LIFE for nature

Why Europe's flagship environmental programme must remain part of the next EU budget

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Introduction

The EU LIFE programme is the only fund dedicated exclusively to financing the environment and, specifically, biodiversity. For over three decades, it has proven its worth – supporting an ever-growing catalogue of diverse, innovative, and ambitious projects. It is also widely considered one of the most successful funding instruments at the EU's disposal. Yet despite these achievements, a new political agenda and shift in priorities poses a major threat to both its continuation and structure. This could see either the entire fund or its standalone composition – so crucial to the programme's success – being removed.

These changes must also be placed within the context of the growing financing gap, currently estimated at EUR 48 billion annually, which needs to be closed in order to achieve the EU's Biodiversity Strategy objectives for 2030. Additionally, EU Member States will need to secure sufficient resources to finance their nature restoration plans. Simply put, now is the time to not only maintain these precious existing resources, but to significantly increase them in view of the drastic need to address this ever-widening funding deficit.

This report provides an overview of why the LIFE programme must continue as a standalone fund within the framework of the next EU budget. It also highlights a series of exemplary cases that demonstrate just some of the many LIFE-funded projects that have yielded significant benefits for nature and the environment.

What does the EU budget reshuffle mean for LIFE?

A major reorganisation of EU funds and programmes is imminent. In July 2025, the European Commission will release its much-anticipated proposal for the next EU budget, outlining its vision for the size, composition, and political priorities of the Multiannual Financial Framework for the next seven-year period (2027–2034).

Although this is a process that happens every seven years, the upcoming funding cycle is expected to bring about particularly significant, unprecedented, and long-lasting changes. Strong signals indicate that the Commission's approach will be to reduce the amount of existing funds and programmes into a categorised pillar system, reflecting its new political priorities.

To drive one of its highest political priorities – competitiveness – the Commission is expected to announce a corresponding competitiveness fund, which would merge a series of existing, smaller funds and programmes together to create an umbrella 'superfund'.

At the same time, Member States would also have access to funding through separate national plans. These would take a similar approach, merging a series of existing EU funds and programmes together into a single national pot that Member States would then allocate to achieve various objectives.

The LIFE programme, unfortunately, would be split between a competitiveness fund and national plans. Climate related projects would be placed into the competitiveness fund and nature and biodiversity projects would be covered by the national plans.

This development, although not confirmed, likely stems from intentions to streamline and simplify the various rules applied across existing funds and programmes under the current EU budget to create a 'single rulebook'. This would lead to the development of a more common framework aimed at applying more consistency across the budget.

While the objective is likely designed to attract a greater number of applicants to apply for funding, which would theoretically increase the overall number of projects receiving financing, it would also undermine a unique aspect that has made programmes like LIFE so effective: the successful collaboration between small stakeholders like universities, research institutes, environmental organisations, and local authorities.

The LIFE programme merging into much larger, broader funds focused on achieving multiple different objectives raises concerns. These will instead prioritise larger enterprises, which typically lack the expertise and knowledge necessary to design and implement nature-focused projects and therefore lead to smaller applicants losing opportunity to obtain financing for their projects. Whether these 'smaller fish' would be able to compete with larger companies attracted by the prospect of a quick economic return remains to be seen.

Much of LIFE's success can be attributed to its composition as a dedicated, standalone fund. This means it is not subject to external competition and conflicting sectoral priorities, which typically leads to the neglect of environment and nature funding in particular.

And while there is a strong and ever-more present link between the healthy state of our natural world and a prosperous economy, placing the LIFE programme within the context of broader funds with vastly different objectives comes with significant risks. Dwarfed by profit-driven investments that offer little of the transformative potential that we so urgently need to tap, environment and nature financing would inevitably become the lowest priority in this scenario.

Stating their position on the next EU budget, certain members of the European Parliament recently reaffirmed this view, expressing the need for increased, dedicated environment funding amid concerns over LIFE's potential restructuring and calling for the fund in its standalone form to continue.[1]

Once the Commission's proposal is released, intensive negotiations are set to take place between the European Parliament and Member States. However, given recent disagreements about fund restructuring, reaching common ground is far from certain.

[1] European Parliament, A revamped long-term budget for the Union in a changing world, *European Parliament*, 2025.

With this unfolding context in mind, the following success stories show why the future EU budget must ensure that LIFE continues as a standalone fund. In light of the adoption of the Nature Restoration Law and the need for increased funding to finance nature-focused measures, there is a compelling case for environment financing to increase in quantity and scope in the upcoming programming period.

Background

The LIFE programme, a proven and effective resource for financing biodiversity, is widely considered one of the EU's best performing funds. Despite its importance, however, it risks either being scrapped entirely or absorbed into broader umbrella programmes with diverse and often conflicting objectives, which would significantly undermine its impact. This would effectively remove the only fund in Europe dedicated significantly to biodiversity.

This report focuses exclusively on the programme's role in financing environmental and climate-related initiatives. While the programme also provides operational grants to non-governmental organisations, that dimension falls outside the scope of this analysis.

LIFE has allocated more than EUR 3.4 billion in funding since 1992, supporting over 5,500 projects across various environmental sectors.[2] Figures from the 2021–2027 Multiannual Financial Framework reveal the allocations:

- EUR 2.15 billion for nature and biodiversity;
- EUR 1.35 billion for the circular economy;
- EUR 0.95 billion for climate mitigation and adaptation; and
- EUR 1 billion for the clean energy transition.[3]

Although these figures may seem substantial, they pale in comparison to the EUR 386.6 billion budget allocated to the Common Agricultural Policy in the same period. This makes LIFE one of the smallest EU programmes. For context, the Common Agricultural Policy accounts for around 30 per cent of the EU's total budget, whereas LIFE receives just 0.5 per cent.

LIFE is the only EU fund dedicated exclusively to financing climate and environmental activities. The programme is split into two main priorities: the environment, representing 75 per cent of the financial

[2] Directorate-General for Research and Innovation of the European Commission, Programme for the Environment and Climate Action (LIFE), *EU Funding and Tenders Portal*, accessed 10 February 2025.

[3] Directorate-General for Communication of the European Commission, Programme for the Environment and Climate Action (LIFE), *European Commission*, accessed 10 February 2025.

