PEATLANDS ACROSS EUROPE: INNOVATION & INSPIRATION

State of the Art & Guide to Next Steps

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FOREWORD

Dianna Kopansky, Global Peatlands Coordinator
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"Peatlands are ancient irrecoverable carbon stores. Mysterious homes offering refuge to migrating birds, rare flora and fauna and unique biodiversity. They provide much needed protection from droughts and floods. Although largely unknown and often overlooked, they matter – for the climate, for people and for our planet's future. Peatlands urgently need our protection and restoration efforts. We need to deepen our understanding of these precious ecosystems and inspire forward thinkers to invest in their conservation and sustainable management."

Peatlands provide an unparalleled and disproportionate contribution to climate action and, if prioritised, will help accelerate efforts for green recovery and 'building back better' in the post COVID world. I am hopeful that 2021 will be the year that ignites people's passion for nature, sparking self-reflection and a commitment to action. We all need to work together to safeguard the health and well-being of current and future generations by restoring, protecting and conserving the critical ecosystems - like peatlands - that are so important to the health of our planet.

Peatlands can be found in almost every country in the world, but we are only just starting to realise their value and how to harness their potential as a powerhouse nature-based solution. The more we learn about peatlands, the more we value the important services they provide - controlling floods, purifying and supplying water, safeguarding species, harbouring deep cultural meaning, inspiring creativity and offering livelihoods to millions of people. We cannot afford to lose them or abuse them.

A lack of understanding of peatlands' vital role in the landscape, combined with outdated policies and perverse incentives, means that peatlands continue to be drained and damaged around the world. Peatlands are our largest terrestrial organic carbon stock, and if we are to meet our global goals and commitments, we must work hard to understand, protect, restore, and sustainably manage these vital ecosystems. This *Peatlands Across Europe: Innovation & Inspiration Guide* is a valuable step towards that reality – it captures important recommendations, shares the cutting edge experiences of peatland restoration pioneers, and identifies gaps, priorities and lessons from across Europe that can be taken up by peatland practitioners around the globe.

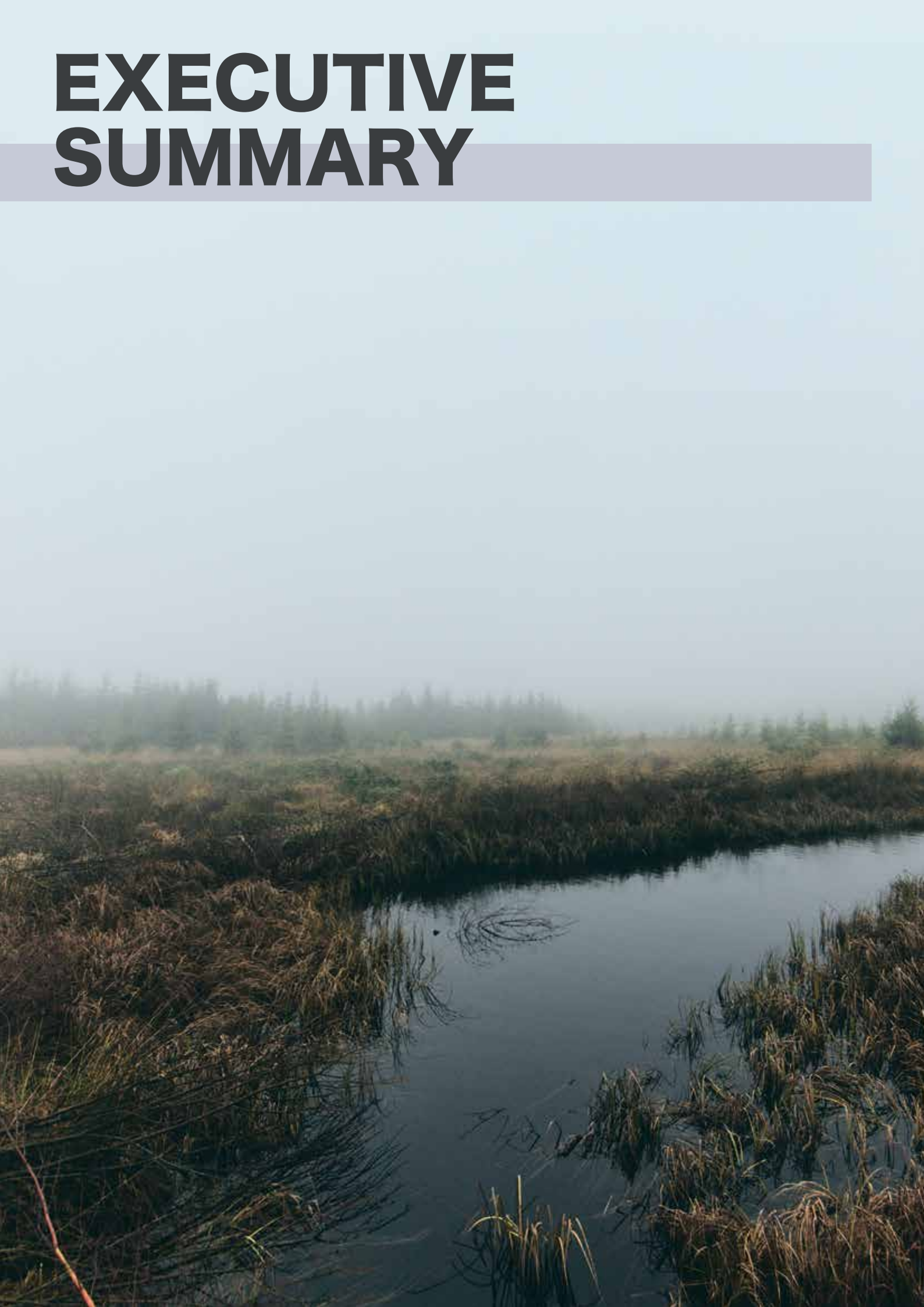
Peatlands offer an incredible opportunity for accelerating emissions reductions, protecting irrecoverable carbon sinks and providing precious refuges for species. According to the latest scientific estimates, only 15% of the world's peatlands have been degraded (representing less than 0.4% of the global land surface area) but these sites alone contribute to more than 5% of global anthropogenic CO2 emissions. Draining and clearing land for agriculture has been the main threat to peatlands historically and continues to this day. About 75% of the EU's land-related emissions from cropping and grazing result from peatland drainage, although this area covers only 2% of agricultural and grazing land.[1]
While this figure is worrying, it is also source of hope. We can work together to reverse this trend through restoration action and, at the same time, invest in protecting pristine peatlands. The UN Decade on Ecosystem Restoration is proof that countries are committed to getting behind our planet's health with a goal to stop and reverse the destruction and degradation of billions of hectares of ecosystems. The Global Peatlands Initiative is supporting the implementation of the Decade, offering an ideal platform to help foster peatland restoration and conservation action at scale.

We can do it, but only by working together – collaboration is the key – a lesson beautifully captured in this dynamic collection of learnings, reflections, recommendations and valuable nudges that mean we do not need to start from scratch. We don't have time for that! Nature needs time to heal, and the same is true for peatlands, so let's get to work – share, join up, inspire and exchange for the benefit of all.

UNITED NATIONS DECADE ON ECOSYSTEM RESTORATION 2021-2030

Global Peatlands Initiative

EXECUTIVE SUMMARY



Despite being carbon storage powerhouses, biodiversity champions, and important for climate change adaptation and mitigation, peatlands are in trouble. Across Europe they have been drained and degraded. As we enter the UN Decade on Ecosystem Restoration, it is crucial that we ensure peatlands are protected, restored, and sustainably managed now and for our future.

