

International seminar



PROGRAM 15 • 16 • 17 MAY 2024 BOIS D'AMONT • JURA • FRANCE

Functioning and rehabilitation of European mountain peatlands

conferences with European specialists • discussions •
 site visits • English French translation



Ce document est la version définitive du programme.











les amis de la réserve naturelle du lac de remoray







International seminar Functioning and rehabilitation

of European mountain peatlands

The peatlands of the (central) European mountains have a number of features in common from a hydrological, biological and, more broadly, functional point of view. Although they appeared later than on the plains, human practices have also had an impact on the functioning of these peatlands. The consequences of these disturbances, far from diminishing over time, are set to increase with climate change.

In many mountain areas, there are a growing number of initiatives aimed at rehabilitating peatlands and trying to preserve their future. Thanks to this international seminar, the partners of the LIFE Climat Jura peatlands programme want to bring together researchers and managers of Central European «mountain peatlands» to answer a number of questions:

- What are the most appropriate scales and strategies for intervention?
- What rehabilitation techniques should be used, and what effects will they have?
- How can the problems be diagnosed and the results quantified?
- And more broadly, what is the future for these mountain peatlands in the context of climate change?



THE PROJECT IN A FEW WORDS *

NAME: LIFE Climat Jura peatlands CODE NAME: LIFE RestituO

MISSION: to rehabilitate 70 peatlands and limit the impact of their degradation on climate change

DURATION: 7 years (from September 2022 to August 2029) TOTAL BUDGET: €12.5 million

LOCATION: Jura massif of the Franche-Comté region

COORDINATING BENEFICIARY: Conservatoire d'espaces naturels de Franche-Comté

ASSOCIATED BENEFICIARIES: EPAGE Haut-Doubs Haute-Loue, Parc naturel régional du Haut-Jura, EPAGE Doubs Dessoubre and Association des amis de la Réserve naturelle du lac de Remoray

FINANCIAL PARTNERS: European Union, Rhône Méditerranée Corse Water Agency, Ministry of Ecological Transition, ADEME Bourgogne-Franche-Comté, Bourgogne-Franche-Comté Region, Doubs and Jura Departments.

*This project follows the LIFE Jura peatlands programme (2014-2021) which enabled the rehabilitation of 55 degraded peatlands

Wednesday May 15, 2024

Find the summaries of the interventions starting on page 8



8:30 am to 9 am	Reception of participants at the "La Tourbière" community hall in Bois d'Amont	
9 am to 9:15 am	Welcoming speach	Michel Puillet, Maire de Bois d'Amont Flore Lafaye de Micheaux, Senior Advisor for Europe - Secretariat of the RAMSAR Convention on Wetlands Francis Muller, Former Director of the Peatland Relay Centre France

INTRODUCTION • European mountain peatlands: what are we talking about?

9:15 am to 9:45 am	A brief portrait of (central) European mountain peatlands: where are they found? What do they have in common and how do they differ from lowland mires? What are the issues?	Stephan Glatzel Professor Research, University of Vienna Austria
9:45 am to 9:55 am	Focus on the Jura peatlands	LIFE Climat Jura peatlands team
9:55 am to 10:25 am	Break	

SESSION 1 • Hydrology and carbon in mountain peatlands: scales of consideration and consequences for rehabilitation.

This session will present hydrological and carbon flux approaches at multiple scales in mountain peatlands.

10:25 am to 10:45 am	Origin and transfer of water in the Forbonnet active peatland at Frasne: a multi-tracer assessment	Marc Steinmann Geochemist and Senior Lecturer, Chrono- environment Laboratory, University of Franche-Comté - France
10:45 am to 11:05 am	Identifying the available revitalisation potential of drained peatlands	Karin Kessler Ingenieur for water ressource management, Hydrotopio - Germany
11:05 am to 11:25 am	Small supposed to be beautiful - Upscaling the implementation of hydrological bufferzones	Philippe Grosvernier Professionnel Environnement REGA, Lin'Eco Switzerland
11:25 am to 11:45 am	Flux et bilans de carbone d'une tourbière des Pyrénées : suivi à long terme et impact des épisodes de sécheresse	Laure Gandois Research fellow, CNRS - Toulouse university France
11:45 am to 12:15 pm	Questions - Exchanges	
12:15 pm to 2 pm	Lunch at the "La Tourbière" community hall in Bois d'Amont	

SESSION 2 • Rehabilitation of European mountain peatlands

After an overview, the aim of this session is to present some of the initiatives undertaken in Europe's mountains with a view to functional rehabilitation.