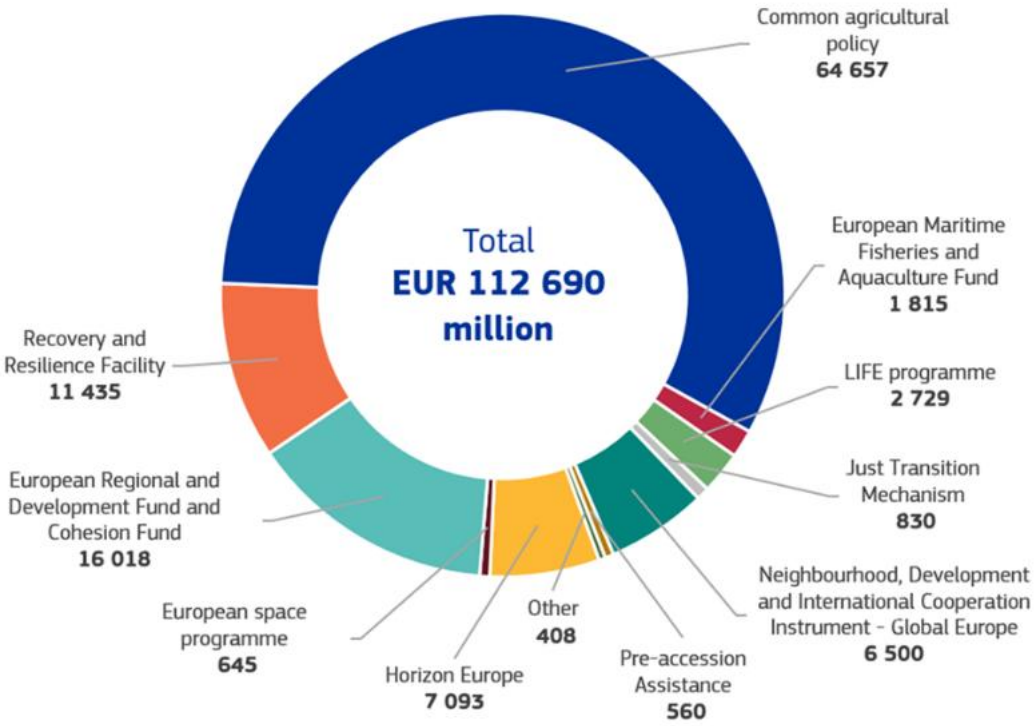
envelope, and climate action, representing 25 per cent. Each of these priorities is divided into two subprogrammes: nature and biodiversity.

One of the main strengths of the programme is its highly targeted focus on the environment. Unlike other funding programmes under EU cohesion policy or the Common Agriculture Policy, which integrate biodiversity funding into other thematic policy areas, LIFE is narrow in scope. Therefore, it directly finances the actions most needed to address biodiversity loss, avoiding the sectoral competition and conflict for funding typical of other funding streams.

The LIFE projects featured in this publication are unique to this funding programme. Their innovative and highly ambitious nature sets them apart – such projects are not typically developed under other EU funding instruments, despite the significantly larger budgets those programmes command. Discontinuing LIFE on the assumption that broader funding streams can simply take its place is therefore misguided. These alternatives are unlikely to deliver projects of comparable scope, quality, or impact.

Following the adoption of the Nature Restoration Regulation, the need for dedicated financing instruments is now more urgent than ever. Given the long-term character of this legislation, restoration plans will require stable and future-proof funding that spans the next Multiannual Financial Framework and beyond. It is essential that purpose-built instruments remain in place – particularly those like LIFE, which benefit from decades of accumulated expertise and proven effectiveness.

Figure 1. EU biodiversity contribution for the 2021–2027 period (EUR million).



Source: European Commission, Biodiversity mainstreaming, *European Commission*, accessed 20 June 2025. © European Union, 1995-2025

Why LIFE must continue and expand

LIFE is widely regarded as Europe's most successful programme for financing environmental projects, specifically those focused on nature and biodiversity. The following factors can be attributed to its success:

- **Efficient governance**

LIFE is one of the rare programmes under direct management, as opposed to indirect or shared management. This means that the European Climate, Infrastructure and Environment Executive Agency (CINEA) – the body responsible for overseeing the fund – deals directly with project applicants in a centralised way without the need for Member State intermediaries.

Despite the challenge of dealing with these applications, the projects tend to be of higher quality, since they are protected from political influence and fall under expert supervision. Support is provided through grants, tenders, and technical assistance.

- **Targeted funding in direct alignment with nature conservation needs and priorities**

LIFE is exclusively dedicated to environmental investments, which ensures there is no competition between different priorities. For example, LIFE often directly aligns with the measures outlined in Member States' prioritised action frameworks, which are crucial for the successful management of Natura 2000 sites and, more broadly, the objectives of the EU Biodiversity Strategy for 2030.

As a highly targeted fund, LIFE is also more efficient at absorbing resources. And unlike other programmes that fund broad research, LIFE focuses on delivering practical, on-the-ground results that directly support regulatory frameworks.

- **No competition or conflict with other sectors for funding**

Other integrated financing approaches often lead to competition between and across sectors, such as agriculture, transport and water. In the case of cohesion policy, for example, biodiversity is typically overlooked, losing out due to competition with other sectors.[4]

The EU's nearly EUR 800 billion recovery package was a major opportunity to finally support biodiversity and place it high on the agenda for Europe's recovery. However, it failed to do so. In fact, it has almost entirely neglected biodiversity and underachieved on its objectives, as was also the case with the EU's 2020 target of halting biodiversity loss and restoring degraded ecosystem services.[5] LIFE avoids this pitfall by establishing a clear and defined financial scope, focusing solely on the environment and climate.

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[4] CEE Bankwatch Network, EuroNatur, Biodiversity on the brink: What's holding back financing for nature in the EU?, *CEE Bankwatch Network*, February 2023.

[5] European Commission, Our life insurance, our natural capital: an EU biodiversity strategy to 2020 /* COM/2011/0244 final, *EUR-Lex*, 3 May 2011.

- **Highly innovative and effective project financing**

Unlike many top-down funding mechanisms, LIFE provides flexibility to test new governance and conservation methods, encouraging experimentation and adaptive management. These strategies are often developed in collaboration with a wide range of stakeholders representing many different interests, including local authorities, organisations, academic institutions and citizens' initiatives. It also allows new knowledge, expertise and approaches to be developed in a multidisciplinary manner.

In light of the Nature Restoration Regulation, LIFE should be seen as a frontrunner in providing proven, successful approaches, and currently represents the most substantive database for cost indications. Therefore, LIFE can – and should – be regarded as the primary reference point for replicable best practices that can be transferred and applied to other funding streams. These results can also serve as small-scale pilot projects suitable for expansion into larger initiatives.

- **Strong focus on monitoring, reporting and evaluation**

The outcomes of LIFE-funded projects are subject to in-depth monitoring and evaluation. This is important for a variety of reasons, such as identifying whether projects are effective in achieving their objectives and evaluating which of these successes can be replicated in other geographic areas and funding streams, thus informing future EU policymaking.

Success of LIFE at the national level

The cases presented below are based on direct input from national campaigners working within their respective Member States. They represent just a small sample of the many successful projects implemented across Europe. Together, these examples illustrate the diverse and innovative initiatives supported by the LIFE programme – projects made possible specifically because of the programme's tailored design and dedicated management. These projects would unlikely be conceived, let alone funded, through broader instruments such as the cohesion policy or Common Agricultural Policy.

Dinara's dry grasslands: Boosting biodiversity and regional sustainable development

Photo: Melani Glavinić, Association Biom

Dinara: A mountain of ecological significance

Situated within the Dinaric Alps, the Dinara mountain range stretches over 100 kilometres along the border between Croatia and Bosnia and Herzegovina. Recognised for its exceptional ecological value, Mount Dinara has been designated both a special protection area and a site of community importance, forming part of the Natura 2000 network. In 2021, it was declared Croatia's newest nature park.

For generations, the grasslands atop Mount Dinara thrived under traditional grazing practices, which helped maintain a delicate ecological balance. However, in recent decades, the region has experienced significant depopulation, particularly following the Croatian War of Independence, which led many residents to abandon the area. The decline in population resulted in the loss of traditional land-use practices, upon which many habitats, especially open grasslands, and species depend.

