Alaska pipeline winds its way through the peaty tundra. Photo: Hans Joosten.

IMCG Bulletin 2019-6:
November – December 2019

INTERNATIONAL MIRE CONSERVATION GROUP

www.imcg.net

Contents of this Bulletin

IMCG issues

Word from the Secretary-General

Dear mire friends,
Happy New Year 2020 and success in your conservation and research activities. Here is a new Bulletin covering November and December 2019, going into January 2020. Against my promise, I did not keep this Bulletin substantially shorter than the former, because again too much has happened. This Bulletin *inter alia* reports on the Climate Convention, where more attention than ever was devoted to peatlands and to 'nature based solutions' in general. It is good and correct that land use gets the attention it deserves, on the other hand we should take care that 'nature based solutions' do not distract from the necessity to decarbonize our entire society. 'Nature-based solutions', including peatlands, can only *contribute* to reaching that goal.
The notices of interest for the IMCG Field Symposium, General Assembly and accompanying activities (see last Bulletin) in Southern Africa later this year are coming in. If you have not informed the organisers yet, please do as soon as possible. The organisers have installed a secretariat with a special email address: IMCG2020SA@gmail.com. So hurry up with your (still not-binding) expression of interest to help the organizers planning the events.
Keep sending news, photographs, papers and other contributions for the next Bulletin **by February 14, 2020** to Hans Joosten at joosten@uni-greifswald.de.

Mires and Peat

In November and December 2019 the following papers were published in Mires and Peat:

- Undrained peatland areas disturbed by surrounding drainage: a large scale GIS analysis in Finland with a special focus on aapa mires. [A. Sallinen, S. Tuominen, T. Kumpula & T. Tahvanainen] Volume 24: Article 38 http://mires-and-peat.net/pages/volumes/map24/map2438.php
- Bryophyte community composition and diversity are indicators of hydrochemical and ecological gradients in temperate kettle hole mires in Ohio, USA. [R. Grau-Andrés, G.M. Davies, C. Rey-Sanchez & J. Slater] Volume 24: Article 37 http://mires-and-peat.net/pages/volumes/map24/map2437.php
- Centrohelid heliozoans (Haptista: Centroplasthelida) from mires in the North Caucasus, Russia. [K.I. Prokina & D.A. Philippov] (olume 24: Article 36 http://mires-and-peat.net/pages/volumes/map24/map2436.php
- The distribution and naturalness of peatland on Terceira Island (Azores): instruments to define priority areas for conservation and restoration. [C. Mendes, E. Dias, M. Ponte, A. Mendes & L. Rochefort] Volume 24: Article 35 http://mires-and-peat.net/pages/volumes/map24/map2435.php
- Seasonal and inter-annual variability of carbon dioxide exchange at a boreal peatland in north-east European Russia. [O.A. Mikhaylov, S.V. Zagirova & M.N. Miglovets] Volume 24: Article 34 http://mires-and-peat.net/pages/volumes/map24/map2434.php
- Ecohydrology and causes of peat degradation at the Vasi peatland, South Africa. [S. Elshehawi, M. Gabriel, L. Pretorius, S. Bukhosini, M. Butler, J. van der Plicht, P. Grundling & A.P. Grootjans] Volume 24: Article 33 http://mires-and-peat.net/pages/volumes/map24/map2433.php
- A toolkit for field identification and ecohydrological interpretation of peatland deposits in Germany. [C. Schulz, R. Meier-Uhlherr, V. Luthardt & H. Joosten] Volume 24: Article 32 http://mires-and-peat.net/pages/volumes/map24/map2432.php
- Integrated management of invasive cattails (*Typha* spp.) for wetland habitat and biofuel in the Northern Great Plains of the United States and Canada: A review. [D. Svedarsky, R. Grosshans, H. Venema, S. Ellis-Felege, J. Bruggman, A. Ostlund & J. Lewis] Volume 25: Article 09 http://mires-and-peat.net/pages/volumes/map25/map2509.php

Find the journal online at http://mires-and-peat.net/ Electronic submission is required using our dedicated electronic submission system. If you experience any problems please contact the Editor-in-Chief Olivia Bragg (o.m.bragg@dundee.ac.uk) who can offer alternative routes for electronic submission.

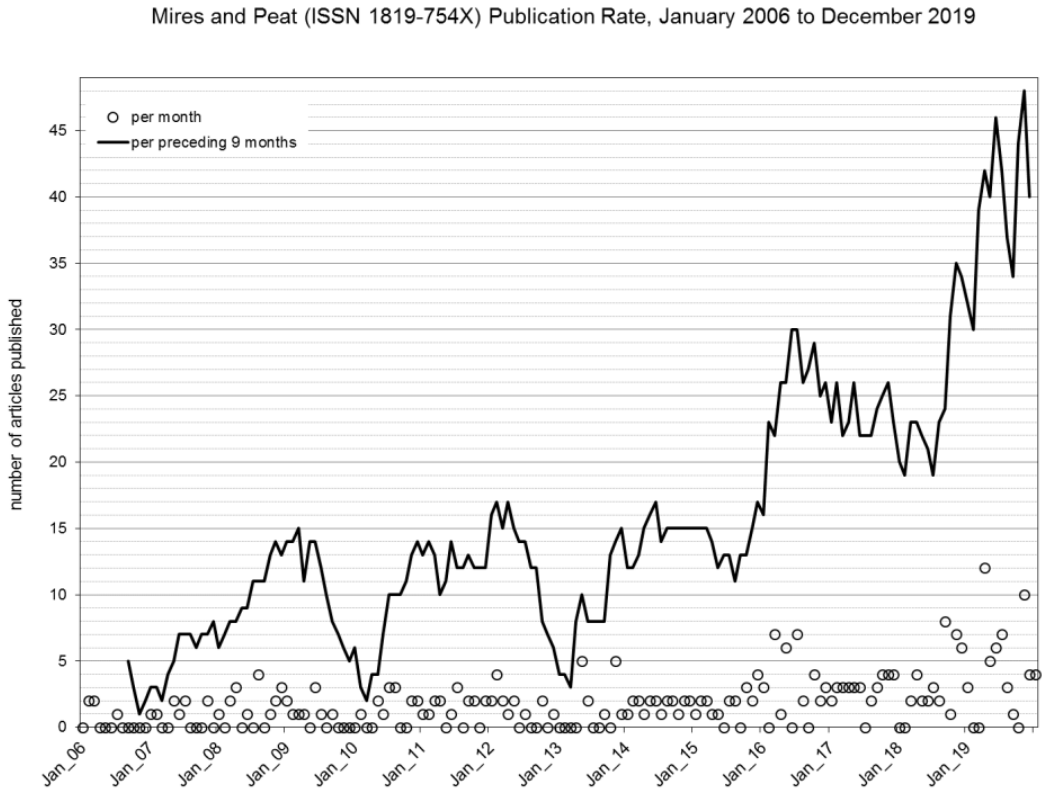
***Mires and Peat*: Synopsis of the Fourteenth Editor-in-Chief's Report (to 31 December 2019)**

Olivia Bragg (o.m.bragg@dundee.ac.uk)

During 2019, *Mires and Peat* published 52 peer-reviewed articles (835 pages) by authors from 26 countries including two new ones, namely India and Venezuela. This brings the total number of peer reviewed articles published to 300 and the number of countries represented amongst our authors to 68 (i.e. ~35 % of the 195 United Nations sovereign states). Standard Volume 24 (2019) contains 38 articles (627 pages); five articles (76 pages) were added to complete Special Volume 23 (2018/2019) *The Flow Country Peatlands of Scotland*; and Special Volume 25 *Renewable Resources from Wet and Rewetted Peatlands* (132 pages) was published in its entirety. The Special Volumes series will now be terminated.

The current (2018) *Web of Science* 2-year Impact Factor (IF), published in mid-2019, is 1.868. This is based on citations during 2018 of material published during 2016 and 2017 and shows a substantial increase on the 2017 (2-year) IF (1.326). The 5-year IF also increased, from 1.638 (based on articles published in 2012–2016 inclusive) to 1.802 (for articles published in 2013–2017). *Mires and Peat* again moved upwards within the 'Environmental Sciences' journal category, from the 29th to the 39th percentile (i.e. 61 % of Environmental Sciences journals currently have higher IFs and 39 % have lower IFs), although it remained in the third quartile (Q3). Of the ten most-cited articles, three were in Volume 17 (2016): 17.04 Wilson et al. (cited 13 times), 17.05 Strack et al. (6 times), 17.06 Jauhainen *et al*. (8 times); four were in Volume 18 (2016): 18.03 Rahgozar & Saberian (9 times), 18.16 Saberian & Rahgozar (8 times), 18.20 Lamentowicz *et al*. (7 times), 18.21 Glina *et al*. (6 times); and three were in Volume 19 (2017): 19.01 Minayeva *et al*. (6 times), 19.12 Bacon *et al*. (5 times), 19.22 Tanneberger *et al*. (7 times).

Throughout 2019 the publication rate per nine months exceeded the threshold (15) stipulated by *Web of Science*, oscillating between 30 and 48 and ending at 40. Submissions continue to arrive at more than double the minimum required publication rate.



Number of articles published during the current month (open circles) and the total number published during the current and eight preceding months (line) from January 2006 to December 2019. The threshold for inclusion in Web of Science *is 15 articles per nine months.*

The team that produced the journal's outputs in 2019 consisted of the Editor-in-Chief plus Jack Rieley (Deputy Editor-in-Chief), Andy Baird, Frank Chambers, Dicky Clymo, Stephan Glatzel, Bartek Glina, Ab Grootjans, Richard Payne, Jonathan Price, Katy Roucoux and David Wilson as Article Editors; Wendelin Wichmann and John Couwenberg as Guest Editors for Volume 25; Samer Elshehawi and Tom Kelly as Assistants; and Michael Trepel

as Website Administrator. It would be impossible to produce a peer reviewed journal without the careful and thorough reviews provided by our Associate Editors and many others (80 reviewers are listed for Volume 24 alone), whose contributions are also gratefully acknowledged.

In May we heard the devastating news of Richard Payne's untimely death in a climbing accident in the Himalayas. The two articles Richard had in hand were published posthumously in July and October. Richard was one of the driving forces behind Volume 23, which has now been dedicated to his memory; an account of his decade of contributions to *Mires and Peat* was appended to the Foreword (http://mires-and-peat.net/modules/download_gallery/dlc.php?file=282&id=1566238870).

International Mire Conservation Group Mongolia-2019 field excursion: day by day

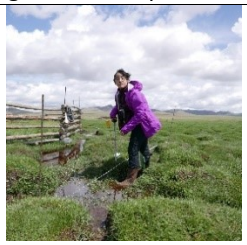
Tatiana Minayeva (tatiana.minayeva@care-for-ecosystems.net)

In this IMCG bulletin, we are geting back to July and August 2019, when eleven brave IMCG members agreed to visit the remains of the rapidly disappearing Mongolian peatlands. Our small team works on Mongolian peatlands already for 20 years. All these years we have faced failing awareness and understanding of the tragedy of Mongolian peatlands. Eleven peatland specialists from nine countries and three continents helped to make a change just by being on the sites and by sharing their concerns and ideas with local people, administration, experts and central government. We very much thank our participants Eerik Leibak, Jaanus Paal and Marko Kohv (Estonia), Pascal Demaziere (France), Jenny Lonnstad (Sweden), Jutta Zeitz (Germany), Hlynur Oskarsson (Iceland) and especially our volunteers Mónica Maldonado (Peru), Line Rochefort (Canada), Shane Grundy (Australia) and Angéline Bedolla (Switzerland). On the sites we were all the time accompanied by our Mongolian team members G.Burenbaatar (MSc.Researcher, Laboratory of Flora and Plant Systematics) and Ch.Khosbayar (Researcher, Laboratory of Vegetation Ecology and Plant Resources) (both Department of Botany, General and Experimental Biology, MAS), B.Purevochir (student, Mongolian National University of Education, Mathematics Science School, Biology Department), D.Tsogt-Erdene (project manager in Monhydroconstruction - and kind Angel part time) and as drivers Purevochir and Chuluun. Part of our travels we were accompanied by Ch.Dugarjav (Dr Academician, Researcher), Z.Tsogt (PhD, Researcher) and D.Zoyo (PhD, Researcher) (all Laboratory of Forest Phytocoenology, Department of Botany, General and Experimental Biology, MAS); S. Vandandorj (Research Fellow at Leiden Conservation Foundation/Researcher at Wildlife Science and Conservation Center of Mongolia) and G.Tsogt-Erdene (Researcher, Permafrost Department, Institute of Geography and Geo-ecology, MAS).

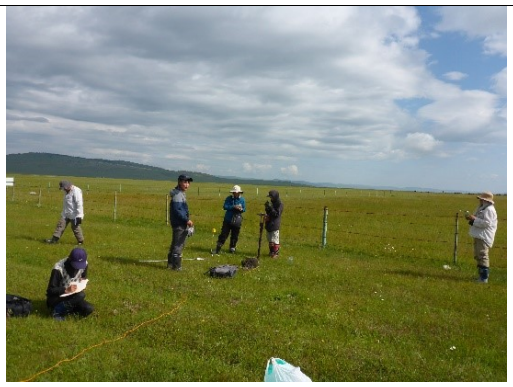
The trip was not easy and did not meet the expectations of many participants: blue skies (it was raining all the time), warm weather (it was cold), and beautiful mires (most of them was heavily overgrazed and destroyed). On top, there were all sorts of troubles: changing of planned track due to bad weather and inaccessible roads at passes, broken car, sickness of drivers, non-agreeable horse, not working chargers and generators and other fun. All participants were extremely helpful, tolerant, patient and friendly. Thank you!!

Volunteer camp in Mongolia 2019

	What had been planned	**What happened**
26 July – 2 August Khashaat	The volunteers had been invited to join the peatland restoration project in prolongation of the activities funded before by the Asian Development Bank and implemented by local people and communities, experts and groups of enthusiasts from different organisations in Mongolia and internationally. Peatland restoration in Mongolia is a not very easy process. It demands good knowledge of the local conditions, patience and high-quality monitoring. We planned seven days of intensive work in Nomgon peatland, Khashat sum	We got a great team including: four international volunteers, five experts from Mongolian Academic institutes, Universities, and engineer consultancy, local people guided by Chimedtseren and even Buddhist monks with a team to support and advertise our work. In one week, we repaired old fences and small dams, built two new fences and improved surface flow patterns, carried out monitoring work, looked for new places to work on, and discussed a lot with local people to find solutions for the problem of disappearing peatlands. We thank Monica, Line and Shane for their great help!

	What we were doing			
26 July – 2 August Khashaat	 Admiring beauty, even with destroyed nature		 Celebrating the start of the trip	
	 Learning life in a ger – doing all at same place		 Sharing experience with local people and	
	 Learning from them	 Struggling with equipment	 Identifying species without features	 Carrying out boring measurements
	 Admiring biodiversity	 Looking for peatlands	 …"with peat"	 Doing the "real stuff".

	What was planned	What happened
16-19 August Khurkh	Khurkh is a valley rich in peatlands which are underlaid by permafrost. Khurkh is a Ramsar site and a natural protected area. It hosts six species of cranes, including the disappearing Siberian crane – Sterkh. Since many years the Mongolian NGO Wildlife Science and Conservation Center carries out research and monitoring, maintains an ornitological station, provides support of protected status, and organises awareness and educational work. The funds for this work must be raised from several sources. We invited researchers as volunteers to help the team of WSCC.	We had two brave ladies, Monica and Angelina, and five Mongolian researchers and Tatiana on the site. We carried out a geobotanical survey at permanent plots along a transect to study vegetation dynamics under changing climate conditions. Angelina helped to collect a good herbarium of vascular plants and mosses. Monica performed all measurements. We had beautiful weather and a huge storm at the end. The data will be used by WSCC for better protecting the habitats of cranes and other birds, for peoples livelihoods around and downstream, and - in the end – for global biodiversity and climate.

	What we were doing	
16-19 August Khurkh	 Expressing respect to what WSCC did	 Measuring all parameters we could measure
	 Sharing lunch with mosquitoes	 Celebrating good peat and strong permafrost.
	 Admiring plants with finally some morphological features!	Join us two weeks in 2020 from July 18th to August 1st as a volunteer in Khashat and Khurkh and have fun!

The main IMCG trip started August 2 in Ulaanbaatar, where participants arrived by different means from various points of departure. Below you will find information about our schedule. We would like to ask participants to come up with small sketches as a contribution to our further arguments for Action on Mongolian Peatlands.

More about Mongolia you can find under

- http://www.imcg.net/media/2018/imcg_bulletin_1807.pdf - p. 62.
- http://www.imcg.net/media/2018/imcg_bulletin_1803.pdf - p.10
- https://www.scribd.com/document/371829657/MON-PDA-Demonstrating-Community-Based-Hydrological-and-Ecological-Restoration-of-Peatlands-in-Mongolia-Final-Report
- https://www.wetlands.org/news/wetlands-international-leads-strategic-planning-for-peatlands-of-mongolia/
- https://link.springer.com/referenceworkentry/10.1007/978-94-007-6173-5_108-1

date	sketch
2 August	The topic was "Physical geography of Mongolia, introduction to peatlands of Mongolia". We were driving from Ulaanbaatar to Khashaat (350 km). On our way, we crossed three biogeographical zones: forest-steppe, meadow-steppe and steppe. We stopped in Lun sum, where our brave guests had to change from their native to Mongolian food having lunch in the canteen with a mix of traditional and international kitchen. We looked at tree plantations, developed by a Korean-Mongolian project within the "Green Wall" initiative. This project got much criticism of the various experts. The trees are planted on a gentle slope of the Tuul river terrace in the steppe zone (where trees normally do not grow). Groundwater is pumped up to water the planted trees. As a result of this water extraction, the wetlands downhill get less water and dry out. That is one of the examples when campaigns for "Action on Climate" could be harmful to the climate. The third stop was at sandy dunes nearby the settlement Rashant in Khugnu Tarna Nature Reserve. The dunes or moving sands form a long belt of more than 100 km length from north to south. People call this area "Small Gobi". At the edge of the dunes, a large lake has formed by water discharging from the huge groundwater body, formed by the thawing of permafrost.
3 August	The topic was "Peatland restoration possibilities in Tarnii River valley of Tuul river catchment". In the morning, Tatiana gave a short introduction on Mongolian peatlands. Further, we looked at the restoration projects in the Khashaat valley. The participants helped actively with fence construction around springs by carrying logs to the construction site. Further, we were driving around Khashaat valley looking at peatlands in various stages of degradation. The audience was disappointed by the condition of the peatlands. And we hope that we have convinced participants that peatlands in Mongolia are under threat.
4 August	The topic was "Orkhon valley – cultural and natural values". We thanked Chimedtseren and Nara for their hospitality and drove through the watershed between Tuul and Orkhon. We made a small stop before the town Khashat at a peatland, where locals had fenced the springs and significantly improved the hydrological situation. A team of Buddhist monks joined us at this point to support and bless our work. The participants participated in the ritual. When the group reached Orkhon, we had the second cultural break: a visit of the archaeological monument Gokhturk at Khushuu Tsaidam. After this cultural break, we undertook an attempt to visit the minerotrophic mire Lun in a small spot of remaining permafrost in Orkhon Valley at the right bank of the river. However, not everybody reached the spot as the way through the degraded peatlands was too long.
5 August	We were staying in Orkhon valley with a very busy agenda: looking at cultural values (monastary in Kharkharin), meeting the Administration of the UNESCO Cultural Heritage Site "Orhon Valley" and National Park, had a look at parts of the irrigation systems, and finally, at the end of the day we reached a frozen spot on the left bank of Orkhon with remaining permafrost with good peat and mire vegetation.
6 August	The topic of the day was "From steppe to highland taiga". After we had left Kharkharin we made a stop to look at the huge agriculture fields near Khoton with a very poor crop. This is the result of a new state fiscal policy aimed to change land use structure by introducing crops. People take the land, declare it as agriculture investment, get support, plough huge areas, saw the seeds, and nothing is growing. The steppe and wetlands are destroyed for nothing , an example of a wrongly organised incentive scheme. After lunch in Tsencher we started to climb Tsencher river valley. The higher we were going, the better the peatlands and steppe became. After driving with stops around 120 km we set up our camp in a beautiful steppe at the edge of the taiga belt.
7 August	The topic of the day was "Highland spring peatlands and mining". In the morning, we looked at sloping mires around the camp and started towards the pass Olchin Davaa. On the southern slope, we found nice spring peatlands with *Betula fruticosa* and the first *Sphagnum* mosses of the entire trip. Immediately the beautiful picture was replaced by the sad impression of the mining area. We travelled almost 15 km along open gold mines in Shiiirt river valley. After a small pass we saw old reclamation areas in the Dzun-Sudetiin-Am Gol river valley. The reclamation was undertaken with international funding. On our way to the Ulaan Tsutgalan waterfall (Ulaantsutgalaan) we crossed the Orkhon river and drove a long time through the volcanic valley with a lot of fun. Very late we arrived at our camping site.
8 August	The large part of the team needed rest and it was raining. So we were looking around the waterfall, have a small seminar and recover. Our birdwatchers Eric, Hlynur and Line were working hard on the birdlist for the area. It was the request of our host – owners of the ger camp – Blue Sky. The young couple running the ger camp is interested in developing environmental tourism and we were glad to help them by sharing ideas and with the information. Special thank to all members of the team for their help.
9 august	In order to look at peatlands in the highlands around Ulaantsutgalaan we had to undertake a horse ride. The Eigh Lakes nature reserve is situated at the watershed between Orkhon river and Ongijn