2 pm to 2:20 pm	Reaction and resilience of Austrian mires to 35-40 years of environmental stress: A comprehensive resampling study in >200 sites	Michael Steiner Professor, University of Vienna - Austria
2:20 pm to 2:40 pm	Hydrological restoration in mountain mires - experience from Sumava National Park (project LIFE for MIRES)	Ivana Bufková LIFE for Mires Expert Guarantor - Czech Republic

2:40 pm to 3pm	Conservation efforts for mountain peatlands in Poland	Pawel Pawlacyk Project Manager in Naturalists Club Poland
3 pm to 3:30 pm	Questions - Exchanges	
3:30 to 4 pm	Break	

SESSION 3 • Site rehabilitation: what are the effects?

Through a number of case studies, this session will present innovative and original approaches to measuring the effects of rehabilitation measures

4 pm to 4:20 pm	Learning from the past for a better future: Evidence-based rehabilitation of bogs	Stephan Glatzel Professor Research, University of Vienna Austria
4:20 pm to 4:40 pm	Thermal monitoring of wetland restoration using remote sensing	Martin Hais PhD student, University of South Bohemia Czech Republic
4:40 pm to 5 pm	Greenhouse gas (CO ₂ and CH ₄) flux measurements in Sphagnum-dominated peatlands of the Jura Mountains (France and Switzerland) and development of a testate amoeba-based transfer function for rapid assessment of GHG fluxes	Edward Mitchell Professor, Soil Biodiversity Laboratory, University of Neuchatel - Switzerland Robin Calisti PhD student, Soil Biodiversity Laboratory, University of Neuchatel - Switzerland
5 pm to 5:30 pm	Questions - Exchanges	
5:30 pm to 6 pm	LIFE Climat Jura peatlands programme: presentation and introduction to the fieldwork the following day (logistics)	LIFE Climat Jura peatlands team

EVENING

7 pm to 11 pm

Regional buffet at CEVEO Bois d'Amont

Thursday May 16, 2024



FIELD VISITS (see details on pages 6-7)

Choose one of the 3 suggested routes. Duration: full day with picnic lunch.

8:30 am to 6 pm	ROUTE 1 Peatlands of the Lac des Rouges-Truites and the Douillons, a review of 10 years' work
8:30 am to 6 pm	ROUTE 2 Les Rousses and Bellefontaine, peatlands, lakes, drinking water and major works
8:30 am to 6 pm	ROUTE 3 Rehabilitated sites in the Haut-Doubs, between active and wooded peatlands, lakes, rivers, raised bogs and a university research station

EVENING

7 pm to 8:30 pm	Dinner at CEVEO Bois d'Amont	
8:30 pm to 9:30 pm	Conference "Peatlands: how to reach 2050 in the fastest possible way?" at the "La Tourbière" community hall in Bois d'Amont	Hans Joosten Emeritus Professor of Peatland Studies and Palaeoecology at the University of Greifswald and Secretary General of the International Mire Conservation Group

Friday May 17, 2024

8 am to 8:30 am

Reception of participants at the "La Tourbière" community hall in Bois d'Amont

SESSION 4 • What does the future hold for mid-mountain peatlands?

How might Europe's mountain peatlands evolve in the context of global change? What is their vulnerability?

8:30 am to 8:50 am	Modelling the hydrology of a headwater valley mire in the French Massif Central and simulation of the hydro-ecological impacts of climate change	Julian Thompson Professor of Physical Geography, Hydrology and Wetlands, University College London United Kingdom Arnaud Duranel Consultant in wetland science and conservation wetlands, Ecotelm engineering office - France
8:50 am to 9:10 am	Assessing the resilience of peatlands to climate change: a modeling perspective of the hydrogeological controls	Clément Roques Lecturer/Senior scientist, University of Neuchâtel - Switzerland
9:10 am to 9:30 am	The future of carbon storage in calcareous fens depends on the balance between groundwater discharge and air temperature	Patricia Singh Researcher and qualification postdoc, Masaryk University - Czech Republic
9:30 am to 9:50 am	Questions - Exchanges	
9:50 am to 10:10 am	Pause	

CONCLUSION

10:10 am to 11:30 am	Round table: What choices should be made to preserve European mountain peatlands in the face of global change? How can potential for rehabilitation be identified? What criteria should be used? Should sacrifices be made?	Animator : Francis Muller Speakers : Philippe Grosvernier, Stephan Glatzel, Edward Mitchell, Ivana Bufková, Geneviève Magnon, Pierre Goubet
11:30 am to noon	Seminar synthesis	Hans Joosten Emeritus Professor of Peatland Studies and Palaeoecology at the University of Greifswald and Secretary General of the International Mire Conservation Group
noon to 1 pm	Lunch at the "La Tourbière" community hall in Bois d'Amont	



Find out more about the Seminar

Exhibitions

 "Précieuses tourbières du massif du Jura" exhibition: 14 roll-ups designed as part of the Jura peatlands LIFE and Jura peatlands LIFE Climat programmes, inviting the general public to discover the peatlands of the Jura

 Photo exhibition "tourbières du massif du Jura" (landscape, species, etc.) produced as part of the as part of the Jura peatlands LIFE programme

Posters

If you have any posters that you would like to present during the three-day seminar (free access), please let us know when you register. We will get back to you later for more information.