As traditional grazing ceased, vast areas of pasture were gradually overtaken by shrubs and woody vegetation. This transition led to the degradation of open habitats critical to biodiversity. Compounding the issue, post-war afforestation policies and restrictions on free grazing placed additional pressure on local livestock breeders, prompting many to abandon their trade altogether.

In response, the 'Dinara back to LIFE' project was implemented between January 2020 and November 2023, aiming to restore these threatened habitats. Led by BirdLife Croatia, the project brought together local

action group Cetinska Krajina, the Faculty of Agriculture at the University of Zagreb, and Croatian Forests. The project received funding from the following sources: EU LIFE Programme (EUR 777 903), Environmental Protection and Energy Efficiency Fund (EUR 222 271), Government of the Republic of Croatia Office for Cooperation with NGOs (EUR 79 155), and Split–Dalmatia County (EUR 10 617). The total project value amounted to EUR 1 296 509.

Addressing environmental and socio-economic issues

A range of measures was implemented to restore grasslands in the project area, with a primary focus on removing encroaching woody vegetation. Through manual clearance, 112.3 hectares of open grassland were restored, while an additional 56.7 hectares were revitalised using controlled burns. The core aim was to rehabilitate pastures and protect bird species that depend on this habitat, including the ortolan bunting (Emberiza hortulana), short-toed lark (Calandrella brachydactyla), and stone curlew (Burhinus oedicnemus).

Recognising that grazing is the most effective long-term strategy for maintaining these ecosystems, a key component of the project was to promote sustainable grazing and improve the practical conditions for its reintroduction. To this end, livestock infrastructure was either restored or newly constructed, including 11.5 kilometres of livestock and mountain paths, nine wells, two kilometres of dry-stone walls, and eleven ponds.

Complementing this, the project partnered with 16 local cattle breeders to implement mixed herd grazing as a habitat restoration method across 536 hectares. Because different livestock species feed selectively – consuming some plants while avoiding others – this approach creates more balanced vegetation patterns and maximises benefits for biodiversity.

Benefits for nature and people

Although the project recently concluded, its positive effects are already evident:

- There has been a notable increase in the number of pairs of short-toed larks and ortolan buntings have migrated to more favourable habitats that were enhanced during the project's implementation.
- Activities aimed at restoring livestock infrastructure and introducing additional animals to diversify herds are anticipated to directly benefit livestock farming by streamlining the work of breeders.
- Collaboration councils established during the project have united representatives from various sectors including cattle breeders, hunters, beekeepers, tourism professionals, local authorities and mountaineering associations. Together, they have generated ideas for potential restoration as well as educational and tourism initiatives.
- Twelve business and marketing plans were developed for local family farms which sustainably utilise the Dinara region's natural resources, thereby contributing to nature preservation and

biodiversity. Additionally, an online ‘digital marketplace’ platform was launched to promote agricultural products and tourist services from the Dinara region.

Leading by example

This project demonstrates how genuine habitat restoration can go hand in hand with revitalising the local economy. The decline of traditional grassland use – whether for grazing or haymaking – and the resulting overgrowth are challenges not unique to Mount Dinara. Similar issues affect many other depopulated mountainous areas across the region and beyond. The measures implemented through this project offer a replicable model that could be applied elsewhere, provided adequate funding and local engagement are secured.

Restoring Estonia's wetlands: A legacy of preservation and renewal

Photo: Marko Kohv

In 1997, Estonian wetland scientist Viktor Masing remarked, 'The actions of our generation will be judged not only by what we have created with our own hands, but also by what we have managed to leave untouched.'[6] Nearly three decades later, those words ring truer than ever. Where past generations have failed to protect nature, today's task is not only to preserve what remains – but to restore what has been lost.

Mires in Estonia and Europe

Europe is home to nearly 600,000 square kilometres (km^2) of peatlands,[7] but about half are degraded and no longer qualify as true mires. The distribution of mires across the continent is uneven: northern Europe remains a stronghold, with Ireland, Scotland, Sweden, Finland, Estonia, Latvia, and northern Russia particularly rich in these unique ecosystems.

Despite recent progress in conservation, the status of many mire types remains critical. This is particularly true for 'palsa' mires – permafrosted peatlands rapidly thawing due to climate change – as well as the

[6] Quote unofficially translated from the Estonian. See: Viktor Masing, Ürgsed sood kui loodusmälestised, Talinn: Eesti Entsüklopeediakirjastus, 1997.

[7] Tanneberg, et al., The peatland map of Europe, *Mires and Peat*, 19(22), 1–17, 2017.

blanket bogs of north-western Europe, alkaline fens outside Fennoscandia,[8] and deciduous swamp forests. In some regions, bogs are under the most severe threat.

In Estonia, mires now cover just 7 to 8 per cent of the land area, roughly a third of what they did a century ago. The main cause of this loss is drainage, followed by peat extraction and other human activities. The most endangered mire types in Estonia are species-rich alkaline fens and deciduous swamp forests.[9]

A restoration project to ad-mire

From September 2015 to December 2021, Estonia undertook one of its most ambitious and wide-reaching habitat restoration efforts to date: LIFE Mires Estonia.[10] With a budget of just over EUR 2.8 million, this EU-funded nature conservation project set out to restore the ecological integrity of Estonia's threatened mire habitats – vital wetlands that play a key role in biodiversity, carbon storage, and water regulation.

The project was coordinated by the Estonian Fund for Nature, which led the on-the-ground restoration work. Two other key partners were the University of Tartu – responsible for scientific research, species monitoring, and expert guidance – and the Estonian non-governmental organisation Arheovisioon, tasked with conducting archaeological surveys to ensure restoration activities in historically significant areas were carried out responsibly. Close cooperation was also established with the Estonian State Forest Management Centre and the Estonian Environmental Board.

To ensure broad input and informed decision-making, representatives and experts from various organisations were invited to join a project steering group. In parallel, the project promoted wider collaboration through regular communication among the State Forest Management Centre, the Environmental Board, the Estonian Agriculture and Food Board, local municipalities, landowners, and other stakeholders.

The central goal of LIFE Mires Estonia was to restore and safeguard the conservation status of some of Europe's most endangered wetland habitats, especially those listed under the EU Habitats Directive such as active raised bogs, bog woodlands, and Fennoscandian deciduous swamp woods.

Another aim of the project was to restore a near-natural hydrological regime in protected areas and on state-owned, unmanaged lands where conditions had been disturbed. These sites included the abandoned peat mining area of Soosaare within the Alam–Pedja nature reserve, the peatland restoration area of Feodorisoo within the Agusalu nature conservation area, sites within the Ohepalu, Tudusoo, and Sirtsi nature reserves, and the Laukasoo bog within Lahemaa national park.

[8] Fennoscandia is the geographical region of northern Europe encompassing Norway, Sweden, Finland, and parts of north-western Russia.

[9] Eerik Leibak, Mires in Estonia and Europe, *Estonian Fund for Nature*, 9–11, 2021.

[10] Estonian Fund for Nature, About the Project "LIFE Mires of Estonia", *Estonian Fund for Nature*, accessed 28 May 2025.