EU PROJECTS

To this end, five EU funded transnational projects – Carbon Connects, Care-Peat, DESIRE, LIFE Peat Restore, and CANAPE – across North West Europe, the North Sea region, and the Baltic Sea Region have been operating under the INTERREG and LIFE funding programs. They have been developing and piloting techniques, technologies and business models to restore and sustainably manage peatlands. This collaborative guide documents their efforts and highlights the key messages to equip future peatland practitioners, managers and decision makers with vital state of the art information.

PEATLAND SOLUTIONS

Although taking different approaches, these projects share a commitment to sustainably re-wetting and restoring peatlands. Restoration, however, must be accompanied by funding and business models to ensure the long-term economic viability of healthy peatlands. To underpin funding and restoration decisions, effective monitoring of the ecosystem services before and after restoration is crucial. This means assessing and modelling greenhouse gas (GHG) emissions, water quality and biodiversity. This guide outlines practical solutions for ensuring peatlands can be restored and managed sustainably: restoration technologies for assessing and modelling GHG emissions, sustainable funding and business models, and various restoration and management options. Drawing on the knowledge developed while delivering these practical solutions, the projects also came together to identify and address the policy barriers, enablers and gaps. These have been outlined as broad, high-level policy recommendations in this Guide.

WHO IS THIS GUIDE FOR

Peatlands are multifaceted, with the work required to restore and safeguard these valuable ecosystems crossing departments, regions and industries. As such, this guide contains practical guidance for local governments ready to act. It also features high level policy recommendations to inform environmental groups and national decision makers able to make the interventions needed to safeguard peatlands for the future. This brief is also for peatland practitioners, managers and experts. As the need to protect peatlands gains traction, and the EU enters a new era of funding, now is a critical moment to codify existing learnings and identify knowledge gaps for future research to address. To prevent new projects from reinventing the wheel, here we outline the main findings of EU peatland projects from 2016 to 2021, with links to more detailed information. The combination of learnings, recommendations and practical advice will help guide the next stage of peatland projects, policy and research.

THE ROAD AHEAD

Peatland restoration is an important component of the world's journey to net-zero carbon emissions. When healthy, peatlands are incredible carbon stores and potential carbon sinks – yet, if allowed to degrade, they threaten biodiversity, release pollutants into the environment and thwart climate change mitigation and adaption goals everywhere. The importance of UNFCCC COP-26 and the UN Decade on Ecosystem Restoration, which launched in June 2021, mean that now is the time to make the necessary decisions to support and scale up peatland restoration and sustainable management.

WHAT ARE PEATLANDS?

Intact peatlands – also known as mires, fens, moors, swamps and bogs – are a type of wetland which can still be found in almost every country on earth. Their year-round waterlogged condition means that dead plant material cannot fully decompose. Instead, it builds up to form peat.

ANATOMY OF A PEATLAND

Over millennia the peat accumulates, becoming, in some places, meters thick. "Peatland" refers both to areas with this layer of undecomposed plant material, including drained and used sites, and the wetland habitat that grows on its surface, which, under sufficiently wet conditions, will eventually die and turn into the peat itself.

Peatlands span all continents, and although all waterlogged, can be incredibly varied. In Europe peatland ecosystems range from Ireland and Scotland's open, treeless blanket mires or bogs, to North Europe and the Baltic region's raised bogs, Central Europe's river valley peatlands, Northern Scandinavia's string-flark mires and the Southern European fens. With such variation, a sensitive approach to peatland management and restoration is crucial, making pan-European collaboration a necessity.

ECOSYSTEM SERVICES

Despite only covering 3% of land surface, globally, peatlands contain at least 550 gigatons of carbon - more than twice that stored in all forest biomass and equivalent to 75% of all carbon in the atmosphere. This makes peatlands the world's largest land-based carbon store, despite their relatively small surface coverage. Beyond their vital role in carbon storage, peatlands also provide further crucial ecosystem services. In their natural wet state, they mitigate flooding and drought, reduce the risk of fire and help ensure clean drinking water. In the UK, 43% of the population receives drinking water sourced from peatlands, with the number climbing to 68% in Ireland.[2] Peatlands are also incredibly important for biodiversity, home to rare birds, throngs of insects, and unusual plants.

CULTURAL IMPORTANCE

Peatlands are also culturally important for people. As well as providing a buffer against flooding and droughts, peatlands provide space for recreation and engaging with nature. Thanks to their long history and preservative nature, peatlands also have an important archive function, with the capacity to preserve scientific and community history spanning thousands of years. Once the peat has decomposed or is removed, this archive is lost forever. They are also, however, now often home to important cultural landscapes formed by their drainage and use over centuries - a fact that has to be acknowledged and taken into account in the narrative of transformative change and just transition.

Despite only covering 3% of land, peatlands contain more than twice the carbon stored in all forests

PEATLANDS IN TROUBLE

Although peatlands are amongst our most valuable ecosystems, today they are under intense threat. Globally, 25% of peatlands have been destroyed, and in Europe peatlands are our most degraded ecosystem.[3]

Damaged peatlands emit more CO2 than shipping & aviation combined

PEATLAND DAMAGE

Drained and damaged peatlands are a major source of greenhouse gas emissions, responsible for 5.6% of global human-caused CO2 emissions annually, more than aviation and shipping combined. Drainage also leaks nutrients and carbon to surface waters, impacting drinking water production and halting new peat growth in fen areas downstream. Peatland loss also means biodiversity loss, more floods and droughts, degraded drinking water for local communities and eutrophication (excessive algae growth) of open waters.

Damage is caused when peatlands are drained for agriculture and tree planting. Atmospheric pollution, (from sulphur and nitrogen), peat extraction for fuel, horticulture or development, fires, and overgrazing are also responsible for peatland degradation. When a peatland is drained or stripped of its peat-forming vegetation it becomes inactive, emitting rather than storing and sequestering significant quantities of nutrients and carbon.

PEATLAND RESTORATION

Peatland restoration, protection and sustainable management is thus highly significant to attempts to combat climate change and preserve biodiversity. While it is crucial to understand how we can effectively restore degraded peatlands, this is a complex area crossing multiple domains and affecting many landowners and land users that cannot be solved by simply raising the water table on drained peatlands. To effectively target restoration and underpin financial incentives for restoration, we need to learn more about peatland GHG emissions by developing user friendly and cost-effective monitoring tools. It is also important to establish peatland management techniques, supported by sustainable business models and agricultural practices, that can ensure restored and healthy peatlands continue to be maintained into the future. These practical tools for researching and restoring peatlands must be underpinned by effective local, national and EU policies that safeguard peatlands while allowing economic activities and respecting local cultural relationships with the land.

Aleksandrs Galaks for LIFE Peat Restore

EU COLLABORATION P

To achieve the best results for these complex, varied landscapes collaboration is crucial. That's why Carbon Connects, Care-Peat, DESIRE, LIFE Peat Restore, and CANAPE have joined forces to share their knowledge, optimise their work and provide the blueprint for future research and project development.

Carbon Connects, Care-Peat, LIFE Peat Restore, and CANAPE shared their experiences over four workshops in 2020, the outcomes of which have formed the backbone of this brief. The workshops covered their experiences with peatland restoration and management techniques, sustainable business models, and techniques and technologies for modelling and assessing GHG emissions. They also identified the policy enablers, barriers, and recommendations to overcome these challenges. These shared insights have been developed into this brief, with additional input from the DESIRE project to offer a richer perspective on the solutions to the many challenges that peatlands are facing.