date	sketch
	Gol river. Ongijn Gol is ending in the Gobi Desert in an undrained basin and is heavily degraded and connected to a lot of ecological problems downstream. Many NGOs are struggling for it. The watershed is a volcanic plateau with lakes and peatlands, known as "Eight lakes" or Naiman Nuur, 2400 metres above sea level. Eight lakes and the surrounding area of 11.500 hectares have the status of National Park since 1992. We reached the peatlands at the plateau and they are really good, but endangered by tourism. Crowds of tourists are passing the peatlands by horses without even stopping to take a lookt, but only complaining about the bad road. More horses, worse road. Very sad story.
10 August	This day we planned to look at valley peatlands in our way to OgyjNuur lake and Ramsar site. From this day, Fortuna left us. One of our cars was broken. The driver became sick. We had to find a solution how to reach OgyjNuur. The world is full of kind people, so our host in the Ulaantsutgalaan camping rescued us and helped us to get to the Ramsar Centre.
11 August	This day we had a small but productive discussion in the Ramsar Centre. It was a special benefit to have Jenny with us who is currently vice-chair of the Ramsar Standing Committee. The Ramsar manager was very interested in getting feedback. After the seminar, we started towards Bayanuur. Salt Lake Tsagaan Nuur, as announced in the program, was still available, but the peatlands in the valley of Tuul river and the planned visit to the culture artefacts of the Khitan Dynasty were beyond reache. A huge storm with strong hail stopped our team's attempts to cross the valley and we decided to go to Ulanbaator
12 August	Drive to Gatchuurt from Ulanbaator. Gatchuurt river, translated as Sprice river, was a valley with permafrost and forested peatlands with spruce. Nowadays the area is actively settled up by people from the growing capital. We were hosted by the Research Station of the Forest Research Association lead by Dr. Tzogt. On the day of arrival we visited a more or less natural peatland with *Betula fruticosa* and *Sphagnum* upstream the river.
13 August	The second day we looked at the remains of forested peatlands on frozen soils in a different state of degradation. The main threat is construction and development. Also, we looked at experimental plots and spoke to local rangers. After lunch, we discussed the results of the trip and our impressions and prepared the upcoming workshop on 15 August. Meanwhile, our hosts prepared for us a Farewell Khorkhog, a traditional way to prepare meat with hot stones. The Khorkhog was lasting up to the early morning.
14 August	The half-day visit to peatlands in Terelj National Park left the impression of active development. Peatlands crossed by roads and cleaned for the construction of touristic facilities. The main threat is low awareness. After visiting the Monastery in Terelj National Park we returned to Ulanbaator.

Overlooking Okhron valley, Mongolia. Photo: Hans Joosten.

Papers

Peatlands and climate in Russia: towards a framework for contributing to the Paris Agreement

Tatiana Minayeva, Irina Kamennova, Anastasia Markina & Andrey Sirin (Tatiana.Minayeva@wetlands.org)

The Russian Federation ratified the Paris Agreement by Resolution No 1228 of the Government of the Russian Federation of September 21, 2019. The Resolution states, inter alia, that "The Russian Federation shall proceed from the importance of preserving and increasing the absorbing capacity of forests and other ecosystems, as well as the need for its maximum possible consideration, including in the implementation of the Paris Agreement mechanisms." The latter statement was repeated by Ruslan Edelgeriev, Advisor to the President of the Russian Federation and Special Envoy for Climate, in his speech at the Ministerial Sector of the Conference of Parties to the UNFCCC in Madrid on December 10, 2019. Edelgeriev also stressed that "...currently, as part of the implementation of the Paris Agreement, Russia is preparing a Presidential Decree on the national goal of reducing greenhouse gas emissions by 2030, a national plan for adapting the economy to climate change, as well as a long-term strategy for development until 2050 with low greenhouse gas emissions. In this activity, Russia will pay great attention to the development of observations of climate and its changes on the territory of our country, scientific assessment and paring of climate risks, support of scientific research in the field of climate and related areas". At the end of December 2019 the Russian Government endorsed its National Climate Change Adaptation Plan.

The project “Restoring peatlands of Russia for fire prevention and climate change mitigation” (PeatRus) funded by the International Climate Initiative (Germany) is implemented in Russia already for almost ten years and is aiming among others to formalise reporting on peatlands rewetting to the UNFCCC. The ratification of the Paris Agreement and the demonstrated understanding by the authorities of the significance of the land use component is a solid framework to sustain the achievements of the PeatRus project.

Within the PeatRus project, a three-level approach to climate change mitigation and adaptation through rewetting, restoration, and management of degraded peatlands has been taken. Statistics on the activities for the implemented phases 1 (2011-2016) and 2 (2017-2019) and for the planned phase 3 (2020-2023) are presented in Fig. 1 and Table 1.

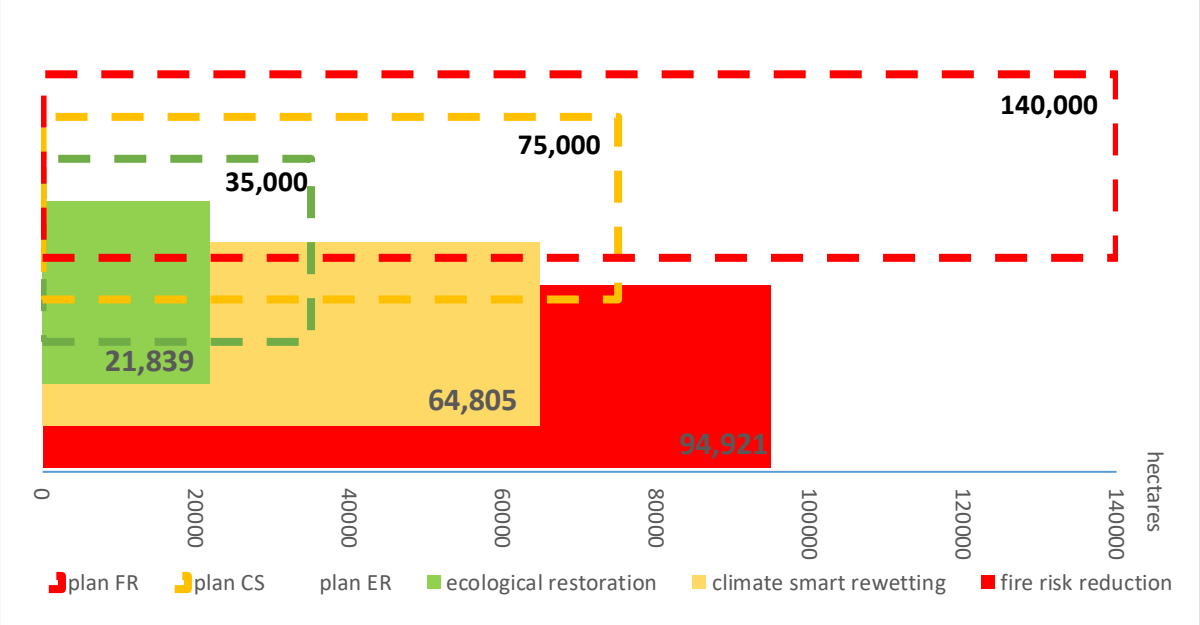


Fig. 1: PeatRus mitigation/adaptation measures phases 1 and 2 (blocks) and plans for phase 3 (dashed lines).

Table 1: The statistics of the PeatRus project (in ha)

	Phases 1 and 2 planned	Phases 1 and 2 achieved	Total to be achieved after Phase 3
Fire reduction	100,000	94,921	140,000
Climate smart rewetting	59,000	64,805	75,000
Ecosystem restoration	35,000	21,839 (+ 6,336 in pipeline)	35,000
Pilot projects for ecological rewetting)	6,500	7,474	9,500
Additional areas identified for rewetting	45,000	45,211	75,000

Ecosystem restoration includes not only rewetting but also the design and implementation of measures promoting a return to the initial type of mire ecosystem including all components related to biodiversity, hydrology and carbon balance. The restored areas should be excluded from land use. Ecological restoration contributes both to mitigation and adaptation. Within phases 1 and 2, ecological restoration was implemented on 21,839 ha, and for 6,336 ha, designs were prepared and proposed for implementation by the project partners. Due to obstacles connecting with land tenure, the project did not reach the planned restoration area of 35,000 ha and this target was postponed to the 3rd phase.

Climate-smart rewetting includes rewetting activities resulting in the reduction of GHG emissions. This option includes ecosystem restoration, but also the creation of artificial wet ecosystems for paludiculture and other purposes. Within phases 1 and 2, climate-smart rewetting activities were implemented on 64,805 ha (initially planned 59,000 ha). At the end of the project (after the completion of phase 3), we expect 75,000 ha to be climate-smart rewetted.

Fire risk reduction can be achieved not only by rewetting, but also by infrastructure improvement, capacity building, improving peatlands related data (mapping, assessment) and monitoring of fire-hazardous sites. Sites rewetted in line with "climate-smart" criteria and areas of ecosystem restoration activities are also considered having lower fire risk. The activity contributes to both mitigation and adaptation. The areas of decreased fire risk make up almost a hundred thousand hectares in phases 1 and 2 (94,921 ha) and we expect to achieve 140,000 ha at the end of the project.

Pilot sites within the PeatRus projects are sites where ecosystem restoration or paludiculture is combined with detailed monitoring of GHG fluxes and biodiversity, and where capacity for experimental, education and awareness work in a particular locality is developed. The entire project cycle is as a rule funded by PeatRus. The area of pilot sites is currently 7,474 ha.

The spatial distribution of the various activities is shown in Fig. 2, the statistics of phases 1 and 2 in Table 2.

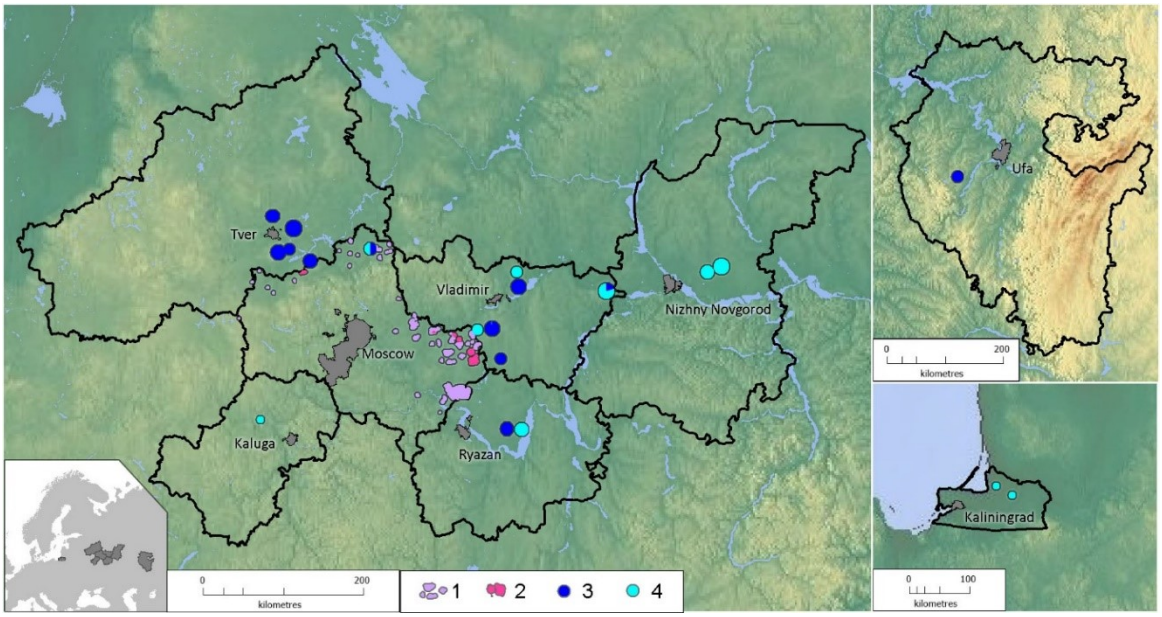


Fig. 2: The project sites: 1 – fire reduction only; 2 – climate-smart rewetting only; 3 – ecological restoration implemented; 4 – ecological restoration planned in the third phase.

Currently, the task of the project team is to merge these statistics (Table 1) with the National Reporting to the UNFCCC in line with the 2013 Wetlands Supplement to the 2006 IPCC Guidelines for National Greenhouse Gas Inventories. The project started cooperation on this with the Yu. A. Izrael Institute of Global Climate and Ecology (http://www.igce.ru/), the authority responsible for National Reporting to the UNFCCC.
The reporting on peatland rewetting in Russia can be organised only on the basis of information from the regions. The focus of the next project phase will be to develop and implement a reporting system for the 12 regions involved (Fig. 3). Until now the focus was on inventory and identification of sites for rewetting based on a Decision Support System (DSS) developed by experts of the Michael Succow Foundation [1] and updated for the needs of the project in cooperation with the consultancy Ethnoexpert[2].

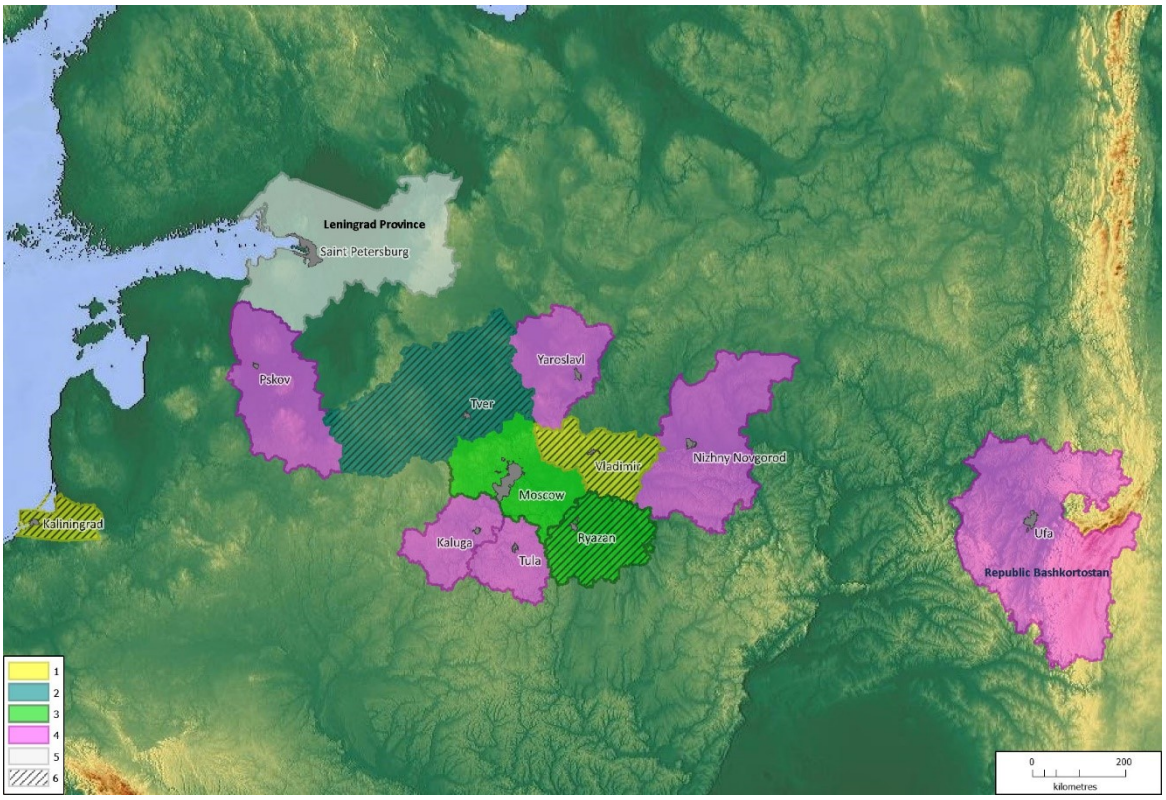


Fig. 3: The regions of PeatRus work, including plans for the 3rd phase. Provinces: Kaliningrad, Leningrad, Pskov, Tver, Yaroslavl, Moscow, Kaluga, Tula, Vladimir, Ryazan, Nizhny Novgorod; Republic Bashkortostan and city Saint Petersburg. For explanation of the legend see text.

Fig. 3 shows the location of the PeatRus activities in the various Russian regions with

1. sites prioritized on the basis of fire risk assessment
2. the same but updated in the course of the project
3. sites prioritized for rewetting/ecological restoration, including legal and socio-economic analysis
4. only initial delineation of peatland boundaries carried out
5. new regions to be included in the work on inventory of peatlands and prioritization for rewetting/ecological restoration in the next project period (2020-2023) (Leningrad Region and St. Petersburg)
6. regions in which in the next project period a peatland management plan will be developed for reporting in the Nationally Determined Contributions (regional plans for mitigation and adaptation).

The project team is open to cooperation with other projects taking place in these regions of the Russian Federation to increase the efficiency of nature conservation investments.