The project also targeted related ecosystems like dystrophic lakes, transitional mires, and species-rich fens, aiming to improve conditions not only for habitat types but also for species that depend on them, including the western capercaillie (*Tetrao urogallus*); the willow grouse (*Lagopus lagopus*), the moor frog (*Rana arvalis*), whiteface dragonflies (*Leucorrhinia spp.*), and brush-footed butterflies (*Nymphalidae*).[11]

Restoration guided by public engagement and education

Restoration of the six degraded mire areas encompassed a wide range of activities – from technical planning and fieldwork to public education and community engagement. Detailed restoration plans were developed for each site, supported by archaeological and species surveys to ensure ecologically and culturally informed approaches. The vast majority of the restoration work took place on state-owned land within protected areas.

Before any of the plans were officially approved, draft versions were made publicly available, giving everyone the opportunity to submit suggestions and feedback. Each plan was also publicly introduced on-site to aid restoration efforts. These public briefings were often covered by local media, helping to raise awareness and spark interest in the project.

This open and transparent approach ensured that the voices of local communities were heard early in the process. Dialogue with local residents proved invaluable for the project team. In several cases, locals shared historical knowledge, such as information on bird species that used to inhabit the areas prior to drainage works. On the other hand, some individuals expressed their opposition to the planned changes and restoration activities. These views were respected: in cases where landowners raised objections during the consultations, the scope of the restoration work was reduced accordingly.[12]

These experiences clearly show that implementing a large-scale LIFE project is not only about restoring ecosystems; it's also about engaging the public through effective communication and environmental education. However, most people now encounter mires while ambling along boardwalks – visited, but not truly understood. As urbanisation increases and people become ever more removed from nature, many are left to wonder: What is a mire? How does it form? Why does it disappear? And what makes it so special?

These questions underline the need for targeted outreach through engaging events, educational materials, and modern communication tools that explain the value and purpose of mire restoration.[13] Without this understanding, the visible changes caused by restoration, such as the rewetting of forested areas, can cause confusion or even provoke backlash.

[11] Estonian Fund for Nature, LIFE Project Number LIFE14 NAT/EE/000126: Final Report, *Estonian Fund for Nature*, 31 March 2022.

[12] Estonian Fund for Nature, Taastamiskavade koostamine kuuel projektialal, *Estonian Fund for Nature*, accessed 28 May 2025.

[13] Estonian Fund for Nature, Õppe- ja teavitustegevus, *Estonian Fund for Nature*, accessed 30 May 2025.

In Estonia, news reports and social media debates have revealed public opposition in some cases. For example, in 2024, when restoration of the Öördi mire in Soomaa resulted in 50 hectares of dead forest that had developed as a result of past drainage[14] environmental experts recognised this as a sign of successful rewilding and a return to natural mire conditions. Yet others saw it as the destruction of a seemingly healthy forest. This contrast highlights the critical role of clear, ongoing communication in building trust, fostering understanding, and securing lasting public support for nature restoration.

In this respect, the LIFE Mires Estonia project has been a resounding success. For instance, the project attracted more than 1,500 people to take part in guided hikes known as 'mire days', which included open-air lessons. Plus, over 600 volunteers from 16 countries joined volunteer work camps, providing additional hands-on support and enabling participants to engage with nature while actively helping to restore it. This practical involvement added another meaningful layer to public engagement – turning shared responsibility into shared action.[15] In addition, nine short films from the *Ah soo!* series became an instant hit, watched over 120,000 times. These engaging, playful videos brought bogs into homes and classrooms, earning Estonia's Science Communication Award while remaining freely available to the public.

Beyond visuals and fieldwork, the project also looked inward – exploring how mires have been imagined in Estonian culture. Over 200 literary references were identified, tracing a national mindset that evolved from fear and disdain to exploitation and, finally, to reverence and protection. An essay on this topic even won a national award, proving that conservation isn't just about biology – it's about identity, too.[16]

Breaking ground for mire restoration in Estonia and beyond

Compared to the initial project plan, which aimed to restore 5,800 hectares (including 3,650 hectares of Natura 2000 habitats), the project ultimately covered a much wider area – approximately 7,900 hectares of mires, including 5,284 hectares of Natura 2000 habitats, of which 5,064 hectares are priority habitats.

After being drained, mined, or fragmented, the six degraded mires of Tudu (2,089 hectares), Sirtsi (2,779 hectares), Ohepalu (1,120 hectares), Soosaare (167 hectares), Laukasoo (1,149 hectares), and Feodorisoo (597 hectares) were brought back to vibrant life.[17]

In the process, conditions improved for a wide range of protected habitats, including those protected by the Natura 2000 network – from active raised bogs and bog woodlands to natural dystrophic lakes. As water returned, so did the mires' inhabitants. Dragonflies, amphibians, birds, and butterflies were carefully monitored as indicators of success. Monitoring results revealed striking positive changes across the restored habitats. For example, the moor frog, one of the project's target species, along with the common

[14] Kristi Raidla, Soomaal tekkis soo taastamise käigus poolsada hektarit surnud metsa, *Eest Rahvusringhääling*, 12 September 2024.

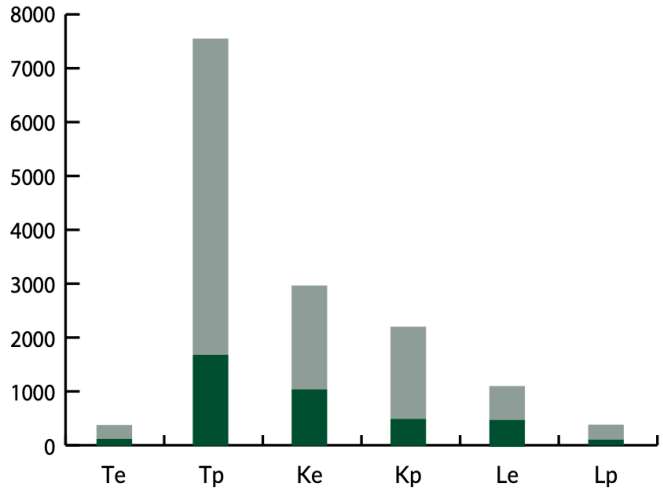
[15] Estonian Fund for Nature, Loodustalgud, *Estonian Fund for Nature*, accessed 28 May 2025.

[16] Pungas-Kohv, P., Õppe- ja teavitustegevus, *Estonian Fund for Nature*, accessed 30 May 2025.

[17] Estonian Fund for Nature, LIFE Project Number LIFE14 NAT/EE/000126: Final Report, *Estonian Fund for Nature*, 31 March 2022.

frog (*Rana temporaria*), benefitted significantly, with notable increases in both spawn clumps and adult sightings.[18]

Figure 2. Total number of spawn clumps for moor frogs (green part of each column) and all brown frogs (whole column). Data cover three habitat types – restoration areas (T), drained areas (K), and natural reference areas (L) – shown both before (e) and after (p) recovery efforts.[19]



Dragonfly diversity and abundance also grew in restored areas, while declining in reference sites. Bird communities shifted as well: forest and brushwood species declined, making way for typical mire birds. In areas like Soosaare, meadow pipits (*Anthus pratensis*) went from absent to one of the most common species within five years, highlighting the success of the restoration efforts.[20]

Photo: Jüri-Ott Salm

[18] Liina Remm, Urmas Sellis, Voldemar Rannap, Impact of mire restoration on species, *Estonian Fund for Nature*, 26–29, 2021.