Presentation of site visits

Some of the visits will take place on undeveloped peatlands (wet and uneven terrain), so we advise you to wear clothing suited to the terrain and the weather (it can be cold in May in the Haut-Jura), particularly boots rather than walking shoes.

Groups for each route will be made up of a maximum of 25 people and will be accompanied by a guide, with translation for some groups.

ROUTE 1

Peatlands of the Lac des Rouges-Truites and the Douillons, a review of 10 years' work (Jura, 39)

The Lac des Rouges-Truites peatland is made up of a mosaic of habitats combining, in addition to its lake of glacial origin, a wide variety of low mires (gouilles, sedge meadows, wet meadows, phragmitaie, etc.) and a raised bogs. The latter is one of the few

in the Jura massif not to have been subject to peat extraction. The site has been drained, but only to a limited extent. The main damage to the site was caused by the rectification of the stream that flows out of the lake in the late 1960s, halving its length. Part of the site is used for mowing and grazing. In 2014, the stream was re-routed, causing the water table to rise and significantly transforming the area surrounding the stream. This work and its consequences will be presented during the visit, along with issues relating to the management of an invasive exotic species, agricultural maintenance of the low marshes and the opening up of the site (development of a discovery trail in 2023).

> The 21-hectare **peatland at Les Douillons** in Nanchez was farmed by families and then semi-industrially until the 1970s, and was marked by large drainage ditches and peat mining fronts. Extensive restoration work was carried out in 2016 as part of the Jura peatlands LIFE Nature programme. The visit will provide an opportunity to find out more about this work, the results and the impact on the large population of large white-faced darter (Leucorrhinia pectoralis) present.

• Guides: Sylvain Moncorgé (Conservatoire d'espaces naturels de Franche-Comté), Quentin Ducreux (Parc naturel régional du Haut-Jura) and Romain Decoin (Amis de la Réserve naturelle du Lac de Remoray)

• Terrain: easy to difficult (can be adapted to suit groups)

• Key words: lake, watercourse, trophy, low marsh management, drains, extraction, odonates, post-construction setback

Les Rousses and Bellefontaine, peatlands, lakes, drinking water and major works (Jura, 39)

The **vast peatland complex surrounding the Lac des Rousses** was subject to extensive peat extraction and systematic drainage until the 1975s. The main tributary, the Bief Noir, and its tributary, the Bief Février, underwent extensive work, also during the peat mining period. As part of the Jura Peatlands LIFE Nature programme, major functional restoration work was carried out in 2018 on 35 ha of this peat complex, which combines low alkaline marshes, high marshes with hooked pine forest and active transitional marshes. The following work has been undertaken: the neutralisation of 2.6 km of drains, the restoration of 1 km of watercourse and the regeneration of 1.6 ha of peat extraction areas. This visit will give you an insight into these major works, often in a wooded setting.

At **Bellefontaine**, we will be visiting a peatland where a major ditch has been filled in. The work involved relocating a drinking water pipe and a cross-country ski run. As well as the technical aspects of the work, this will be an opportunity to discuss how to reconcile recreational uses with water resource issues.

If we still have time, an example of the reactivation of high marsh gullies on **the small Chaumoz peatland at Chapelle-des-Bois** can be visited.

- Guide: Pierre Durlet (Parc naturel régional du Haut-Jura) and Céline Mazuez (Amis de la Réserve naturelle du lac de Remoray)
- Terrain: medium to difficult (can be adapted depending on the group) long distances
- Key words: drains, neutralisation de fossé, extraction, cours d'eau, lac, haut-marais boisé, alimentation en eau

ROUTE 3

Rehabilitated sites in the Haut-Doubs, between active and wooded peatland, lake, watercourse, raised bogs and university research station (Doubs, 25)

Frasne is home to one of the largest mountain peat complexes in France, covering more than 500 ha in the municipality, including 300 ha in the Forbonnet sector, hemmed in between morainal hillocks, some of which are outcrops, and sinkholes with natural or forced outlets. The site features various forms of peat system, from alkaline mires to active, domed and wooded peat bogs, all of which are highly interesting from a biological and functional point of view, and have been classified as a regional nature reserve

since 1986. The site has been extensively exploited as a local energy resource since the XVIIIth century, with the persistence of a highly efficient drainage system that is still dramatically draining the peat complex on all sides. The Life tourbières du Jura 2014-2021 programme has enabled the drainage system to be neutralised in the priority conservation area, the active peat bog, with major works that will be the subject of this visit. 9 years after the initial work was carried out, it will be interesting to see the new vegetation dynamics during the planned visit.