The five EU projects all have similar main goals; to recognise peatlands as endangered ecosystems and to restore peatlands. The difference lies in their approach and their focal ecosystem services.

CANAPE

Creating a New Approach to Peatland Ecosystems, or CANAPE, is an INTERREG VB North Sea Region Project focused on reducing flooding and restoring unique peatland ecosystems via rewetting, developing paludiculture for the wet use of peatlands, restoring fen lakes, and ensuring restoration is economically viable by monetising products produced from intact wetland ecosystems. Running from 2017 to 2022, the project brings together North Sea Region (NSR) local authorities, NGOs, and academic bodies from the UK, Belgium, Denmark, Germany and the Netherlands.

CANAPE is working with five previously drained peatland pilot sites and three lakes, demonstrating best practice in rewetting and restoration to improve climate resilience, halt the release of CO_2, and prevent further degradation of the soil. As wet soil is incompatible with traditional farming practices (e.g., wheat, potatoes or grazing cattle), CANAPE is developing suitable agricultural procedures and a market for alternative products that can be produced from the re-wetted peatlands - a type of farming known as paludiculture. The project has three paludiculture trial sites, trialing the production of Typha, Reed Canary Grass, Common Reed and Sphagnum moss.

Existing agricultural policy and subsidies do not always support rewetting – they still favour drainage-based farming, thus hindering rewetting. This limits farmers' abilities to move away from agricultural practices that are damaging to peatlands. As such, CANAPE has worked to unlock alternative finance in the form of peatland products.

The products that can be produced via paludiculture farming and from the waste generated during conservation projects include compost, biochar, horticultural substrates, seeding material for restoration, paper, and cooking charcoal. However, farmers and landowners don't always have access to information about or confidence in the market for these products. CANAPE has been identifying, sharing and disseminating knowledge on production methods, costs and sale prices, and the potential market for these products, to help establish economically viable alternatives to draining peatlands.

Interreg North Sea Region CANAPE European Regional Development Fund

EUROPEAN UNION

STIFTUNG NATURSCHUTZ IM LANDKREIS DIEPHOLZ

natuurpunt

PINDSTRUP

Grenspark Kalmthoutse Heide

BRØNDERSLEV KOMMUNE Ny Rådhusplads 1 9700 Brønderslev

FOR PEATLANDS

CCONNECTS

The Interreg Carbon Connects (CConnects) project aims to reduce the unnecessarily high emissions caused by traditional practices on agriculturally converted peatlands in Northwest Europe by introducing new bio-based business models developed for sustainable peatland management practices.

The CConnects consortium, including stakeholders and partners in the UK, Ireland, France, Belgium, Germany and the Netherlands, is working with a representative range of 11 pilot sites across NW Europe from 2018 - 2023. On the pilot peatland sites low carbon land management and restoration practices are tested in tandem with sustainable business models. These include livestock adapted to wet conditions, cultivation of peat moss as an alternative to fossil peat substrate and the introduction of alternative crops (for example cattail and reed, which can be used as low embodied carbon construction materials, biofuels and animal feed).

In addition to growing wet agricultural crops, CConnects has explored a carbon and blue credit scheme to monetise the ecosystem services provided by sustainably managed peatlands. To develop and promote the uptake of wet agriculture in peatlands, CConnects has implemented a network of farmers/ landowners/experts, a farmer-to-farmer learning program, and an online toolbox. By promoting and developing sustainable methods for farming peatlands, CConnects not only aims to protect farmers, landowners, society and the environment from the consequences of climate change, but also offers practical solutions to reduce CO2 emissions and store carbon in the peat soil, as well as sustainable biobased products.

DESIRE

DESIRE is a project within the Interreg Baltic Sea Region Programme (2014-2020), honoured with the award of flagship status by the EU Strategy for the Baltic Sea Region. The project will be finalised at the end of 2021, after running for three years. DESIRE is coordinated by Greifswald University and Succow Foundation alongside partners from Poland, Lithuania and Kaliningrad. The project is supported by the scientific environment at Greifswald Mire Centre (GMC) and the Interdisciplinary Centre for Baltic Sea Region Research (IFZO) at Greifswald University.

DESIRE aims to improve the management of drained peatlands in the Neman river catchment basin to reduce their nutrient and GHG emissions. The Neman is the fourth-largest river flowing into the Baltic Sea. In its catchment basin in Belarus, Poland, Lithuania and Russia extensive drainage of peatlands has led to peatland degradation and contributed to eutrophication (when nutrient run off leads to excessive algae or plant growth, damaging the ecosystem) of the river waters, the Curonian lagoon and the Baltic Sea. DESIRE restores selected drained peatlands by rewetting and establishes demonstration sites for paludiculture to reduce these processes and deliver environmental benefits. Because peat mineralisation (decomposition) has decreased, the re-wetted peatlands show significantly reduced greenhouse gas and nutrient emissions and serve as more effective filters for water running into the river.

The project also aims to increase the capacity of regional and national authorities in the Neman catchment basin – from NGOs to agricultural consultants and other stakeholders - to adopt policies that incentivise wet peatland management for nutrient retention. A mixed approach has been applied: drafting policy recommendations, modelling the effect of rewetting and paludiculture, and piloting measures on the ground. The Neman river basin also serves as a model area for EU-Russian cooperation. The project feeds into overall river basin management plans by proposing agri-environmental schemes that give farmers incentives for wet peatland management. Practical investigations and pilot sites in Poland, Lithuania and Kaliningrad region (Russia) are used for awareness raising and demonstrations for stakeholders. Nutrient-rich biomass has also been harvested from pilot sites, which contributes to improved water quality downstream. Through these methods, paludiculture integrates environmental protection, conservation and utilisation.

LIFE PEAT RESTORE

LIFE Peat Restore is reducing CO2 emissions by restoring degraded peatlands in Poland, Germany, Estonia, Latvia and Lithuania. Nine partners from these countries have come together from 2016-2021 to rewet 5300 ha of degraded peatlands in the project area, which is a global peatland emissions hotspot. In addition to restoring the degraded sites, LIFE Peat Restore has also drawn on the project's experience to create guidelines and best practice scenarios for peatland restoration, management and policy.

To raise the water levels on the sites dams have been constructed and drainage ditches have been filled with degraded peat, vegetation, or plastic planks. Water-hungry bushes and trees have also been removed, and some sites have trialled establishing Sphagnum (peat moss) which contributes to peat production and accumulation. The project is also testing floating islands to facilitate the growth of peat forming vegetation as a restoration technique on a former extraction area covered by a waterbody. To estimate the climate effect of the restoration measures LIFE Peat Restore is using the Greenhouse Gas Emission Site Types (GEST) approach for the targeted peatlands; as well as taking direct GHG measurements using the chamber system. This will prove how crucial proper peatland management is to climate change mitigation.

Beyond peatland restoration, the project has also worked to promote biodiversity in these unique ecosystems which are home to migratory birds and rare species highly adapted to the wet conditions. To this end, flora and fauna have been mapped and monitored. The project has also worked to raise general public awareness with national events, photography and a documentary.

CARE-PEAT

Care-Peat is an Interreg North West Europe project running from 2019-2023. The project brings together five knowledge institutes and four nature organisations from Belgium, France, Ireland, the Netherlands and the United Kingdom to restore the carbon storage capacity of different types of peatland by setting up and demonstrating innovative technologies for new peatland restoration and carbon measurement.