[19] Ibid.

[20] Ibid.

Nearly 3,000 people across 60 conferences have learned about Estonia's experience, with these lessons increasingly incorporated into European discussions on ecosystem restoration. For example, one of the project's most innovative features was the rehabilitation of abandoned peat mining areas, where experimental techniques like the spreading of *Sphagnum* moss were tested to accelerate ecological recovery. Developed in Estonia, these methods could shape mire restoration far beyond Estonia's borders. In addition, a handbook[21] was produced to help future projects avoid common pitfalls and benefit from Estonia's expertise.

The project also aligns with, and contributes to, a number of key conservation strategies, including the Estonian Nature Conservation Development Plan, the Action Plan for Protected Mires, the EU Biodiversity Strategy for 2020 and 2030, and the Prioritised Action Frameworks for Natura 2000 (2014–2020, 2021–2027).

These efforts have helped Estonia advance its national and EU commitments to halt biodiversity loss and restore carbon-rich landscapes – all while involving civil society in the process.

Life after LIFE Mires Estonia

The project continues to make a significant contribution to managing and restoring EU priority habitats in Estonia and other Member States. Its legacy includes ongoing restoration work and strong international partnerships, notably through the Horizon 2020-funded WaterLANDS project.[22] Coordinated by University College Dublin, the initiative brings together 32 partners from 14 countries, including the Estonian Fund for Nature, Tartu University and the State Forest Management Centre.

This partnership, alongside the continued restoration efforts of the State Forest Management Centre supported by national and EU funds, signals a sustained commitment to safeguarding Europe's vital natural heritage for generations to come.

[21] Jüri-Ott Salm, et al., Restoration of Mire Habitats: Experiences from the Project 'Conservation and Restoration of Mire Habitats', *Estonian Mires*, 2021.

[22] University College Dublin, RESTORING WETLAND SITES | waterLANDS, *University College Dublin*, accessed 11 June 2025.

The Pannon Seed Bank: Sowing the seeds for long-term flora conservation in Hungary

Photo: Pannon Seed Bank

The Pannon Seed Bank was established between 2010 and 2014 as part of the EU's LIFE+ project – HUSEEDBANK – aimed at conserving wild vascular plant species native to the Pannonian biogeographical region.[23]

The project was coordinated by the Research Centre for Agrobiodiversity[24] in Tápiószele, in cooperation with the Institute of Ecology and Botany in Vácrátót, and the Aggtelek National Park Directorate. The eligible budget totalled just over EUR 800 000, with roughly half this amount – EUR 400 000 – provided by the EU LIFE Programme.[25] In 2019, the Research Centre for Agrobiodiversity was transformed and expanded, becoming the National Centre for Biodiversity and Gene Conservation.

[23] The Pannonian biogeographic region, also known as the central Danubian Basin, is entirely encircled by mountains. It is bordered by the Alps to the west, the Dinaric Alps to the south, and the Carpathians to the north and east. See: European Environment Agency, Biogeographical regions in Europe: The Pannonian region — the remains of the Pannonian Sea, *European Environment Agency*, 2002.

[24] National Centre for Biodiversity and Gene Conservation, Nemzeti Biodiverzitás- és Génmegőrzési Központ honlapja, *National Centre for Biodiversity and Gene Conservation*, accessed 13 June 2025.

[25] European Commission, Establishment of the Pannon Seed Bank for the long-term ex situ conservation of Hungarian vascular wild plants, *Life Public Database*, accessed 13 June 2025.

Protecting native species from eradication

The main aim of the HUSEEDBANK project was to create a seed bank that would protect the genetic diversity of wild vascular plants native to the Pannonian region, preserving them securely in a controlled human environment[26].

The project began with establishing what would become known as the Pannon Seed Bank, aiming to collect and store roughly 50 per cent – at least 800 species – of Hungary's native wild vascular flora. By the end of the project, the team had collected and stored seeds from an impressive 912 species, exceeding the original target.

By 2014, some 800 species' seeds had been cleaned, documented, and tested for germination, with an additional 112 species processed in spring 2015. The majority are protected species as well as numerous Natura 2000, endemic, and subendemic species. Some collected species have special economic significance. Most of the plants collected are daisies, grasses, carnations, legumes, and mustards.

Having achieved and surpassed all of its goals, the project was included among the best LIFE nature projects for 2015.[27]

A project that keeps on giving

Since the project concluded a decade ago, the Pannon Seed Bank has been fully integrated into the National Biodiversity and Gene Conservation Centre. In cooperation with Hungary's national park directorates, the Centre now maintains an ongoing programme dedicated to seed collection – a vital element of plant gene conservation.

Starting in 2025, the first viability tests will be performed on some of the stored seeds, which continue to be available for nature restoration projects. Efforts to revive sandy grassland habitats in the Kiskunság region of the Great Hungarian Plain are already underway using seeds from the collection. To restore these natural habitats, native and endemic species – including centaury (knapweed), carnation, globe thistle, spurge, baby's breath, blue-hair grass, and pincushion flowers – have been sown.[28]

The Pannon Seed Bank was established with a vision that spans not just decades but centuries, aiming to safeguard plant genetic diversity over the long term. As climate change and other factors cause unprecedented and often unexpected changes, weakening fragile habitat networks, the Pannon Seed Bank

[26] Also called *ex situ* conservation.

[27] João Pedro Silva, et al., Best LIFE Nature projects 2015, *European Commission*, 2016.

[28] Anna Kövendi-Jakó, et al., Effect of seed storing duration and sowing year on the seedling establishment of grassland species in xeric environments, *Restoration Ecology*, 29 (2021).

provides vital propagation material to support biodiversity conservation and habitat restoration for many decades to come.

More than just seed preservation

Beyond its ecological significance, the Pannon Seed Bank plays a role in strengthening the economy, providing an invaluable resource for research and development in agriculture and biotechnology. The genetic material stored in the Pannon Seed Bank can be utilised to develop new crop varieties with improved traits that are more tolerant to drought, pests, and disease – essential characteristics for sustainable agriculture. In doing so, the Pannon Seed Bank contributes to food security and enhances agricultural livelihoods.

The project has also opened up opportunities for education and community engagement through exhibitions, interactive tools, and learning programmes, helping to raise public awareness about the importance of plant conservation and biodiversity.[29] These initiatives not only inspire public involvement in environmental stewardship, but also bring together scientists, conservationists, and local communities around a common goal: protecting Hungary's natural heritage.

Far more than just a conservation tool, the Pannon Seed Bank is an invaluable asset for the country, contributing to its environmental, economic, and social resilience. It protects biodiversity, drives agricultural innovation, and enriches public understanding through education and outreach – fostering a shared responsibility for Hungary's natural heritage.

[29] These educational efforts are well showcased on the National Centre for Biodiversity and Gene Conservation's Facebook page.

Restoring Latvia's mires for the benefit of nature and climate

Madiešēni mire in Augstroze Nature Reserve (photo: Māra Pakalne).