In addition, the historical presence of academics in this sector has highlighted the knowledge that took concrete form 15 years ago with the installation, in **the active Forbonnet peatland**, of a research station belonging to the National Peatland Observation Service of the National Centre for Scientific Research. This station, one of four in France, is highly instrumented and measures in particular all the parameters linked to carbon in the peatland, as well as hydrological data. It is located close to the work carried out in 2015-2016, and a visit to it will enable us to identify all the monitoring points and discuss the indicators of the functioning of the peatland in terms of carbon.

The tour ends with a visit to the Entonnoir lake and the Varot marsh in the communes of Bouverans and Bonnevaux. In a karstic context, the Entonnoir lake has been drained several times over the centuries, in particular by rectifying the Drugeon, which fed the marsh, in the 19th century. This work was completed by the construction of a dike to prevent flooding of the wetland. A restoration programme was carried out by the EPAGE Haut-Doubs Haute-Loue in 2021, as part of the Jura peatlands LIFE programme. It consisted of re-watering around 3 km of stream, while filling in 1.2 km of straight, incised and draining course. The dike isolating the wetland was completely removed to ensure good connectivity.

The magnificent viewpoint from the belvedere will be the ideal place to present the re-routing work carried out, before moving on to the banks of the river.

- Guides: Geneviève Magnon, Jean-Noël Resch et Michel Sauret (Epage Haut-Doubs Haute-Loue), Daniel Gilbert (Laboratoire chrono-environnement Université de Franche-Comté) and the team from the regional nature reserve of the Frasne-Bouverans peatlands
- Terrain: medium difficulty
- Keywords: drains, flow diversion, retention dyke, carbon measurements, watercourse, lake, remeandering

Wednesday May 15, 2024 • "La Tourbière" community hall in Bois d'Amont

INTRODUCTION • European mountain peatlands: what are we talking about?

• STEPHAN GLATZEL, Professor Research, University of Vienna - Austria

Quick portrait of (central) European mountain peatlands: where are they found? What do they have in common and what differentiates them from lowland peatlands? What are the issues?

The presentation highlights the differences to, but also the similarities of Mountain peatlands in (Central) Europe with peatlands in a lowland setting. As all peatlands, mountain peatlands in Central Europe are controlled by the nature of their water supply. Therefore, relief, drainage type and altitude are the main controls responsible for the differentiation of mountain peatlands in (Central) Europe. This notion will be elaborated with a comparison between a well-drained blanket bog in the UKL and a hydrologically closed raised bog in Austria. The presentation closes with an elaboration of the challenges to mountain peatlands due to land use and climate change.

References:

> Joosten H.; Tanneberger F.; Moen A. (Eds) (2017): Mires and Peatlands of Europe: Status, distribution and conservation. Schweizerbart Science Publishers, 780 p.

> Glatzel, S., Worrall, F., Boothroyd, I.M., Heckman, K. (2023): Comparison of the transformation of organic matter flux through a raised bog and a blanket bog. Biogeochemistry. https://doi.org/10.1007/s10533-023-01093-0

 PIERRE DURLET, Project manager on the Jura peatlands LIFE Climat programme - Natura 2000 - RAMSAR, Parc naturel régional du Haut-Jura & SYLVAIN MONCORGÉ, Pealtands coordinator, Conservatoire d'espaces naturels de Franche-Comté - France Focus on the Jura peatlands

SESSION 1 • Hydrology and carbon in mountain peatlands: scales of consideration and consequences for rehabilitation

 MARC STEINMANN, Geochemist and Senior Lecturer, Chronoenvironment Laboratory, University of Franche-Comté - France

Origin and transfer of water in the Forbonnet active peatland at Frasne: a multi-tracer assessment

The presentation highlights the differences to, but also the similarities of Mountain peatlands in (Central) Europe with peatlands in a lowland setting. As all peatlands, mountain peatlands in Central Europe are controlled by the nature of their water supply. Therefore, relief, drainage type and altitude are the main controls responsible for the differentiation of mountain peatlands in (Central) Europe. This notion will be elaborated with a comparison between a well-drained blanket bog in the UKL and a hydrologically closed raised bog in Austria. The presentation closes with an elaboration of the challenges to mountain peatlands due to land use and climate change.

References:

> Lhosmot, A., Collin, L., Magnon, G., Steinmann, M., Bertrand, C., Stefani, V., Toussaint, M.-L., Bertrand, G., 2021. Restoration and meteorological variability highlight nested water supplies in middle altitude/latitude peatlands: Towards a hydrological conceptual model of the Frasne peatland, Jura Mountains, France. Ecohydrology 14. https://doi.org/10.1002/eco.2315 > Lhosmot, A., Bouchez, J., Steinmann, M., Lavastre, V., Bichet, V., Loup, C., Stefani, V., Boetsch, A., Chevet, J., Toussaint, M.-L., Gaillardet, J., Bertrand, G., 2022. The origin and transfer of water and solutes in peatlands: A multi tracer assessment in the carbonated Jura Mountains. Hydrological Processes 36, https://doi.org/10.1002/hyp.14781

