

Peatlands

International

issue 4.2022



Revisiting Ireland

CSPMA Held Annual Meeting in Ottawa

The Irish Peatland Road Trip & Welcome to Québec for RE3!

Storing Carbon in Peatlands Through Sustainable Agriculture

IVG Comments on the German National Peatland Protection Strategy and Publishes its own Peat Fact Check

Landscapes to freshwaters invertebrates: Understanding the effects of peatland restoration on Atlantic Salmon

Digital Aestheticisation of Fragile Environments: Finnish Mires Involved in a New Ethnographic Research Project

Major new awards seek innovative solutions to restore Europe's rivers, lakes, and wetlands

Management histories and wildfire impacts in a southern Ontario bog

IPS Annual Assembly 2023

RE3 2023 Conference: Reclaim, Restore, Rewild

1st International Symposium on
Growing Media, Compost Utilization and
Substrate Analysis for Soilless Cultivation

Abstract deadline
27 January!

Québec City, Canada
11-15 June 2023
www.re3-quebec.org

Editorial

Prospects for 2023

The last two years have been a difficult time for IPS for three main reasons: Covid-19, resignation of the Secretary General (SG) in February 2021, and finances. These have put additional pressure on the Acting Secretary General (now SG), and me as Second Vice President and Chair of the Scientific Advisory Board (SAB). Both Susann and I have had to take on the work of the former SG on top of our normal commitments. This was supposed to be a short interim arrangement until appointment of a new SG. However, this was not to be and already it has lasted for over 21 months .

As a result, it has been impossible to provide a 'normal service' and some things have had to be abandoned, ignored or postponed. Despite this Executive Board has met almost monthly as were a few meetings of SAB. The 16th International Peatland Congress was held successfully in Tallinn in June 2021 (postponed from 2020 owing to Covid-19) thanks to the ingenuity and hard work of our Estonian colleagues.

With the cooperation and excellence of IPS scientific members I was able to organise an IPS 'roadshow' of our collective peatland and peat expertise in the Peatland Pavilion at UNFCCC COP26 in Glasgow, Scotland in November 2021



Jack Rieley (red jacket) and other IPS members at Oweninny Windfarm in Ireland. Photo: Susann Warnecke

that increased the international profile of the Society considerably.

We even started to have some face-to-face meetings again with an Executive Board meeting in Estonia in May and another in Ireland more recently in October 2022, followed by a fantastic 'Peatland Road Trip' to visit natural, restored and after use bogs. It began to feel as if life was returning and IPS had survived, but not unscathed, because the funding base of the Society was changing (for the worse) and had to be addressed.

Hopefully, the funding difficulty facing IPS will be resolved in a new pact with our industrial members, and we shall be better equipped to face the challenges of the future. These are numerous and serious and IPS will need to become stronger and better organised to deal with them. Unfortunately, I shall not be able to contribute because I have decided to step down from

Peatlands International is the global magazine of the International Peatland Society (IPS). It provides the more than 1,500 individual, institute and corporate members of the Society with up-to-date information on peat and peatland matters, reports and photos of conferences and workshops, background reports and publication reviews. To serve all of our members, we provide always a good balance between economic, social and environmental points of view. Opinions are those of the authors. To receive Peatlands International in your email every three months, visit www.peatlands.org/join-us and sign up as a member - or easily **subscribe** for € 59/year via our online shop.

Executive Board, Second Vice President and Chair of SAB at the Annual Assembly at the International Peatland Congress in China in August 2024 after 28 years at the centre of the Society. Age has caught up with me, but I want to spend my last 18 months helping IPS prepare for the future.

On this matter I want to state that IPS is a unique organisation. No other NGO that I know of has a membership that includes both experts and industry on equal footing. IPS funding comes from both individual and corporate members, and yes, industry provides the lion's share, but IPS does not lobby on behalf of industry, neither do we campaign against it. IPS is an independent international, non-government, not-for-profit organisation, registered in Finland under Finnish Law. IPS' constitution (Statutes) is based on equality, fairness and transparency derived from the acquisition, assessment, discussion and dissemination of information that is factual, credible, reliable, and verifiable.

I said that IPS is changing and it is. Financial stability is at the core, but this needs to be linked to organisational and structural reliability. IPS is an organisation devoted to the needs of all aspects of peatland and peat and is therefore a partnership between experts and industry. It is like a family, and families have good and happy times and others when difficulties and disputes interfere. Over the last ten years or so IPS and industry have drifted apart with relations becoming fractious at times. Peat industry felt it needed advocacy and lobbying capability and as IPS was not prepared to provide these industry set up its own organisation to provide them. This brought into question whether or not industry needed IPS any more.

With passage of time and events at the international and regional (especially EU) level it became clear that major changes to legislation and regulations were affecting peat business and its future severely. Peat extraction was being accused of being a cause of biodiversity loss and climate change. Policies that originated in conferences of international conventions (COP) were being handed down to governments to be enacted and enforced.

Some of these changes and constraints were based on data that were selective, partial and unverifiable. IPS as an independent NGO, the

majority of whose members are scientific, technical and other experts, is capable of assessing the facts used in devising policies and regulations, and participating in bodies advising international conventions. Basically the peatland wheel has turned a full circle and peat industry needs IPS as much as it did more than 50 years ago when it formed it.

Industry is only one part of IPS, however, and the other equally, or more, important component is the large body of experts - scientists, technologists, experts in every branch of peatland and peat including culture and society - more than 1,200 of them globally.

They are the backbone of the Society whose expertise is drawn upon to implement the IPS Strategic Plan, provide presentations at symposia, workshops, conferences and congresses and the brains behind Commissions and Expert Groups. Again the activities of Commissions and Expert Groups has been constrained by Covid-19 and resignation of the Secretary General and must be revived.

IPS is in the process of appointing its first ever Scientific Officer (SO) to take over much of the work of the Chair of SAB who will be renamed IPS Principal Scientist (and is the elected IPS Second Vice President). A main job of the SO will be to coordinate the IPS Commissions and Expert Groups, prioritise the work they do and enable them to deliver outputs of the Strategic Plan.

This will involve preparing action plans for Commissions and Expert Groups and monitoring their implementation. This is why I am calling upon SAB and all members to discuss what the future involves, to determine if you are willing to be part of it, and contribute to a vision of what that IPS should be. It is time for all of us to make choices and take decisions. I hope I can count on you.

Jack Rieley

Chair of the SAB
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----> [linkedin.com/company/peatlands](https://www.linkedin.com/company/peatlands)

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Welcome to Québec for RE3!

Abstract deadline
27 January!

Québec City, Canada, is proud to relaunch the Québec RE3 Conference, a joint conference between the Society for Ecological Restoration - Eastern Canada (SER-EC) and the Canadian Land Reclamation Association (CLRA).

The event will be held from **11 to 15 June 2023**, on the third year of the UN Decade of Ecosystem Restoration (2021-2030). The hosting societies will collaborate with the International Peatland Society (IPS), the Ontario chapter of SER (SER-O), the Midwest Great Lakes Chapter of SER (SER-MWGL), the Canadian chapter of the Society of Wetland Scientists (SWS Canada), and the International Society for Horticultural Science (ISHS) to provide

an expanded scientific and field trip program. IPS will also hold its Annual Assembly and celebrate its 55th anniversary in Québec, on **13 June**.

The proposed theme of the conference for 2023 is “From Reclaiming to Restoring and Rewilding.” It aims to stimulate discussions about the range of environmental management approaches advocated by the hosting societies.

Since 2000, economic development and climate change have accelerated in temperate, boreal and arctic regions, and nature-based mitigation solutions, including ecological restoration, are in full expansion. As the boreal biome comprises close to 20% of wetlands in North America, the event will bring together experts from SWS Canada and IPS to join members from CLRA and SER for stimulating exchanges of knowledge, best practices, and new ideas.

The conference will provide an excellent opportunity for all members, whether academic, private-sector, or governmental stakeholders, to interact and to present the latest developments for reclaiming, restoring, or rewilding diverse ecosystems and to promote the understanding, the science-based management, and the sustainability of organic soils use (wetlands, peatlands) in agriculture and soilless cultivation.

Each day will begin with plenary sessions featuring prestigious speakers. More than 30 symposia are planned on various topics. Side events will be held before and during the conference, such as the “Forum on the UN Decade of Ecosystem Restoration: Advancing the Canadian Agenda at the RE3 2023 Conference” and the “Global Peatlands Initiative Workshop: Building Collaborations for Effective Peatland Management in Canada.”