During the project nature organisations work with local landowners to restore seven varied pilot site peatlands with different techniques and to demonstrate the associated carbon savings. Restoration techniques range from growing vegetation combinations that maximise carbon storage to excavation of former peat pits and terrestrialisation of water bodies. Sphagnum moss is also being farmed as a carbon crop. Throughout the project new technology (e.g., drones and satellites), methods and models are developed and tested to guide restoration, monitor carbon balance and inform GHG models.

By the end of 2022 the project expects to prevent 7800 tonnes of carbon emission equivalents per year from the pilot sites. Care-Peat will publish advanced management and decision tools, developed from the experiences of the pilot sites, outlining the best options for restoring different kinds of peatland in order to maximise carbon storage. These scenarios will allow the project's learnings and approaches to be scaled up by other organisations.

TECHNIQUES & SOLU

TIONS

These are practical methods to restore, assess, and manage peatlands in a way that promotes their many benefits.

The EU projects have developed techniques to restore damaged peatlands, sustainable business models to provide the necessary funding for ongoing management of peatlands, and assessment methods to better understand the effects of restoration on GHG emissions, biodiversity and nutrient runoff.

Aukštumala Sphagnum field. Photographers: L.Sveistyte and Z.Sinkevicius for LIFE Peat Restore

RESTORATION & MANAGEMENT TECHNIQUES

Effective peatland restoration returns damaged peatland to a stable state, and proper management safeguards healthy peatlands for the future.

This can include ensuring their productive function which farmers can be dependent on for agriculture. In a healthy state, peatland ecosystems are naturally self-regulating, and when restored a functioning peatland will continue to accumulate peat and provide the vital ecosystem services upon which we depend.

Peatland restoration is an important tool. Restored peatlands help mitigate biodiversity loss by improving the quality of (often rare) species' habitats. They are crucial for climate change mitigation, thanks to the carbon sequestration and long-term storage, local climate regulation and the regional cooling effect provided by a healthy peatland. Restored peatlands improve local water quality through the removal of damaging nutrients from inflowing waters and act as a natural buffer against droughts and flooding. Intact peatlands also play a significant cultural and historical role, as an irreplaceable natural archive, and home of unique biodiversity.

As Europe's peatlands are largely degraded, to recover their functionality in the landscape and to provide multiple ecosystem services they must be restored. Europe's projects have explored and established effective methods to restore, and subsequently sustainably manage, peatlands in order to safeguard these valuable ecosystems and their multiple benefits.

Collecting donor material for Sphagnum planting at Aukstumala peatland (2019/09) Photographer: Jūratė Sendžikaitė for LIFE Peat Restore

SITE PLANNING

Spatial science-based planning is a useful preparatory measure for site selection and developing a re-wetting strategy. Using data gathered during an on-site survey, restorative measures can be planned effectively. This includes outlining the hydrological conditions, soil sampling, assessing nutrient levels, considering stakeholder opinions, and outlining potential future developments, although the emphasis will change dependent on the site conditions.

RESTORE HYDROLOGY

The first step in peatland restoration is to restore optimal water levels and the peatland's hydrological functions. Blocking ditches and drains with natural or synthetic materials slows down water loss, allowing water levels to rise. This creates the right conditions for a peatland's ecological functions. Proper water levels promote healthy soil structure and provide the right growing conditions for vegetation adapted to wet conditions. This enables natural succession and reactivates ecological functioning, thus reducing GHG emissions.

Clearing of woody vegetation at Amalva peatland. Photographer: Z.Sinkevicius for LIFE Peat Restore

Bags of Sphagnum during the first day of collecting donor material at Aukštumala peat bog. Photographer: Žydrūnas Sinkevičius for LIFE Peat Restore

REMOVE INVASIVE VEGETATION

Removal of invasive (native and non-native) vegetation can be necessary. Drained peatlands often see a rapid growth of trees and shrubs not natural to the peatland habitat. In most circumstances it is appropriate to clear the invasive vegetation to support restoration efforts and minimise competition with peatland vegetation. Vegetation removal can increase light exposure for Sphagnum growth, decrease water loss through evapotranspiration, and remove weight off the peat surface.[4] Mechanical and manual methods to remove vegetation include shrub clearance, ground smoothing, stump flipping, and mulching woody debris.

REINTRODUCE PEATLAND VEGETATION

In addition to raising and stabilising the water level in a bog, actively reintroducing peat bog plant species helps further restore peatlands. Sphagnum moss is a key plant for this.[5] Due to its ability to absorb high amounts of water and acidify its surroundings, Sphagnum helps to create the conditions where dead plant material accumulates over time as peat. The Sphagnum is spread by hand or using agricultural machinery.

REWET WITH PALUDICULTURE

Paludiculture is the agricultural use of wet and rewetted peatlands.[6] It allows the wet land to remain productive, without causing detriment to the peat soil, excessive GHG emissions or hindering a peatland's ecosystem services. An important aspect of paludiculture is the rewetting of peatlands and reduction of GHG and nutrient emissions to near-natural levels. The peat body is also maintained, and peat is encouraged to accumulate. Paludiculture includes the production of specialised crops and livestock grazing on the rewetted peatland.

RESTORATION BEFORE & AFTER

BEFORE

VALLEI VAN DE ZWARTE BEEK

BELGIUM

Care-Peat started restoration works by closing 15 km of ditches. They restored the water table and rewetted the area with adapted machines such as tractors with low-pressure tyres.

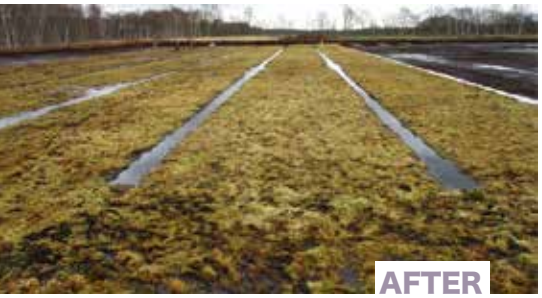
These repaired plots contribute to a better protection of the peat layer. They will prevent the peat from further drying and will create an open peat valley.

DURING

DURING

AFTER


BEFORE


AFTER


DURING

BARVER MOOR, GERMANY

CANAPE worked on this paludiculture site with Sphagnum spreading. They converted the site back to productive use with the construction of the first Sphagnum farming polder.

There are three main elements on the site; a reservoir to ensure the Sphagnum lawn will have a steady water supply, electricity supply for pumps, and the construction of polders by creating irrigation ditches and removing the nutrient rich topsoil.

OUGHTERARD, IRELAND

At Oughterard, Carbon Connects implemented drain blocking using peat dams and wooden logs at regular intervals.


BEFORE

DURING


AFTER

SUSTAINABLE PEATLAND BUSINESS MODELS

Developing sustainable business models is an important part of ensuring peatlands can be protected and sustainably managed.

An effective business model will keep peatlands healthy, and support them to operate as a carbon sink, while also providing an income for farmers, funding peatland restoration activities and stimulating the local economy. When developing a business model, it's important for projects to consider affected stakeholders, the value chain, and profitability indicators.

Europe's peatland projects have identified four key business models to support the sustainable restoration and management of peatlands.