KARIN KESSLER, Ingenieur for water ressource management, Hydrotopio - Germany Identifying the available revitalisation potential of drained peatlands

Since each drained bog has its own individual structure, the available potential for rewetting differs from one bog to another. The physically-based hydromorphological analysis (EDOM et al., 2007) is a simple but robust tool to calculate the current potential for rewetting bogs affected by drainage or peat extraction. Only based on a digital elevation model and the annual runoff, future vegetation patterns for the entire bog can be predicted, and different rewetting scenarios can be generated at a moment's notice. With these calculations we distinguish between bogs with a high or low potential for rewetting. Rewetting measures are especially successful in areas with a high potential. In severely damaged bogs the potential vegetation patterns differs quite a lot from the historical vegetation, known by peat drillings, and from the current vegetation, known from vegetation mapping.

PHILIPPE GROSVERNIER, Professionnel Environnement REGA, Lin'Eco - Switzerland Small supposed to be beautiful - Upscaling the implementation of hydrological bufferzones

How wide should a hydrological buffer zone be around a mire? In Switzerland, where mires have been strictly protected for over 35 years and their condition is steadily deteriorating, there has been no workable answer to this question. To get round this obstacle, we had to develop a simplified but plausible approach, known as «espace marais» ("mire space"), to change perspective and move from a concept of protective strips of a certain width to functional geomorphological and hydrological spaces encompassing entire catchment areas.

References:

> Gattlen, N. & Klaus, G. 2023. Biodiversité en Suisse - État et évolution. État de l'environnement n° 2306. Office fédéral de l'environnement (OFEV), Berne, 97 p. <u>français</u> / <u>Deutsch</u>

> LIN'eco, Ph. Grosvernier et al. 2014-2018. Maintien des ressources en eau dans le bassin versant des biotopes marécageux d'importance nationale. Projet pilote, Office fédérale de l'environnement (OFEV). <u>français</u> / <u>Deutsch</u>

LAURE GANDOIS, Research fellow, CNRS - Toulouse university - France

Flux et bilans de carbone d'une tourbière des Pyrénées : suivi à long terme et impact des épisodes de sécheresse This presentation focuses on work to monitor carbon flows in a peatland in the French Pyrenees, in order to establish a multi-year carbon balance. The assessment is based on field monitoring, satellite imagery and statistical models. We show that, on average over the period 2017-2022, the peatland is a source of carbon to the atmosphere and surface waters. We observed strong inter-annual variability: in 2018, the peatland acted as a carbon sink, but in 2022, when an intense drought hit south-west Europe, the peatland acted as a substantial source of carbon. Our study highlights the vulnerability of mountain peatlands to climate fluctuations, underlining the need for comprehensive monitoring and modelling approaches to accurately assess their carbon balance under changing climate conditions, including extreme events.

References:

> Rosset, T., L. Gandois, G. Le Roux, R. Teisserenc, P. Durantez Jimenez, T. Camboulive, et S. Binet. 2019. « Peatland Contribution to Stream Organic Carbon Exports From a Montane Watershed ». Journal of Geophysical Research: Biogeosciences 124 (11): 3448 64. https://doi.org/10.1029/2019JG005142.

> Garisoain, Raphaël, C. Delire, B. Decharme, S. Ferrant, Franck Granouillac, Virginie Payre-Suc, et Laure Gandois. 2023. « A Study of Dominant Vegetation Phenology in a Sphagnum Mountain Peatland Using In Situ and Sentinel-2 Observations - Garisoain - 2023 -Journal of Geophysical Research: Biogeosciences - Wiley Online Library ». Journal of Geophysical Research: Biogeosciences, 2023.

SESSION 2 • Rehabilitation of European mountain peatlands

• MICHAEL STEINER, Professor, University of Vienna - Austria

Reaction and resilience of Austrian mires to 35-40 years of environmental stress: A comprehensive resampling study in >200 sites

IVANA BUFKOVÁ, LIFE for Mires Expert Guarantor - Czech Republic

Hydrological restoration in mountain mires - experience from Sumava National Park (project LIFE for MIRES)

In Sumava National Park, restoration of both drained and mined mires has been carried out since 1999. Due to the holistic approach (micro-catchment concept), restoration of mires in the area is implemented together with restoration of other key water elements including non-peaty wetlands, springs or small watercourses. The concept of target water table as well as measures and technologies used on sloping mountain terrains will be presented using concrete sites. Important results of water table monitoring, hydrochemistry and vegetation, showing the response of habitats to implemented measures will also be highlighted.

References:

> BUFKOVÁ I., STIBAL F. & MIKULÁŠKOVÁ E. (2010): Restoration of drained mires in the Šumava National Park, Czech Republic. – In: Eiseltová M. (ed.), Restoration of lakes, streams, floodplains, and bogs in Europe: principles and case studies, 331–354, Springer Verlag.