Québec city now during Christmas. Photo: Dogukan Sahin



A selection of more than 20 scientific and technical tours is offered to delegates before, during and after the conference. The Call for Abstracts is underway and will close on **27 January 2023**. The deadline for early registration and for presenters is **15 March 2023**.

IPS members can benefit from a significant discount on registration fees.

The conference will be held at the Convention Centre of beautiful Québec City, the cradle of the French language in North America. The city has been recognized as a UNESCO world heritage treasure on account of its historic district since 1985.

Québec City is easily accessible by plane (Jean-Lesage International Airport), car, and train. Bienvenue à Québec! Welcome to Québec!

Claire Boismenu

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<https://re3-quebec.org>
 #QuebecRE3



Québec in summer. Photo: Etienne Delorieux

Call for abstracts

The Québec RE3 Organizing Committee is now inviting presentations for the Québec RE3 conference. We welcome abstracts for issues related to ecosystem reclamation, restoration, rewilding and/or wetland science, practice or policy, including social, cultural, and economic considerations. All abstracts must be submitted via the online form.

Research Topics

- The Science Behind Restoration
- Policy and Planning
- Economics of restoration and reclamation
- Social, cultural and philosophical dimensions
- Restoration/Reclamation/Rewilding amid rapid environmental change
- Meeting specific restoration challenges
- Restoration approaches for different biomes/ ecosystems
- Monitoring and assessing restoration, reclamation, rewilding outcomes
- Wetland Biology, Ecology and Physical Sciences
- Wetlands and Global Climate Change
- Horticulture (submission already closed)

All presenters will be required to register for the conference by **15 March**. Presenters who do not register by this date will not be included in the conference program. We are inviting abstracts for three different types of presentations:

- Oral in a General Session: 15 minutes
- Oral in a Symposium: 15 minutes total with some flexibility
- Poster presentation

For full instructions, please visit the conference website at <https://re3-quebec.org/en/participate/abstract-submission>.

The Irish Peatland Road Trip

In October 2022 the Irish National Committee of the IPS (the Irish Peatland Society) organised a road trip to study issues which currently confront peatland management in Ireland. The programme for the study tour included visits to some eight peatland sites located in the Midlands and in the west of Ireland in Mayo.

The event was sponsored by Bord na Móna, EPA (Research) and the National Parks and Wildlife Service (NPWS) and attracted participants from overseas as well as from Ireland. In all 60 people participated in the event, with 10% coming from overseas while students amounted to 5%.

Clonboley Bog - Sustainable management of agricultural land adjacent to peatlands

The Clonboley Bog site comprises a cluster of bogs located in Co. Roscommon which is bounded



Caroline Lalor (left) and Emma Byrne (right) from the FarmPeat project on Clonboley Bog with landowner farmer Seam Fallon (centre). Most photos: Catherine O'Connell

by agricultural land, remnant bog areas, cutover and some conifer forestry areas. The visit was to grassland on peat soil on a farm owned by Seamus Fallon. The field is a FarmPEAT project site.

The FarmPEAT (Farm Payments for Ecological and Agricultural Transitions) Project is a scheme for farmers who manage wetlands in the buffer zones that surround eight of Ireland's raised bogs of conservation importance. The project is results based and rewards farmers financially for the ecological quality of the peatland on their farm and provides grants for measures necessary to improve ecological quality such as drain blocking. The on-site presentations were made by Caroline Lalor and Emma Byrne (both from FarmPEAT and Irish Rural Link) who brought participants.

Carrownagappul Bog - Peatland restoration and community involvement

Carrownagappul Bog SAC (Special Area of Conservation), just outside Mountbellew Co, Galway, is one of the biggest, most accessible raised bogs in Ireland. It has been at the centre of local community life for generations.

At almost 1,200 hectares, it contains one of the largest extant areas of uncut high bog in County Galway and it has a full spectrum of typical raised bog flora and fauna. As part of the Living Bog EU LIFE project almost 25kms of open drains were blocked on the high bog. In all, over 3,000 peat dams were installed to encourage active raised bog on the high bog and peat-forming habitat on the cutover bog. Initial results from the project indicate that 43.6ha of active raised



The Peatland Roadtrip Group on Carrownagappul Bog in Co. Galway being shown drain blocking with peat dams to restore the hydrology of a peat forming raised bog.



Donal Clarke (centre) with the group on Tawnannasol Bog in Co. Mayo discussing plans to rehabilitate a large tract of blanket bog that is in private ownership.

bog (the EU Annexed habitat) has been restored. The presentations were made by Maurice Eakin and Fernando Fernandez (both NPWS) and Hugh Cushman and Francis Mackin (both RPS Group, consultants who have worked on peatland restoration).

There was a separate visit to the nearby Galway Living Bog Interpretative Centre at which dealt with the extensive community involvement in the use and conservation of the bog.

An account was given of the process of persuading landowners to cease cutting turf on the SAC, the problems encountered and the successes achieved by painstaking interaction. Many of those who had been turfcutters were now actively involved in bog conservation and developing the area for peatland education and recreation. The presentation was made by Paul Connaughton, former member of the Irish parliament.

Ballycroy Bog - Working with local farmers

Wild Nephin is a national park in northwest County Mayo. It includes much of the Nephin Beg Mountains and one of the largest expanses of peatland in Europe, consisting of 150 square kilometres of Atlantic blanket bog. The visit was to peatland on a farm owned by Eddie Rowland.

The Wild Atlantic Nature project is a 9-year EU-funded LIFE Integrated Project, working with farmers, local communities and land owners to add value to the wide range of services provided from the SAC network of blanket bogs and associated areas. This results-based project encourages farmers to improve the ecological quality of peatlands on their farms and it also invests in up-skilling skills of landowners in such

Dr Derek McLoughlin demonstrating the use of the Peatland Habitat Score Card at Ballycroy Bog, Co. Mayo.



Dr Sabine Jordan and Hannu Salo at Ballycroy Bog. The Wild Atlantic Nature project is working with the landowner to remove the forestry plantation in the background.



Derry Bog. This blanket bog site was formerly forested. The trees were removed and drains were blocked by Coillte under an EU LIFE-funded project in 2005.



Paddy Rowland of Bord na Móna explaining the history of the Oweninny Windfarm. Photo: Susann Warnecke

management. The presentations were made by Derek McLoughlin and John Derwin (both Wild Atlantic Nature).

Oweninny Bog - Windfarm on cutaway peatland

Oweninny Wind Farm, Bellacorick, Co. Mayo consists of 61 turbines with an overall tip height of up to 176m, located on post-industrial cutaway blanket bog which was formerly utilised for peat harvesting by Bord na Móna.

The visit included a history of the development and use of the bog and of the subsequent development of the windfarm (the footprint of which occupies less than 5% of the site) in conjunction with the restoration of ecological services on the bog itself. The presentations were made by Richard Cosgrove, Mark McCorry and Paddy Rowland (all Bord na Móna).

Derry Bog - Restoration of forested peatland

Derry Bog near Bellacorick, Co. Mayo is a former Coillte property (forestry company; site now owned by NPWS) that lies along the southern margins of the Bellacorick Bog Complex. This SAC is one of the largest blanket bog-dominated SACs in the country and thus ranks as one of the most important blanket bog landscapes in Europe.

Derry Bog was restored by Coillte in the mid-2000s as part of the EU LIFE-funded blanket bog restoration project. Derry Bog had been dominated by approximately 180 hectares of poorly productive conifers which were planted in the mid-1980's. The conifers were felled and any significant drains were blocked in order to raise the water levels within the peat.

An uninformed outsider would never realise that the area, now covered in peatland plants, was once a forest. The site has been monitored by Coillte since the end of the LIFE project. Ownership was subsequently handed over to NPWS. The presentations were made by Janice Fuller and John Conaghan (both Coillte).

Kiltane Bog - Restoration of former industrial peat production site

This is a large blanket bog situated near Bangor-Erris, Co. Mayo which was acquired and developed by Bord na Móna. From it they transported milled peat to the now-defunct, peat-fuelled power station at Bellacorick. 200ha of this site was drained but never milled and is undergoing restoration as part of an EU LIFE project.

Nearby is an area of damaged bog which has been acquired by a private investor who is planning to restore it and to investigate how the restoration might be used to acquire carbon credits. The presentation was made by Mark McCorry of Bord na Móna.



An example of cell bunding rehabilitation of former industrial cutaway bog at Derryfadda Bog, Co. Galway.

Derryfadda Bog - Horticultural peat production on rewetted industrial site

Derryfadda Bog was drained and developed for industrial peat production in the 1990s. Industrial peat production permanently ceased in 2019. The majority of the former peat production footprint is bare moss peat and contains active drainage channels. The site is being rewetted by building bunds enclosing cells in which the water table will be raised.