[1] https://succow-stiftung.de/russia-decision-support-system-peatland-utilisation.html
[2] https://ethnoexpert.com/en/project/restoring-peatlands-russia-fire-prevention-climate-change-mitigation-wetlands-2011-2017-2/

Table 2: Inventory and DSS-based rewetting planning undertaken until now by the project (in ha)

	Total region	Area of peatland	Drained peatland	Rewetted by or with input of project	Recommended for rewetting/ restoration	Method of prioritisation
Republic of Bashkortostan	14,294,700	55,874	12,500	700	2,500	Consultations with government
Kaliningrad Province	1,512,500	59,546	27,000		4,800	Consultations with government and experts
Moscow Province	4,432,900	250,000	73,000	43,240	8,700	Recommended by MO based on district governors' submissions
Ryazan Province	3,960,500	112,781	24,729	910	12,511	Full regional DSS applied
Tula Province	2,567,900	931	430		200	Consultations with government and experts
Tver Province	8,420,100	808,200	No recent data*	13,607	18,000	Government recommendations
Vladimir Province	29,084	109,668	45,000	6,348	16,500	Consultations with government
Total	**38,097,000**	**1,397,000**	**182,659**	**64,805**	**63,211**	

* inventory is in process of update

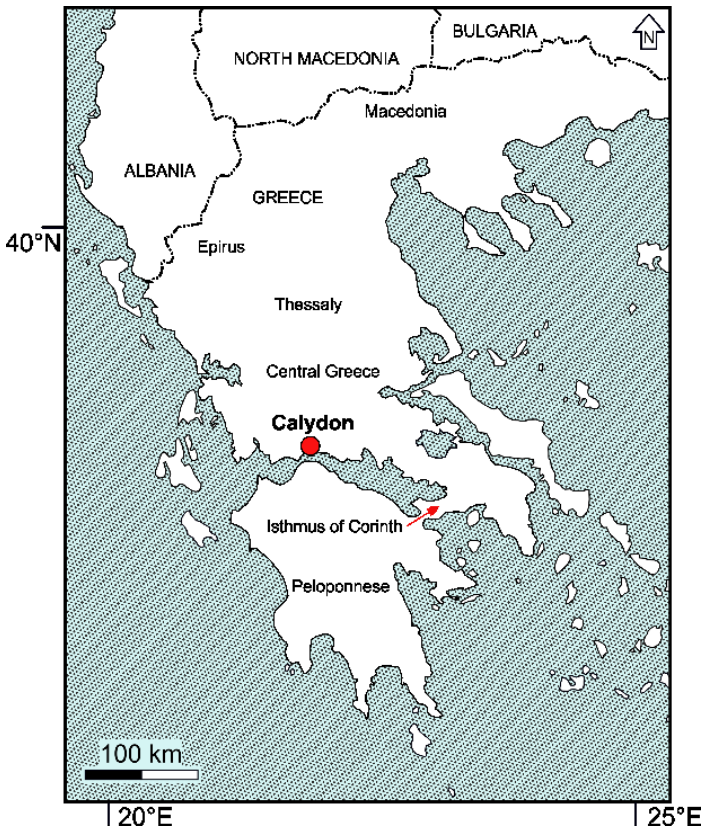
Descriptions of some sites under https://russia.wetlands.org/topic/restoration-pilot-projects/page/2/

The project is a long term initiative within the Russian-German technical cooperation initiative headed by the Federal Ministry for the Environment, Nature Conservation, and Nuclear Safety of the Federal Republic of Germany and the Ministry of Natural Resources and Environment of the Russian Federation.
Project donor: German Federal Ministry for the Environment, Nature Conservation, and Nuclear Safety (BMU) in the framework of the International Climate Initiative.
Project partners: Ministry of Natural Resources and Environment of the Russian Federation (MNRE Russia, www.mnr.gov.ru), Government of Moscow Province (www.mosreg.ru), Wetlands International (www.wetlands.org), Michael Succow Foundation (Germany, www.succow-stiftung.de), Institute of Botany and Landscape Ecology, Greifswald University (Germany, www.botanik.uni-greifswald.de), Institute of Forest Science, Russian Academy of Sciences (www.ilan.ras.ru)
Managing authority: German Development Bank (KfW), *Implementing agency:* Wetlands International

Peatland poetry from the past:
The Calydonian boar in the Metamorphoses by Ovid (43 BCE – 17/18 CE)

Pim de Klerk (Greifswald Mire Centre/State Museum of Natural History Karlsruhe; pimdeklerk@email.de, www.pimdeklerk-palynology.eu)

The Greek and Roman mythology contains many exiting stories of gods and goddesses, demigods and heroes, wars, quests and horrific creatures. One of the most famous monsters was the Calydonian boar that Artemis (known as Diana in the ancient Roman pantheon) had sent as punishment for the people of Calydon, which had forgotten to sacrifice to her. The animal was gigantic, had huge tusks and spewed lightning that set the agricultural fields on fire. Some 40 of the greatest heroes of Greek mythology under the leadership of the Calydonian prince Meleager eventually hunted the boar down. The story is told briefly or referred to by Homer ('Iliad' IX:651-668), Hesiod ('Catalogue of women' fragment 98), pseudo-Apollodorus ('Library', various places), Plutarch ('Parallel lives', chapter on Theseus), Pausanias ('Description of Greece', various places), Procopius ('On the wars' V:15), and various others. Strabo posed that the Calydonian boar was an offspring of the Crommyonian sow ('Geography' VIII:6,22), which had ravaged the area around the Isthmus of Corinth until it was killed by the Athenian hero Theseus. Pausanias told that the alleged original tusks of the Calydonian boar were taken to Rome by Emperor Augustus ('Description of Greece' VIII:46,1). In the time of Pausanias (second century CE) one of these tusks had been broken, but the other was on display in the imperial gardens of Rome and had a length of a half an orguia (i.e. around one metre) ('Description of Greece' VIII:46,5). Mayor (2011) posed that these tusks were actually fossil tusks of elephants (or other Proboscidea animals) found in Pleistocene exposures in Greece were Proboscidea remains are common (cf. Doukas & Athanassiou 2003).



The most elaborate version of the story of the Calydonian boar stems from Ovid, one of the most popular poets of early Roman Imperial times. His work 'Metamorphoses' is a collection of numerous myths in poetic form, of which Book VIII (verses 260-444) tells the tale of the Calydonian boar. Ovid placed the beginning of the final confrontation in a mire setting:

"There was a hollow little valley, in which streams of rainwater discharged themselves. The deep hollow is held by wagging willows, smooth grasses, marsh rushes, willow shrubs, and small reeds underneath tall reed stalks. From here the roused boar rushed violently into the midst of its enemies, like lightning ejaculated from the clouds.

The woods were forced-down to the ground, and the forest uttered cracking sounds while being shoved away." ("concava vallis erat, quo se demittere rivi adsuerant pluvialis aquae; tenet ima lacunae lenta salix ulvaeque leves iuncique palustres viminaque et longa parvae sub harundine cannae: hinc aper excitus medios violentus in hostes fertur, ut excussis elisi nubibus ignes. sternitur incursu nemus, et propulsa fragorem silva dat"). ('Metamorphoses' VIII:334-341).

Although it almost appears to be an eye-witness account, it is by no means clear what kind of vegetation Ovid described (see Glare 2016). "Salix" and "vimen" both denote willow, where the latter means intertwined brushwood-like shrubs rather than trees ("vimen" also means "wickerwork", for which frequently willow branches were used). "Ulva" is a collective word denoting various wetland grass-, sedge- and rushlike plants in general, "iuncus" designates rushes or similar plants, "(h)arundo" generally means tall reeds, and "canna" denotes small reeds. Thus, to put it simple, it was a setting with some willow trees and shrubs, and many different kinds of green shoots. The small valley mire was at least fed by streams discharging rainwater: whether these were envisaged by Ovid to be continuously active or only during severe rain is unknown. Ovid was a poet, and his intention was to provide a pleasant-sounding poem with words that fitted well in the metre of his work, and botanical or ecological accuracy – as far as such concepts were at all known in Roman science - was not relevant. However, he may have modelled his poem on own observations or on tales from others who had seen mires.
It is remarkable that Ovid described a marsh rather idyllically, whereas in general in the ancient Roman culture a large aversion existed against mires and peatlands (De Klerk & Joosten 2019). Possibly Ovid merely tried to contrast a friendly peaceful landscape with the violent destruction of the monstrous boar. However, also at other places in his works he seemingly provided a less negative view on wetlands than other Roman authors did. The reasons for this are unknown, and can be only a matter of speculation.

I am grateful to Immanuel Musäus for his help with the translation.

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Homer (Ὅμηρος; 8th/7th centuries BCE): Ἰλιάς (Iliad). – Dutch translation by Van Oldenburg Ermke, F.: Homeros Ilias & Odyssea. Kempische Boekhandel, Retie, 1959. – Original text and eight English translations by Chapman, G., Pope, A., Cowper, W., Butler, S., Lang, A., Buckley, T.A., Derby, E. and Murray, A.T.: Complete works of Homer. Delphi Classics, Hastings, 2016 (kindle edition).

Hesiod (Ἡσίοδος; between c 750 and 650 BCE): Γυναικῶν κατάλογος (Catalogue of women). – Original text and English translation by Evelyn-White, H.G.: The Homeric hymns and Homerica. William Heinemann, London / The Macmillan Co., New York, 1914.

Ovid (Publius Ovidius Naso; 43 BCE-17/18 CE): Metamorphōseōn librī (Metamophoses). – Original text and German translation by Von Albrecht, M.: Metamorphosen. Reclam, Stuttgart, 1994. – Original text and two English translations by Riley, H.T. and Howard, J.J.: The complete works of Ovid. Delphi classics, Hastings, 2012 (kindle edition).

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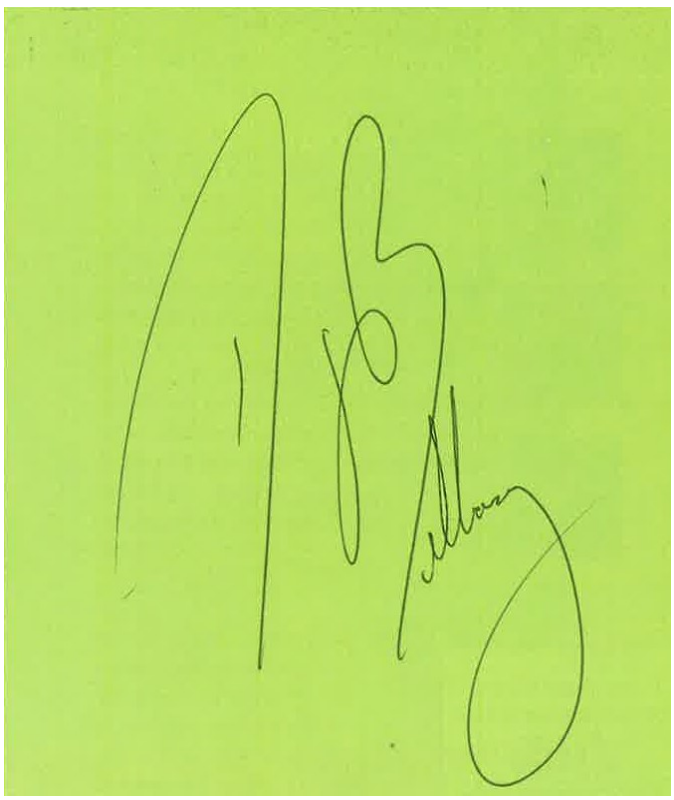
Peatland news

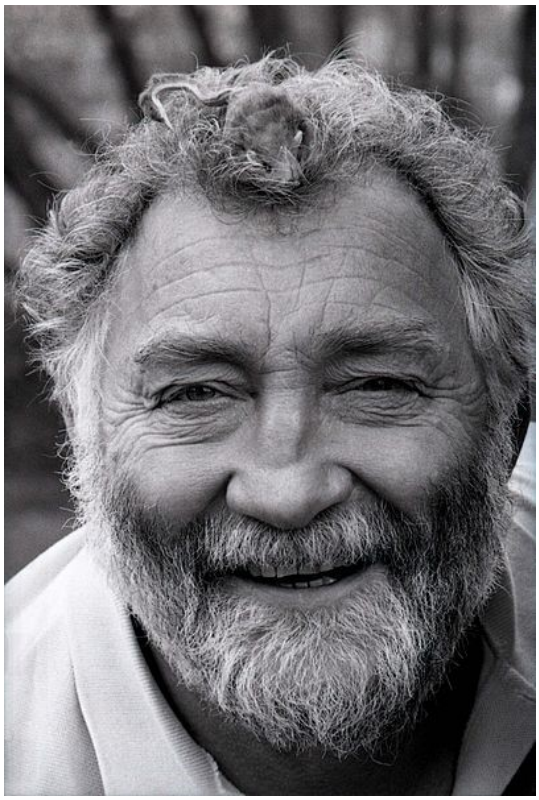
Global

Professor David Bellamy (1933 – 2019) – an appreciation

Richard Lindsay (R.Lindsay@uel.ac.uk)

To those of us brought up in the 1960s and with access to the BBC, 'Nature programmes' were synonymous with the eruditely cultured voice of David Attenborough as he explored far-flung and highly exotic places in search of rare species, though always with the rather detached tone of an observer. It is hard, now, to make clear just how startling it was in the early 1970s, therefore, when a larger-than-life character called David Bellamy burst from our TV screens, not merely enthusing in his broad south London accent about some obscure 'peat bog' near the English/Welsh border but positively thrusting handfuls of this strange plant *Sphagnum* into your face through the TV screen. His first two TV series, Bellamy on Botany and Bellamy's Britain, attracted millions of viewers who were drawn into the wonders of the plant world to be found not in some far-off place such as Borneo or Cameroon but in our own back yards, as it were. Bellamy was arguably the first true presenter of Nature, someone who threw himself into the natural world (quite literally, in the case of a schwingmoor west of Birmingham, scuba diving to show the lens of water beneath the peat raft) as a means of demonstrating both memorably and clearly how natural systems actually worked. His follow-up series Bellamy's Europe highlighted the huge natural diversity to be found across Europe but also emphasised the interconnections that held the entire network of living systems together – a powerful message that could have been aimed at our own fractious times. The books accompanying these TV series were enormously popular, and Bellamy's subsequent output through the publishing world became enormously prolific, some written himself, some written by others but assembled under Bellamy's by-now-famous name. Indeed, his fame had unexpected but happy consequences for me. When meeting new people and conversation came round to what each of us did for a living, I was at last able to say, "Well, I'm a peat bog specialist – [blank looks] – you know, like a sawn-off David Bellamy." "Ah, yes, I see!" – though usually followed by a rapid change in conversation topic.





David Bellamy https://commons.wikimedia.org/wiki/File:David_Bellamy_4_Allan_Warren.jpg

David Bellamy grew up during the war years in south London and had originally wanted to be a ballet dancer but soon realised that, in one of his typical memorable phrases "my mass exceeded my aspirations". His subsequent move into science led him to study for a PhD at Bedford College, London University, his topic being "Ecological

studies on some European mires". While his media persona developed following his TV appearances as a lecturer at the University of Durham, discussing the impacts of the Torrey Canyon oil spill, Bellamy was also an active peatland researcher, investigating in particular the relationships between water chemistry and floristics. In 1974, together with Peter Moore, he published what was in effect the first peatland textbook in English, titled simply Peatlands, where much of his work from his PhD, his studies on Irish peatlands, and his classic paper with Jack Rieley on the ecological studies of a miniature bog, all featured. The penultimate chapters focused on the global resource – the 'World Picture' being a mere three pages long, perhaps reflecting the poor state of knowledge at that time. The final chapter considered the arguments for peatland conservation and introduced Project Telma, with which Bellamy was actively involved and which, ultimately, can be said to have been the progenitor of the Ramsar Convention's, the CBD's and ultimately the UNFCCC's interest in peatlands.

David Bellamy and I encountered each other, directly or indirectly, on several occasions, my first meeting with him being in the Flow Country of northern Scotland where he was making a film about the afforestation of the Flow Country blanket bogs. In true Bellamy fashion, he was using a hot-air balloon to obtain aerial footage but we were filming our particular scene on terra non-firma – i.e. in the middle of a wet peat bog. Off camera, Bellamy was modest, kind and quietly spoken. As soon as the camera was on him he became this force of nature and the words just flowed clearly, eloquently yet in succinct but memorable sound-bites.

In later years he came to believe that it was better to work with industry rather than be constantly at war with it, so was accused by many in the environmental world of having 'sold out'. This rupture in relations became even more extreme when Bellamy started to question, increasingly vociferously, the idea that global warming was anthropogenic. Almost all the environmental organizations of which he was president or patron severed ties with him, and my last direct encounter with him was the source of great alarm for the peatland conservation bodies because he was about to go on evening TV to state his support for conservation of Fenns & Whixall Moss, a large cut-over raised bog on the English-Welsh border. He abruptly announced to the Shropshire Wildlife Trust, 30 minutes before going on-air, that he though it best if the bog was extracted for peat because it was already so damaged. Cue a frantic phone call to me as I had prepared the original case for the site's conservation, and a hurried discussion which led to David very graciously agreeing to state that, "he had been told of the importance of the site for nature conservation".

Despite his later beliefs, I always had enormous respect for David Bellamy – in part because of his actions in New Zealand. He became a figurehead for a campaign seeking to prevent the construction of a hydro-electric power scheme on the wild Gordon River in Tasmania. He was arrested and placed in a tiny cell. Bellamy suffered terribly from claustrophobia. The authorities offered to release him if he undertook to cease campaigning. He refused. So they locked him up again – on his birthday.

David James Bellamy (18 January 1933 - 11 December 2019) – a gentle giant, in so many ways.

See also

- https://www.delta-optimist.com/news/burns-bog-conservation-society-mourns-loss-of-honourary-chair-1.24037369
- https://www.theguardian.com/environment/2019/dec/12/david-bellamy-obituary
- https://www.bbc.com/news/uk-50752089
- https://peatlands.org/assets/uploads/2019/06/ipc2008p1-3inv-bellamy-the-way-i-went.pdf

UN Emissions Gap Report: world must ramp up climate ambitions at least threefold to meet Paris goals

The United Nations Environment Programme (UNEP) released its latest Emissions Gap Report on the eve of the climate negotiations t in Madrid, Spain. According to the report, the nearly 200 countries that signed the Paris Climate Agreement in 2015 must boost their emissions-reduction ambitions by at least threefold to meet the targets adopted in the agreement. The Paris Agreement set the goal of limiting average global temperature rise to "well below 2°C," and included 1.5°C of temperature rise as an additional, essentially aspirational, target. In signing the agreement, countries also agreed to ramp up their emissions reductions pledges, known as "Nationally Determined Contributions" or NDCs, every five years. That means that next year's climate summit, to be held in Glasgow, Scotland, will be the first time countries are due to take stock of progress toward the Paris goals and strengthen their emissions reduction pledges accordingly.

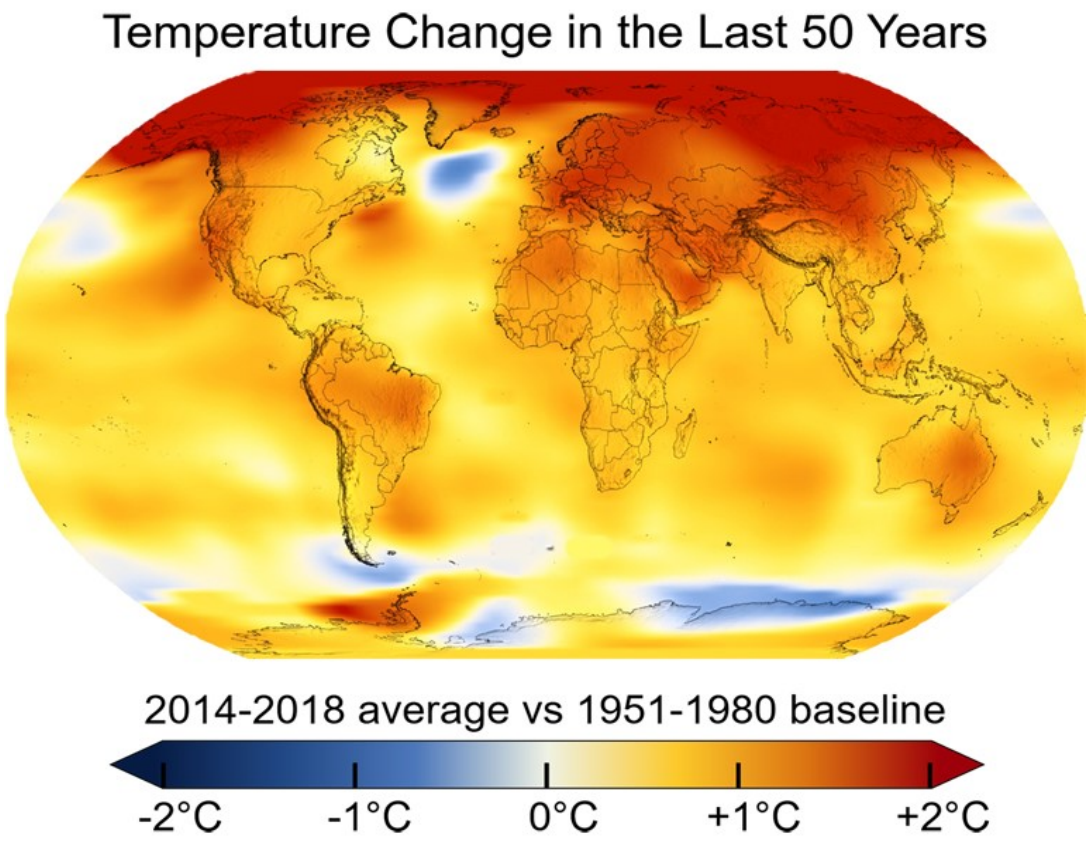
The Emissions Gap Report 2019 finds that total greenhouse gas emissions have risen by 1.5 percent per year over the past decade, and that even if all current commitments made under the Paris Agreement were implemented, global temperatures would rise by 3.2°C and the world would face a much wider range of even more destructive impacts of global climate change than we're experiencing now.

A report released by the Intergovernmental Panel on Climate Change (IPCC) last year warned that climate impacts like heatwaves and severe weather, as well as risks to economies, food security, human health, livelihoods, and the world's water supply, will increase dramatically if global warming reaches 1.5°C. Impacts on biodiversity and ecosystems, such as species loss and extinction, would increase as well.