State of nature, drainage, and restoration

Mires are among the few remaining natural landscapes in Latvia. Different types of mires such as fens, transitional mires, and raised bogs30 collectively cover around 5 per cent of the country, while peatlands overall account for more than 10 per cent of Latvia's territory.31 Most of the country's mire habitats are listed in the EU Habitats Directive (hereafter, EU-protected habitats), with active raised bogs making up more than 80 per cent and degraded raised bogs still capable of natural regeneration representing almost 10 per cent.32 Transition mires and quaking bogs cover about 6 per cent of the mire area, alkaline fens 2 per cent, and other types even smaller percentages. Two-thirds of these habitats lie within the Natura 2000 network, and almost all occupy publicly owned land.

[30] Fens are mires fed by mineral-rich groundwater, featuring a relatively thin layer of peat and lush vegetation. By contrast, raised bogs are fed only by rainwater, exhibit a thicker peat layer, and support only specialised species. Transitional mires form when fens gradually transform into raised bogs.

[31] Māra Pakalne, Purvu ekosistēmas Latvijā, *National Encyclopedia,* 14 March 2025.

[32] Nature Conservation Agency, Informatīvais ziņojums "Par Eiropas Savienības nozīmes aizsargājamo biotopu izplatības un kvalitātes apzināšanas rezultātiem un tālāko rīcību aizsargājamo biotopu labvēlīgas aizsardzības stāvokļa nodrošināšanas un tautsaimniecības nozaru attīstības interešu sabalansēšanai", *Nature Conservation Agency*, 45–51, 2022.

According to Latvia's 2013–2018 national report under the EU's Habitats and Birds Directives, most of Latvia's EU-protected mire habitats are in 'unfavourable-inadequate' or 'unfavourable-bad' condition.33 Of these, alkaline fens and degraded raised bogs still capable of natural regeneration are in particularly poor condition. Latvia's nature census, finalised in 2021, found that only 12 per cent of EU-protected mire habitats are of excellent quality, more than half are satisfactory, almost 30 per cent average, and 4 per cent in poor condition. Three times as many mire habitats were evaluated compared to the 2013–2018 report, even though the census assessments were less detailed and degraded raised bogs were not included.34

The more intact a mire is, the more functions it can sustain, including carbon storage, water regulation, and biodiversity support. Healthy peatlands balance greenhouse gas emissions and sequestration, whereby carbon is sequestered due to the slow decomposition and accumulation of organic matter under water-saturated, oxygen-poor conditions. Disruption of water retention leads to peat mineralisation and carbon loss, along with changes in vegetation and the overgrowth of grasses, shrubs, and trees. When degraded, these ecosystems shift from carbon sinks to carbon sources. In Latvia, degraded peatlands account for about 10 per cent of total national emissions.35 Therefore, maintaining or restoring the water table is essential for mitigating climate change and improving the conservation status of these ecosystems.

Although peat is extracted from only 4 per cent of the Latvia's total mire area,36 the hydrological regime has been altered across significantly larger areas. Forestry remains the main driver of peatland degradation, followed closely by agriculture.37 However, to define realistic restoration goals and identify the needs of landowners, land managers, and other key stakeholders, expert evaluations are required. For instance, not all peatlands can be restored to their original state. In some cases, such as heavily afforested or mineralised sites, parts of the area in question may no longer support typical mire species and peat formation. Therefore, timely intervention is crucial before degradation reaches advanced stages. Even when full recovery is not viable, partial restoration can still provide important ecological benefits at the landscape level.

Latvia's first mire restoration efforts began in the mid-1990s with ditch blocking, later expanding to include peat damming, shrub and tree removal, ditch infilling, and full-scale restoration.38 In recent years, several EU LIFE projects, such as LIFE Mires, LIFE Wetlands, LIFE Raised Bogs, LIFE Peat Restore, and LIFE Peat

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[33] Nature Conservation Agency, Ziņojums Eiropas Komisijai par ES nozīmes biotopu (dzīvotņu) un sugu aizsardzības stāvokli Latvijā. Novērtējums par 2013.-2018. gada periodu. Ziņojuma kopsavilkums par dzīvotņu aizsardzības stāvokli, *Nature Conservation Agency*, 2019.

[34] Nature Conservation Agency, Informatīvais ziņojums "Par Eiropas Savienības nozīmes aizsargājamo biotopu izplatības un kvalitātes apzināšanas rezultātiem un tālāko rīcību aizsargājamo biotopu labvēlīgas aizsardzības stāvokļa nodrošināšanas un tautsaimniecības nozaru attīstības interešu sabalansēšanai", 45–51.

[35] Ministry of Climate and Energy of Latvia, Latvia's National Inventory Document under the UNFCCC: Greenhouse Gas Emissions in Latvia from 1990 to 2022, *Ministry of Climate and Energy of Latvia*, 2024.

[36] Cabinet of Ministers of Latvia, Ministru kabineta rīkojums Nr. 531 "Par Taisnīgas pārkārtošanās teritoriālo plānu", *Likumi.lv*, 14 July 2022.

[37] United Nations Environment Programme, Global Peatlands Assessment: The State of the World's Peatlands, *United Nations Environment Programme*, 142–146, 17 November 2022.

[38] Agnese Priede (ed.), Protected Habitat Management Guidelines for Latvia. Mires and springs, Nature Conservation Agency, 21–25, 2017.

Carbon, have been implemented, alongside other initiatives supported by EU and national funding. Beyond restoring mires, these projects have strengthened the capacity of scientists and practitioners, increased awareness among policymakers and the public, and promoted international knowledge exchange.

Making the case for rewetting: LIFE Peat Restore

The LIFE Peat Restore project took place from 2016 to 2022. The total project budget was just over EUR 5.9 million, including approximately EUR 3.5 million in funding from the European Commission's LIFE Climate Change Mitigation and Adaptation subprogramme.[39] The project concentrated on restoring degraded peatlands, building scientific capacity, testing innovative restoration methods, and conducting greenhouse gas emissions measurements.[40] Central to this work was raising and stabilising the water table in selected case study mires with the goal of reducing CO_2 emissions from degraded peatlands. Another objective of the project was to develop methodological resources, such as mire restoration guidelines and handbooks for policymakers, conservation managers, and public authorities.

The project brought together a diverse group of partners from five European countries: the Nature And Biodiversity Conservation Union (NABU) (Germany, lead partner); the University of Latvia, the Lake Engure Nature Park Fund, E-Buvvadiba, and the Rucka Art Foundation (Latvia); the Lithuanian Fund for Nature and the Lithuanian Peat Association (Lithuania); Tallinn University (Estonia); and the Naturalists' Club (Poland). The project focused on various degraded peatlands around the Baltic Sea, including post-harvested peat fields in raised bogs, slightly-to-heavily drained raised bogs, transitional mires, fens, and mire woodlands. Despite being located within protected areas, all sites required restoration due to the impacts of drainage, extraction, or both interventions. In Latvia the sites were solely affected by drainage.[41]

Project sites and restoration measures

The first restoration site targeted alkaline fens in the Engure Lake National Park, which formed some 200 years ago in response to a reduction in the lake's water level.[42] Traditionally used for grazing and hay mowing, the site began to be drained in the early 20th century, resulting in highly fluctuating water levels. In recent decades, the area was abandoned and gradually overgrown by woodland, leading to a loss of peat-forming vegetation. Prior to carrying out the restoration works, the project team developed a site management plan. This included the removal of shrubs and smaller trees, along with the installation of two ditch dams to raise the water table. Although the total Engure Lake mire complex spans 12,580 hectares,

[39] European Commission, Reduction of CO_2 emissions by restoring degraded peatlands in Northern European Lowland, *European Commission*, *S.a.*, accessed 30 May 2025.