> BUFKOVÁ, I., KŘENOVÁ, Z., BASTL, M. (2021): Ten years of changes in hydrology and vegetation in montane mires of temperate zone in Central Europe (Šumava National Park). Silva Gabreta, 27.

PAWEL PAWLACYK, Project Manager in Naturalists Club Poland

Conservation efforts for mountain peatlands in Poland

Peatlands and mires are rare, but valuable natural features in Polish mountains. Most of them are degraded by draining in the past and by inappropriate forest management in mountain bog forests. In the XXI century conservation measures are widely implemented on mountain mires by nature conservation authorities, State Forests and conservation NGOs, targeting in particular:

- raised bogs in Bieszczady National Park (Kucharzyk & Szary 2012);
- mires complex in Izerskie Mts & Karkonoski National Parks (unpubl. data);
- various mountain mires in Sudety Mts (Jermaczek et al. 2012);
- many alkaline fens in Carpathians (LIFE AlkFens; Stańko & Wołejko 2018)
- raised bogs in Orawa-Nowy Targ region (continued presently by LIFE MultiPeat).

Blocking of draining ditches was the most common measure. Various techniques vere used, including wooden dams, dams composed of natural elements (tree logs, sedge clusters), beaver-dams analogs. On several bogs trees were removed for decreasing evapotranspiration and restoring typical bog vegetation. Some fens need hay mowing for maintaining typical plant species.

References:

> Jermaczek A., Wołejko L., Chapinski P. 2012. Mokradła Sudetów Środkowych i ich ochrona. Wyd. Klubu Przyrodników, Świebodzin.

> Kucharzyk S., Szary A. 2012. Degradacja i ochrona torfowisk wysokich w Bieszczadzkim Parku Narodowym. Roczniki Bieszczadzkie 20: 83-97.

> Stańko R., Wołejko L. (ed.) 2018. Conservation of alkaline fens in Poland. Project report for projects LIFE11 NAT/PL/423 and LIFE13 NAT/PL/000024.

SESSION 3 • Site rehabilitation: what are the effects?

STEPHAN GLATZEL, Professor Research, University of Vienna - Austria

Learning from the past for a better future: Evidence-based rehabilitation of bogs

The presentation elaborates the necessity of understanding the development of peatlands when designing rehabilitation projects. Knowledge about the historical development trajectories of peatlands provides an idea about the feasibility and time required for formulating goals of peatland rehabilitation and future developments to consider. The presentation will illustrate this case with examples of recent efforts for peatland rehabilitation in several European countries.

Reference:

> Ahmad, S., Liu, H., Günther, A., Couwenberg, J., Lennartz, B. (2020): Long-term rewetting of degraded peatlands restores hydrological buffer function. Science of the Total Environment. https://doi.org/10.1016/j.scitotenv.2020.141571

- MARTIN HAIS, PhD student, University of South Bohemia Czech Republic
 Thermal monitoring of wetland restoration using remote sensing
- EDWARD MITCHELL, Professor, & ROBIN CALISTI, PhD student, Soil Biodiversity Laboratory, University of Neuchatel - Switzerland

Greenhouse gas (CO2 and CH4) flux measurements in Sphagnum-dominated peatlands of the Jura Mountains (France and Switzerland) and development of a testate amoeba-based transfer function for rapid assessment of GHG fluxes The renaturation of peatlands aims to restore habitats for rare and endangered species, as well as their function as carbon sinks. Assessing this function requires a great deal of work: regular visits to measure greenhouse gas (GHG) flows on numerous plots. To simplify this work, we are developing a bioindication method based on thecomoebials. These microorganisms are commonly used in palaeoecology to reconstruct past fluctuations in groundwater levels. As greenhouse gas fluxes (CO2 & CH4) are largely controlled by the level of the water table, it should be possible to build a predictive model based on the analysis of thecamoebiens. An initial study has confirmed that this approach has potential. We are now developing models to determine CO2 and CH4 fluxes in the peatlands of the Jura.

References:

> Mitchell E. A. D., Charman D. J. & Warner B. G. 2008. Testate amoebae analysis in ecological and paleoecological studies of wetlands: Past, present and future. Biodiversity & Conservation 17: 2115-2137.

> Frésard A., Mulot M., Bertrand G., Lhosmot A., Gandois L., Tuittila E.-S., Loisel J., Talbot J., Roeder G., Sarnio S., Männistö E., Pelletier L., Garneau M. & Mitchell E. A. D. 2023. Inferring northern peatland methane emissions from testate amoebae: A proof of concept study. Mires & Peat 29: Article 20, 18 pp.

LIFE CLIMAT JURA PEATLANDS TEAM

LIFE Climat Jura peatlands programme: presentation and introduction to the fieldwork the following day (logistics)

CONFÉRENCE • Peatlands: how to reach 2050 in the fastest possible way?