Global greenhouse gas emissions would have to be reduced by some 32 gigatonnes of CO_2 equivalent by 2030, or 7.6 percent every year between 2020 and 2030, in order to reach the 1.5°C target, the Emissions Gap Report states. That would require a five-fold increase in countries' emissions reduction commitments. Even limiting global warming to 2°C would require a 15-gigatonnes reduction in emissions, or 2.7 percent per year, by 2030.

All but one of the G20 nations have committed to full implementation of the Paris Climate Agreement. (The United States is the lone outlier; President Trump withdrew the US from the Paris Agreement in 2017.) However, the UNEP report finds that, while G20 nations collectively account for 78 percent of all global emissions, just five G20 members have actually committed to a long-term zero emissions target.

Inger Andersen, UNEP's Executive Director, said that it is still possible to meet the Paris Climate Agreement's targets, but that solutions must be deployed at a much faster rate and at a much larger scale. "Our collective failure to act early and hard on climate change means we now must deliver deep cuts to emissions — over 7 per cent each year, if we break it down evenly over the next decade," Andersen said in a statement. She added: "We need quick wins to reduce emissions as much as possible in 2020, then stronger Nationally Determined Contributions to kick-start the major transformations of economies and societies. We need to catch up on the years in which we procrastinated. If we don't do this, the 1.5°C goal will be out of reach before 2030."



Average Global temperatures from 2014 to 2018 compared to a baseline average from 1951 to 1980. Credit: NASA's Goddard Institute for Space Studies.

- https://news.mongabay.com/2019/12/latest-un-emissions-gap-report-finds-world-must-ramp-up-climate-ambitions-at-least-threefold-to-meet-paris-goals/

Polar regions in deep trouble

As delegates from 197 member states convened in Madrid, Spain, for the 25th United Nations Climate Change Conference (COP 25) the world's polar scientists sounded the alarm in a new report over the rapidly changing Arctic and Antarctic regions. In the last decade alone, the Arctic warmed 0.75 degrees Celsius. In contrast, it took 137 years for the entire Earth to warm nearly that same amount, 0.8 degrees Celsius. Subsequently, the region

has undergone a significant transformation as sea ice melts, permafrost thaws, and wildfires burn. "It's too late to prevent dangerous climate change impacts because we're already seeing them, and the amplified impacts in the Arctic drive that home," Michael Mann, a renowned climate scientist, told Mongabay. But he says it is still possible to avoid catastrophic warming of more than 1.5 degrees Celsius.

In a comprehensive *Science Advances* report published early December 2019, an international team of researchers, including Mann, documented the far-ranging effects of warming in both polar regions, on land and at sea. "Many of the changes over the past decade are so dramatic they make you wonder what the next decade of warming will bring," said Eric Post, lead author of the paper and a University of California Davis professor of climate change ecology. In addition, researchers examined the potential consequences for the polar regions as the planet moves ever closer to 2 degrees Celsius of warming above the 1981-2005 baseline mean. By the time the lower latitudes hit that mark, it is projected that the Arctic will have seen annual temperature increases of 4 degrees Celsius, rocketing up to 7 degrees Celsius increases in the boreal winter.

Since 2001, the United Nations Intergovernmental Panel on Climate Change's projected sea level rise contributions from ice sheets have repeatedly been boosted higher due to accelerated polar warming. Current overall sea level rise has occurred at a mean rate of 1.8 millimeters per year for the past century, but more recently at rates estimated near 2.8 to 3.1 millimeters per year (1993-2003). And even if carbon emissions were miraculously contained tomorrow, the polar regions would still continue to change. "Though the sea level rise rate is small for the next few decades, it kicks in strongly after 2040 and may continue to increase despite mitigation," said James Overland of the National Oceanic and Atmospheric Administration (NOAA)

Speaking at the opening of COP 25, UN General Secretary António Guterres said: "We stand at a critical juncture in our collective efforts to limit dangerous global heating. By the end of the coming decade we will be on one of two paths. One is the path of surrender, where we have sleepwalked past the point of no return, jeopardizing the health and safety of everyone on this planet.… The other option is the path of hope. A path of resolve, of sustainable solutions.… That is the only way to limit global temperature rise to the necessary 1.5 degrees by the end of this century."

- https://news.mongabay.com/2019/12/world-is-fast-losing-its-cool-polar-regions-in-deep-trouble-say-scientists/: natural solution pivotal in delivering NDCs

Climate Convention

The 2019 UN climate change conference (COP25) was held from 2 to 15 December in Madrid, Spain. At this conference, a wide range of side events touched upon or even specifically addressed peatlands and their important role in climate change mitigation and adaptation. Find an overview below.

Overview of peatland associated side-events at UNFCCC COP25 in Madrid.

Dec. 2	Dec. 4	Dec. 5	Dec. 6	Dec. 7	Dec. 9	Dec. 10
Avoiding loss of high carbon soils through peatland mapping, monitoring and adequate management (see links below); JICA/GMC/GEC/FAO/UNEP	Gearing towards NDC ambition with C-rich peatlands in agenda; Indonesia	UN Global Peatlands Initiative: Milestones, impact and the path forward; UNEP/BMU	Getting climate results by bringing science to peatland policy through South-South and Trinagula Cooperation; ITPC/UNEP	Scottish and Chilean peatland restoration Scotland/ Chile	Averting the climate and biodiversity crisis: natural solutions pivotal in delivering NDC ambitions; WI/BL/Ramsar/UNEP	Realities of cryosphere changes and risks for people and climate; WI/Russia
	Lessons learned on peatland management practies from company concessions, communities and government; Indonesia	From the Boreal to the Arctic: Indigenous knowledge and leadership for climate mitigation and adaptation; ICC/DSF				
		Working together to help protect 30% of the world's land and highlighting peatlands as a priority ecosystem for climate action, biodiversity and resilience NDRC/IPS/UNEP				

- Avoiding loss of high-carbon soils through peatland mapping and monitoring for climate action-schedule
- Avoiding loss of high-carbon soils through peatland mapping and monitoring for climate action-flyer
- Concept note on responsible tropical peatland management

International experts in the Indonesian Pavilion at COP 25 climate talks. Photo: CIFOR/Julie Mollins

Indonesia's leadership in peatland management in focus at COP 25

At U.N. climate talks in Madrid, Indonesia, which has committed to restore 2.4 million hectares of drained peatlands, presented various strategic approaches to conservation, restoration and sustainable management.

Its centrally located pavilion attracted a broad range of speakers from the global peatlands and environmental communities. Even Former U.S. Vice President and 2007 Nobel Peace Prize laureate Al Gore stopped by to deliver a motivational talk in his capacity as founder and chair of The Climate Reality Project.

Indonesia, considered a leader in peatlands research, is part of the Global Peatlands Initiative (GPI) and is the founding country of the International Tropical Peatlands Center (ITPC), which includes the Democratic Republic of Congo, Republic of Congo and Peru. Working alongside coordinating partners, which include the Center for International Forestry Research (CIFOR), the U.N. Environment Programme and the U.N. Food and Agriculture Organization, through the ITPC, Indonesia is taking a pro-active approach to restoring and protecting its peatlands, said SPM Budisusanti, Director for Peatland Degradation Control in the Ministry of Environment and Forestry.

Of 180 peatland-containing countries, Indonesia has the fourth largest area of the boggy ecosystems, after Canada, Russia and the United States. The archipelago also features the largest tropical peatland area in the world. Worldwide, peatlands make up more than half of all wetlands. They are equivalent to 3 percent of total land and freshwater surfaces. Built up over thousands of years from decaying and waterlogged vegetation, they store a third of the world's soil carbon and 10 percent of global freshwater resources, according to the International Mire Conservation Group and the International Peat Society. Although they are vital carbon sinks, Wetlands International reports that 15 percent of peatlands have been drained for agriculture, commercial plantations and for fuel extraction, which leads to oxidization and carbon release into the atmosphere, causing global warming.

- https://forestsnews.cifor.org/63485/indonesias-leadership-in-peatland-management-in-focus-at-cop-25-climate-summit?fnl=en

Peatland potential untapped in Nationally Determined Contributions

Fewer than a dozen countries have so far included peatlands in their Nationally Determined Contributions, although the carbon-rich ecosystems exist in 180 countries, according to an international expert speaking on the sidelines of the U.N. climate talks in Madrid. Peatland mapping and monitoring can help overcome barriers to climate action. "Seven out of 197 parties have mentioned peatlands as a strategy – 3 percent," said Martial Bernoux, a natural resources officer with the U.N. Food and Agriculture Organization (FAO), at an event hosted jointly with the Indonesian government. "We have many more than 3 percent with peatlands; we have peatlands everywhere," he said. Indonesia has made a strong commitment to restore 2.4 million hectares of drained peatlands. The country, considered a leader in peatlands research, is part of the Global Peatlands Initiative and is the founding country of the International Tropical Peatlands Center (ITPC). "This is really an example for the world," said Bernoux, who was detailing a systematic approach through which countries could gather their

peatland data for inclusion in NDCs. The other countries include Afghanistan, Belarus, Brunei, Burundi, Rwanda and Uruguay.

NDCs are a key part of the U.N. Paris Agreement strategy to prevent post-industrial average temperatures from rising to 1.5 degrees Celsius or higher. Each country is required to provide data on greenhouse gas emissions and reductions targets it aims to meet post-2020. Progress and climate pledges are monitored under the Talanoa Dialogue. NDCs are under close scrutiny because under current pledges the Intergovernmental Panel on Climate Change (IPCC) reports with high confidence that global warming is expected to surpass 1.5 degrees Celsius above pre-industrial levels, even if they are supplemented with substantial increases in the scale and ambition of mitigation after 2030, according to the 2018 IPCC Special Report on Global Warming of 1.5°C. Improving the capacity for countries in the Global South is central to establishing a successful collaboration for a country-driven agenda for peatland action, Bernoux said, explaining that barriers to sustainable peatland management include economic, institutional, technological and legal factors.

Labelled as bogs, mires, moors and muskegs, peatlands are vital carbon sinks. They make up more than half of all wetlands worldwide and they are equivalent to 3 percent of total land and freshwater surfaces. The Global Peatland Hotspots Map published in 2015 by the Conventions on Biological Diversity, Wetlands (Ramsar), and Desertification (UNCCD) shows that 25 countries are responsible for 95 percent of global emissions from peatland drainage, excluding fires.

New guidelines from the IPCC have separated peatland and mangrove ecosystems. These wetlands ecosystems were formerly lumped together with the AFOLU (Agriculture, Forestry and Other Land Use) Guidelines, said Daniel Murdiyarso, a principal scientist with the Center for International Forestry Research, who moderated the event, which was titled "Gearing towards NDC ambitions with C-rich peatlands in the agenda." "The '*2013 Supplement to the 2006 IPCC Guidelines for National Greenhouse Gas Inventories: Wetlands*' should be used in the next round of NDCs submissions," said Murdiyarso, an expert in peatland and blue carbon ecosystems, who has been a Convening Lead Author on the IPCC Guidelines, Special Reports and Assessment Reports. Ecosystem restoration and protection are considered contributors to a Nature-Based Solution (NBS) to the climate crisis. Research suggests that NBS could provide around 30 percent of mitigation that is needed by 2030 to curb global warming, according a report by the International Union for Conservation of Nature and Natural Resources and the University of Oxford.

- https://forestsnews.cifor.org/63274/peatland-potential-untapped-in-nationally-determined-contributions-cop25-delegates-say?fnl=en

"We have to start with business unusual which means to use alternative crops on wet peat soils called paludiculture!" Faizal Parish of GEC (centre) stressed in the Indonesia pavilion. Photos: Jan Peters GMC

Peatlands as Nature-Based Solutions

The Global Peatlands Initiative, IPS, Ramsar and the Canadian National Resource Defence Council held a side event at UNFCCC COP25 in Madrid on 5 December on "Peatlands as Nature-Based Solutions (NBS)" in order to:

- Present the GPI partnership, share the major achievements and identify further opportunities for collaboration
- Emphasize the importance of international action for the protection and sustainable management of peatlands as key ecosystems & promote peatlands as a nature-based solution
- Highlight opportunities to ensure international commitments to protect 30% of terrestrial ecosystems by 2030 and support global efforts to secure a safe climate.
- Promote collection of good practices and reinforce mutual learning by sharing successful stories including the work on policy making and interdisciplinary research
- Highlight areas/countries that are leading the way in aligning conservation and climate goals

Speakers were Dianna Kopansky (UNEP/GPI), Gilbert Ludwig, IPS Secretary General, Tobias Salathé from Ramsar, Anthony Swift from NRDC, and Pamela Castillo Barahona, Vice Minister for the Environment, Costa Rica. IPS especially highlighted the importance, and the need to mitigate conflicts between stakeholders with differing interests:

"We cannot ignore or deny these conflicts, just as we cannot ignore or deny the threats of climate change. In order to find successful solutions, it is of key importance to keep open the dialogue between all stakeholders, including industry, to keep them both informed and involved, in order to mitigate conflicts."

More press on peatlands and COP 25:

- Peatlands are crucial carbon sinks but they are not on the map: https://india.mongabay.com/2019/12/peatlands-are-crucial-carbon-sinks-but-they-are-not-on-the-map/

Could farming become an absorber of carbon?

At present, farming, agriculture and other land practices contribute around 11 gigatons to carbon dioxide emissions every single year, which is roughly one quarter of all greenhouse gas emissions worldwide. However, a recent study from the University of Virginia in the USA has argued that the land could actually be converted into an absorber of carbon, given the right conditions. Among the measures recommended by the study's authors were richer countries transitioning to plant-based diets and reducing food waste, while aiding poorer nations to curb deforestation and restore degraded land. If a concerted global effort was made, land could be absorbing three gigatons of carbon by 2050, turning one of our biggest liabilities into a helping hand in the fight against climate change. The ambitious but entirely attainable plans laid out by the researchers claim that implementing eight steps could achieve as much as a third of the gains necessary to comply with the target of limiting global warming to 1.5°C, as agreed upon at the Paris Climate Summit in 2015. Their eight recommendations are as follows:

- **95% reduction in deforestation and land degradation by 2050.** This would include more robust conservation policies in developing tropical countries, as well as the conversion of coastal wetlands into protected areas and the prohibition of peatland burning.
- **25% reduction in agricultural emissions by 2050.** This would include introducing synthetic or organic fertilisers, enhancing the water-agriculture interface in places where rice cultivation is a primary industry and managing emissions from fermentation and manure.
- **50% adoption of plant-based diets by 2050.** This would involve encouraging a healthier diet through consumer campaigns and governmental policies, as well as the development of new foodstuffs to entice unconvinced consumers.

- **50% reduction of current level of food waste by 2050.** This would involve tightening up gaps in the supply chain, improving consumer awareness through advertising campaigns and enhancing refrigeration and distribution capabilities in the developing world.
- **Restoration of forests, coastal wetlands and drained peatlands.** This would involve financing ecosystem services, improving in local and national conservation policies and investing in restoration practices.
- **Improving forestry and agroforestry management.** This would include optimising current forestation conservation process and integrating agroforestry into lands currently used for agriculture and grazing.
- **Enhancing soil carbon sequestration capabilities.** This would include controlling soil erosion, reducing tillage of the land and restoring degraded soils, as well as the application of biochar where appropriate.
- **Deploying bioenergy with carbon capture and storage (BECCS) in developed countries.** This would involve investing into the research and development of BECCS technologies and deploying them in relevant sites.

While the targets laid out in the study might sound ambitious, the authors are confident that the tools are already at our disposal to achieve them. These [measures] are feasible now and deliver many other benefits," explained Stephanie Roe, lead author on the paper and an environmental researcher from the University of Virginia. "Recent reports on the state of our forests and food systems show a worrying lack of progress in the land sector, and our window of opportunity to deliver on the Paris agreement is getting smaller. However, I remain optimistic because we have all the tools we need, as well as increasing public pressure and political will to turn things around."

- https://www.envirotech-online.com/news/environmental-laboratory/7/breaking-news/could-farming-become-an-absorber-of-carbon/50751

Global progress to tackle the climate crisis through peatland action

Peatlands are the world's largest carbon store, holding more than twice as much carbon as all the world's forests. However, damaged peatlands are a significant source of greenhouse gas emissions. Peatland restoration is widely regarded as a cost-effective option. It would bring benefits for wildlife, water supplies and livelihoods.

Delegates to the UN climate conference (COP25) in Madrid heared about research led by Professor Mark Reed from the Centre for Rural Economy at Newcastle University, showing that countries around the world are beginning to conserve, restore and sustainably manage their peatlands. The study was done in collaboration with the International Union for the Conservation of Nature's Committee on Environmental Management and UK Peatland Programme, and the United Nations Global Peatlands Initiative. Many countries responded to the survey that they had or were developing national strategies to protect and restore their peatlands. Eight out of 11 priority countries with the largest area of peatlands and highest emissions from them had a national strategy. Two had a strategy under development, one had no strategy and eight did not respond to the survey. A total of 27 national peatland strategies were found. Most of these included:

- co-ordination of action to protect existing peatlands
- work to assess the distribution
- condition of peatlands and policies to support local communities

Few included policies to sustainably manage peatlands, monitor greenhouse gases, stop peat extraction or leverage private investment in restoration.

Linked to this work, Mark Reed is chairing a working group for the Global Peatlands Initiative with the aim to identify national research funding opportunities and policy-relevant research priorities. One of the key barriers to developing peatland policy is with mapping the location and condition of the world's peatlands. Attempts to better identify and protect peatlands are being hampered by researchers using different evaluation methods. It is also difficult to combine insights from different studies about the same issue, for the same reasons. Some studies do not fully or consistently report the data, either. As a result, many decisions in policy and practice are informed by the results of individual studies. These may then be contradicted by the findings of subsequent research.

In response to this, the Newcastle team with Dr Gav Stewart and Dr Dylan Young, are leading a new process to standardise the collection of environmental data to better inform policy and practice. After starting with UK peatlands, the group is now replicating the process across other peatlands as part of the Global Peatlands Initiative. The group is now planning to identify a menu of methods for measuring each variable, including methods that can be used by non-researchers and those with limited resources. Dianna Kopansky from the Global Peatlands Initiative said, "It is crucial that we standardise how we collect and report data. Particularly if we are to map where the world's peatlands are, and what condition they are in. "The United Nations Global Peatlands

Initiative and the International Tropical Peatlands Centre want to enable researchers from around the world to generate and share data more effectively to inform international policy. This is an important step towards establishing the state of the world's peatlands in a Global Peatland Assessment." Mark Reed from Newcastle University said, "If we are serious about evidence-based policy and practice, initiatives like the identification of core outcomes for tropical peatlands, are of crucial importance. "This initiative won't instantly enable us to harmonise data to create accurate global peat maps. "But we must think about how we collect and report data now. Espcecially if we want the data we collect to enable more evidence-based policy and practice in years to come."

- https://www.ncl.ac.uk/cre/news/item/globalprogresstotackletheclimatecrisisthroughpeatlandactiontobeprese.html

Monitoring Stordalen permafrost peatland, Abisko, Sweden. Photo: Hans Joosten.

Could peatlands be key to tackling climate change?

Peatlands are areas that accumulate dead plant material under a layer of standing water. Those conditions ensure that the dead plant material rots away only very slowly. Yet we know little about peatlands. The details of their biochemistry and how it might change in response to climbing temperatures are fuzzy.

One thing we do understand is the reason peat locks away carbon so tightly. In 2001, biogeochemist Professor Chris Freeman at Bangor University, UK, discovered that it's down to what he called the enzymatic latch. Plant material is broken down by enzymes in microorganisms, but in peatlands there are an assortment of compounds called phenols that stop the various enzymes working. You can think of them like a key left in the wrong side of a door, blocking the lock from being used. 'It's a spectacular failure of decomposition,' said Prof. Freeman. Under normal circumstances, those phenols would all be degraded themselves by an enzyme called phenolic oxidase, but in peatlands that doesn't happen, principally because the enzyme needs a supply of oxygen to work. Rather worryingly, Prof. Freeman discovered that if this single enzyme were to kick back into action peatlands would begin to release their carbon. It's a delicate latch holding back the door to climate disaster.