[40] Letícia Jurema, et al., Restoring peatlands for climate – "Reduction of CO_2 emissions by restoring degraded peatlands in Northern European Lowland", *Life Peat Restore*, March 2022.

[41] Māra Pakalne, et al., Best Practice Book for Peatland Restoration and Climate Change Mitigation. Experiences from LIFE Peat Restore Project, 57–77, 94–103.

[42] Ibid.

the restoration focused on 106 hectares. This area includes EU-protected habitats such as alkaline fens and calcareous fens – home to the great fen sedge (*Cladium mariscus*) and the *Caricion davallianae* plant community. While the rewetting process at the site is not expected to drastically lower greenhouse gas emissions, it is primarily designed to preserve the ecosystems and ecological functions of the fens.

The second site, Baltezers Mire Nature Reserve, was once described as a raised bog complex. However, decades of pollution from a nearby cement factory had contaminated the site with limestone particles, shifting vegetation towards more calciphilous species. During the early 20th century, roads and ditches were built in preparation for peat extraction, which ultimately never proceeded. To identify restoration measures, a new nature conservation plan was developed for the reserve. Restoration efforts focused on fitting the mire's drainage ditches with eight peat dams. Of the larger mire complex, which spans some 228 hectares, 41.4 hectares were restored as part of the project, including EU-protected habitats like transitional mires and quaking bogs, western taiga, and bog woodland. The rewetting is expected to result in a notable reduction in greenhouse gas emissions. Monitoring data shows rising water tables and the return of typical mire species such as *Drosera* spp.

The third site focused on raised bogs within Augstroze Nature Reserve, which were drained in the late 20th century. This intervention resulted in compaction and mineralisation of the upper peat layer, reduced *Sphagnum* moss cover, and the encroachment of trees and shrubs. The project team was responsible for developing the management plan for the area. The entire site covers 1,880 hectares, with restoration efforts concentrated on 147.8 hectares, primarily the Madiešēni mire. The project focused on EU-protected habitats, including active raised bogs and degraded raised bogs still capable of natural regeneration. After constructing 25 peat dams, the water table rose and became more stable. By the end of the project, characteristic bog vegetation had begun to recover. Greenhouse gas emissions from the site are expected to halve by 2050, making Augstroze the most effective Latvian site for climate change mitigation.[43]

Importance of assessing restoration success

Monitored parameters at all project sites, including in Latvia, covered biota, water levels, water and peat chemistry, precipitation, air temperature, and greenhouse gas measurements.[44] To assess emissions after raising water tables, both indirect estimates and direct measurements were conducted using a unified approach across all participating countries.

Indirect assessments were performed using the greenhouse gas emissions site-type (GEST) method, which draws on mire vegetation structure, site characteristics, and water levels.[45] Developed by the Greifswald

[43] Leonas Jarašius, et al., Handbook for Assessment of Greenhouse Gas Emissions from Peatlands: Applications of direct and indirect methods by LIFE Peat Restore, *Life Peat Restore*, 56, 22 April 2022.

[44] Māra Pakalne, et al., Best Practice Book for Peatland Restoration and Climate Change Mitigation. Experiences from LIFE Peat Restore Project, 25.

[45] Leonas Jarašius, et al., Handbook for Assessment of Greenhouse Gas Emissions from Peatlands: Applications of direct and indirect methods by LIFE Peat Restore, *Life Peat Restore*, 20–21, 22 April 2022.

Mire Centre in Germany, the method was applied for the first time in the Baltic States. A total of 34 GEST types were defined, representing different site conditions and peatland types – both pristine and drained – and indicating their potential for CO_2 and methane (CH_4) emissions. The method was applied annually both before and after restoration to evaluate the effectiveness of the implemented measures. For direct measurements, transparent and non-transparent chambers were installed to measure CO_2, CH_4, and nitrous oxide (N_2O) fluxes over specific time intervals.

Immediate results for biodiversity, long-term gains for climate

By the end of the project, over 5,300 hectares of degraded peatlands had been restored across the participating countries.[46] One of the most important outcomes of these efforts was their contribution to climate change mitigation, with estimates suggesting a total reduction of approximately 9,890 tonnes of CO_2 equivalent annually across all restored sites.[47] This could amount to a global warming potential reduction of around 30 per cent.[48] These results underline the role peatland restoration can play in meeting national and EU climate goals and advancing nature restoration plans.

Initial restoration results showed that water tables rose relatively quickly, particularly near blocked ditches, allowing peat-forming vegetation to return.[49] Creating suitable conditions for this regrowth is the first and most important step for successful peatland recovery. Choosing the right approach means developing a thorough understanding of how each peatland ecosystem functions, including its hydrology, vegetation dynamics, and interaction with the wider landscape. For this reason, focused and ambitious efforts, such as LIFE projects, are crucial. While the initial results are encouraging, restoration is not a quick fix. Indeed, in many areas, especially those with more complex degradation histories, full recovery will take decades. That's why long-term monitoring is critical, not only for tracking progress but also for managing restoration efforts in an adaptive way.

Greenhouse gas measurement results showed that GEST-based estimates differed from direct measurements by around 40 per cent on average.[50] This is largely because GEST types are more representative of temperate peatlands and do not fully account for all site-specific factors such as weather variations, dissolved carbon flows, or fluctuating N_2O emissions. While the GEST method is useful for tracking changes over time, it's not yet reliable enough for official emissions reporting. Therefore,

[46] Māra Pakalne, et al., Best Practice Book for Peatland Restoration and Climate Change Mitigation: Experiences from LIFE Peat Restore Project, 174.

[47] Ibid.

[48] Leonas Jarašius, et al., Handbook for Assessment of Greenhouse Gas Emissions from Peatlands: Applications of direct and indirect methods by LIFE Peat Restore, *Life Peat Restore*, 78, 22 April 2022.

[49] Māra Pakalne, et al., Best Practice Book for Peatland Restoration and Climate Change Mitigation. Experiences from LIFE Peat Restore Project, 174-178.

[50] Leonas Jarašius, et al., Handbook for Assessment of Greenhouse Gas Emissions from Peatlands: Applications of direct and indirect methods by LIFE Peat Restore, *Life Peat Restore*, 78–79, 22 April 2022.

continued investment in broader direct measurements across both time and space, even if more resource-intensive, is essential for improving the accuracy of emissions estimates and strengthening similar methods.

Measuring greenhouse gases at Madiešēnu mire in Augstroze Nature Reserve (photo: Māra Pakalne).

Sharing lessons and promoting mire restoration

Outcomes of the restoration work, including details on the greenhouse gas measurement methodology used, feature in two key publications.[51,52] In addition, a report on innovative technologies and business models for peatland restoration was developed in collaboration with four other European peatland projects.[53] Each participating country also prepared an analysis of the national regulatory framework concerning peatland management, identifying both opportunities and obstacles to implementing restoration solutions,[54] as well as socio-economic impact assessments of the project activities.[55] These resources serve as invaluable tools for researchers, practitioners, and authorities involved in wetland conservation.