Within these cells it is proposed to cultivate Sphagnum moss through inoculation with Beadamoss®. Remnant peat depths are generally > 4 m. Derryfadda is considered a deep-peat cutover bog. The site is located adjacent to the River Suck and several designated conservation sites. The peatland rehabilitation is supported by

a Peatland Climate Action Scheme (PCAS) which is funded by the Irish Government and by Bord na Móna. The presentations were made by Frank Curley and Doreen King, and a demonstration of a carbon chamber was made by Stephen Barry and his team (all Bord na Móna).

Glenlough Bog - Horticultural peat plant

The final visit on the Road Trip was made to the Klasmann-Deilmann horticultural peat factory at Rathowen, Co. Westmeath. A presentation outlined the history of the legal and planning developments of recent years which resulted in all production ceasing on the bog.

It also detailed the problems in sourcing non-peat raw materials (coir, bark and wood fibre), and the historical importance of peat in the professional production of horticultural plants. The presenters facilitated a discussion which included opposition to the use of peat in horticulture. The presentations were made by Kevin Mahon and John Neenan (both Klasmann-Deilmann).

The Peatland Road Trip was very successful and the Irish National Committee feel that it would be worth repeating within 3-5 years to monitor how the different management options demonstrated progress.

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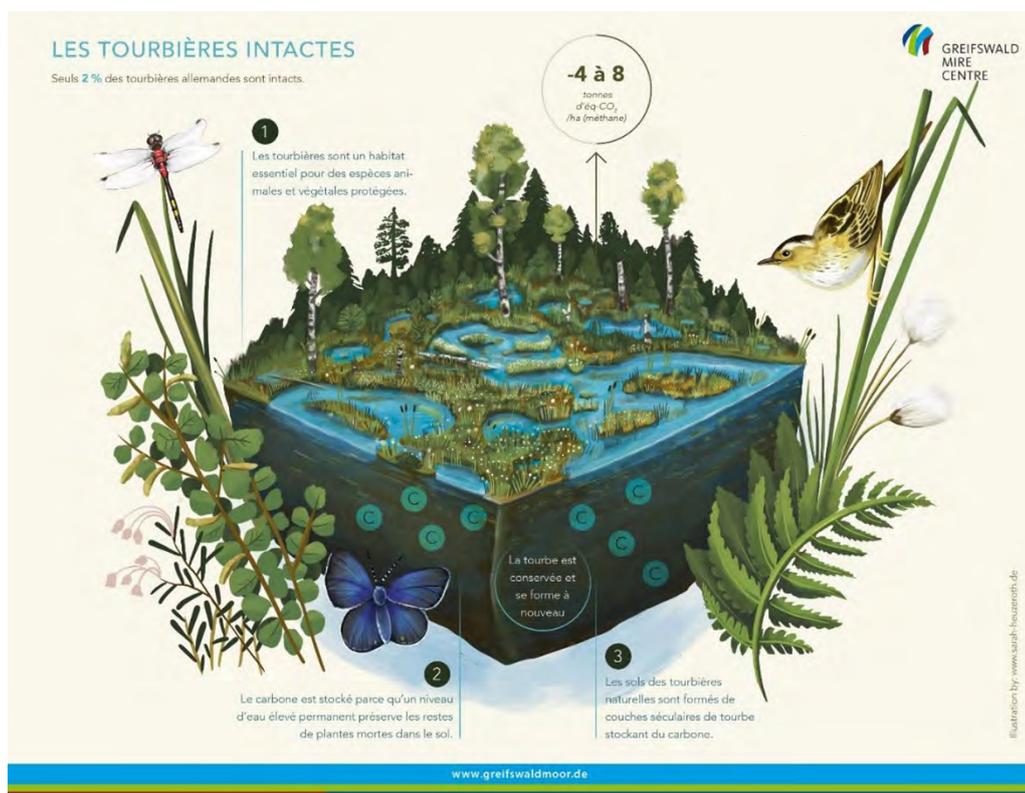
The Peatland Roadtrip Group visited the Galway Living Bog Interpretative Centre at Mountbellew and were given a lively talk by Paul Connaughton, former member of the Irish parliament. Photo: Mountbellew Centre

Storing Carbon in Peatlands Through Sustainable Agriculture

Peatland restoration is an important part of achieving the revised LULUCF target of 310 MtCO₂eq net removal by 2030 in Europe and achieving climate neutrality thereafter. Healthy peatlands are incredible potential carbon stores and sinks. However, when drained or degraded, they begin to emit carbon and contribute to global warming, while

threatening biodiversity and water quality. The Carbon Connects project, funded by the European Interreg North West Europe programme, builds on these findings and aims to reduce the carbon footprint of degraded peatlands.

This will be done by introducing new bio-based business models, developed in collaboration with farmers, and unlocking funding opportunities from private investors.



Europe has 241,812 km² of diverse peatlands¹, which will turn from sinks into huge, unstoppable emitters of carbon when drained. Currently, an estimated 50% of the EU's peatlands are degraded².

Illustration of a healthy peat bog. Image: Greifswald Mire Center

On the right: Sphagnum moss, an emblematic plant of peat bogs, can retain up to 20 times its weight in water. Photo: Clara Diebolt



Therefore, the Carbon Connects project has brought together European partners and farmers convinced of the need to restore peatlands in northwestern Europe to combat carbon emissions.

The aim of the project is to reduce greenhouse gas emissions caused by draining practices while proposing new viable and sustainable economic models for using peatlands that support farmers. Led by partners from Belgium, France, Germany, Ireland, the Netherlands, and the United Kingdom, the Carbon Connects project has been able to manage and innovate 10 pilot sites in northwestern Europe.

A Toolbox to Help Farmers Adopt New Practices

Thanks to the experiences of the pilot sites, these innovative practices have been catalogued in a toolbox called "Carbon toolbox" available on the Carbon Connects website (<https://sites.google.com/view/c-toolbox>). It aims to encourage the adoption of new practices and collaborative learning among farmers. The Carbon Toolbox also facilitates interaction between farmers, experts, business and government organisations, and NGOs through a European Peatland Management Network, which all stakeholders involved in peatlands can join.

Developed on the basis of lessons learned from five European projects, this tool focuses largely on future sectors, such as reed and Sphagnum moss cultivation, a practice that has also been used extensively during the Carbon Connects project. Additionally, the tool also provides an overview of all major pilot sites in northwestern Europe

where sustainable peatland management is being applied.

Towards Better Financial Support for Farmers

Many peatland farmers in northwestern Europe are reluctant to switch to new practices due to a lack of financial opportunities, compensation mechanisms, and market certainty.

The products of sustainably managed peatlands should also be better valued economically to support the transition to sustainable peatland management. In this context, a report was recently

Estimate Your Peatland Carbon Emissions

To help farmers and peatland managers make decisions, the Carbon Connects project partners have developed a carbon emissions calculator.

By considering water levels, peat depth, surface area, vegetation type, fertilisation, and cultivation practices, on-farm greenhouse gas emissions (CO₂, CH₄, N₂O) before and after rewetting can be evaluated, enabling carbon sequestration scenarios as part of a peat restoration plan. The calculator is available at <https://bit.ly/CC-SET>.

published by Carbon Connects partners, led by Association des Chambres d'Agriculture de l'Arc Atlantique (AC3A), on the basis and methodology for a carbon credit scheme for peatlands in northwestern Europe. The aim of this methodology is to mobilise new private resources through carbon credits for projects on rewetting, restoration, and sustainable management and agricultural practices in drained and degraded peatlands.

Many private companies could now invest in peatland restoration as part of their Corporate Social Responsibility (CSR) policies or to meet their carbon offset targets, but they lack connections, financial mechanisms, or a sufficiently reliable framework for certifying carbon credits. This is an issue that the Carbon Connects project has aimed to analyse with a new phase of activities since 2021. Until December 2023, Carbon Connects partners' efforts will focus on providing new financial incentives to facilitate peatland restoration. This involves assessing the needs of private companies in the field of CSR and carbon offsetting and connecting funders and potential project leaders.

Bringing Farmers and Funders Together

To ensure that restoration projects can be carried out while maintaining a sustainable and viable agricultural activity on the impacted land, incentives and compensatory funding

are necessary. The Carbon Connects project partners are currently developing numerous tools to facilitate connection of farmers and private investors to activate funding for peatland restoration.

