide the best value for money in terms of public environmental, social and economic benefits.
3. **Boost investment for nature-based solutions** including by improving biodiversity proofing and tracking of all relevant EU and national investment to be able to more precisely and regularly assess progress of integrated funding against identified needs and intermediate objectives and take additional action where necessary to keep on track on 2030 commitments. Most urgently, concrete action should be taken to better:
- a) **Use public investment as leverage for more and better private investment** in NbS, by quickly adopting clear thresholds and criteria for economic activities that substantially contribute to protecting and restoring biodiversity and ecosystems, and cause no significant harm, following the Taxonomy Regulation.
 - b) **Integrate biodiversity commitments in the post-COVID-19 response**, such as setting biodiversity spending targets for COVID-19 stimulus measures and recovery plans, including the Recovery and Resilience Facility (RRF), to scale up investment in ecosystem restoration, linking environmental conditionality to bailouts to drive sustainability improvements, and foster cross-sectoral and international collaboration to safeguard biodiversity and restore critical ecosystems.
 - c) **Integrate biodiversity commitments with EU climate policy and investment** and its implementation in EU Member States, in particular through making nature-based solutions a central pillar of the new EU Adaptation Strategy and ensuring its alignment with national, regional and local strategies and prioritizing the greenhouse gas emissions reductions of new restoration commitments in revised National Energy

and Climate Plans (NECPs) to ensure they are prioritised and eligible for funding and avoid perverse measures e.g. in incentivising increased biomass use.

- d) **Increase the prioritisation of the use of European Structural and Investment Funds (e.g. in CAP Strategic Plans) towards biodiversity objectives**, especially where they provide other social and economic benefits through nature-based solutions.

Case study 4: Zeche Zollverein – *Nature's solutions and green transitions*

Zollverein is a former coal mine near the city of Essen in Germany. Since its industrial activities stopped in 1993, the site was abandoned allowing natural vegetation to start reappearing. Due to its impressive infrastructure, the site was designated as a UNESCO World Heritage Site in 2001. After that, a master plan was created to redevelop the area focused on designing space for leisure which integrated nature and post-industrial heritage. Through this, the complex was successfully converted into a multifunctional cultural, entertainment and touristic centre attracting over **2 million visitors every year**. This attracted green commerce and innovation to the area creating over **1,000 jobs and 170 enterprises**. Simultaneously, key habitats for endangered species were created and protected leading to increased biodiversity in the former industrial site including the return of the endangered peregrine falcon. In addition, walkways and green spaces were created and natural tours organised giving visitors an opportunity to connect with nature and experience its multiple benefits.

Learn more at: <https://naturvation.eu/nbs/essen/derelict-area-transformation>

More possible examples at:

- <https://naturvation.eu/search/node/jobs?page=5>
- http://www.zaragoza.es/contenidos/medioambiente/life/acta_lifehuerta_2014-03-19.pdf
- <http://growgreenproject.eu/city-actions/valencia/>

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