Uses of biomass from paludiculture

Building, insulation & furniture
Animal feed
Soil improvers (for open field cultivation)
Growing substrates (for container cultivation)
Raw material for paper/ carton packaging
Composting
Conservation
Livestock grazing
Maximum Sustainable Output (Low input/output/ impact livestock grazing)

Vegetation growth on a floating island in Poland, Slowinski National Park. Photographer: Klub Przyrodników. Experimental floating islands are anchored in the center of high GHG emitting post-exploitation peat water reservoirs. It is difficult for peatland vegetation to grow on the large, windswept surface of these reservoirs. By growing vegetation from central floating islands, the project hopes to prevent waves, encouraging overgrowth of peatland vegetation and, ultimately, reducing GHG emissions.

CARBON CREDITS

Carbon credits are tradable certificates or permits representing the right to emit one tonne of carbon dioxide or the equivalent amount of a different greenhouse gas. Carbon credits are used to offset emissions and can be both purchased voluntarily, or, in some cases, their purchase is mandated by law.

It is possible to reduce GHG emissions from degraded peatlands by rewetting and restoring them. Each tonne verified as saved can be offered for sale as a carbon credit. Carbon credits can represent an important potential income for landowners and farmers, and their implementation can fund restoration and sustainable peatland management.

Spaghnum growth on a floating island in Poland, Slowinski National Park. Photographer: Klub Przyrodników

PALUDICULTURE

Paludiculture is the productive use of wet and rewetted peatlands while preserving the peat soil and thereby minimising nutrient runoff, CO2 emissions and subsidence.[7] Peatlands are kept productive under permanently wet, peat-conserving and potentially peat forming conditions. The conditions allow for low-impact animal grazing or certain crops to be grown and harvested by adapted machinery, offering productive use of the land. Utilisation of biomass from paludiculture may be in the agricultural, energy, or construction sectors.

Plant species which thrive under wet conditions

Cattail (Typha sp.)
Reed (Phragmites)
Peat Moss (Sphagnum sp.)
Sedges (Carex sp.)
Alder (Alnus sp.)
Rushes (Juncus sp.)
Willows (Salix sp.)
Canary grass
Heather

ECO CREDITS

Ecosystem services, such as water purification, water storage, and water retention can potentially be combined with Carbon credits to create Eco credits. Developed during the Carbon Connects project, the concept arises from the idea that wet agriculture provides additional services beyond CO2 emission reduction, including water storage, water retention and water purification. These other ecosystem services have so far not been accounted for as added value to the carbon benefits. The creation of a credit system for these services, and thus recognition at the institutional level, should make these additional ecological values visible and stimulate sustainable peatland management. These funding mechanisms could also reward farmers and managers of natural sites with intact, undrained peatlands for their climate benefits.

RENEWABLE ENERGY

In some countries, there is historical and cultural significance to the practice of turf (peat) cutting and burning by private citizens. While restoring peatlands requires phasing this out, it is key to give those with traditional turbary rights (the right to cut away and burn peat as fuel for the home) a viable alternative. As such, a business model is being developed to re-wet the peatland and explore the installation of renewable energy generation, such as wind power. Other options are the use of biomass from rewetted peatlands as a fuel (e.g., silage for biogas production or briquettes for direct combustion) to replace peat burning.

GHG ASSESSMENT & MODELLING TECHNOLOGIES

Techniques and technologies for monitoring and assessment in peatland research are used to provide reliable information on the effects of degradation and restoration of peatlands on GHG emissions, biodiversity and more.

To provide reliable information on the effects of degradation and restoration of peatlands on biodiversity, GHG balance and ecosystem services, peatlands need to be comprehensively assessed, mapped and monitored. There is a need for affordable, practical, scientifically-sound approaches and tools that can be fed into national and international monitoring and reporting frameworks. This will inform climate, biodiversity and agricultural policies, and allow for peatland restoration efforts to be continually adapted in light of accurate evidence. Assessing GHG emissions in peatlands is highly complex, but key to understanding the real extent and location of the carbon stores and to effectively prioritise and guide the course of restoration action.

An interactive map of all peatlands in a catchment area, based on an extensive database, would allow for multiple kinds of evaluation. For example, this could be used to rank the restoration needs of peatlands in an entire river basin under various priorities such as restoration, promotion of biodiversity, economic factors, or reduction of emissions.[8]

Europe's peatland projects use different approaches to estimate emissions from peatlands. Some are more statistical, whereas others are more mechanistic. All approaches, however, share the need for quantified data on greenhouse gas emissions in order to calibrate the approach in the best possible way.

Taking GHG measurements at Vallei van de Zwarte Beek, Care-Peat

SITE EMISSIONS TOOL (SET)

The Carbon Connects project built a Site Emission Tool (SET) that determines pre and post rewetting GHG emissions using a scenario approach.[9] This can help calculate carbon credits for a project. The SET uses the GEST database, originally developed by Greifswald Mire Institute, to quantify carbon dioxide (CO2) and methane (CH4) emissions from soil.[10] In essence, the GEST approach provides an estimate of the greenhouse gas balance based on the vegetation and water conditions. The SET adds IPCC Tier 1 calculations to this to determine CO2 from fuel use and N2O from fertiliser, and includes carbon storage in long-rotation biomass applications as carbon savings. Using this approach, it is possible to assess and monitor GHG fluxes from peatlands by measuring water levels, vegetation types and the use of peat as fertiliser and fuel.

MANUAL CHAMBER METHOD

LIFE Peat Restore focused on data collection and monitoring to assess the greenhouse gas (CO2, CH4, N2O) fluxes on pilot sites. The project implemented the Manual Chamber Method, which consists of transparent and opaque chambers equipped with a cooling system to measure the GHG flux for each site.[11] The chambers were placed on specially installed frames on the ground. To prevent disturbance from trampling, the monitoring sites were equipped with boardwalks.
Data was collected to record the initial state. This included vegetation mapping (using GEST). Fixed plots and measuring points were set up to take vegetation, water level and gas measurements.

The annual balance of GHG emissions were modelled, based on the calculated gas flows. The scenarios illustrate how much GHG is emitted and what are the boundaries that determine the amount emitted.

Taking GHG measurements at Vallei van de Zwarte Beek, Care-Peat

HYDROGEO-CHEMICAL MODEL & DST

Care-Peat developed a hydrogeochemical model able to calculate the GHG (CO2 and CH4) fluxes at the peatland-atmosphere interface. The project then integrated this model in a Decision Support Tool (DST) to simulate the gas transfers at the peatland scale. This tool could be used by site managers and owners to optimise the management and restoration of sites. Through different scenarios, this tool estimates the carbon fluxes at a given time, according to hydrogeological conditions and site characteristics.

To calculate GHG fluxes the model needs various inputs, including information on weather conditions (temperature, recharge and precipitations, evapotranspiration, etc.), the water table level, and a digital elevation model. Existing data on GHG measurements and new acquisitions help calibrate the model.

The Decision Support Tool outputs are maps of the carbon sink and/or source zones of the sites. This mapping allows for a rapid visualisation of the site in order to identify, characterise and quantify the gas transfers according to each site's specific characteristics (vegetation, water table, precipitation/recharge). It will also help define the priority zones to restore first.

Different scenarios (rainfall patterns, long-term dry-out, vegetation modification, management of site hydrology etc.) can be modelled in order to predict the evolution of peatland functioning over the next 5-10 years. The DST output consists of an interactive PDF containing scenarios already simulated.

SUGGESTED NEXT STEPS

The project identified a knowledge-gap and need for a means to assess water quality (such as a Nutrient Tool) and water quantity (such as a Peat Hydrology Tool).