From Germany to Ireland, via France, the Carbon Connects partners are going to organise fifty meetings between farmers and private financiers to give a more concrete start to the implementation of payments for environmental services. The aim is to unlock €400,000 of private investment in peatland restoration in northwestern Europe, while supporting farmers and landowners, and in the longer term, to be able to propose new financing methods on a larger scale.

Footnotes

- ¹ Tanneberger, Franziska, et al. "The peatland map of Europe." (2017). *Mires and Peat*, Volume 19.
- ² Tanneberger, F.; Moen, A.; Barthelmes, A.; Lewis, E.; Miles, L.; Sirin, A.; Tegetmeyer, C.; Joosten, H. *Mires in Europe - Regional Diversity, Condition and Protection*. *Diversity* 2021, 13, 381. <https://doi.org/10.3390/d13080381>

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Digital Aestheticisation of Fragile Environments

Finnish Mires Involved in a New Ethnographic Research Project

Digitalisation can be seen wherever people move and act, including in mires. Smartphones, drones, and game cameras are a common sight in different natural areas as people capture their views and aesthetic experiences. The way nature is perceived has changed with digitalisation and media technology,

which also affects the ways of life and how people see themselves as part of their environments.

Researchers at the University of Eastern Finland are engaged in the international research project Digital Aestheticisation of Fragile Environments (DigiFREN) led by Assistant Professor of Cultural



Patvinsuo National Park in Eastern Finland. Photo: Kirsi Laurén

Anthropology Blaž Bajič at the University of Ljubljana. The objective of the project is to study the digitally transformative moment of environmental perceptions in Europe.

The research explores how digital media technologies are influencing new understandings, ideals, concepts, and practices of the environment.

DigiFREN is the first ethnographic project to carry out a large-scale comparative study of digital aestheticisation of natural environments in Europe. Five diverse sites in Slovenia (alpine areas), Croatia (coastal national parks), Finland (protected mires), Norway (an urban forest), and Poland (a river valley) will be studied.

Ethnographic and Netnographic Research on the Mires in Finland

The Finnish sub-project led by Associate Professor of Cultural Studies Juhana Venäläinen at the University of Eastern Finland, focuses on the protected Viiankiaapa and Patvinsuo mires, both



Another view of Patvinsuo. Photo: Kirsi Laurén

representing fragile habitats. In the Viiankiaapa mire (in Finnish Lapland), a proposed mine would be the richest in Europe due to its ore deposit.

Conflicts between ecological values and mineral deposits have raised concerns internationally. In the Patvinsuo mire and national park (in Eastern Finland), the number of visitors has risen in recent years due to the growing popularity of outdoor activities during the Covid-19 pandemic, as an example.

Human activities in the sites are different, as are their impacts on the environment; some are more profound than others. In both cases, the project scrutinizes the interaction between human activity and ecological diversity through the lens of digital representations and digitally mediated experiences of the diverse and conflicting uses of mires.

The project will develop a novel ethnographic method of "senso-digital walks" to collect empirical data on the mires. For these walks, the researchers Kirsi Laurén and Juhana Venäläinen from the Finnish sub-project will recruit activists, artists, and photographers as expert participants along with the ordinary nature-goers. The method will encourage the participants to reflect on their ways of using digital technologies as well as the effects that these technologies have for experiencing natural environments.

In addition, the project collects and analyses digital photography and online discussion from social media and websites, as well as from digitally published local and national newspapers and magazines that have covered and participated in the debates of economic, ecological, and recreational uses of the Finnish mires and peatlands.

Cooperation with the IPS Commission Peatlands and Society

Human activity on mires and the relationship between people and peatlands are important themes of the IPS Commission "Peatlands and Society". The Commission, chaired by Marie

Kofod-Hansen, draws on interdisciplinary fields of studies to explore the cultural meanings of mires and peatlands in everyday life, as well as individual and collective experiences, values, and attitudes.

The Finnish research team of the DigiFREN project could cooperate with the Commission by organising and participating in international seminars and workshops, publishing articles in the media, and making posts on social media related to cultural and social research on peatlands. The collaboration aims to bring the latest research-based findings to as many people as possible.

Information About the DigiFREN Project

Project DigiFREN (2022-2025) is supported by MIZŠ, Slovenia; NCN, Poland; AKA, Finland; HRZZ, Croatia and RCN, Norway under CHANSE ERA-NET Co-fund Programme, which has received funding from the European Union's Horizon 2020 Research and Innovation Programme, under Grant Agreement no. 101004509.

Finnish research team of the DigiFREN project:
<https://uefconnect.uef.fi/en/group/digital-aestheticization-of-fragile-environments-digifren>

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New Members of the IPS

New members (or new contact persons for corporate, NGO and institute members, and industry partners) are mainly approved by our National Committees. For all other countries, the approval is made by the Executive Board of the IPS.

Each National Committee is asked to compare their membership list to that of the IPS at least once a year (status below as of 21 December 2022, not all countries updated yet). In some countries, IPS has both a National Committee and an industry association as a member.

In countries without a National Committee, member applications can be sent directly to the IPS Secretariat or online via www.peatlands.org/join-us. Members are currently not accepted from Belarus and Russia. Membership fees are invoiced for the first year immediately, after that in June/July.

Individual members:

Hungary: Agoston Hegedus
Poland: Barbara Kalisz

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IVG Comments on the German National Peatland Protection Strategy and Publishes its own Peat Fact Check

The National Peatland Protection Strategy of the German Federal Ministry for the Environment, Nature Conservation, Nuclear Safety, and Consumer Protection (BMUV), which was recently adopted by the German cabinet, outlines the importance of peatlands for climate protection and proposes a set of measures to preserve and rewet them.

The substrate industry is already supporting this process in several ways. However, in order to clarify misconceptions and raise awareness about the actual situation, the Industrieverband Garten (IVG) e.V. has published a fact check document on

peat and substrates, while also commenting on the current situation. The document is available for download at <https://bit.ly/3WhsCWO> (in German).

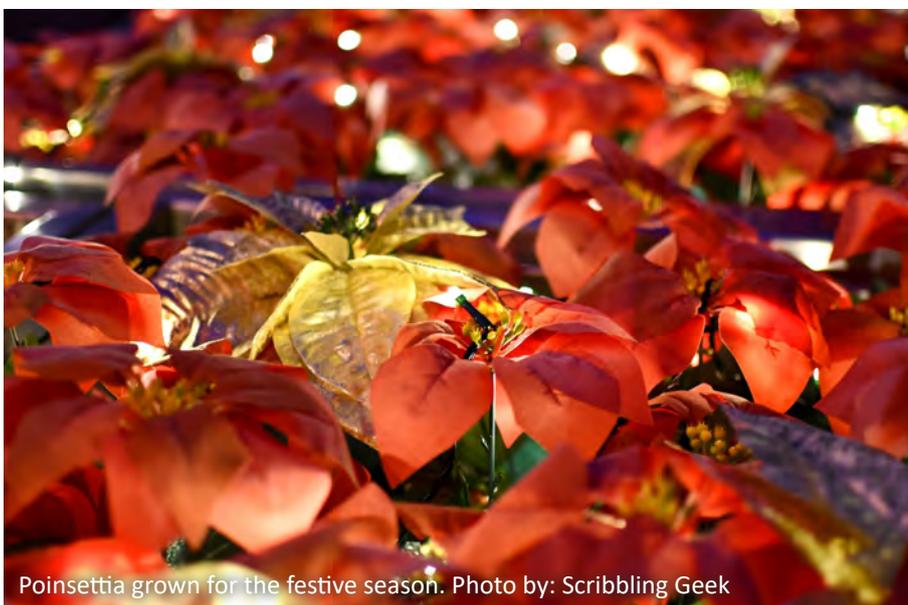
According to the BMUV, the Peatland Protection Strategy includes and specifies all necessary steps to protect and enhance peatlands, to restore them long term, and to promote their sustainable use.

"The basic objective of the strategy, as part of the Action Program on Natural Climate Protection (ANK), to achieve targets in climate protection and restoration of peatland typical biodiversity is in principle very welcome," says Philip Testroet,

Head of the Horticulture and Environment Division at the IVG.

"However, the goals formulated in the strategy with regard to phasing out peat are too ambitious and not compatible with the realities of the substrate and horticultural industry."

For example, he says, phasing out peat use before ensuring the use of non-peat constituents is irresponsible and will inevitably lead to



Poinsettia grown for the festive season. Photo by: Scribbling Geek

Peatland rewetted after extraction. Photo: Eckhard Schmatzler



carbon leakage as peat and substrates are a free trade commodity in the EU. "The extraction conditions in other EU countries are portrayed worse in the strategy than they are in reality," Testroet explains.