HANS JOOSTEN, Emeritus Professor of Peatland Studies and Palaeoecology at the University of Greifswald
 and Secretary General of the International Mire Conservation Group

Currently drained peatlands (on 0.3% of the world's land) cause 5% of the total worldwide greenhouse gas emissions. To meet the goals of the Paris Agreement, all intact peatlands must remain wet and all already drained peatlands (500,000 square kilometers) must be rewetted. Any peatland use should only take place under wet conditions.

The greatest challenge for rewetting lies with peatlands in intensive agricultural use. These lands urgently need alternative (wet) production methods (paludicultures) to allow productive use while avoiding the environmental harm from conventional drainage-based peatland use. This requires cross-sectoral national peatland protection strategies. The massive implementation on the ground, however, is best left to the self-directed momentum of enterprises and markets steered by climate protection rewards ("carbon credits") as a transitional strategy to facilitate a rapid start-up of peatland rewetting. In this way, wet farmlands can compete with drainage-based peatland use until paludicultures are technically fully mature and economically self-sustaining.

References:

> Joosten, H. 2024. Peatland mus be wet. In : K. Wiegandt (ed.) : 3 Degrees More - The impending hot season and how nature can help us prevent it. Springer (in press).

> Temmink, R. J. M., Robroek, B., J. M., van Dijk, G., Koks, A. H. W., Käärmelahti, S. A., Barthelmes, A., Wassen, M. J., Ziegler, R., Steele, M. N., Giesen, W., Joosten, H., Fritz, C., Lamers, L. P. M. & Smolders, A. J. P. 2023. Wetscapes: Restoring and maintaining peatland landscapes for sustainable futures. Ambio https://doi.org/10.1007/s13280-023-01875-8

> Joosten, H. 2023. Peatland rewetting as a Nature-Based-Solution. Global Solutions Journal 9: 262-268.

Friday May 17, 2024 • "La Tourbière" community hall in Bois d'Amont

SESSION 4 • What does the future hold for mid-mountain peatlands?

JULIAN THOMPSON, Professor of Physical Geography, Hydrology and Wetlands, University College London
United Kingdom, & ARNAUD DURANEL, Consultant in wetland science and conservation wetlands, Ecotelm
engineering office - France

Modelling the hydrology of a headwater valley mire in the French Massif Central and simulation of the hydro-ecological impacts of climate change

A high-resolution coupled MIKE SHE / MIKE 11 model is employed to investigate the interactions between a granitic aquifer and a headwater valley mire in the French Massif Central. We show that groundwater upwelling from the aquifer is a quantitatively important and functionally critical element of the mire water balance. The potential impacts of climate change upon the mire and its catchment are simulated using a total of 76 scenarios based on the DRIAS-2020 projections. Scenario result for changes in stream flow and water table level demonstrate some uncertainty in both the magnitude and direction of change although declines in both become more common as the magnitude of global warming increases.

• CLÉMENT ROQUES, Lecturer/Senior scientist, University of Neuchâtel - Switzerland

Assessing the resilience of peatlands to climate change: a modeling perspective of the hydrogeological controls The hydrological connectivity of peatlands with aquifer 'reservoirs' is crucial to their resilience in the face of climate change. However, quantifying groundwater-peatland interactions remains a major scientific challenge. We will present the results of a research project carried out in the Massif du St Barthélémy nature reserve in the Pyrenees (France), jointly developed by the reserve's managers and hydrologists from the universities of Neuchâtel and Rennes. Our approach, combining hydrological instrumentation, analysis of geochemical tracers, geophysical investigations and numerical modelling, has enabled us to quantify groundwater flows in the peatland system and to predict their future evolution by considering climate scenarios. We will conclude with a discussion on the interest of natural site managers in incorporating these results into future management plans.

PATRICIA SINGH, Researcher and qualification postdoc, Masaryk University - Czech Republic

The future of carbon storage in calcareous fens depends on the balance between groundwater discharge and air temperature Calcareous spring fens accumulate carbon-rich deposits through carbonate precipitation and slow organic-matter decomposition, which is influenced by a lowering water table. Rising temperatures can intensify carbonate precipitation and accelerate decomposition, making carbon storage predictions more complex. Our study of 57 spots in 19 calcareous spring fens in the Western Carpathians revealed that lowering water tables increased soil nutrient concentrations, positively impacting carbonate accumulation and decreasing decomposition rates. If increased precipitation or groundwater recharge maintains a high water table, as predicted for some areas, rising temperatures will intensify carbonate precipitation, shifting the ecosystem from peat to tufa-forming, which could help maintain biodiversity and sustainability of existing carbon sinks but depends on preserving fens and natural landscape hydrology.



How do I get there?