More recently, Prof. Freeman began to wonder what might happen to this latch in different peatlands around the world as the climate warms and droughts become more common. Prof. Freeman and Dr Juanita Mora-Gomez, now at the Institute of Earth Sciences in Orléans, France, began a project called microPEAT, looking at peatlands in Wales, the Arctic and Colombia. They took samples, brought them back to Bangor, and subjected them to drought-like conditions. Then they looked to see what happened. They expected that, with little water to shut out oxygen, the microbes in the peat would shift their metabolism up a gear and began belching carbon. That is what happened with the samples from Wales and the Arctic, but with the samples from Colombia, drought actually suppressed the enzymes even further. That was a big surprise and it isn't yet clear why it happened.

Prof. Freeman points out that there are factors other than oxygen that affect the enzymes, such as acidity, and this could explain the findings. But the implication is clear: some peat spots might be more resilient to climate change than we thought.

Prof. Freeman is careful to say that this doesn't mean we can let our guard down when it comes to reducing carbon emissions. Yet the results raise questions, he says, about whether we could enhance the carbon sequestering abilities of peat, perhaps by somehow intervening to change their biochemistry so that even less carbon can escape. 'That's a very important possibility,' he said. 'We have to keep it in our pocket as a plan B for the planet.'

- https://www.thenakedscientists.com/articles/science-features/could-bogs-be-key-tackling-climate-change

Pantano de Martos peatland in Colombia. Photo: Hans Joosten.

No support for carbon storage of >1000 GtC in northern peatlands Comment on the paper by Nichols & Peteet (2019) in Nature Geoscience (12: 917-921), see IMCG Bulletin 2019/05.

Northern peatlands store large amounts of carbon (C) and have played an important role in the global carbon cycle since the Last Glacial Maximum. Most northern peatlands have established since the end of the deglaciation and accumulated C over the Holocene, leading to a total present-day stock of 500 ± 100 GtC. This is a consolidated estimate, emerging from a diversity of methods. Recently, Nichols and Peteet presented an estimate of the northern peat C stock of 1055 GtC—exceeding previous estimates by a factor of two. In a reaction Zicheng Yu et al. argue that this is an overestimate, caused by systematic bias introduced by their inclusion of data that is not representative for the major peatland regions and of records that lack direct measurements of C density. Furthermore, Yu et al. argue that the new estimate cannot 4 be reconciled within the constraints offered by ice-core and marine records of stable C isotopes and estimated contributions from other processes that affected the terrestrial C storage during the Holocene.

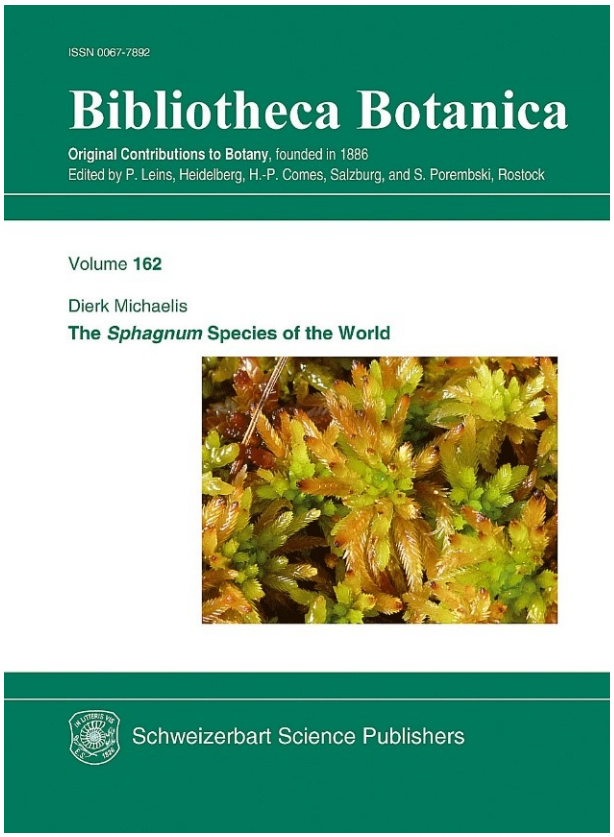
See the full preprint under: https:// eartharxiv.org/hynm7/

The most viable solutions to climate change

Project Drawdown is a global research organization that identifies, reviews, and analyzes the most viable solutions to climate change. The following table provides the 40 top solutions in order of importance.

Rank	Solution	Sector	CO_2-e reduction (Gt)	Net Cost (Billions US $)	Savings (Billions US $)
			1034.75	**$29,609.30**	**$74,362.37**
1	Refrigerant Management	Materials	89.74	N/A	-902.77
2	Wind Turbines (Onshore)	Electricity Generation	84.60	1,225.37	7,425.00
3	Reduced Food Waste	Food	70.53	N/A	N/A
4	Plant-Rich Diet	Food	66.11	N/A	N/A
5	Tropical Forests	Land Use	61.23	N/A	N/A
6	Educating Girls	Women and Girls	51.48	N/A	N/A
7	Family Planning	Women and Girls	51.48	N/A	N/A
8	Solar Farms	Electricity Generation	36.90	-80.60	5,023.84
9	Silvopasture	Food	31.19	41.59	699.37
10	Rooftop Solar	Electricity Generation	24.60	453.14	3,457.63
11	Regenerative Agriculture	Food	23.15	57.22	1,928.10
12	Temperate Forests	Land Use	22.61	N/A	N/A
13	Peatlands	Land Use	21.57	N/A	N/A
14	Tropical Staple Trees	Food	20.19	120.07	626.97
15	Afforestation	Land Use	18.06	29.44	392.33
16	Conservation Agriculture	Food	17.35	37.53	2,119.07
17	Tree Intercropping	Food	17.20	146.99	22.10
18	Geothermal	Electricity Generation	16.60	-155.48	1,024.34
19	Managed Grazing	Food	16.34	50.48	735.27
20	Nuclear	Electricity Generation	16.09	0.88	1,713.40
21	Clean Cookstoves	Food	15.81	72.16	166.28
22	Wind Turbines (Offshore)	Electricity Generation	14.10	545.30	762.50
23	Farmland Restoration	Food	14.08	72.24	1,342.47
24	Improved Rice Cultivation	Food	11.34	N/A	519.06
25	Concentrated Solar	Electricity Generation	10.90	1,319.70	413.85
26	Electric Vehicles	Transport	10.80	14,148.00	9,726.40
27	District Heating	Buildings and Cities	9.38	457.10	3,543.50
28	Multistrata Agroforestry	Food	9.28	26.76	709.75
29	Wave and Tidal	Electricity Generation	9.20	411.84	-1,004.70
30	Methane Digesters (Large)	Electricity Generation	8.40	201.41	148.83
31	Insulation	Buildings and Cities	8.27	3,655.92	2,513.33
32	Ships	Transport	7.87	915.93	424.38
33	LED Lighting (Household)	Buildings and Cities	7.81	323.52	1,729.54
34	Biomass	Electricity Generation	7.50	402.31	519.35
35	Bamboo	Land Use	7.22	23.79	264.80
36	Alternative Cement	Materials	6.69	-273.90	N/A
37	Mass Transit	Transport	6.57	N/A	2,379.73
38	Forest Protection	Land Use	6.20	N/A	N/A
39	Indigenous Peoples' Land Management	Land Use	6.19	N/A	N/A
40	Trucks	Transport	6.18	543.54	2,781.63

- https://www.drawdown.org/solutions-summary-by-rank



The *Sphagnum* Species of the World

Dierk Michaelis, 2019. 435 pages, 15 figures, 219 plates, 23x31cm, 2100 g, Language: English (Bibliotheca Botanica, Heft 162).

ISBN 978-3-510-48033-3, bound, price: 159.00 €

Sphagnum specialist Dierk Michaelis (Greifswald) documents the worldwide known peatmoss species (*Sphagnum*) and presents keys for their identification. It represents the updated, supplemented English language version of the author's original peat moss flora of 2011 (in German), the first overall presentation of *Sphagnum* since Carl Warnstorf's "Sphagnologia Universalis" of 1911. Compared to the German edition, 12 species have been added, 23 new plates were added, the chapters on phylogeny and research history have been revised and a new chapter on *Sphagnum* ecology has been added. Since Warnstorf's comprehensive work, numerous names have been recognized and revised as synonyms - particularly by Andrews, Eddy and Isoviita. These revisions, and the approximately 150 new species described since then, have been incorporated into this volume, as well as the results of the author's own studies. Genetic characteristics were used to define the species of problematic groups. The peatmosses are of key ecological and economic importance among the mosses. They populate almost all continents with a clear focus on northern South America, North America, East and North Asia and Europe. The genus *Sphagnum* is very isolated within the Bryopsida, similarities in the construction of the sporophyte indicate a distant relation to the rockmosses (class Andreaeopsida). For the internal classification of *Sphagnum* there are very different approaches with up to 4 subgenera and up to 18 possible sections, of which 14 are distinguished in this volume. Peatmosses in the narrow sense (genus *Sphagnum*) feature a combination of leaf dimorphism (stem and branch leaves), cell dimorphism (living chlorophyll and empty hyaline cells) and branch dimorphism (strongly assimilating spreading branches and hanging branches serving the outer water supply) that is unique among mosses. Although the assignment of any peatmoss to the genus *Sphagnum* usually does not cause any problems, the determination down to the species level causes difficulties sometimes. The author introduces and describes the anatomy and morphology of *Sphagnum*, and explains the reproductive biology, the research history and phylogenesis of peatmosses. The systematic part is divided into three segments: Description and identification of the sections, keys for all peat moss species, separated by continents, as well as Sphagnum species lists for 20 phytogeographic regions of the world. The keys for Africa, Europe and North America are based on existing data and were revised and supplemented with the help of recent descriptions, updated species concepts and new floristic data. Completely new keys have been developed for South America and Asia, as these did not exist previously. 292 peat moss species are described in detail, supplemented by data on habitats, geographical distribution and lists of synonyms. This section is supplemented by the presentation of the inner and outer characteristics on 219 plates. A very extensive bibliography rounds off the volume.

Africa

Nile Basin Inititative discussing peatlands at meeting in Nairobi, November 2019. Photo: Jan Peters (GMC).

Nile Basin peatlands and climate change

Kenya has been experiencing dramatic weather patterns with repercussions ranging from increased temperatures, floods, droughts and an increase of diseases. With the government taking measures to cushion Kenyans against adverse climatic conditions, a study to assess the role of Nile Basin peatlands in climate change is being done by the Nile Basin Initiative (NBI). During a four-day meeting held in November in Nairobi, experts reviewed information from the regional-based study to enhance data, information and knowledge about such wetlands so as to support sustainable management and utilisation of the ecosystem, said Dr Abdulkarim Seid Deputy Executive Director of the NBI Secretariat and head of programmes at NBI.

Peatlands have the ability to contain (lock) carbon dioxide (CO_2), and also to release the gas in large quantities if they are destroyed. Unfortunately, there is limited information about peatlands along the Nile Basin. “We are collecting a lot of information about these peatlands because one of the problems in the Nile Basin is that there is less information about these wetlands,” said Leonard Akwany, Regional Wetlands Expert for the Nile Basin secretariat based in Entebbe, Uganda. The assessment includes “calculating the current carbon stock in the basin and estimating the carbon dioxide emissions from drained use”. The study is expected to generate technical and policy discussions on how to avoid GHG emissions from these peatlands. Peatlands preserve global biodiversity, provide safe drinking water, minimise flood risk and help address climate change, said Mr Akwany. According to Mr Akwany, the work which is being done is at the centre of solving water scarcity in the region (Nile basin). “Conserving these wetlands and ensuring that they are sustainable or ensuring that they continue delivering the benefits we get from them is very important. We want to ensure that they continue being there to continue being sources of water for River Nile,” he said.

One type of information being generated is about where these wetlands are and the extent of their existence detailed in an inventory in an atlas form, information which will be used for planning at the river level. As such, Kenya is collaborating with Uganda on the trans-boundary wetland between them given that the Nile originates from Lake Victoria, which is shared by Kenya, Uganda and Tanzania. Among the rivers draining to the lake is the Mara River whose source is the Mau Forest in Kenya.“We are developing a plan for the management of this

wetland and have mapped peatlands on it. All the countries within the Nile are really benefiting from the work," said Mr Akwany. Kenya is one of the ten countries under the NBI including Egypt, Ethiopia, Rwanda, South Sudan, Sudan, Tanzania and Uganda.

- https://www.nation.co.ke/health/peatlands/3476990-5367066-hwvumf/index.html

Mapping peatland along Lake Victoria. Photo: Jan Peters (GMC).

Congo Basin

Greenpeace Africa and civil society: prevent any industrial exploitation of peat bogs in the Cuvette Central!

"No oil exploitation or industrial timber exploitation in the peat bogs of the Central Basin". This is the essence of the message sent to the Democratic Republic of Congo and the Republic of Congo by Greenpeace Africa and some environmental civil society organizations through a joint statement made in Kinshasa on Tuesday 10 December 2019, inviting countries sharing the peatlands of the central basin to stop any attempts to explore and/or exploit in these areas of global importance.

"The integrity of the peatland complex in the Congo Basin, the surrounding ecosystem and the rights of local communities and indigenous peoples must be guaranteed," said Irene Wabiwa, Forest Campaigner at Greenpeace Africa. "We call on the governments of two Congo, donors, multinationals, and investors concerned about environmental issues not to accelerate or allow industrial exploitation of timber, agriculture, and oil in peatlands. It is more than important that they be kept intact, as its explosion would put all of humanity at risk.

Greenpeace Africa and environmental civil society organisations call on international donors to set the cancellation of concessions and oil blocks that straddle the peatland area as a precondition for additional financial support or validation of any programmes that their funding could finance.

With its enormous capacity to sequester carbon, the forests of the Congo Basin represent an essential element of global climate stability. About 75% of the peat bogs in this forest are currently threatened by oil blocks. And industrial forest concessions occupy about 18% of the total area of these peatlands. "Both governments must take responsible options. We note that this rush to make operational gains proves that there are people who want to make quick money during their mandate. And for that we say no," insinuated Guy Daniel Mwankana, the main coordinator of Save Your Green World in Central Africa.

African peatlands at the Global Landscape Forum in Accra, 28 Oct - 4 Nov 2019. Photo: Alban Kisife (ICI). *http://www.globalpeatlands.org/?p=16672*

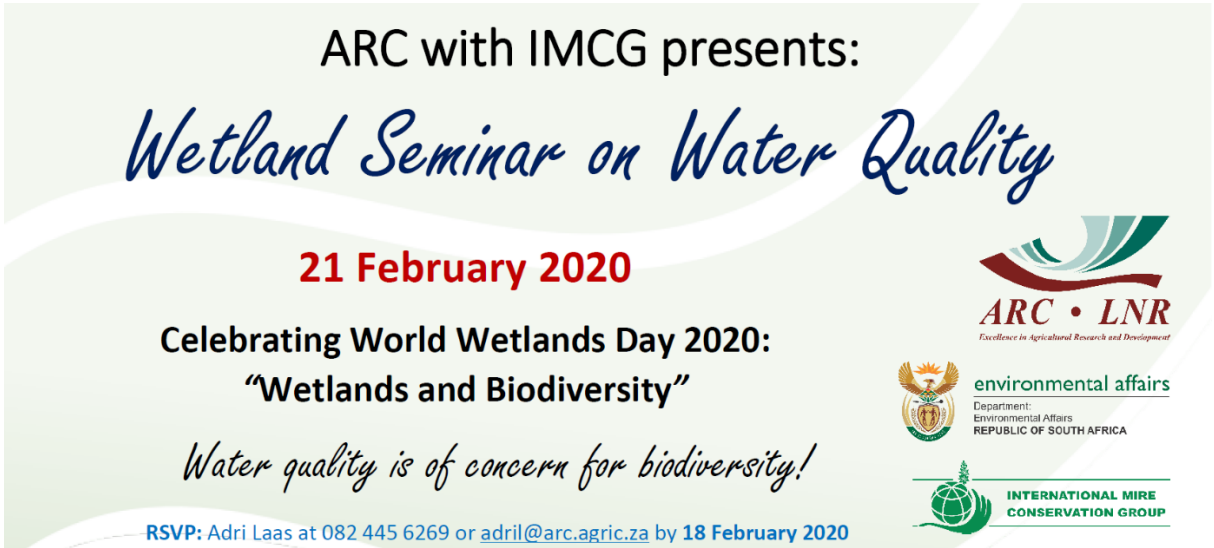
In the Republic of Congo, four oil blocks have already received authorization for exploration. While the decision on the fifth remains unclear. Despite numerous denunciations by civil society, the Congolese government recently announced the existence of an oil field in one of the blocks located in the heart of the peat bogs. According to the reasons given by the Congolese government, oil exploitation in this block could quadruple the country's production. This argument is rejected by Congolese civil society, which believes that oil exploitation does not go hand in hand with the sustainable development needed by communities that depend directly or indirectly on these forests. "We recognize the right of states to seek the means, at the same time we draw their intention from the fact that not all resources are good to exploit in peatland areas. It is not too late to give up waking up this carbon bomb. Because the damage will be greater than the benefits," warned Maixent Fortunin, a member of the FGDH (Human Rights Organisation, Rule of Law and Responsible Governance).

If on the other side of the river the threats denounced are related to peatlands, the same is true for the DRC, whose industrial and uncontrolled exploitation of timber by Maniema Union 2 also threatens peatlands in certain areas. In addition, there is also the question of oil exploitation in the Salonga and Virunga National Parks, whose cases are still pending.

In response to these threats, civil society organizations urge both governments to consider at least the millions of people living and directly dependent on the natural resources and ecosystem services of the forests and peatlands of the Congo Basin.

- https://www.mediacongo.net/article-actualite-60931_tourbieres_greenpeace_afrique_et_la_societe_civile_previennent_contre_l_exploitation_industrielle.html

South-Africa

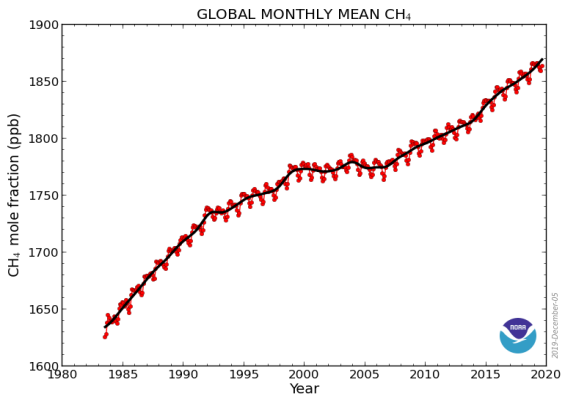


Peat exploration in the Sudd swamps, Aguthdier area, South-Sudan. Photo: John Ater Maker.

South-Sudan

Methane pulse detected from South Sudan wetlands

Scientists think they can now explain at least part of the recent growth in methane (CH_4) levels in the atmosphere. Researchers, led from Edinburgh University, UK, say their studies point to a big jump in emissions coming from just the wetlands of South Sudan. Satellite data indicate the region received a large surge of water from East African lakes, including Victoria. This would have boosted CH_4 from the wetlands, accounting for a significant part of the rise in global methane. Perhaps even up to a third of the growth seen in the period 2010-2016, when considered with East Africa as a whole. "There's not much ground-monitoring in this region that can prove or disprove our results, but the data we have fits together beautifully," said Prof Paul Palmer. "We have independent lines of evidence to show the Sudd wetlands expanded in size, and you can even see it in aerial imagery - they became greener," he told BBC News. It's not been a steady rise, however. Indeed, during the early 2000s, the amount of the gas even stabilised for a while. But then the concentration jumped in about 2007, with a further uptick recorded in 2014. CH_4 is now climbing rapidly and today stands at just over 1,860 parts per billion by volume. There's currently a debate about the likely sources, with emissions from human activities such as agriculture and fossil-fuel use undoubtedly in the mix. But there is a large natural component as well, and a lot of current research is centred on contributions from the tropics.