In addition, the focus on phasing out horticultural peat requires a risk and cost benefit analysis, according to IVG. This is because the area of peat harvesting in Germany is steadily declining and already accounts for less than one percent of peatland soils. Based on the extraction and use of peat, emissions amount to approximately 0.13 to a maximum of 0.27 percent of the total German greenhouse gas emissions. "Some ways of thinking about this can be read in the new fact check," Testroet says.

As another point of criticism, the goal of ensuring enough quantities of non-peat materials of appropriate quality is not sufficiently substantiated with supporting measures. In the view of the IVG, among other things, cascade use must be strengthened, and subsidies for the combustion of wood must be reduced.

This is because the current high demand for wood and sawmill by-products is a major problem for the substrate industry due to the energy crisis. The availability of compost is also limited by increased demand from agriculture.

Substrate Industry Seeks Dialogue

"Despite all the criticisms, the substrate industry sees itself as a close partner in the rewetting of peatlands and is ready for dialogue with politicians," Testroet says. For example, IVG members support the BMUV's promise that novel forms of management, such as paludiculture of renewable raw materials like peat mosses, reeds, or cattails, will be given special support.

In fact, these raw materials could play a decisive role in the switch to peat-reduced substrates if they were produced economically in the required quantities and qualities. Measures for research, development, and use of high-quality non-peat materials, as well as environmental education and consumer awareness on non-peat materials, are very welcome.

Stefan Pohl

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CSPMA Held Annual Meeting in Ottawa

On 3 November 2022 in Ottawa, Canada, the Canadian Sphagnum Peat Moss Association (CSPMA) held its 34th annual meeting and Parliament Hill reception. Holding the annual meeting in Ottawa provided the CSPMA Board of Directors and special guests with an opportunity to hold a reception on Parliament Hill to introduce the industry at a federal level.

The event, called "From Peat to Parliament", was held with industry, members of the scientific community and government representatives.

At the CSPMA annual meeting members heard from various speakers and topics ranging from sustainability messaging, transportation, regulations around packaging and insight into the Environment and Climate Change project about

peatlands as nature-based solution that's being delivered through the University of Waterloo.

Speakers included: Kevin Warner, Manager, SCS Global Services; Pierre Sabourin, Account Executive, Balcan Innovations Inc.; Peter Shaw, Container Development Specialist, Port Saint John; Dr. Brian Jackson, Professor, North Carolina State University, and Kim Kleinke, Project Manager Can-Peat, University of Waterloo. For more information on the programme and future activities, please do not hesitate to contact the author.

Asha Hingorani

CSPMA President
IPS Executive Board member
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The participants on Parliament Hill in Ottawa. Photo: CSPMA



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Major new awards seek innovative solutions to restore Europe's rivers, lakes, and wetlands

The MERLIN Innovation Awards (MIA) invite submissions for products and services that help bring freshwaters back to life. Freshwaters are among the most threatened ecosystems in Europe. While restoration projects are increasingly popular across the continent, there is an urgent need for new approaches that benefit nature and are financially sustainable.

The new MERLIN Innovation Awards 2023 will showcase cutting-edge work to develop products and services that help protect and restore increasingly threatened freshwater ecosystems. Innovative, widely applicable, and market-ready solutions from all over the world are welcome.

Applications are open for companies across the world in two categories:

- MIA Product of the Year
- MIA Service of the Year

The MERLIN Innovation Awards offer companies a unique opportunity to pitch their innovative products and services to 17 European freshwater restoration project managers, as well as other key decision makers and stakeholders.

The MIA will also showcase companies within the large and growing European freshwater ecosystem community. Selected companies will automatically be included in the MERLIN Marketplace, an online portal which features best-practice approaches to freshwater restoration, due for launch in 2023.

“Innovative solutions for inland water restoration are increasingly sought after. The MERLIN Innovation Awards will reach out to the vibrant community of solution providers and allow them to showcase their products and services to restoration practitioners across Europe. Let us grow together with this initiative,” says Dr. Sebastian Birk, co-coordinator of the MERLIN



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MERLIN seeks new and widely applicable solutions for restoring or enabling financial benefits for freshwater ecosystems. If your innovative product or service is market-ready, you are eligible to apply.

project at the University of Duisburg-Essen in Germany.

The MERLIN Innovation Awards aim to connect companies with state-of-the-art approaches for ecosystem restoration to potential buyer organisations. The Awards provide a unique opportunity for companies to join the rapidly growing global freshwater ecosystem restoration community and to offer innovative solutions to help address pressing environmental issues to benefit nature and society.

The MERLIN Innovation Awards 2023 application deadline is **22 December 2022** (17:00 CET). The independent MIA jury will comprise freshwater restoration managers from the MERLIN project and other related stakeholders with backgrounds in business, NGOs, or administration. For any additional questions, please see <https://project-merlin.eu/events-news/mia.html> or contact info@connectology.eu.

About MERLIN

MERLIN (Mainstreaming Ecological Restoration of freshwater-related ecosystems in a Landscape context: INnovation, upscaling, and transformation) is a European Commission flagship project, worth over 20 million Euros, that commits to transformative ecosystem restoration through Nature-based Solutions.

MERLIN supports 17 cutting-edge restoration projects across Europe, in which streams, rivers, and wetlands are being restored to a near-natural state. These major projects will be expanded, upscaled, and developed into Europe-wide models. Through collaborations with local communities and key economies, MERLIN will co-develop win-win solutions spearheading systemic economic, social, and environmental change.

*Astrid
Schmidt-Kloiber*

<https://project-merlin.eu>
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New articles in Mires and Peat

Grain diversity and cultivation of Indonesian swamp rice germplasm: building the foundation for an ex-situ conservation programme by D.H. Mursyidin, I. Khairullah, M. Saleh

Complex systems methods for impact evaluation: lessons from the evaluation of an environmental boundary organisation by M.S. Reed, P. Barbrook-Johnson

A morphological analysis of Holocene charcoal particles from a peatland in southwest England by A.J. Crawford, C.M. Belcher

Assessing mire-specific biodiversity with an indicator based approach by J. Hammerich, C. Dammann, C. Schulz, F. Tanneberger, J. Zeitz, V. Luthardt

Total biomass and annual yield of *Drosera* on cultivated *Sphagnum* in north-west Germany by B. Baranyai, M. Krebs, C. Oehmke, H. Joosten

Pyrogenic carbon content of *Sphagnum* peat soils estimated using diffuse reflectance FTIR spectrometry by D.M. Uhelski, E.S. Kane, R.A. Chimner, K.A. Heckman, J. Miesel, L. Xie

The occurrence patterns of gut bacteria in a post-mined peatland, northern Japan by S. Tsuyuzaki, T. Saito, R.S. Arakawa

Literature review on testate amoebae as environmental indicators and as a functional part of the microbial community in northern peatlands by O. Kuuri-Riutta, M. Välranta, E.-S. Tuittila

A just transition from the perspective of Finnish peat entrepreneurs by

K. Laasasenaho, A. Palomäki, R. Lauhanen
Peatland core domain sets: building consensus on what should be measured in research and monitoring by M.S. Reed, D.M. Young, N.G. Taylor, R. Andersen, N.G.A. Bell, H. Cadillo-Quiroz, M. Grainger, A. Heinemeyer, K. Hergoualc'h, A.M. Gerrand, J. Kieft, H. Krisnawati, E.A. Lilleskov, G. Lopez-Gonzalez, L. Melling, H. Rudman, S. Sjøgersten, J.S. Walker, G. Stewart

Immediate effects of heather cutting over blanket bog on depth and microtopography of the moss layer by K. Holmes, S. Whitehead

Open access: www.mires-and-peat.net

Landscapes to freshwaters invertebrates:

*Understanding the effects of peatland restoration on Atlantic Salmon (*Salmo salar*) habitat in the Flow Country*

The Flow Country of Caithness and Sutherland in the Scottish Highlands is a vast blanket bog of around 200,000 hectares with 400 million tonnes of carbon locked up in its peat. This landscape has hosted wildlife and people since the retreat of the glaciers at the end of the ice age.

Over the past century management by humans intensified with the implementation of industrialised drainage post World War and then in the 1970s expansive plantation forestry. Around one third of the Flow Country has been drained and plantations were developed onto deep peats where quality timber crops were never expected. These activities lead to large areas of peatland being degraded, including deep peats that would have been protected from developments today.

In recent times peatlands are being restored following the recognition of their intrinsic value to biodiversity and climate change mitigation.