POLICY RECOMMENDA

ATIONS

Local, national or EU policy could make a big difference for peatlands. Be it through changing legislation, effectively allocating funding, improving awareness or other tools, policy can lay the groundwork for change.

The following policy recommendations were identified during the projects as an important part of the solution to the challenges surrounding maintaining, managing and restoring peatlands.

Photo: Latvia, Photographer: Dace Stuķēna, LIFE Peat Restore

RECOMMENDATIONS A

As peatlands and their management have a huge variety of interconnections and dependencies in many different sectors, policy making has at times created a conflict of objectives, which may explain the mixed results in regulatory effectiveness. Going forward, policy coherence is key to identifying conflicting objectives, regulatory gaps, oversights and the missed opportunities which can be tapped into without high economic or political cost.

APPLICABLE EU POLICY & FUNDING AREAS[12]

NATURE PROTECTION

Habitat Directive, Natura 2000, Biodiversity Strategy 2030, Nature Restoration Law, LIFE funding

CLIMATE

2030 Climate and Energy Framework, Climate Law, LULUCF Regulation, upcoming EU Carbon Farming Initiative

RESEARCH & DEVELOPMENT

Horizon 2020, JRC

AGRICULTURE

Common Agricultural Policy, EAFRD, Farm to Fork Strategy

EU WATER POLICY

Water Framework Directive, Flood Directive

SOIL POLICY

Soil Thematic Strategy, EU's 7th Environment Programme, upcoming Soil Framework Directive

RURAL DEVELOPMENT

ERDF, Interreg, Cohesion Fund, EU Recovery and Resilience Facility[13]

ENERGY POLICY

Renewable Energy Directive

INFRASTRUCTURE PLANNING

EU Environmental Impact Assessment (EIA) Directive, Green Infrastructure policy

Photo: Engure, Latvia. Photographer: Žydrūnas Sinkevičius for LIFE Peat Restore

AT A GLANCE

HARMONISE POLICIES

Harmonise all policies, legislation and actions affecting peatlands to ensure they do not negate one another. Ensure interdependent EU policies such as green and land use objectives reinforce rather than contradict one another.

MAINSTREAM PEATLAND RESTORATION

Incorporate peatland management and restoration in all appropriate national strategies, including a schedule for change that clears the path for action on peatlands.

ESTABLISH EFFECTIVE REPORTING

Gather effective data on peatland emissions and ecosystem services to draft accurate and sufficient legislation.

CREATE COMMON STANDARDS

Develop EU-wide common, accessible, usable standards and affordable techniques for GHG balance assessment to underpin international carbon credit schemes and effective reporting.

ENGAGE & INSPIRE COMMUNITIES

Work with farmers, communities and stakeholders to increase awareness of the importance of peatlands and build a positive vision of their future role as custodians of the re-wetted land.

SET THE RESEARCH AGENDA

Establish an EU-wide shared research agenda to identify and close knowledge gaps, encourage collaboration and avoid “re-inventing the wheel”.

HARNESS NEW BUSINESS MODELS

Build reliable business cases and funding models, supported by peatland market ecosystems, to ensure financial viability of sustainable peatland management. Support the transition to new activities with demonstration sites, machinery co-operatives, and strategic funding.

INCREASE ECONOMIC INCENTIVES

Increase economic incentives for farmers and landowners to rewet, maintain and restore peatlands, including carbon credits and using CAP subsidies to support sustainable peatland practices with conditional payments for restoration, maintenance and wet farming.

NATIONAL LEGISLATION

INTEGRATE PEATLANDS ACROSS POLICY

Assess policy holistically to avoid contradiction and highlight peatlands in all relevant areas from climate and biodiversity to water and flooding.

Peatland benefits and needs cross policy sectors, creating a risk that peatlands fall through the gaps.

Fragmented legislation can lead to contradictory policies as the interdependencies of environmental goals go unacknowledged. In Latvia, for example, climate and biodiversity policies, which should protect peatlands, are in direct conflict with energy policies, which state that peat should be used for energy production.

Assess legislation holistically from an integrated perspective to ensure one area of environmental action is not negatively impacting another. For example, different EU and national funding schemes could synergistically support wet agriculture on peatlands.[14]

Assess all legislation in the light of the Paris Agreement's goals and biodiversity targets to highlight the importance of land use emissions and the impact on habitats.

Consider peatlands and their hydrology in the context of the entire watershed and catchment area in the frame of the Water Framework Directive and Flood Directive.

ESTABLISH EFFECTIVE REPORTING

Gather effective data on peatland emissions and ecosystem services to draft accurate and sufficient legislation.

Existing legislation can be based on outdated data, especially when it comes to peatland distribution, carbon storage and land use. This legislation can thus prioritise an unfavorable status quo or insufficient measures. In Lithuania, for example, wetlands are protected by land laws which prevent change in the water system, making it extremely difficult to raise the water level. In Estonia, it is prohibited to raise water levels and abandon drainage systems in agricultural lands. Conserving grassland on peat soils without raising water levels, however, reduces GHG emissions only marginally.

In most EU Member States, reporting and accounting for GHG emissions from peatlands underestimates their importance as a source of GHG emissions.[15]

Include peatland emissions within national emission inventories. Use an up-to-date methodology following 2013 IPCC Wetlands supplement and comprehensive area data for peatland distribution and status. For example, from 2021 Ireland will report GHG emissions and removals from managed wetlands (including peatlands) as part of the progress toward EU GHG targets. Additional guidance is given in a policy brief by Greifswald Mire Centre here.

MAINSTREAM PEATLAND RESTORATION

Incorporate peatland management and restoration in all appropriate national strategies, including a schedule for change that clears the path for action on peatlands.

Excessive bureaucracy can thwart restoration measures. In Poland, for example, collecting the necessary permits for blocking ditches with dams can be twice as expensive and significantly more time consuming than building the dams.

Incorporate peatland management and restoration in national climate change plans, laws, biodiversity strategies and nature restoration plans, including tangible objectives and timescales. National peatland strategies should foster the awareness and mainstreaming of peatlands in policy making.[16]

Integrate peatland agriculture into national CAP strategic plans and Rural Development Plans. Use agri-environmental and climate schemes (AECS), such as those proposed during the DESIRE project for Poland and Lithuania, as part of a package of payments for water retention and paludiculture.[17]

Create emission reduction pathways to guide peatland management in order to outline a transparent schedule for change, to which stakeholders can orientate their decisions.[18]

Designate protected areas (national and EU Natura 2000 sites) within which peatlands must be conserved.[19] Successful examples of protected peatland zones can be seen in Estonia, Germany and Ireland.

EU POLICY

REFORM CAP PAYMENTS

Use CAP subsidies to support sustainable peatland practices with conditional payments for restoration, maintenance and wet farming.

Europe's Common Agricultural Policy (CAP) damages peatlands EU wide by supporting farmers with significant subsidies for agricultural activities that require peatlands to be drained. This influential policy often comes into conflict with the EU's environmental aspirations expressed through policies such as the Green New Deal.

Replace harmful CAP payments with conditional payments that favour conservation and maintenance, of all peatlands, including supporting farmed wet peatlands and phasing out funding for drained peatlands.[20] Implementation and maintenance of paludiculture should be taken into account within the CAP.

Remunerate ecosystem services with results-based payments.[21]

STRENGTHEN SECTOR NEXUS

Ensure interdependent EU policies such as green and land use objectives reinforce rather than contradict one another.

Sectoral fragmentation of EU policies creates conflict in reaching individual sector objectives and can be counterproductive.