Recognising the importance of involving stakeholders in planning and decision-making processes, the project focused strongly on outreach. Since all Latvian restoration sites were located in protected areas and managed by the state-owned company Latvia's State Forests, decisions were made in close coordination with the relevant authorities. In Latvia, the public was engaged in the consultation process during the development of nature conservation and management plans. To allay potential concerns, local communities in the participating countries were also kept informed about ongoing works, such as the

[51] Māra Pakalne, et al., Best Practice Book for Peatland Restoration and Climate Change Mitigation. Experiences from LIFE Peat Restore Project.

[52] Leonas Jarašius, et al., Handbook for Assessment of Greenhouse Gas Emissions from Peatlands: Applications of direct and indirect methods by LIFE Peat Restore, *Life Peat Restore*, 22 April 2022.

[53] Amber De La Haye, et al., Peatlands across Europe: Innovation & Inspiration | State of the Art & Guide to Next Steps, *Bax & Company*, June 2021.

[54] LIFE Peat Restore, Legal regulatory framework of peatland exploitation, draining and restoration in Latvia, *University of Latvia*, July 2018.

[55] LIFE Peat Restore, Socio-economic impact assessment. Latvia, *University of Latvia*, March 2022.

removal of trees. To raise awareness about the value of peatlands and the need for restoration, a wide range of activities were implemented. These included online posts, brochures,[56,57,58] public discussions, and conferences. Two short films were produced,[59,60] and a travelling photo exhibition (also available online) was displayed across all partner countries.[61]

Funding gap limits peatland potential

Monitoring was identified as a crucial component of the project. However, with no funding in place to maintain these efforts, particularly direct measurements, all monitoring activities at Latvia's project sites have ceased.[62] This unfortunate reality highlights the importance of long-term project continuity and the need for sustainable and reliable funding. Continued monitoring is essential for understanding the impacts of restoration and whether adaptation measures are needed. Given the significance of research results for emissions accounting and the need for improved reliability of carbon credit schemes, continued investment in research is essential, particularly through innovation-driven programmes like LIFE.

At present, researchers from the University of Latvia and experts from NABU, among others, are involved in the LIFE Peat Carbon project, aimed at developing and testing emissions assessment methods using remote sensing for emissions accounting.[63] They are also evaluating the outcomes of earlier LIFE projects – LIFE Wetlands, LIFE Mires, and LIFE Raised Bogs – where water levels were stabilised in Latvian wetlands, including the Sudas-Zviedru mire, Cena mire, and Melnais Lake mire. As noted by a project representative, this kind of follow-up work, although critical, is unfortunately not commonly supported by EU-funded projects.[64]

What remains clear is that peatland restoration takes time, and there is no universal approach. However, the long-term benefits far outweigh the costs. Nature restoration is essential for climate change mitigation. That makes ongoing research, awareness-raising, as well as strong political will absolutely crucial.

[56] LIFE Peat Restore, Baltezers Nature Reserve, *University of Latvia*, 2020.

[57] liFE Peat Restore, Engure Fens, *University of Latvia*, 2020.

[58] LIFE Peat Restore, Augstroze Nature Reserve, *University of Latvia*, 2020.

[59] LIFE Peat Restore, Make Peatlands Wet Again, *Rucka Art Foundation*, 9 June 2022.

[60] LIFE Peat Restore, True Power of Peatlands, *Rucka Art Foundation*, 10 June 2022.

[61] LIFE Peat Restore, Restoring Peatlands for Climate, LIFE Peat Restore, accessed 30 May 2025.

[62] Information received during a phone call with a project coordinator from the University of Latvia on 28 May 2025.

[63] LIFE Peat Carbon, Par projektu, *University of Latvia*, accessed 30 May 2025.

[64] Information received during a phone call with a project coordinator from the University of Latvia on 28 May 2025.

Restoring the lower Drava River: Reviving ecosystems and enhancing biodiversity

Photo: Tilen Basle

The riparian ecosystem of the Drava River has suffered significant degradation due to human activities, including the construction of hydropower dams, barriers, and riverbank reinforcements aimed at flood protection. These interventions have led to the deepening of the riverbed, disrupted sediment transport, severed connections between different parts of the riparian ecosystem, impaired key ecological functions, and caused the loss of vital habitats and species.

To address these challenges, a project aimed at restoring the ecosystem of the lower Drava River was carried out between 2012 and 2017. Led by BirdLife Slovenia in partnership with VGB Maribor, DRAVA Vodnogospodarsko podjetje Ptuj, and the Municipality of Ptuj, the project focused on the stretch of the Drava River between Maribor and the town of Središče ob Dravi, encompassing the Natura 2000 site of the Drava in north-eastern Slovenia.

The total project budget amounted to EUR 4.1 million, with 50 per cent financed by the EU LIFE programme. The remaining co-financing was secured by Dravske elektrarne Maribor, the Ministry of the Environment and Spatial Planning, and Ormož Municipality (43 per cent), alongside other beneficiaries contributing the final 7 per cent.

Improving habitat conditions for water birds

The project partners worked to improve the conservation status of the riparian ecosystem and of local species by implementing following actions:

- Gravel bars along the river were cleared of woody vegetation over a total area of 14 hectares, creating favourable conditions for nesting and breeding of little ringed plovers (*Charadrius dubius*) and other local bird species, such as the common sandpiper (*Actitis hypoleucos*).
- The riverbank was restored by removing stone reinforcements and other barriers to encourage the creation of a natural riverbed. Additionally, side arms were connected to the main river channel.
- The former wastewater basins of a nearby sugar factory were completely restored, including the construction of a new water supply system and the restoration of waterbird habitats restored. The site was also placed under management and official designated a nature reserve.

Benefits for nature and people

Many positive results have shown how effective the project has been in restoring ecosystems and allowing species to recover and return to breed:

- The little ringed plover population increased by 35 per cent, while the common sandpiper population grew by 20 per cent.
- The numbers of sand martins (*Riparia riparia*) and kingfishers (*Alcedo atthis*) have risen. After more than 20 years, both species have once again become regular breeders along the Drava River between Maribor and Zavrč. Due to improved management of artificial breeding islands, 118 pairs of common terns (*Sterna hirundo*) bred at Lake Ptuj in 2017 – the highest number recorded in 14 years.
- For the first time water engineering works on the river were aligned with nature conservation guidelines. Green solutions were implemented, successfully achieving flood safety alongside conservation goals.

Leading by example

Since the project concluded, the riparian ecosystem of the Drava River has become significantly more suitable for the nesting of target Natura 2000 species. Conditions for riverbank nesting species, especially those requiring nesting islands, have notably improved. The Ormož Basins, together with Lake Ormož, have emerged as vital resting and breeding sites during migration periods. Additionally, a new public nature reserve was established.

For the first time in Slovenia, substantial river renaturation measures have been successfully carried out on a large river, demonstrating that restoration efforts are not limited to tributaries or smaller stretches. Due to its economic significance and scale, the Drava serves as a key example of how effective collaboration between experts and local stakeholders can make such ambitious projects feasible.