Peatland restoration in the Flow Country has increased dramatically since 2000, with the Royal Society for the Protection of Birds (RSPB) Scotland pushing for the large-scale restoration of the Forsinard Flows reserve, the largest RSPB reserve in the UK. Much of the reserve was purchased as plantation forestry that has subsequently been removed using multiple techniques in an attempt to restore the landscape back to blanket bog. The research on how to best restore the peatland and what that means is a complex issue.

Restoring peatland that only requires drain blocking and surface smoothing compared to plantation forestry is far less intensive. The removal of a plantation first requires the felling of the conifers, that often have grown so poorly on the bog that they can only be sold as pulp or for biomass boilers. Following felling the remaining brash is sometimes removed and sometimes mulched, while stumps are either left in situ or upturned into the adjacent drains. The drain



Plantation forestry on blanket peat immediately after felling. All photos: Liam Godwin



Brash piles following felling.

An area of forestry following mulching and surface smoothing, as an experiment to encourage more rapid restoration.



spacing that is dug for plantations is often far more intense than the moor-gripping, used across the rest of the Flow Country, and often requires far more work to block. It is not yet known what the most effective way to restore these areas of severely damaged peatlands is, but research by the Environmental Research Institute in Thurso is making great strides to monitor the rise in water table, recovery of bog vegetation and wildlife. The restoration of the Flow Country will hopefully be a safe store of carbon for the next century, and without any more disturbance a net sink.

My PhD, under the stewardship of Prof Roxane Andersen at the University of the Highlands and Islands, is looking into how these restoration techniques of drain blocking and “forest-to-bog” are altering the water quality in the landscape, and how any changes may impact the freshwater ecology. My research is multidisciplinary with engagement from the RSPB Scotland, the Flow Country Rivers Trust, and University of Aberdeen. I am attempting to understand the role in water quality within the rivers of the Flow Country in protecting the few remaining Atlantic salmon (*Salmo salar*) populations left in the UK. There are multiple rivers that are sourced in the Flow

The Wick river during fieldwork to compare Flow Country river habitat, with Paula Fernandez Garcia.



A marsh orchid growing on the chipped brush of recently restored plantation forestry.



Country that are Special Areas of Conservation for salmon and are intrinsically linked with the healthy state of their peatland catchments.

For my project I have been monitoring the rivers of the Flow Country and drainage waters of catchments that are being restored. I have looked to see how the water quality changes between peatland streams that have different dominant land usages: plantation forest; recent (<10 years) restoration; old (>10 years) restoration; and near natural bog. I measured water quality parameters including but not limited to, nutrients, dissolved metals, sediments, pH, DOC. These I compared with known values that are detrimental to freshwater invertebrates and salmon. The invertebrate communities of these streams were also kick sampled and camera traps were set up to monitor how terrestrial wildlife interacted with them.

Stream water quality sampling in the Langwell catchment, with native broadleaf woodland behind, with Bethany Copsey.





A post next to a peatland stream showing a camera trap and ropes connected to invertebrate traps used to monitor wildlife usage.

I have found that drain blocking activities in the Flow Country have had no negative impacts on water quality or freshwater ecology, but plantation forestry removal and associated restoration may have short term negative impacts but long-term benefits. We concluded the reason drain blocking alone was not impactful on water quality was that many areas of the moor-gripped Flow Country had never heavily degraded. This was in part because many drains were not maintained or intensely dug initially and so did not cause a level of degradation to the peatland that would deteriorate water quality following rewetting.

This contrasts with the results of the forest-to-bog work where we found that streams draining plantation forestry had worse water quality than the natural bogs, but recent felling and restoration work resulted in water quality deterioration that could impact wildlife. The unavoidable intensity of felling and restoration work produced dramatic increases in metal and nutrient concentrations, as well as heavy sedimentation loads. While these stream values were very poor the river water quality remained high. The large river catchments ensured that a sufficient amount of the landscape was standing forestry or natural bog that could dilute restoration runoff. Additionally,



River sampling and habitat monitoring in the Langwell river catchment, with Prof Roxane Andersen.

the freshwater invertebrates of the recently restored and forestry streams had less biodiversity and biomass than the near natural bog and old restoration, showing that after 10 years the freshwater ecology had begun to become more bog-like. The freshwater invertebrate community from the Dyke River did not change downstream after it met with degraded streams, meaning that any poor water quality could be effectively diluted out before causing harm to river ecology and Atlantic salmon.

The main finding behind this project is that where the restoration of peatland occurs there can be short term negative impacts to small water ways, but major water courses are often safe even with large scale projects as seen in the Forsinard Flows reserve. Thus ensuring high water quality in the Flow Country for salmon does not compete with the desire to restore peatlands, and that their future security requires the climate mitigation peatlands provide.

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Allan Robertson Grants 2023: If you were born after 1992, apply by 31 January via www.peatlands.org/about-us/honoursgrants to receive €500 project or travel funding.

Management histories and wildfire impacts in a southern Ontario bog

Peatlands used for resource extraction can experience multiple disturbances including drainage and peat harvesting but also wildfire. Following resource extraction peatlands are often restored in order to return their carbon sequestration function, either by raising the water table (rewetting) and/or by spreading moss and plant fragments onto the surface of a rewetted peatland - known as the moss layer transfer technique¹.

However, natural disturbance, such as wildfire, can occur during any part of the resource extraction cycle and disrupt the typical processes and successional trajectories. Due to climate change wildfire activity is increasing across many northern

regions, increasing the potential for the interaction of multiple peatland disturbances.

Through the Allan Robertson Grants (2021) a decade-old dataset was analysed to evaluate the ecohydrological impacts of wildfire on a harvested peatland complex and to assess the ignition potential of harvested and restored peatlands².

Wainfleet Bog in southern Ontario is a 1200 ha Carolinian temperate bog dominated by Sphagnum moss and invasive European white birch (Fig. 1). It was drained in the mid 20th century with different areas harvested and subsequently abandoned between 1955 and 2000. The bog is estimated to be ~5000 years old and has a peat

depth of three to five meters. The degree (depth) of harvesting was greater in more recently abandoned areas³.

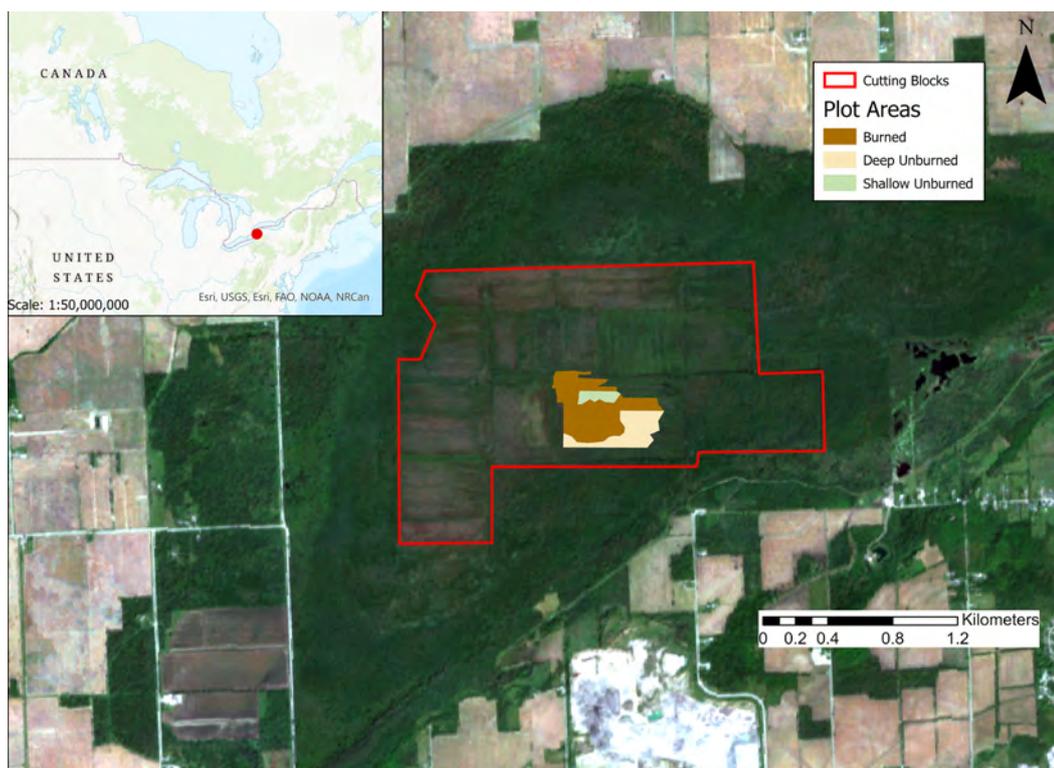


Figure 1. Map of Wainfleet Bog in southern Ontario. Red lines outline cutting blocks and shaded areas denote burned and unburned areas. The bog is now surrounded by mainly agricultural land use. Adapted from McCarter et al. ².