Strengthen the nexus between climate, biodiversity, water and bio-economy within the EU Green Deal and its policies to look more holistically at peatland benefits and mainstream them into different policy fields.

SPOTLIGHT ON PEATLANDS

Recognise and include a strategy for peatlands in all relevant policies, frameworks and directives.

Peatlands are largely overlooked in the EU Climate Framework as they are not reported and accounted for within the agricultural sector, but rather under Land Use, Land-Use Change and Forestry (LULUCF) regulation, which currently has weak targets.

Peatland habitats are some of the most threatened and degraded ecosystems across the EU. While this is recognised under the Habitat Directive, only limited action has been taken.

The Water Framework Directive only considers water bodies directly, although peatlands are in direct contact and crucial for water quality and quantity in rivers, lakes and seas. The Greifswald Mire Centre has produced a fact sheet outlining the vital filtering role of buffer zone peatlands.[22]

Peatlands should be taken more directly into account in the Water Framework Directive implementation as they have a direct impact on the quality and quantity of waters in respective water bodies following the existing guidance of the European Commission. This has been explored in the DESIRE project, which has analysed the recognition of peatlands in the Newman river basin's management plans.[23]

ALIGNMENT & COHESION

HARMONISE ACTIONS

Harmonise all policies, legislation and actions affecting peatlands to ensure they do not negate one another.

Policies on climate, biodiversity, water management, agriculture, and energy can, at times, contradict and negate one another.

Align member state and EU policies and legislation that connect to peatlands with the Sustainable Development Goals and Paris Agreement targets to ensure they are not in contradiction.

Foster collaboration and capacity building between science, conservation, academia, business and local people across the EU at every opportunity to build alignment and minimise the chance of contradictory efforts.

ALIGN MEMBER STATE REGULATIONS

Reduce fragmentation in peatland regulation to prevent damaging practices from being relocated.

National policies can affect the wider EU market. If member states do not have a unified approach to regulation and enforcement, companies might move operations to escape strict regulation. For example, if peat extraction is banned in one country but substrates with peat are still on the market, it could continue to be imported from abroad, damaging peatlands elsewhere.

Reduce fragmentation in conservation enforcement with EU wide directives.

CREATE COMMON STANDARDS

Create common, accessible, usable standards for GHG balance calculations to underpin international carbon credit schemes.

The lack of centralised standards at EU level for GHG balance calculations can make internationally comparable carbon credit schemes challenging to implement.

Develop common GHG balance calculation standards and frameworks at EU level to pave the way for an effective EU-wide peatlands carbon credit scheme.

LAND USE FACTORS

CONSOLIDATE OWNERSHIP

Consolidate land to create large areas under single ownership, allowing for easier re-wetting and avoiding conflict.

Peatlands have complex ownership structures and land use rights. Many different owners make access to land in one hydrological basin difficult and policies impossible to fully mandate. This means a singular owner of a minor area can block the whole process of rewetting and shifting to wet management.

Adapt national and regional planning regulations to prevent minor landowners from exercising a veto to block rewetting measures which have been agreed upon by the majority. Consolidation can be critical to success as action needs to happen across the peatland ecosystem and in connection to the landscape that surrounds them.

BUILD A POSITIVE IMAGE

Work with farmers and communities to build a positive vision of their new role as custodians of the re-wetted land.

There is a strong cultural history of land use, resulting in uncertainty with change. For example, in Ireland, peat (or turf) was long seen as a source of power for homes and electricity plants. The Irish Peat Board (Bord na Mona) has now shifted to restoration, but the historical right to cut and burn the 'turf' has made the change controversial.

In the Netherlands and Northwest Germany there is a long tradition of drainage and cattle grazing on grassland for dairy, which is a distinct feature of the region's landscape and will drastically change with large-scale rewetting and the transition to paludiculture.

Build a positive image of farmers caring for peatland ecosystem services, for example as "peatland carbon farmers". In Germany, the job profile 'Moor-Klimawirt', meaning Moor Climate Host, was created and promoted.

Work with farmers' associations, taking socio-economic factors into account, to gain trust and build awareness in this traditional and often unfairly maligned industry.

The Smartland project in the Netherlands provides a successful example of how building a positive image can bring local communities and the wider public on board.

MAKE SOLUTIONS SCALABLE

Support the transition to new activities with demonstration sites, machinery co-operatives, and strategic funding.

Alternative products to peat are underdeveloped and insufficiently promoted. For example, in Germany, a common complaint by growing medium companies is the lack of availability of alternatives in adequate quantity and quality to produce soil and stay profitable.

Paludiculture, a new technology that does not yet have a fully proven supply chain, is challenging to implement as it requires a full transformation of management practices and machineries. The current small-scale crop areas hinder large-scale production and the economic viability of production.

There is a lack of adequate wet-adapted machinery to help operate re-wetted sites economically.

Establish agri-cooperatives or machinery rings to ensure that single farmers do not need to bear all the restoration costs.

Increase the number of medium-large demonstration sites to test and develop techniques and markets (for example, for substrates or construction material).

Include peatlands in National CAP strategic plans and rural development plans to support farmers and landowners with restoration by funding ecosystem services and facilitating new economic activities.[24]

FUNDING MECHANISMS

INCREASE ECONOMIC INCENTIVES

Increase economic incentives for farmers and landowners to rewet, maintain and restore peatlands.

There are a lack of financial incentives for sustainable peatland management, with a particular lack of funding for rewetting only.

Current carbon credit systems do not effectively support sustainable peatland management practices and restoration. Adhering to international standards is often too expensive for most small peatland areas due to the high cost of verification to current standards.

Establish voluntary carbon credit schemes and Payments for Ecosystem Services (PES) frameworks for peatlands. Accreditation systems should be easy, cheap and based on GHG monitoring or proxies (e.g., GEST).

Establish results-based payment schemes such as that adopted by the Freshwater Pearl Mussel Project, a European Innovation Partnership (EIP) project in Ireland.[25] This scheme allows farmers to implement on the ground measures such as rewetting drained peatlands and, in return, to receive financial incentives.

Develop common guidelines on how to measure and account for carbon credits and ecosystem services to establish a payment scheme.

Support farmers with revised CAP and, in the UK, Environmental Land Management Schemes (ELMS) payments that encourage peatland restoration or maintenance of existing undamaged peatlands. It is essential that payments can be relied upon long term, to build sufficient security for farmers to enact transformative change and make the necessary investments.

Apply “polluter-pays” principles so that the procurers of drainage-based farming must include the externalised costs of environmental damage.

HARNESS UNTAPPED INVESTORS & BUILD NEW BUSINESS MODELS

Build reliable business cases, supported by peatland market ecosystems, to ensure financial viability of sustainable peatland management.

The business case for alternative investment in peatlands is underdeveloped, and a significant number of farmers and landowners are still hesitant to commit due to a perceived lack of market security. Farmers lack confidence in the current models due to a low number of large-scale demonstration sites and proven cases.

In parallel there are many untapped actors seeking to invest in peatlands for enhanced carbon offsetting, or to incorporate low carbon paludiculture products into their production process.

Bridge the gap between the relevant actors across the value chain, including industries interested in or reliant on the ecosystem services and products from peatlands. This includes water utilities, food and beverages, construction, energy, and pharmaceuticals.

Link local business interests to the benefits of peatland restoration for sustained economic growth locally. For example, local manufacturers could benefit economically from the flood protection offered by healthy peatlands.