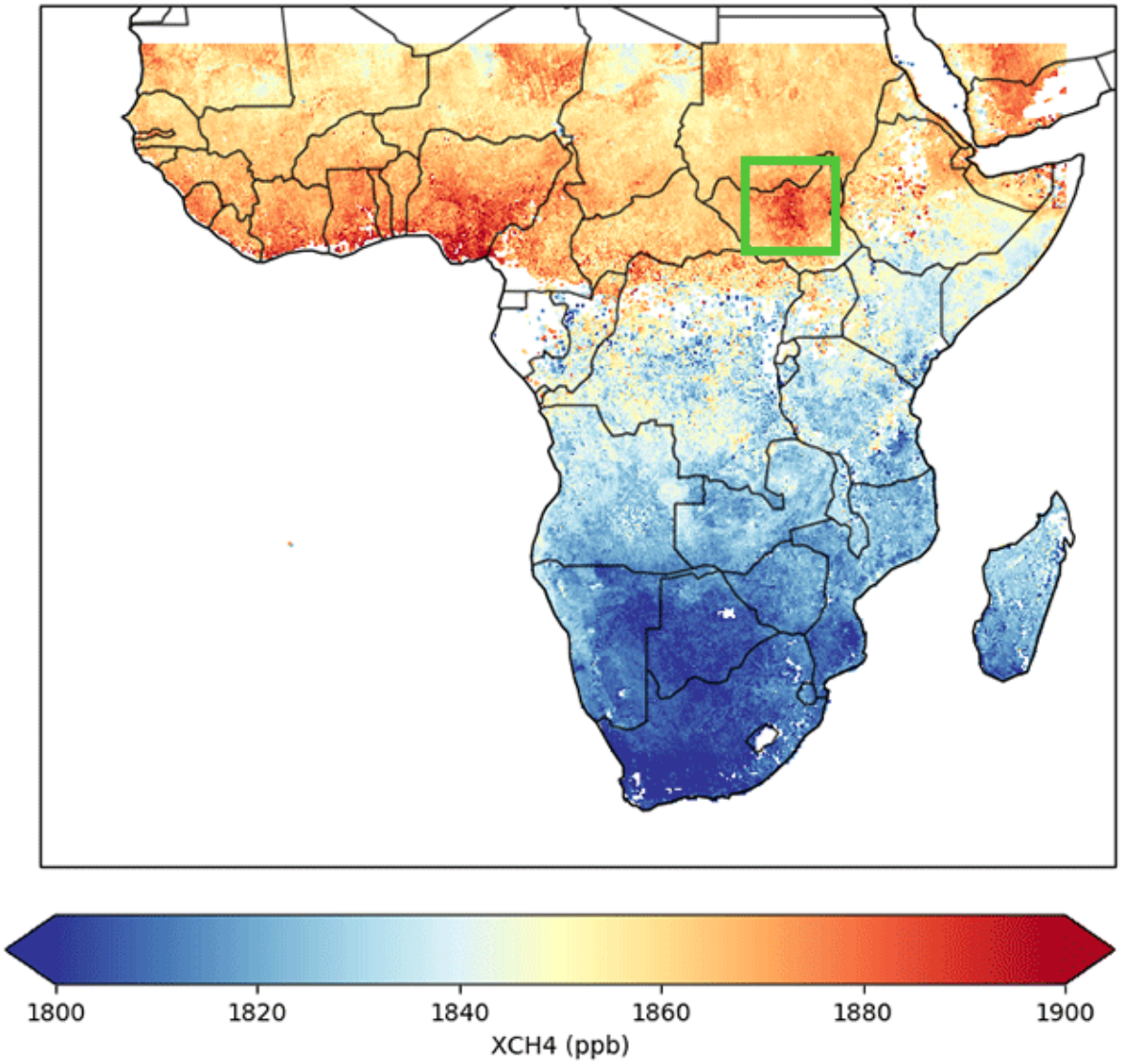
Global CH_4 monthly means.
https://www.esrl.noaa.gov/gmd/ccgg/trends_ch4/

The Edinburgh group has been using the Japanese GOSAT spacecraft to try to observe the greenhouse-gas behaviour over peatlands and wetlands in Africa, and found significant rises in methane emissions above South Sudan centred on the years 2011-2014. Believing the region called the Sudd could be the culprit (soil microbes in wetlands are known to produce a lot of methane), the team started looking through other satellite data-sets to make the link. Land surface temperature observations supported the idea that soils in the region had become wetter; gravity measurements across East Africa also detected an increase in the weight of water held in the ground; and satellite

altimeters had tracked changes in the height of lakes and rivers to the south. "The levels of the East African lakes, which feed down the Nile to the Sudd, increased considerably over the period we were studying. It coincided with the increase in methane that we saw, and would imply that we were getting this increased flow down the river into the wetlands," explained Dr Mark Lunt. Much of the extra water likely resulted as a consequence of dam releases upstream.

The Edinburgh group published its findings on December 11, 2019, in the journal Atmospheric Chemistry and Physics, and, as an update to the story, Dr Lunt has presented new data at the American Geophysical Union meeting. He's been looking at methane observations made by the EU's Sentinel-5P satellite. Its Tropomi instrument sees CH_4 at a finer resolution than GOSAT, and it's clear from the European mapper that methane emissions are still elevated over South Sudan. The level of activity is nothing like the same as in the early 2010s, but the Sudd wetlands remain an important source. "It's a huge area so it's not surprising that it's pumping out a lot of methane. To give context - the Sudd is 40,000 km^2. And being that big we expect to see the emissions from space," Dr Lunt told BBC News.

- https://www.bbc.com/news/science-environment-50708544



Tropomi detects a methane hotspot right over the Sudd (green square). https://www.bbc.com/news/science-environment-50708544

Asia

Methane budgets are very different in tropical peatlands than northern peatlands

Charles Harvey (charvey@mit.edu)

Methane fluxes measured from tropical peat surfaces are consistently small, a finding that is puzzling both because wetlands are generally a major source of methane to the atmosphere and also because tropical peatlands appear to offer an ideal wetland environment for producing methane. We resolve this puzzle by constructing the first comprehensive methane budget for a tropical peatland from a suite of field measurements collected in northern Borneo. Our analysis of porewater methane concentrations, carbon isotope ratios, and natural tracers indicates that tropical peatlands produce ten times more methane than is emitted from the peat surface. Rainwater infiltration creates lateral flow that transports dissolved methane towards rivers, preventing methane from reaching concentrations sufficient for the formation of bubbles that would carry methane to the peat surface. This lateral advection to rivers is by far the largest methane flux from the peatland, although much of this flux is oxidized in or near rivers before it can escape to the atmosphere. Upward transport through trees, dominated by a small subpopulation of large trees, is the second largest flux. Thus, the fluxes that constitute the methane budget in a tropical peatland are very different than those in northern peatlands: rather than rising to the surface in bubbles, methane is transported to rivers or degasses through trees.

- https://earthobservatory.sg/events/methane-budgets-are-very-different-tropical-peatlands-northern-peatlands

Dropping eddy-tower material in the MIT-Singapore peat swamp research site in Brunei. Photo: Hans Joosten.

EU supports ASEAN in sustainable use of peatland, haze mitigation

The European Union (EU) has launched in November 2019 the civil society component of a 24 million EUR programme to support Sustainable Use of Peatland and Haze Mitigation in **ASEAN** (SUPA). This new initiative supports the objectives of the ASEAN Peatland Management Strategy through collective actions and enhanced cooperation that improves sustainable peatland management, mitigates the impacts of climate change, manages the risk of wild fires and reduces trans-boundary regional haze. It also supports and sustains local livelihoods while contributing to global environmental management. The programme is also critical in tackling the root causes of peatland fires in mitigating the impacts of climate change, especially in the wake of recent peatland and forest fires in the region in 2019, with a total of 857,755 hectares burned, an increase from the 529,266 hectares that was destroyed in 2018 and on top of the 2.6 million hectares that went up in flames in 2015.

The EU's support is composed of two mutually reinforcing main components, namely a governmental approach and a non-state actor approach. The governmental approach is being implemented by the German Corporation for International Cooperation (GIZ) while the non-state actor approach is being implemented by World Resources Institute Indonesia in collaboration with Tropical Rainforest Conservation & Research Centre Malaysia and the IDH Sustainable Trade Initiative. The two components will work collaboratively to help ASEAN address the root causes of forest fires.

Speaking at the launch, EU Ambassador to ASEAN Igor Driesmans hopes that this new programme will encourage the ASEAN region to become more resilient and proactive in sustainable peatland management. Although much has been achieved since 2015, to fully realise the ASEAN Transboundary Haze Agreement, efforts to mitigate peatland fires and curb the adverse impacts of climate change require sustained attention.

The Secretary-General of ASEAN Dato Lim Jock Hoi said that together with the ASEAN-EU High-Level Dialogue on Environment and Climate Change held early November in Bangkok, and the project on Biodiversity Conservation and Management of Protected Areas in ASEAN, the SUPA initiative is another opportunity provided by the ASEAN-EU cooperation framework which will act as foundation of knowledge to help ASEAN member states and relevant institutions to achieve enhanced capacity and regional coordination in sustainable management of forest and peatland.

- https://en.vietnamplus.vn/eu-supports-asean-in-sustainable-use-of-peatland-haze-mitigation/163850.vnp
- https://en.qdnd.vn/asean-community/asean-news/eu-supports-asean-in-sustainable-use-of-peatland-haze-mitigation-511492

Malaysia and Singapore explore cooperation in R&D to address regional haze

Malaysia and Singapore have agreed to explore cooperation in Research and Development (R&D) in the area of peatland fire prevention and mitigation to find innovative solutions to address the haze issue in the region. The agreement was achieved by Minister of Energy, Science, Technology, Environment and Climate Change of Malaysia (MESTECC) Yeo Bee Yin and her Singapore counterpart Masagos Zulkifli during a two-day Annual Exchange of Visits (AEV) in Singapore, which ended on November 15, 2019. According to a statement by MESTECC, Yeo and Masagos expressed concern over the transboundary haze from land and forest fires in the region which affected the citizens of Malaysia and Singapore. The ministers noted the progress made by Asean member states in addressing the perennial problem of transboundary haze pollution, and urged all parties to renew their commitment to implement the Asean Agreement on Transboundary Haze Pollution (AATHP).

- https://www.malaymail.com/news/malaysia/2019/11/20/minister-malaysia-singapore-to-explore-cooperation-in-rd-to-address-regiona/1811777
- https://www.theedgemarkets.com/article/malaysia-singapore-explore-cooperation-rd-address-regional-haze-issue

Green deal for Asean

Asean secretary-general Lim Jock Hoi said in a statement that the 10-country group remains determined to address regional and transboundary haze issues. The Supa programme, he said, would help create a foundation of knowledge to help member states improve their capacity and regional coordination to manage forests and peatlands in a sustainable manner.

"The EU has been working with Asean for 10 years to address this issue," Mr Driesman said at a briefing on Nov 15. "This initiative is a new phase that makes the programme work in a triangular way since it now involves civil society groups in Indonesia and Malaysia, which will work closely with Asean to address the root cause of the forest fires. "It is a bottom-up approach that involves non-state actors and it comes on top of a component of working with governments."

The civil society organisations taking part are World Resources Institute Indonesia (WRI), in collaboration with the Tropical Rainforest Conservation & Research Centre Malaysia (TRCRC) and the IDH Sustainable Trade Initiative. "They will work on programmes such as making inventories of existing peatlands in the region, and with local communities and farmers, to determine what crops they can grow on certain peatlands," said Muamar Vebry, the programme manager for climate change with the EU delegation to Indonesia and Brunei. He said pineapple was among the crops that can also grow on peatlands.

More than 3,000 plant species grow in Southeast Asian peatlands including oil palm, which remains deeply controversial, in many parts of Indonesia. The peatlands also serve as the natural habitat of unique animal species from fish to and dragonflies and are estimated to store 68 billion tonnes of carbon, or approximately 14% of carbon stored in peatlands worldwide. But massive deforestation, land conversion, logging, unsustainable land-use changes and raging forest fires have been degrading the peatlands, making them a major greenhouse gas

source with an estimated 2 billion tonnes of carbon dioxide emitted annually. This is almost equal to the total CO_2 emissions from Germany, the UK and France in 2012, according to data from the Asean Peatland Management Strategy (APMS). Land clearing and forest fires in the region have destroyed more than 3 million hectares of peatlands.

Roughly 56%, or 24.7 million hectares of global tropical peatlands are located in Southeast Asia, of which 70% are found in Indonesia, where the bulk of the Supa work will take place. According to data compiled by the National Disaster Mitigation Agency (BNPB) as of Nov 6, forest fires in Indonesia burned a total of 857,756 hectares of land and forest from January to September this year, of which 227,304 hectares were peatlands.

The fires led to damages and economic losses estimated at US$5.2 billion, or equivalent to 0.5% of the country's gross domestic product, in eight affected provinces from June to October alone, said Frederico Gil Sander, lead economist for the World Bank in Indonesia, at a briefing on Dec 11.

The agriculture and environmental sectors accounted for more than half of the losses, because fires damaged valuable estate crops and released significant greenhouse gas emissions to the atmosphere, according to the bank's Indonesia Economic Quarterly report.

Old oil palm plantation in Sabah, Malaysia, with replacement planting. Photo: Hans Joosten.

Forest and land fires have longer-term consequences, since the production of affected commodities such as timber would need at least two to five years to harvest, and this could reduce economic growth by 0.09% this year and 0.05% next year, it said. The World Bank also said that the recurring fires and haze have deepened the already negative global perception toward Indonesian palm oil, as indicated by "declining demand from European countries, as well as EU's plan to phase out palm-oil based biofuel by 2030".

The EU on Monday November 11 imposed definitive countervailing duties of 8-18% on imports of palm oil-based biodiesel from Indonesia for the next five years, to hit back at certain biodiesel-producing palm oil companies, which it says benefit from unfair subsidies. Now that the EU has made sustainability a top priority with the launch of the Green New Deal, member states will be obliged to import biofuels that were sustainably produced in the countries where they come from, including from Indonesia, said Vincent Piket, the EU Ambassador to Indonesia. "We have a situation where biofuels made of palm oil do not meet our sustainability criteria," he said early November. The Indonesian government has decried Europe's "black campaign" against the country's palm oil sector and says it will continue to fight against the EU policy, which it sees as discriminatory. It intends to challenge the policy at the World Trade Organization (WTO).

But Mr Driesman said the EU "would not see this [Supa] programme as part of the palm oil debate". He said he hoped the programme would spur Asean to become more resilient and proactive in sustainable peatland management, mitigating the impacts of climate change, managing the risk of wildfires and reducing transboundary haze through collective actions and enhanced cooperation. "Although much has been achieved since 2015, to effectively implement the Asean Transboundary Haze Agreement, efforts to combat peatland fires and curb the negative impact of climate change have to be sustained," he said.

- https://www.bangkokpost.com/world/1816939/green-deal-for-asean

Fight deforestation, fight climate change

Greenpeace has released a new bombshell report in tandem with the COP25 Climate Conference's dedicated forest day. The report details how palm oil and wood pulp producers are wreaking havoc on important carbon sinks like peatlands and forests, with Southeast Asian regions particularly affected. The new analysis by Greenpeace puts substantial blame on industrial activity, including that carried out by the makers of global products from Kit-Kats to Oreos, Dove soap to Paseo tissue. While many international firms now purport to be "climate champions," few have actually ended their dependence on palm oil.

Indonesia is one of the countries most affected by commodity-induced deforestation: from 2001 to 2018, the country lost 25.6Mha of tree cover, equal to a 16 percent decrease since 2000 and a 10.5Gt uptick in carbon emissions. The culprits? Palm oil and pulp producers, who are responsible for burning large swathes of forests every year. "We are experiencing a climate and ecological emergency," the Greenpeace report warns. "Companies that are unwilling or unable to do what is needed to fit the global commodity trade and keep forest destroyers out of their supply chains must instead avoid high-risk commodities entirely."

Greenpeace claims that it wrote to more than 50 retailers, producers and consumer firms earlier in 2019, requesting that they demonstrate progress toward combating deforestation by disclosing their commodity suppliers – mostly in vain. Only a handful replied, and, in combination with publicly available supply chain information, Greenpeace ruled that none of the 50 had taken any "meaningful" action to end deforestation.

Greenpeace has identified a number of bad actors, each with their share of blame in the unfolding environmental disaster. It's singled out Astro Agro Lestari, Bakrie and Best Agro Plantation—all vast family-controlled conglomerates active in Indonesia's agricultural sector and guilty of burning vast swathes of land. But one company has drawn especial criticism: Sinar Mas Group, owned by the Chinese-Indonesian Widjaja family. Via subsidiary Asia Pulp & Paper, pulp producer Sinar Mas Group has been identified as being responsible for "the largest area of peatland burn within its concessions." The company came especially to global attention in summer this year at a time when Indonesia was fighting its biggest forest blaze to date. With Asia Pulp & Paper being linked to 27 other plantation companies implicated in the fires, it's clear that Sinar Mas Group has a large stake in Indonesia's deforestation and emissions failures. In the four years from 2015, the group oversaw the burning of 193,500 hectares of peatland for its own pulp and palm oil operations, emitting some 178.6 $MtCO_2$ in carbon pollution in the process.

A large amount of these fires occurred at a time when Asia Pulp & Paper was ostensibly involved in a pact with Greenpeace, according to which it would refrain from engaging in harmful environmental practices. But an Associated Press investigation revealed in 2018 that Sinar Mas never stopped their traditional practices, leading Greenpeace to end the truce and cut all ties. Its far-reaching involvement in both the paper and palm oil industries means that Sinar Mas Group is producing in excess of 40% of the emissions associated with the plantation sector.

Indonesian authorities have begun to expand oversight, with the Indonesian Ministry of Environment suing palm oil firm PT Arjuna Utama Sawit over the fires that destroyed 970 hectares of Borneo forest in 2015. The company was forced to pay a fine of $18.5 million for environmental damages incurred. On the basis of a permanent moratorium on new forest clearance passed recently, Jakarta now has a solid legal foundation on which to move forward. Nevertheless, the issue of enforcement remains. International, national and company pledges to curb deforestation ring hollow until the demonstrable change takes place. This is where the weight of the international community is most sorely needed.

- https://www.devdiscourse.com/article/science-environment/779479-fight-deforestation-fight-climate-change

Anaklia mire, Kolheti National Park, Georgia. Photo: Hans Joosten.

Georgia

Georgia cancels contract for Anaklia Black Sea megaport

Georgia's government has revoked a contract to construct the nation's first-ever deep-sea port that was touted locally as the project of the century and designed to turn Georgia into a global entrepot as part of China's Belt and Road Initiative. Tbilisi now says it will be looking for a new investor to build the Anaklia port, but it's not clear who might be willing to take on a $2.5 billion project laden with economic risks and mired in political controversy. Infrastructure Minister Maia Tskitishvili said following a January 2020 cabinet meeting that the government was cancelling its contract with Anaklia Development Consortium, the group that was supposed to build the transcontinental port. In the past, U.S. and EU diplomats have called on the government to help complete the port, which would offer an alternative transit route for Chinese exports to Europe that currently mainly go through Russia. The government insists that its commitment to the project has not waned. "We've said many times that our country needs the Anaklia deep sea port for its economic security, for security in general," Tskitishvili said. "Georgia needs this project and therefore we will be looking for new partners." Anaklia port was planned to be build adjacent to Kolketi National Park and would possibly endanger its peatlands of high conservation value.

- https://eurasianet.org/georgia-cancels-contract-for-black-sea-megaport

Indonesia

Indonesia's bid for clean palm oil

Indonesia has launched a campaign that government officials say should boost the reputation of the country's palm oil industry, even as activists and experts warn it could make the industry even less sustainable. President Joko Widodo signed off on the initiative in November 2019, roping in more than a dozen ministers and top officials to coordinate the campaign. The plan is to improve data management within the palm oil industry, boost the capacity of farmers, resolve conflicts over farmland, and push for international recognition of the country's homegrown sustainability certification standard. The initiative is the latest move by the government to shore up the palm oil industry in the world's biggest producer of the commodity, which faces a growing global backlash from consumers and, increasingly, companies and other governments.

In particular, the government has condemned what it calls a “negative campaign” to keep palm oil-based biodiesel out of the European renewable fuel market. The European Union is currently the No. 2 export market for Indonesian palm oil, but the bloc plans to phase out palm biofuel as a renewable energy source by 2030, on concerns that its production contributes to deforestation.

Musdhalifah Machmud, the deputy for agriculture to Indonesia’s chief economics minister, acknowledged that the campaign was aimed at tackling negative perceptions of palm oil. She added that the effort was part of a wider move toward greater sustainability of the industry. Environmental activists have welcomed the notion of imposing stricter standards on palm oil producers, but say this new initiative threatens to do the opposite.