In August 2012, a 12-ha wildfire occurred in the bog and smouldered for eight days before being extinguished by fire crews, resulting in a burn scar overlapping areas of different management histories i.e., with different harvesting depths (Fig. 1).

We found that deeper harvested areas (more recently abandoned) typically burned at a high severity and emitted more carbon from peat combustion (Fig. 2). We attributed this to the distinct hydrophysical soil properties and greater bulk density of peat in deeper harvested areas. Within harvested areas, peat at the edge of peat fields next to drainage ditches burned very severely and emitted up to 15 kg C m^{-2} .

Importantly, these results bring to light the role that management decisions play on peat burn severity and carbon loss and suggest that resource extraction protocols should consider potential impacts on wildfire behaviour. To evaluate the effect of restoration via rewetting on peatland ignition potential we modelled soil moisture (soil water pressure) in peat profiles corresponding to deep and shallow harvested areas.

We found that shallow harvested areas had a much greater ignition probability (53% of simulation runs) compared to deep harvested areas (26% of simulation runs) in the top 5 cm in a simulated drying period, likely due to the greater distance to water table in the shallow harvested area. Rewetting of the site via a decrease in

water table depth by 15 cm showed substantial reductions in ignition probabilities for both harvesting depths, reducing ignition probabilities to 17 and 18% for shallow and deep harvested areas, respectively.

Management decisions resulted in differences of peat properties across the peatland complex and subsequently altered the severity of wildfire. These areas of differing management histories had contrasting ignition probabilities but both responded favourably to restoration to reduce ignition potential. As our climate becomes increasingly conducive to wildfire our understanding of multiple disturbances and management decisions on peatland condition will be critical for the sustainable management of peatland resources.

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Research paper co-written with Dr. Colin McCarter, Assistant Professor at Nipissing University, and in collaboration with Drs. Paul Moore and Mike Waddington at McMaster University, Canada.

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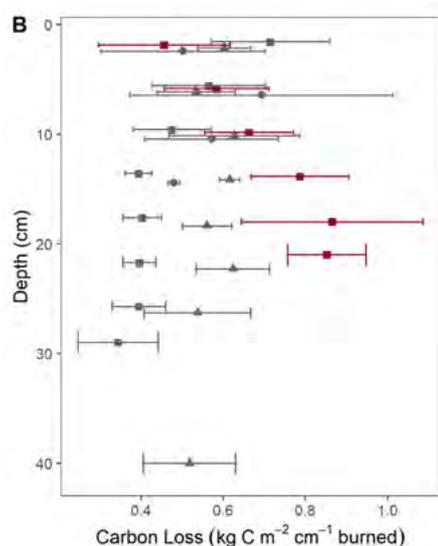


Figure 2. Carbon loss per cm of peat burned ($\text{kg C m}^{-2} \text{ cm}^{-1}$) in shallow harvested areas (grey symbols) and deep harvested areas (red symbols). Adapted from McCarter et al. ².

Ian D. Rotherham: Peatlands - Ecology, Conservation and Heritage

This book is a welcome and wide-ranging account of peatlands for non-specialists although it also provides a good introduction for serious students of ecology, geography, environmental sciences, history, and amateur naturalists. It is a primer for those in other disciplines who need some basic knowledge of peatlands and peat. It provides a concise and understandable overview of peatlands from both a natural and social science perspective. The book is divided into five parts - Setting the Scene; Ecology, Biodiversity and Hydrology; History, Heritage and People; Peatland Destruction and Loss; Peatland Recovery and Repair, a total of fifteen chapters.

The book begins from a historical perspective tracing human dependence on and uses of peat over millennia from the Iron Age to the twenty first Century stressing the reliance of many societies in different countries on peat for fuel. Before the advent of canal, rail and road transport that facilitated rapid transport of coal to almost anywhere, peat was one of the most important energy resources for remote or isolated communities.

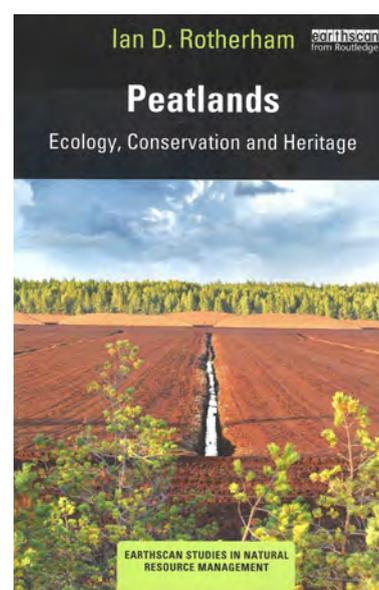
Chapter 1 sets the scene with an overview of peatlands and peat and how they became embedded in folklore and superstition. This is followed by an account of what peat is, how it is formed, where it is found and extent and types of peatland in different regions of the world. There are brief referrals to peatlands and climate change, peatland restoration and bog burst - a strange mixture of topics.

Chapter 2 provides an overview of global peat resources and the area of peatland in Great

Britain. Several estimates have been made over several decades of areas of peatland and amount of carbon stored in their peat, but these vary greatly depending on the methods used and the purpose for which they were carried out.

For centuries peatland and associated wetland was regarded as 'waste' land with a focus on drainage for agriculture and more recently, forestry. Consequently, vast areas were drained and converted for food production and commercial forests, leading to massive loss of stored carbon. This process was not confined to the British Isles but was widespread throughout Europe and North America.

Chapters 3 and 4 consider the ecology, wildlife and functioning of temperate and tropical peatlands starting with an overview of different peatland types in the boreal and temperate zones of the northern hemisphere. This is followed by a brief account of four broad groups of bog types in Britain and their formation in the successional process of terrestrialisation from open water and fen. The information on tropical peatland is relatively brief but provide a short introduction to a rapidly developing area of expertise and interest in which new peatlands in various tropical countries are being discovered.



Ecosystem services and nature-based solutions are modern approaches towards the understanding of relationships between environment and humankind. The former explains the benefits of nature to society while the latter provides a roadmap for remediation of the damage humans cause to the environment.

Peatlands are important for provision of food and fibre, water supply, climate regulation and biodiversity maintenance. In addition, they provide opportunities for leisure, recreation, culture and inspiration. They contribute to local and national economies by providing land for agriculture while extracted peat is important for energy, gardening and horticulture. Peatlands also have a regulating role on climate, air quality, weather, water purification and flood. In addition, peatlands provide a wide range of cultural and other non-material benefits, including eco-tourism.

The origin, evolution and sustainability of mires and peatlands depends very much on water availability, source, amount and chemistry, but this fundamental aspect receives only five pages of explanation in Chapter 6, probably the largest failing of this book.

Chapter 7 on history, heritage and people is where the author is most comfortable. Historical information is scattered throughout other chapters, but the three chapters 7-9 provide much interesting and important information. He provides an outline of the association of people with peatlands over millennia for subsistence living, safety and shelter to grazing of livestock, arable farming, and plantations of oil palms, pineapple and other crops, especially in the tropics.

Peatlands have played roles in human conflict, persecution and refuge over the ages. They have also been the focus for demonstrations against unreasonable landowners preventing access, as in the Peak District of England, or places where unreasonable landowners forced tenants to re-settle after being dispossessed of their homes, such as the Highland clearances in the Highlands of Scotland in the 17th and 18th Centuries.

The most interesting and important section of this book is Part 4 on Peatland Destruction and Loss because this is a topic that is mis-represented in the popular and scientific literature and is mis-

understood when it does appear. The value of this book is the historical information, the way it is expressed and explained by the author, and how he integrates it with other aspects of the peatland resource.

In Chapter 10 the author relates the decline in the global peatland area, especially in Europe and North America, to the exponential rise in population numbers, and consequent need for increased food production through agricultural expansion, and resources for housing and infrastructure. He relates this to a doubling of the global population between 1000AD and the mid-1300s. In the uplands, forests were cleared while in the lowlands lakes, marshes and peatlands were drained.

Throughout the Middle Ages peasants were resettled on wetlands, including peatland and given land rights on condition they drained and farmed these areas. However, there were periods during which population numbers declined, because of disease or famine, such as the Black Death Plague in the 14th Century, during which speed of peatland drainage declined or stopped altogether, only to start again when population numbers increased once more.