BY TRAIN

• Vallorbe station, 30 km from Bois d'Amont - trains from Paris, Dole, Dijon, etc. Shuttle bus chartered by LIFE team from Vallorbe to Bois d'Amont

Means of transport prefer

• La Cure station, 10 km from Bois d'Amont - train connection between Geneva (station and airport) and La Cure station via Nyon in Switzerland (more information at www.nstcm.ch); trains from Lausanne, Basel, etc. Shuttle bus chartered by LIFE team from La Cure to Bois d'Amont

• Morez station, 18 km away - trains from Besançon, Dole, Saint-Claude

BY PLANE

• Geneva airport in Switzerland, 50 minutes away (50 km) - train connection between the airport and La Cure station (consult Swiss train and bus timetables: www.tprnov.ch), then shuttle bus chartered by LIFE team from La Cure station

• Dole airport, 1h45 away (120 km) - possible connection by bus then train between the airport and Vallorbe or Morez station (via Dole station) then shuttle bus chartered by LIFE team

The LIFE team will provide shuttle buses between the "La tourbière" venue and the stations at La Cure and Vallorbe. Depending on expected arrivals, we may also need to add additional buses to the standard service if the need arises.

Hosting

The accommodation offered at the time of registration is located at :

Village Club Cévéo de Bois d'Amont

167 Montée du Val d'OrbeGPS coordinates39220 Bois d'Amont46°54'00.78" N 6°13'65.02"Ewww.ceveo.com/village/village-club-de-bois-damont-ete

When you register, it is possible to book bedrooms **from Tuesday evening until Saturday morning** (depending on your arrivals and departures).

Most bedrooms are to be shared by two people, but it is possible to book single bedrooms at an additional cost and subject to availability.

The cost for a night is €65 per person on a half-board basis. Lunch is at €20. It is possible to book a 3-day pack (2 nights from 15/05 to 17/05 - 2 dinners - 2 breakfasts - 3 lunches including 1 picnic) at €190 for a shared bedroom and €220 for a single bedroom.

If you do not wish to be accommodated at CEVEO Bois d'Amont, you can find hotels close to the seminar venue (<u>www.lesrousses.com/se-loger.html</u>). The seminar organising team will not be responsible for booking this accommodation or for travel to and from the venue.

Tourism

If you want to take advantage of your stay to visit the region, here are some useful links:

• www.doubs.travel

• www.lesrousses.com/en

- <u>www.parc-haut-jura.fr</u>
- <u>www.jura-tourism.com/#</u>
- <u>www.myvalleedejoux.ch/en/</u>

Registration

Registration closes on 15 April 2024.

YOU CAN REGISTER FOR:

- the 3-day seminar: participation in the seminar's conferences and field trips + the 3 lunches + depending on your choice, with or without full board at the Village Club Cévéo;
- on the first day: participation in the conferences on Wednesday 15 May with lunch included;
- on the last day: participation in the conferences on Friday 17 May with lunch included;
- book rooms at CEVEO Bois d'Amont, depending on your arrivals and departures (for the evening of Tuesday 14 May, for example...);

PLEASE NOTE!

- When registering, please tick the "site visit" option(s) to specify your field trip preferences.
- The site visits on Thursday 16 May are reserved for 3-day packs, so it is not possible to register for this day only.
- 3-day packs will be given priority over single-day registrations, so you may be put on the waiting list.
- Those wishing to pay by money order must enter the promotional code "MANDAT" when paying.

REGISTRATION LINK

www.helloasso.com/associations/conservatoire-d-espaces-naturels-de-franchecomte/evenements/colloque-international-du-life-climat-tourbieres-du-jura



Contact

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More information on the Jura peatlands LIFE Climat programme:

www.life-climat-tourbieres-jura.fr



SESSiON 2 • • Rehabilitation of European mountain peatlands (bis)

• MICHAEL STEINER, PROFESSOR, UNIVERSITY OF VIENNA - AUSTRIA

Reaction and resilience of austrian mires to 35-40 years of environmental stress: a comprehensive resampling study in >200 sites

The aims of the study in the period 2022-2026 are

> the improvement of the knowledge basis in view of biodiversity changes by remapping the vegetation of 200 Austrian mires,

> the biodiversity monitoring in which the vegetation changes from the first survey (1984-1990) until the present are compared with the changes predicted by the CLIMOOR-study (Essl et al. 2012)

> the replication of the CLIMOOR-study based on new vegetation data from the mires in view and new assessment of the stability of the habitat types in these mires until the end of the 21st century.

> the assessment of Carbon sequestration and the release of greenhouse gases in the observed mires as well as the changes of these parameters since the initial recording from 1984 through 1990.

> restoration measures in at least three mires after a priorisation.

With the usage of indicator values Landolt (2010) it was possible to compare the two vegetation surveys which originally have been worked out for different objectives (plant communities of Austrian mires, monitoring of vegetation change). The comparison showed slight changes in reaction (pH), moisture, light and nutrient values which could be the result of two overlapping effects: Climate change and Nitrogen enrichment from the atmosphere.

The resilience of mires especially from bog seems to be very high, 40 years of stress are not enough to show dramatic changes.