Launch a corporate social responsibility policy that requires businesses to invest X% of annual profits in restoration of carbon rich ecosystems like local peatland sites.

MONITORING & ASSESSMENT

CREATE A COMMON APPROACH

Set-up an EU-body to oversee a common, standardised, simple frame-work for GHG calculations that takes into account varied environmental indicators such as biodiversity, GHG, and flood services.

Common standards for the monitoring of effects on different ecosystem services are not developed, even at member state level. Data on the development of peatlands is mostly missing.

The indicators chosen to measure environmental protection can also often overlook peatlands. For example, a policy which only considers sustainability in terms of energy, or environmental protection in terms of biodiversity, could miss the crucial role of peatlands.

Develop common standard indicators that are easy to use by local stakeholders in member states and that also function at EU level to monitor success and enable wider meta studies on the impact of peatland rewetting.

GHG monitoring systems should be easy to use (without the need for expert-operated analytical instruments) and affordable. Quick (but reliable and scientifically-sound) overall-methods are important for decision makers.

COLLECT & STANDARDISE DATA

Expand and standardise GHG assessment techniques and models to include a wider reach and variety of territories.

Current GHG assessment models are hyper-specific to their location and geography. As such, there are a lack of common, EU wide metrics that could provide standard information to investors, land managers or policy makers.

Calibrate the GEST approach for use with various land and vegetation types in different geo-climatic regions to make it fully operational for effective, accessible monitoring.

INCREASE CAPACITY

Drive ongoing development and research into GHG monitoring systems, including funding for this research.

Currently, there is not enough capacity or funding for sufficient monitoring of peatland GHG emissions.

Increase funding for GHG emission (or proxy) monitoring and assessment for peatlands to increase the accuracy and availability of the data necessary to support evidence-based decision making.

KNOWLEDGE & RESEARCH

SET THE RESEARCH AGENDA

Establish an EU-wide shared research agenda to identify and target knowledge gaps and to prevent "re-inventing the wheel".

Researchers and experts in the peatland community are often working in silos, without a common vision, leading to duplication of efforts.

Launch a communications campaign to make the need for a common approach in evidence-gathering and restoration (for transferability and replicability) clear.

ESTABLISH COLLABORATIVE RESEARCH

Bring various, distinct stakeholders together to identify barriers, solve problems and implement best practices.

Siloed researchers risk missing out on key perspectives from stakeholders.

Engage with communities by establishing citizen science and local initiatives.

Increase international funding for peatland research capacity.

Launch further EU wide collaboration projects, including EIP-AGRI projects such as the Pearl Mussel Project.

FILL THE KNOWLEDGE GAPS

Identify and close knowledge gaps across the peatland restoration process

There are still some knowledge gaps and research funding shortfalls surrounding peatlands, particularly with respect to the role peatlands play in flood mitigation, water quality and filtration, and GHG emissions.

Conduct further research to better understand and report on the impact of peatlands so decisive action for sustainable management can be taken.

Build upon the key recommendations for priority action on peatland mapping and monitoring.

Consider future climate scenarios on a scientific and socio-political level. For example, there may come a water shortage conflict between agriculture and rewetting peatlands. Therefore, it may be important to consider what are the prerequisites for successful rewetting in times of global warming.

AWARENESS & ENGAGEMENT

ENGAGE & INSPIRE COMMUNITIES

Use community forums, accessible engagement tools, and recreation initiatives to increase awareness about the importance of peatlands.

Communities can be opposed to change, and fear losing the familiar "cultivated" peatland scenery and cultural landscape.

To inform and inspire communities, investors, and businesses use easily accessible interactive multi-media engagement tools such as story maps.

Launch tourism and recreation area initiatives to educate and inspire citizens on the importance of these rich, historic ecosystems while preserving peatlands. An effective example is the Loughboora Discovery Park in Ireland.[26]

Establish EU wide awareness with a pan-European Community Wetland Forum. This could be modelled on the Irish Community Wetlands Forum (CMF), a successful scheme that represents community groups involved in wetland conservation from a community led development perspective.[27]

MANAGE CHANGE WITH STAKEHOLDERS

Engage all stakeholders with a transformation plan to pave the way for long term change.

Conflicts between multiple affected stakeholders and traditional thinking within the agricultural and forestry sector can hold back change.

Ongoing engagement and multi-stakeholder collaboration between public authorities, farmers, nature conservation associations, scientists, relevant industries, local businesses and citizens is crucial.

Create a transformation management plan to avoid conflicts between stakeholders. Long-term continuity by a locally accepted "caretaker" who steers the process on the ground should be established and financed.

MYTHBUSTING

Ensure farmers, landowners and communities are aware of the value and potential wet peatlands hold.

The value and benefits of wet peatlands are still largely underestimated. Peatlands often suffer from a bad image of being inaccessible and unproductive 'wastelands'.

Increase awareness among landowners, farmers and stakeholders of the many benefits wet peatlands can provide.

Emphasise that peatland rewetting does not necessarily result in unproductive land. Highlight the options for wet use, such as paludiculture, and the extent of flooding required for effective rewetting.

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NEXT STEPS

Restoring and protecting peatlands is inarguably important for people, nature and the planet's future.

These as yet still misunderstood and often overlooked ecosystems are key carbon stores, provide a vast array of ecosystem services and are home to a unique biodiverse ecology. With our understanding of peatlands and the actions we need to take growing constantly, it's time to put pilots into practice and scale up action on peatlands to save them from degradation.

Decades of research has identified techniques, technologies and solutions for restoring, protecting, managing and modelling peatlands. The necessary decisions to mainstream these solutions have been identified - bringing meaningful action on peatlands within reach. None of this would be possible without the collaboration and dedication of communities, experts, institutions, authorities, nations, and international organisations. However, the work is not yet over.

WHAT NEXT?

To have a significant impact, future peatland projects need to build on what has come before and avoid reinventing the wheel. We must harness existing knowledge, methods and techniques to build larger and more proven demonstration sites that can be upscaled widely - while always paying attention to the local conditions and expertise. Peatlands require common, innovative and scientifically-sound GHG assessment methods that are readily available (read: easy-to-use, affordable, and reliable) for multiple stakeholders. Results must be practically accessible for those who rely on them; from on-the-ground farmers and landowners, to local decision-makers, and international carbon or blue credit and Payment for Ecosystem Services schemes.

Peatland initiatives should develop long-term and resilient business models for farmers and landowners that are trustworthy and reward only sustainable land practices. Peatlands must be mainstreamed in all relevant areas and at all levels of policy; current conflicting objectives need to be addressed and resolved.

Fundamentally, we urgently need more people to know and care about the world's wonderful peatlands. While it's key that decision makers and experts take impactful and insightful actions, to return them to healthy carbon sinks, citizens should also celebrate their rich, peaty heritage that lies beneath.

Peatlands may not be regarded as the heart and soul of the nation – they are more aptly considered its liver and kidneys – a crucial part of our anatomy and psyche that we give far too little attention to. These richly pigmented ecosystems represent a complex bio-diverse realm hiding beneath a tweed-textured cloak as dark as crème brûlée and as complex as the most fraught fractal. They ought to be our greatest treasure and yet for decades we've either ignored, exploited or actively destroyed them. They are an endangered species that needs our protection – a collective effort by all sections of society, from citizen scientists to tourism providers, to begin to learn more about them."[28]

- Manchán Magan (writer and broadcaster)

Sphagnum field in Aukštumala peatland (2021), LIFE Peat Restore

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