This large-scale drainage of wetlands required knowledge, technical expertise and finance. It became a profitable business that was exploited by the Dutch who became expert in peatland drainage technology and water management in The Netherlands and exported their knowledge widely throughout Europe.

Chapter 11 provides detail of wetland and peatland drainage in England, especially the fenlands of Eastern England. By the late 18th Century increases in land-drainage techniques facilitated large-scale peatland drainage and conversion to agriculture transforming these landscapes. Dutch drainage engineers came to England to supervise this work that progressed quickly. For example, the English Great Level of the Fens in Cambridgeshire that was still intact in the late 1500s was completely gone by the late 1800s.

This period of 'reclamation' was initiated by King James the First in response to damaging floods that burst the flood defences along the eastern seaboard of England. He established a Commission

that reported there were more than 317,242 acres (120,000 hectares) of land that were not protected by flood defence drains and dykes. "An Act for the recovery and inning of drowned and surrounded grounds and the draining dry of watery marshes, fens, bogs, moors and other grounds of like nature" was passed by the English Parliament in 1600. This was the death knell for most of England's lowland peatland. How this was achieved, and its result is described in this chapter in great and fascinating detail. Some of the consequences are of great concern for climate change at the present day.

Chapter 12 provides similar detail of drainage and destruction of peatland in the British uplands because many land use practices were either inappropriate or had unforeseen consequences. These included forestry, livestock grazing, grouse shooting, peat and turf cutting, reservoir construction and associated water catchment, all of which required drainage and/or vegetation management. Impacts were compounded by cutting of heather and gorse, collection of kindling and other materials for fuel, bedding and fodder. Birch and bracken were harvested. These practices were carried out for centuries.

Nowhere in the British landscape has suffered more than the English Peak District that forms the backbone of the country from the Midlands northwards towards Scotland. In the past there was continuity of peatlands from the high ground of the peak district at heights of around 600 metres (2000 feet), downslope through valley mires towards the lowlands in the east where lay the great fen and boglands. This continuity enabled the water from the high ground, that formed and maintained blanket bogs, to feed and sustain the fens, lakes and bogs of the lowlands with their incredible biodiversity, and carbon storing ability. This is what humans destroyed in their drainage to enable agriculture to feed the increasing population in towns and cities supplying the needs of the Industrial Revolution. It was a disaster in the making - a time bomb for the future that has now arrived.

This book is full of interesting and otherwise difficult to access information on the history of peatland removal and landscape change, too much to be summarised in this review, but do read it to find out. For example, Ardron et al (1998)

estimated that around 34 million cubic metres of peat were cut in the Peak District and South Pennines during the medieval period. This is more than that excavated from the Norfolk Broads at the same time.

Rotherham points out that the exploitation of peat was widespread involving both shallow and thick deposits leading to complete removal over much of the landscape, reducing it to a fraction of what was there before, and increasing the need to preserve and protect what is left.

Peatlands may seem to be remote, natural and wild places but this is not so. They have always been part of someone's landscape and livelihood. Many peatlands also have been part of landscapes of incredible human activity including farming, mining, shooting, mineral smelting, water collection and supply, and more. They have also been recipients of pollution created in the lowlands and carried upward in prevailing wind. The range of industries that have been associated with or have had some damaging influence on peatland are detailed in Chapter 13: The Peatland Industries, a wide range of activities over the centuries.

The Industrial Revolution brought about many changes including movement of people from the land to cities. Whereas landed peasants tilled their own land and cut their own peat, when they left for cities the land they worked in common was transferred to commercial exploitation. This was mostly the case by the 1800s. Cottagers as they were called cut peat and turf for their own fuel use, but commercial cutting increased to provide peat for other purposes such as horse-litter for the animals that powered the early industrial revolution in the towns. This need virtually disappeared following invention of the internal combustion engine and the construction of railways and roads, overcoming the need for horses and peat for their bedding.

In the 20th Century the need for peat changed again. In a few countries, such as Ireland and Soviet Union, peat was burned in power stations to generate electricity. In the former it started as a World War 2 emergency measure because Ireland did not have fossil fuel resources of coal, gas or oil; in the latter peat was widely available and cheap and was used in preference to fossil fuels because

the economy depended on exporting them. In addition, in developed countries of Europe and North America the burgeoning horticulture industry realised that peat was a cheap, available and reliable constituent of growing media so a new industry emerged that required industrial extraction and processing of peat. The game had changed again for peatlands and peat.

This chapter has much interesting information on the history of peat used as a fuel both domestically by peasant communities and commercially in towns and cities before the widespread use of coal and its transportation by canals, railways and roads, led to its demise. Peat has been used for a range of other purposes including chemical extraction, charcoal making, balneology, paper and card, construction, peat ash fertiliser, animal bedding, medical absorbent in bandages, malting barley in whisky making, and more.

After presenting a myriad of facts on peatlands and peat over millennia the author draws his book to a conclusion in Part 5 with a presentation and discussion of “Peatland Recovery and Repair”, commencing in Chapter 14 with “Conservation and Restoration”. This begins with a summary of the loss of peatland in various countries that have been documented earlier in the book, but with a focus on the United Kingdom. He reiterates that in many instances historical peatland loss was not documented and therefore its extent is unknown. He goes on to consider drivers of peatland restoration that include biodiversity and ecosystem services recovery in the short term and tourism, leisure, sport and paludiculture as longer-term goals.

As a historical ecologist the author has strong interest in the wider landscape, especially features that indicate past human activity and impact on

peatlands and their surroundings. These have mostly been overlooked by mainstream ecologists and there is conflict between those who believe peatlands should not be disturbed and others who consider them as a resource that could provide important archaeological, cultural, landscape, and scientific information to better understand past civilisations and their impact on the environment.

A review of peatland restoration examples, mostly in the United Kingdom is presented including Wicken Fen, Woodwalton Fen, Thorne and Hatfield Moors amongst others. The Great Fen Project, for example, aims to restore 3700 acres (1500 hectares) of fenland between Peterborough and Huntingdon in the east of England. There is also description of restoration of upland peatlands, an important source of information, and short accounts of a wide range of peatland restoration activities across the world including Ireland, Poland, Germany, Belarus, Sweden, Africa, Indonesia, China, Mongolia, Australia, USA, Canada and more.

The final Chapter 15 condenses the information that has been provided before to distil a vision of peatlands and peatscapes in the future as an epitaph to their vast destruction over millennia and hope for their survival far into the future. The key to this, the author believes, is engagement of local people and their communities to maintain and protect peatlands as an environmental and social resource and link with other key ecosystems, such as forests and open waters that together will mitigate droughts and floods and climate change, moderate environmental extremes and enhance biodiversity. This may be a dream but if it cannot be achieved the prospect of a planet without peatland is a poor one.

I strongly recommend this interesting book and its interesting combination of ecology and history to specialists, amateurs, students and the environmentally aware layperson because it not only contains much information not easily available, but it is very readable.

Jack Rieley

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Peat and Peatland Events

IPS Executive Board Meeting
MS Teams
1 February 2023

Scientific Advisory Board Meeting
MS Teams
14 February 2023

Global Peatlands Initiative
4th Partners Meeting
Lima, Peru
21 - 26 February 2023
www.globalpeatlands.org

IPS Executive Board Meeting
Jyväskylä, Finland
7 - 8 March 2023

TISOLS
10th International Symposium on Land Subsidence
Delft-Gouda, the Netherlands
17 - 21 April 2023
www.tisols.org

MERLIN WP4 Field Meeting
River Forth catchment, Scotland, UK
17 - 21 April 2023
<https://project-merlin.eu>

EGU 2023
Vienna, Austria & Online
23 - 28 April 2023
www.egu23.eu

4th World Peatlands Day
2 June 2023
#worldpeatlandsday

IPS Annual Assembly 2023
RE3 Conference: Reclaim, Restore, Rewild
1st International Symposium on Growing Media, Compost Utilization and Substrate Analysis for Soilless Cultivation
Québec City, Canada
11 - 15 June 2023
<https://re3-quebec.org/en>

Climate Resilient and Sustainable Forest Management (with focus on peatlands)
Helsinki, Finland
28 - 31 August 2023
www.ibfra2023.org

17th International Peatland Congress
Changchun, China
5 - 11 August 2024

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Cover: EB members Guus van Berckel, Donal Clarke, Sabine Jordan, Marko Pomerants, Anna-Helena Purre and Asha Hingorani (left to right) with other peatland road trip participants at Clonboley Bog in Ireland.
Photo: Susann Warnecke

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