One of the prominent points in the order signed by the president is a provision that could effectively legitimize illegal plantations on deforested land, said Zenzi Suhadi from the Indonesian Forum for the Environment (Walhi). The provision specifically calls on the environment ministry to “finalize the land status of palm oil plantations indicated to be within forest areas and in peat ecosystems.” It’s illegal for oil palms to be cultivated in these areas, and the term “finalize” is sufficiently ambiguous that it could be read to mean granting legal status to such illegal plantations, Zenzi said. “The word is dangerous because it can be interpreted as an instruction for the ministry to pardon crimes,” Zenzi said. “Because it’s clear in our forestry and conservation laws that palm oil plantations inside forest areas is a crime.”

Lack of monitoring and enforcement has resulted in the widespread proliferation of illegal plantations. In Sumatra’s Riau province alone, investigators have identified 10,000 km^2 of illegal oil palm plantations.

The environment minister, Siti Nurbaya Bakar, declined to comment on how that provision should be interpreted. Zenzi said that as an instruction from the president, it should have been worded more clearly as an instruction for the minister to crack down on illegal plantations in forest areas.

Instead, the next provision in the order calls on the land minister to legalize forest-based plantations that have been “finished” or processed by the environment ministry. Zenzi said this instruction clearly indicated that these illegal plantations would eventually be legitimized.

“It means the land minister is obligated to issue plantation permits to illegal plantations that have been pardoned by the forestry minister,” he said. A more detailed instruction in the presidential order actually identifies the legalization of illegal plantations as part of the president’s land reform program, which aims to give local communities greater control over land through the issuance of formal titles.

New oil palm plantation on peat in South-Sumatra. Photo: Hans Joosten.

Another highlight of the new initiative is how it plans to incorporate oil palm plantations, many of them established by clearing primary forests and releasing large volumes of carbon dioxide, into Indonesia's emissions reduction target. One of those ways is through the government's ongoing program to boost domestic consumption of palm oil-based biodiesel — the same fuel the European Union considers not a renewable energy source. This program, Musdhalifah said, will help offset emissions from the burning of fossil fuels.

Deputy parliamentary speaker Muhaimin Iskandar, part of the official Indonesian delegation to the U.N. climate summit in Madrid, also used that opportunity to promote the biodiesel program, claiming the fuel as an environmentally friendly source of energy. He said accusations that Indonesia's palm oil industry was a net contributor to climate change, through deforestation, were false. "In fact, palm oil is capable of absorbing carbon dioxide very well," he said. "And the energy that's produced [from palm oil] is green energy that becomes a replacement for depleting fossil fuel." It's an argument the Indonesian government and palm oil lobby have made for years: that oil palm plantations sequester and store many times the amount of carbon dioxide as natural forests, and that therefore razing those forests and planting oil palms is a positive way to fight climate change.

That's a misguided notion because it fails to account for the CO_2 released throughout the entire process of producing and transporting biofuel, said Teguh Surya, the executive director of environmental NGO Madani. "Khalisah Khalid, the head of policy at Walhi, said the U.N.'s Intergovernmental Panel on Climate Change (IPCC) has already warned against the danger of betting on biofuels as a solution to climate change. According to the IPCC special report on climate change and land, published earlier this year, creating vast plantations for crops simply to make fuel could jeopardize food production, water supplies, and land rights for poor farmers, given how limited land is. "The Indonesian government should have referred to the IPCC report," Khalisah said. "Because the report already recommended against the use of biodiesel because it will increase competition for land." A study by the World Resources Institute (WRI) projects that the program could lead to an increase in palm oil demand to 57 million tons annually by 2025, which in turn would encourage the clearing of an additional 7.2 million ha of land if plantation productivity stays the same — an area the size of Ireland.

- https://news.mongabay.com/2019/12/indonesia-palm-oil-reputation-sustainability/

Bambang Hero Saharjo received the John Maddox Prize for helping to prosecute companies responsible for peatland fires in Indonesia. Photo credit: Bambang Hero Saharjo

Indonesian forestry expert wins John Maddox Prize for testifying against palm oil firms

Bogor Agricultural University (IPB) forestry expert Bambang Hero Saharjo has received the 2019 Maddox Prize for voicing his scientific views on catastrophic peatland fires in Indonesia in the face of harassment, intimidation

and a lawsuit.The John Maddox Prize recognizes individuals who promote sound science and evidence on a matter of public interest in the face of hostility for doing so. The award, now in its eight year, is jointly organized by charity Sense about Science and scientific journal *Nature*.

"Our winners are an example of what can be achieved by one person, standing up against misinformation and corruption," said Sense about Science director Tracey Brown, who also served as one of the Maddox Prize judges. Bambang received the prize on Tuesday November 12 in London alongside Canadian pharmacist Olivier Bernard, who raised concern about high-dose vitamin C injections for cancer patients that have no basis in evidence. The jury picked the two winners from a list of 206 nominations from 38 countries.

"I still cannot believe that I received the prestigious John Maddox Prize," Bambang said in a press statement received by *The Jakarta Post* on Wednesday. "Only last year I was criminalized for presenting evidence and [threatened with a multibillion dollar lawsuit] by palm oil companies that had been found guilty of preparing to plant palms by burning down 1,000 hectares of peatland. Eventually, the lawsuit was rejected and I am free." Bambang is credited with tracing the routes and sources of forest fires and testifying in 500 court cases as well as helping to understand the health and environmental damage caused by the fires. He was the expert witness in the case against PT Jatim Jaya Perkasa (JJP) in 2015, which had been found guilty and ordered to pay Rp 491 billion in restitution. In 2018, the company filed a Rp 510 billion (US$33.5 million) lawsuit against him on a technicality.

In Indonesia, many forest fires are caused by illegal land clearing practices often initiated by palm oil companies. This has caused massive environmental damage and smog crises across Indonesia and neighboring countries like Malaysia and Singapore. More than 14 megatons of carbon dioxide were discharged from forest fires in Kalimantan on Sept. 5 alone, according to satellite data from the Copernicus Atmosphere Monitoring Service. The fires also put the health of 10 million children at risk, according to UNICEF. "Using fire for land clearing is so destructive to the environment and the health of local people. This is what the evidence shows. The prize will give me more power to say it and to fight the misrepresentation by companies that continue to use fire," Bambang added. "Rain forests are under threat, but their preservation matters to all of us who care about the climate and biodiversity," said Martin John Rees of the University of Cambridge, who served as a Maddox Prize judge. "So it's right that we should acclaim a man who seized the chance to really make a difference – by persistent and effective campaigning against powerful interests."

- https://www.thejakartapost.com/news/2019/11/13/indonesian-forestry-expert-wins-john-maddox-prize-for-testifying-against-palm-oil-firms.html
- https://www.nature.com/articles/d41586-019-03547-8
- https://www.nature.com/articles/d41586-019-03491-7

Indonesia's fires burned mostly abandoned and degraded land, not forests

It was large swaths of degraded and idle land, and not forested land, that accounted for much of the burned area during this year's fire season in Indonesia, according to new findings. The preliminary analysis by the Center for International Forestry Research (CIFOR) contradicts the prevailing narrative that rainforests accounted for the landscape hardest hit by the fires in Indonesia. "There was no hard evidence to support that notion," said CIFOR landscape ecologist David Gaveau. Instead, the fires took the biggest toll on abandoned lands, highlighting the importance of immediate protection for these areas to prevent a recurrence of intense and wide-scale burning in the future. Using high-resolution satellite images from Jan. 1 to Oct. 31 over seven provinces, CIFOR found that 76 percent of the burning occurred on idle lands, and only 3 to 3.6 percent in forested landscapes. That chimes with earlier statements by the governors of the Sumatran provinces of Riau and South Sumatra, the two regions that were among the most affected by this year's fires. They said that abandoned lands, including areas for which concessions had been granted but which had been neglected by the concession holders, accounted for much of the fires in those jurisdictions. "There are still lands whose status is unclear and they're not managed, making them prone to fires," South Sumatra Governor Herman Deru said recently in Jakarta. "Most of the fires burn these abandoned lands. So there aren't many fires in [plantation] companies' [active] concessions. They're mostly on abandoned lands."

Gaveau said these were areas that used to be forests several years ago, but had been cleared and experienced cycles of burning and recovery, turning them into scrublands peppered with low trees and bushes. "Though locally present for centuries, forest fires have become a large-scale cause of forest loss since the El Niño drought of 1983," Gaveau told Mongabay. "Once the forest has burned, the increased risk of subsequent fires leads many forests to cycles of repeated burns." And once these closed-canopy evergreen forests turn into scrublands, they

become much more prone to fires. “Such cycles have replaced millions of hectares of forest with invasive species of easily flammable scrubs, ferns and grasses, the source of today’s fires,” Gaveau said. “Villagers living on peatlands will tell you that abandoned land is prone to fires.” As a result, fires that start from industrial plantations, including oil palm and pulpwood, can easily spread beyond the intended area of burning because of the large surrounding areas of flammable idle and degraded lands. CIFOR’s analysis shows only 3 percent of the total burned lands were inside oil palm plantations, and 0.4 percent in acacia or rubber plantations or rice paddy fields.

Abandoned drained peatland in East-Kalimantan. Photo: Hans Joosten.

The Ministry of Environment and Forestry has disputed the figure for total burned area derived in CIFOR’s analysis, but not the proportion of affected forest versus abandoned/idle land. CIFOR has acknowledged the need for further peer review on the matter of the total burned area, which its initial analysis put at 16,000 km^2 across seven provinces — almost triple the official figure released by the ministry of just under 6,500 km^2. The findings present a strong case for mass restoration of degraded idle peatlands back into fire-resistant ecosystems, according to CIFOR.

In 2016, President Joko Widodo launched an ambitious program to restore 26,700 km^2 of degraded peatlands across the country to prevent a recurrence of the particularly devastating fires in 2015. Ideally, this would mean phasing out large swaths of existing oil palm and acacia plantations on drained deep peatlands. However, the industry has pushed back against this notion, arguing that what’s important is to maintain the water table in peatlands by blocking off drainage canals — something that can be done without changing the current dominant land use of oil palm and acacia cultivation. At the same time, the government and some companies have explored “peat-friendly” cultivation alternatives that don’t require intensive draining, including sago and pineapple, as well as agroforestry. But these have been largely written off as far less profitable than palm oil or pulpwood.

CIFOR said there’s a need to create an “economy of restoration” to jump-start efforts to restore degraded peatlands. “We need a paradigm shift,” the organization said. “Massive investments in restoration, massive investments from banks to create an economy of restoration. Only by considering nature as part of a vital green infrastructure that must be rebuilt and maintained with adequate investment in tandem with other infrastructures, can we begin to see significant changes.”

Anggalia Putri Permatasari, a researcher at the NGO Madani Foundation for Sustainability, said one solution to restoring idle degraded peatlands while also developing the local economy is through the government’s social forestry program, which aims to give local communities greater control over lands. The Ministry of Environment

and Forestry recently issued a regulation that allows local communities to cultivate peatlands through the social forestry program. There are 2,590 km^2 of peat areas that can be distributed to local communities under this scheme. “The social forestry program can be a way to solve the problem of open access to land,” Anggalia said. “Because even if the lands are clearly concessions that are the responsibility of companies, the problem of open access remains. There are even concessions that are in conflict with local people.”

The fires in Indonesia in 2019 pumped out at least 708 million tons of greenhouse gases into the atmosphere, according to data from the Copernicus Atmosphere Monitoring Service (CAMS) — nearly double the 366 million tons generated from the burning in the Brazilian Amazon. A major factor is the burning of carbon-rich peatlands, and in particular the burning of peatlands within the concessions of oil palm and pulpwood companies.

A new report by Greenpeace shows that Indonesia’s plantation industries — principally palm oil and pulpwood — were responsible for 41.5 percent of greenhouse gas emissions from the burning of peatlands in the country from 2015 to 2018. Their share of emissions amounted to 427 million tons of carbon dioxide equivalent during this four-year period — the same as the average annual emissions from 110 coal-fired power plants or 91 million cars, and more than half the annual emissions of the whole of Germany. And these plantations supply palm oil and paper products to some of the world’s best-known brands, including Unilever, Nestlé, Mondelēz and Procter & Gamble, according to the report. For instance, between 2015 and 2018, Unilever’s suppliers were responsible for accumulated greenhouse gas emissions as a result of peatland fires on their Indonesian concessions that amounted to a quarter of the total emissions produced by the Netherlands in a year, the report says. Similarly, Nestlé’s suppliers during this period were responsible for more emissions than Switzerland produces in a year; for Mondelēz, it was an amount greater than the annual emissions of New Zealand; and for P&G it was double the emissions produced by Norway. Greenpeace Indonesia senior forest campaigner Annisa Rahmawati said the findings were a reminder of the toll that many of the consumer products people use daily can take on the climate. “On Forest Day at the Madrid Climate talks, people around the world will be horrified to learn of the damage the makers of Kit-Kats, Oreos, Head & Shoulders shampoo, Dove soap and Paseo tissue are doing to our climate,” she said. Annisa called on the brands mentioned in the report to stop sourcing from plantations linked to fires. “Companies parading as ‘climate champions,’ such as Unilever, are linked to massive greenhouse gas emissions from peatland fires,” she said. “These brands need to cut ties with all traders and supplier groups whose fires continue to trade our future for cheap commodities like palm oil.”

- https://news.mongabay.com/2019/12/indonesia-fires-forest-burning-land/

'Black gold' in the heart of Borneo

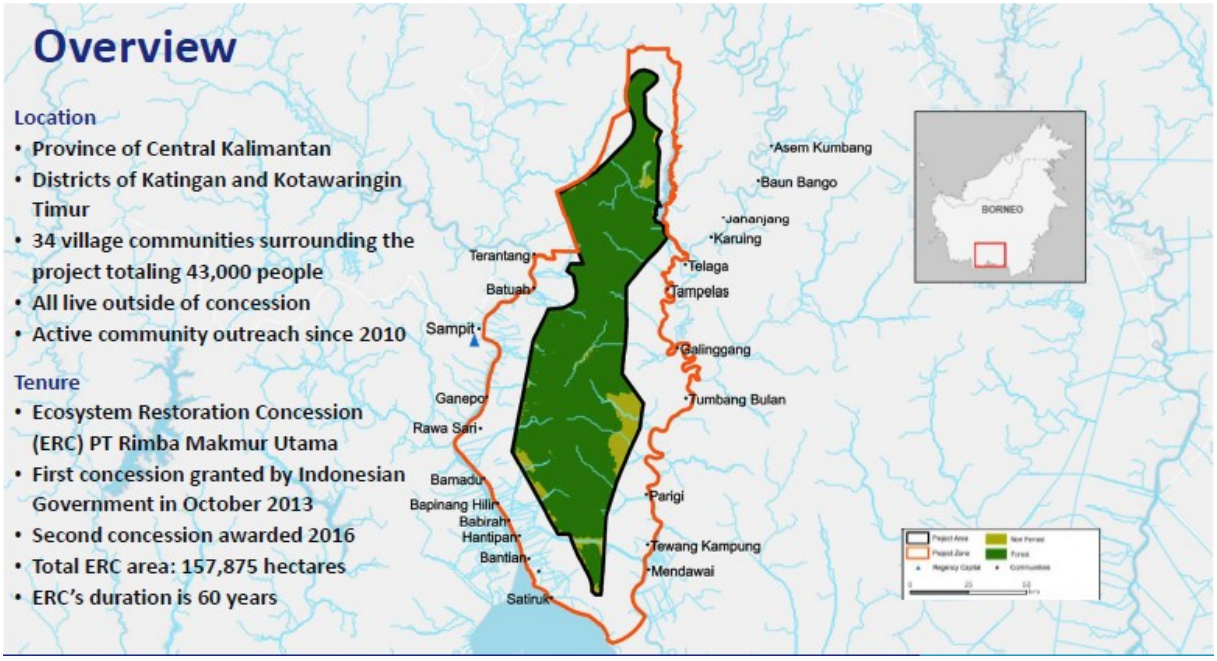
Healthy peatlands have plenty of carbon locked in their depths - and that is essentially what the Katingan Mentaya project in Central Kalimantan hopes to "sell" as carbon credits. The project, owned and managed by Indonesian company Rimba Makmur Utama (RMU), spans about 150,000ha. Active conservation and restoration efforts, such as the replanting of trees in degraded areas, have allowed the land to remove carbon from the atmosphere and store it underground, equivalent to taking two million cars off the road each year.

The 7.5 million carbon credits that the Katingan Mentaya project produces each year are sold to businesses such as oil company Shell and car giant Volkswagen. The units are validated and verified by auditors approved by international non-profit organisation Verra, which manages the Verified Carbon Standard. The cost of each verified carbon unit sold by Katingan Mentaya is commercially sensitive information. But each unit purchased prevents a tonne of carbon dioxide from entering the earth's atmosphere. RMU co-founder and chief executive Dharsono Hartono, 45, said: "Our goal is to save one of the last remaining peatland forests in Indonesia by turning it into a good business model. This will profit the company, the surrounding communities and also save the environment."

The Volkswagen Group said on its website that its purchase of carbon credits in the Katingan Mentaya project "compensates for the currently still unavoidable carbon dioxide emissions from the supply chain, production and delivery of the new Volkswagen e-vehicle ID.3, as well as emissions from other areas". Said the group's head of sustainability Ralf Pfitzner: "Where total decarbonisation is not yet possible, we want to invest in forest conservation programmes that greatly reduce atmospheric carbon dioxide, provide long-term support to local communities, protect biodiversity, while at the same time, help address the climate crisis in line with the United Nations Sustainable Development Goals."

The purchase of carbon credits allows the peat forests to continue what they do best - "store carbon, produce oxygen, provide habitat for threatened and endemic species, and support the sustainable development of local community initiatives", says Katingan Mentaya on its website. Animals threatened with extinction can be found

in the deep forests of the project site, and an estimated 3,500 critically endangered Bornean orang utans call it home. Through this process of saving the planet, Mr Hartono, a former investment banker with JPMorgan Chase in New York, wants to help local communities too. RMU has invested more than US$10 million in schemes to boost the livelihoods of people living in the 34 villages around the project site. The aim is to provide the villagers with more profitable means of making a living - such as by processing coconut sugar, which is a higher-value product than dried coconut meat (copra), and by growing vanilla and cashew trees. This way, villagers do not need to enter the project site to log trees. Coconut farmer Sugiyono, 27, is among those who have benefited from the community programme. He used to sell copra at nearby markets, but can now earn up to 10 times more from selling coconut sugar, which is processed on-site in his village. The idea of making peat forests pay for their own conservation is a novel business idea in Indonesia.



Fact sheet KatinganMentaya carbon project, Central Kalimantan.

The land, which was formerly a logging concession, had been designated by the Indonesian government as a production forest. This meant it could be converted into plantations, for logging, or for ecosystem restoration. In 2007, Mr Hartono started RMU, and subsequently applied for a licence to restore the area. His business partner Rezal Kusumaatmadja played a part in the decision when he highlighted a new business model with a triple bottom line - profit, planet and people. "We had the choice of either being a small palm oil company, or a global player that could have an impact on the world's climate," Mr Hartono told The Straits Times amid the lush foliage of the Katingan Mentaya project site. By putting a price on nature, the duo reasoned, people would be more inspired to protect it. But sticking to this conviction was not easy, said Mr Hartono, who received plenty of criticism for his business premise. It took more than 10 years and millions of dollars in investment before the company finally turned a profit last year, he said. "We have finally proven that the forest is worth saving," he said. Today, Katingan Mentaya is an example of a Redd+ project - a voluntary climate-change mitigation approach.

The Katingan Mentaya project got its name from the two rivers that flow to the east and west of the site, which is apt, considering the importance of water to peatland ecosystems.

Peat forests are worth saving for the next generation, said Mr Hartono, who has a nine-year-old son. "Many people are sceptical about protecting and conserving peatlands, thinking it would be more profitable to open it for cultivation instead," he said. "But there are environmental losses we cannot quantify. Our efforts over the past 12 years show there is a real business case for peatland conservation and restoration."

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Could forest fires burn forever in Indonesia's peatlands?

The toxic haze that engulfed Southeast Asia for months throughout the second half of 2019 was not the first time air pollution has scarred the region. And it might not be the last, if Indonesia's pulp industry does not undertake major peatland restoration efforts, a new report has warned. An environmental group calling itself Koalisi Anti Mafia Hutan (the Anti Forest-Mafia Coalition) says two of Indonesia's largest pulp producers are investing heavily in processes that compound rather than reduce the pressures on fire-prone peatlands. "They are likely to perpetuate elevated levels of fire and haze risk in Indonesia for many years to come," said the coalition, which includes United States-based Rainforest Action Network, the Environmental Papers Network and Indonesian environmental protection groups Auriga and Hutan Kita Institute. Despite claims that they are reducing fire risks in plantation concessions they control, wood suppliers to both of Indonesia's major pulp producers have experienced serious blazes this year. "Of the eight pulpwood concessions with the worst fires, six are wood suppliers to Asia Pulp & Paper (APP) and one is a wood supplier to Asia Pacific Resources International Limited (APRIL)," the coalition said in its report.

The companies disputed the report's findings, saying that most of the fire alerts or "hotspots" detected by NASA's satellites do not correspond to actual fires. "Based on our internal data, it is estimated that less than 20 percent [of] hotspots detected were related to actual fires," Elim Sritaba, APP Sinar Mas Chief Sustainability Officer told Al Jazeera in an email response to questions. APRIL said that 88 percent of the hotspots in Riau on the island of Sumatra occured outside wood fibre concessions, according to data from Global Forest Watch, an open-source forest monitoring application and database, and that its plantations made up only two percent of the total. APRIL told Al Jazeera that as at the end of August 2019, only eight percent of identified hotspots were confirmed as being fires, and that its operations were not severely affected by the fires. Both companies said that internal teams investigate every hotspot detected within 24 to 48 hours.

Logged and burned peatswamp forest in Jambi, Sumatra. Photo: Hans Joosten.

Syahrul Fitra, a researcher with Auriga, one of the NGOs in the coalition, said there was no way to confirm APRIL's data because the company didn't share its ground-truthing hotspot findings publicly. "They just say the NASA data is wrong and expect us to believe their claims without providing evidence," he said. "Our sense is that if their claims were accurate, they would be far more transparent with providing the documentation to support it." He noted that unlike APRIL, APP provides daily and weekly fire reports on its website, indicating how many

hotspots have been detected and how many of these have been verified as fires. The information is presented in both raw data form and on maps. “APRIL should learn from APP about how to be transparent with fire data reporting if they want people to take their claims about fires seriously,” Syahrul said.

The Anti Forest-Mafia Coalition highlighted, however, that APP and APRIL have together drained peatlands covering 750,000 hectares, equivalent to more than 10 times the land area of Singapore. Not only does this make the land more prone to fires, but neither company has implemented large-scale land restoration measures on which they currently grow acacia wood for pulp production, the coalition said. Syahrul said the high number of hotspots showed that not much had changed since the 2015 fire and haze episode. “It’s been four years since the disastrous 2015 fires, and these companies said they had adopted best management practices,” he told Mongabay. “But we can see for ourselves the reality of the fires in Sumatra and Kalimantan [Indonesian Borneo]. This is because these peatlands have long been dried out. So this year’s fires are a result of this long process of peat draining.”

APP's Sritaba told Al Jazeera, "We remain committed to use only responsible woods from 100 percent sustainable plantations across our supply chain." "Where peatlands are concerned, APP Sinar Mas and all our suppliers follow the regulations of the government of Indonesia, which among others move companies operating on peatlands to adopt best practices," she added.

However, the Anti Forest-Mafia Coalition and other international organisations such as Greenpeace have raised concerns that Indonesia's government has not been enforcing regulations. Almost none of the palm oil and pulp companies whose concessions had large tracts of burned land have been punished through serious government sanctions, Greenpeace Indonesia reported in September 2019 based on their analysis of official government data. Meanwhile, the Anti Forest-Mafia Coalition said that the government facilitated the pulp industry's continued reliance on peatlands by issuing new regulations in April 2019 that effectively rolled back earlier efforts to restore and protect such fire-prone areas. Indonesian authorities were considering a plan to impose stricter punishments such as seizing profits from companies or individuals who have benefitted financially from the intentional burning of land, Rasio Ridho Sani, director general of law enforcement at the Environment Ministry, said in late September. The government has sealed off burned areas within concessions controlled by 52 companies and the authorities are investigating five companies on suspicion of starting fires or being negligent in containing fires within their area, he said.

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Paper and fast fashion fan the flames of Indonesia’s burning peatlands

The slate of governmental regulations rolled out after the 2015 fires were aimed at freezing the development of peatlands, including those already part of existing concessions, and rezoning them for conservation to prevent future outbreaks of fire and haze. Peatlands eligible for this protection, initially at least, were those with peat layers deeper than 3 meters (10 feet), those containing high biodiversity, and peat domes — landscapes where the peat is so deep that the center is topographically higher than the edges. These types of peat areas account for a combined 12,000 km^2 of concessions supplying the pulp companies APP and APRIL, located mostly in Sumatra. A previous spatial analysis by the NGO coalition Koalisi Anti Mafia Hutan found that banning the development of these areas for plantations would lead to a supply crunch for APP and APRIL, affecting 30 percent and 25 percent of their respective supply chains.

Earlier in 2019, the government issued a new regulation limiting the types to peat landscapes eligible for protection to just peat domes, leaving 3-meter and high-biodiversity peat areas once again open for exploitation. According to NGOs’ new report, nearly 50 percent of the fire alerts in the worst-affected pulpwood concessions through October were located within these areas previously designated as protection zones.

“Shortly after the regulation was issued, we can see for ourselves that the areas that were supposed to be restored were burned instead,” Syahrul Fitra of Auriga, one of the NGOs in the coalition, said. “While we can’t say that the regulation exacerbated the fires, we can say that fires in peat areas are still severe.” Allowing companies to continue cultivating carbon-rich peatlands means permitting a business model that’s not sustainable, he added. “These fires are connected to these pulp and paper companies’ dependence on peatlands for their crops,” Syahrul said.

That dependence looks set to deepen, with both APP and APRIL investing in new projects that will likely intensify existing cultivation of peatlands. APP has since December 2016 operated one of the world's biggest pulp mills in South Sumatra province. Operation of the mill at full capacity is expected to increase APP's overall demand for wood fiber in Indonesia by 75 percent, according to the NGOs' report. That increase will difficult for APP to commit to major peatland restoration initiatives, which, by their nature, would reduce the group's pulpwood plantation base, Syahrul said. "If APP restores its peat concessions to the maximum, then it will face supply crunch," he said. APRIL, meanwhile, has entered the textile market in a bid to become the world's largest producer of viscose staple fiber (VSF). APRIL recently converted pulp lines at its Sumatra mill to produce the higher grade (dissolving) pulp used in VSF production. APRIL's dissolving pulp supplies a new VSF mill in the same location owned by the company's parent conglomerate, RGE International Group, under the name Asia Pacific Rayon, as well as other RGE-owned VSF mills in China under the Sateri Group, the world's biggest VSF producer. Sateri's customers include global clothing retailers Zara and H&M, according to a 2017 report by the Changing Markets Foundation.

APP acacia pulpwood plantation in Jambi, Sumatra, Photo: Hans Joosten.

VSF is increasingly popular in the textile industry, marketed as an "eco-friendly" and less water-intensive alternative to cotton. At the World Economic Forum in Davos in January, RGE director Anderson Tanoto said VSF could help the fast-fashion industry become more sustainable, touting it as biodegradable and "sourced from sustainably managed tree plantations." But VSF from Indonesian pulpwood plantations might not be quite so sustainable, Syahrul said. He noted that the pulp APRIL uses to produce VSF comes from *Acacia crassicarpa*, an acacia species that the company cultivates only on peatlands; *Acacia mangium*, the species that APRIL grows on mineral soils (i.e. non-peat areas) for its paper products, isn't suitable for producing the type of pulp required to make VSF.

APRIL said there wouldn't be an increase in its production capacity and thus no increase in the group's overall pulpwood requirements. Even so, the need for trees that can only be grown on peatland provides a strong incentive for APRIL to continue draining, planting, replanting, and harvesting in peatland areas rather than reducing its operational footprint there, Syahrul said. "And the possibility of them restoring their peat concessions is going even further down," he added. The combination of the companies' peat-intensive investments and the government's relaxation of peat-protection policies is "evidence of the lack of commitment in restoring peatlands," he said. "The strange thing is that the government knew that if the demand for the raw

material increased [because of the new investments], the threat to peatlands would also grow," Syahrul said. "But the government still issued licenses [for the new investments]."

- https://news.mongabay.com/2019/12/indonesia-fires-peatland-app-april-pulp-paper-emissions-haze/

Paludiculture: because the sad story in peatlands does not want to be repeated

Forest and land fires, or commonly referred to as Karhutla, especially on peatlands, have been a sad story for Indonesia for at least the past three decades. Fires on peatlands have become an international concern, not only because of the direct impacts experienced by the community due to exposure to smoke, but furthermore are due to environmental impacts caused in the form of greenhouse gas emissions, loss of biodiversity and loss of food resources and income of local communities.

In its natural condition, peat provides a variety of important environmental services for human life, both directly and indirectly. Peat is a very effective water storage during the wet season, and then releases it in the dry season. Peat is naturally always inundated. Peat is also a source of life and livelihood for the community because it provides food, energy sources, building materials and medicines. As science and knowledge rapidly developed, peat is known to play an important role in climate change mitigation and adaptation due to their ability to store carbon much more compared to other types of ecosystems.

Problems begin to emerge when there are efforts to convert peatlands into other uses through the drainage process. This will cause emission of below ground carbon into the air. Under drier conditions, peat will then be more prone to fire, and the sad story of Indonesia is repeated year after year. Long-term impact seems to approach, land subsidence occurs, resulted into potential flooding. To stop the repeated severe peat damage, a fundamental change in peat management patterns is needed, without involving, or at least minimizing, the drainage process. Paludiculture is one of the recommended management options. The term Paludiculture refers to the cultivation of native/local plants on swamp land (including peatlands) that are always wet, without disturbing the sustainability of the ecosystem, and helping to restore and preserve the environment, improve the economy and welfare of the people in and around peatlands.

*Pineapple (*Ananas comosus*) can grow under rather humid conditions, like here in South-Sumatra, but is often wrongly praised as a genuine paludiculture crop. Photo: Hans Joosten.*

Given the bright prospects of the Paludiculture approach to use peatlands wisely and sustainably and reduce the existing problems on peatlands, parties from government institutions, scientists, practitioners, academics, non-governmental institutions, private and individuals have agreed to establish the Indonesian Paludiculture Forum

in Bogor, 2019. “The Paludiculture Forum or Paludifor is a multi-stakeholder platform that can help provide information about paludiculture and facilitate communication and coordination of the parties as an effort to improve peatland governance,” said Agus Tampubolon, Chair of the Paludiculture Forum. Furthermore, Hany Setiawan, S.Hut., M.Sc., Plh. The Head of the Center for Forest Research and Development, Ministry of Environment and Forestry, said, “Some of the obstacles and challenges in the development of native peat commodities include the availability of good and healthy seeds, technical capacity, marketing and policy”. “Paludiculture is one of Indonesia’s opportunities to improve peatland management that are in accordance with the characteristics of the peat itself,” stressed I Nyoman Suryadiputra, Head of the Yayasan Lahan Basah (YLBA)/Wetlands International Indonesia.

The challenges then becomes nothing compared to the ecological and economic losses that have been experienced so far. Therefore, there is a need for an opportunity to exchange ideas and experiences regarding the real use of Paludiculture in Indonesia, including developing the investment of the peat native commodity business in a sustainable manner. Because Indonesia does not want the sad news on peatlands and forests to repeat itself.

- https://www.wetlands.org/news/paludiculture-because-the-sad-story-in-peatlands-does-not-want-to-be-repeated/

Indonesia fires emitted double the carbon of Amazon fires, research shows

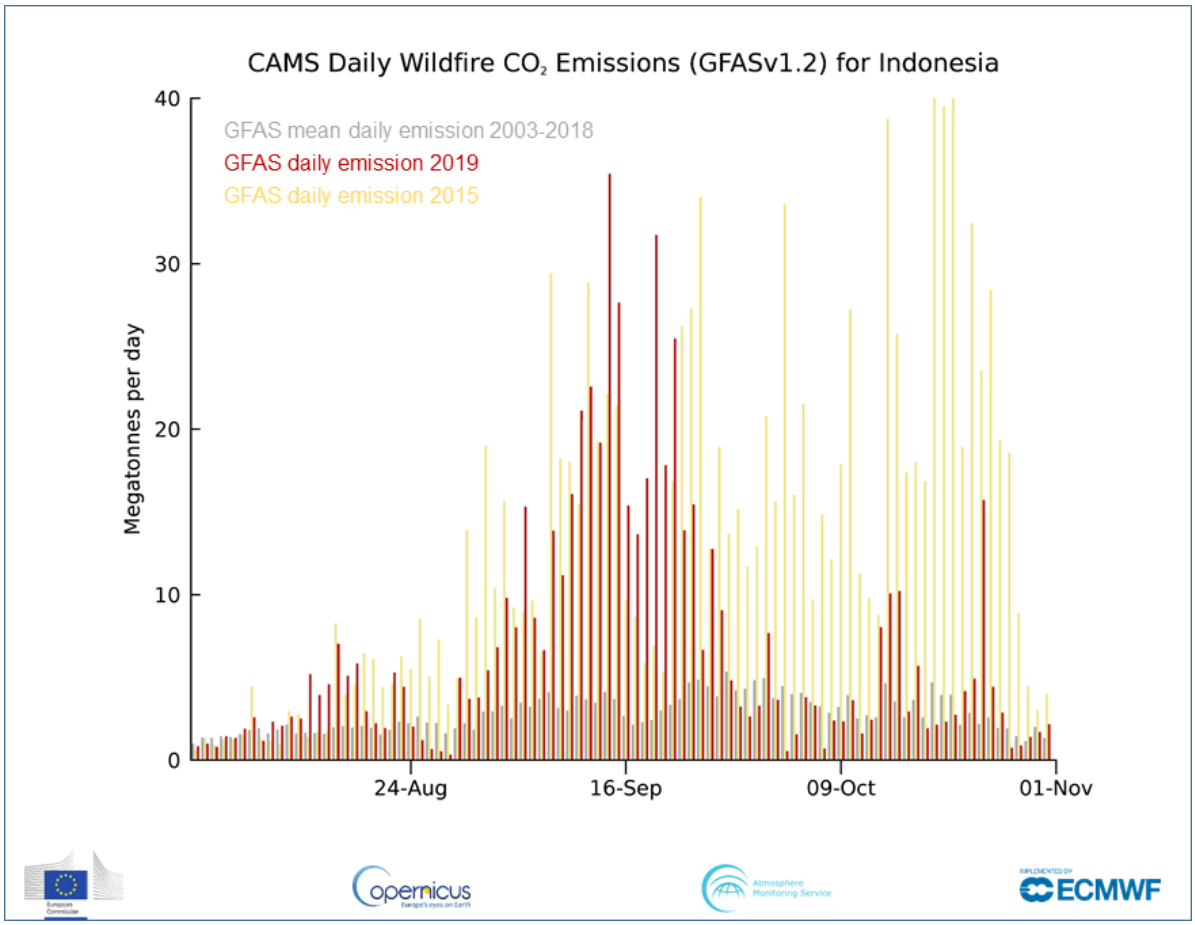
Fires from land and forest fires across Indonesia this year have pumped at least 708 million tons of greenhouse gases into the atmosphere — almost double the emissions from the fires that swept through the Brazilian Amazon this year. That was the finding from researchers at the Copernicus Atmosphere Monitoring Service (CAMS), who noted that the Indonesian fires were one of the most intense in nearly two decades, unleashing far more than the 366 million tons of carbon dioxide equivalent (CO_2e) churned out by the higher-profile fires in the Brazilian Amazon. “What has stood out with the recent fires in Indonesia is how high the daily total fire intensity and estimated emissions [are] than the average of the previous 16 years,” Mark Parrington, a senior scientist at the CMAS who studies emissions from wildfires, told Mongabay.

Exacerbated by drier-than-usual weather patterns, the 2019 fires have been the most severe since those in 2015, when 26,000 km^2 of land across Indonesia was razed. The fires back then cause an estimated $16 billion in economic losses, and the smoke they generated sickened half a million people.

But while greenhouse gas emissions from the 2015 fires were much higher — estimated at 1,385 million tons of carbon dioxide equivalent (CO_2e) — emissions this September were comparable to four years earlier: 420 million tons of CO_2e, compared to 478 million tons in September 2015. “There were some days in August where the emissions were above the average but they have increased significantly since 1 September, and are comparable to the daily activity in August-September 2015,” Parrington said. The intensity of the fires and the volume of emissions have since declined, with emissions in October standing at 119 million tons of CO_2e, and 48 million tons during the first two weeks of November.

The carbon spike threatens to derail Indonesia’s commitment to slash its emissions by 29 percent by 2030, said Anggalia Putri Permatasari, a forest and climate researcher at the Madani Foundation for Sustainability, an NGO. By the time the rainy season sets in, the country will likely be among the top of global emitters, similar to 2015, when the emissions from just six weeks of fires catapulted the country from the sixth-largest emitter in the world to the fourth-largest. Since then, Indonesia has recorded three consecutive years of declining emissions, to the point where it was deemed eligible for the first payment out of a $1 billion fund pledged by Norway in 2010 to keep the Southeast Asian nation’s emissions from forest destruction in check.

Anggalia said the fires this year were a setback that should serve as a wakeup call for Indonesia and its commitment to helping reduce global carbon emissions. The burning comes ahead of next year’s climate summit, where nations that committed to the Paris Agreement in 2015 will gather to assess how much they’ve been able to do and how much more they can do. The aim is to have new carbon-cutting targets, ones that are much more ambitious than the Paris goals in order to limit global warming to 1.5 degrees Celsius above pre-industrial levels, rather than a long-held international goal of 2 degrees Celsius.



Comparison between Indonesia's fire emission data from 2019 and 2015. Courtesy of CAMS.

A key factor in the severity of the emissions in 2019 and in 2015 is the large proportion of burned area that constitutes carbon-rich peatland: about a quarter of the total burned area in 2019, and about a third in 2015. In its biennial update report to the U.N. Framework Convention on Climate Change (UNFCCC) for 2015, Indonesia attributed the spike in emissions that year to the burning of peat fires. Peatlands store on average 10 times more CO_2 than other ecosystems, packed in the thick layers of semi-decayed plant material that can be up to 18 meters deep. Indonesia's peatlands store an estimated 28.1 gigatons of CO_2, according to a 2017 study, more than all the country's upland forest. When drained or burned, the peat decomposes and the stored carbon is unleashed into the atmosphere. And once peatland starts burning, the fire is virtually impossible to extinguish.

"Rather than combust like dry grasses and shrubs on mineral soils, peatland fires smolder, producing smoke and air pollution that is much worse than typical biomass burning," the Earth Innovation Institute, a nonprofit, said in a recent blog post. "Because of this smoldering, it is also very hard to detect and put out peat fires, as they do not burn hot enough to be detected by satellites and can spread underground. To completely extinguish the fires, we must simply wait for rain."

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World Bank: Indonesia suffered $5.2 billion economic loss due to human-made fires:

A World Bank report says that forest and peatland fires in Indonesia caused an economic loss of $5.2bn, which equals 0.5% of Indonesia's GDP. The World Bank assessed the impact of the fires in the eight affected districts between June and October 2019. Officials said that the losses might be even greater as the fires had raged through November. The report says, the forest and peatland fires, as well as the resulting haze, led to significant negative economic impacts, estimated at $157mn indirect damage to assets and $ 5.0bn from affected economic activities. Over 900,000 people suffered respiratory diseases and 12 national airports and hundreds of schools had to be closed in Indonesia, Malaysia, and Singapore due to the smoke from the fires. Indonesian officials are blaming El-Nino weather patterns for amplifying the health effects of the fires in 2019.

Over 942,000 hectares of forest and agricultural land were burned in Indonesia in 2019. Additionally, 44% of the land burned were peatlands; thus, carbon emissions from the fires were double that from fires in the Amazon jungle earlier that year. Thus, El-Nino and the burning of a large peatland area have caused a perfect storm that has engulfed not only Indonesia but its neighboring countries as well.

The report explicitly states that the fires are human-made and this problem has existed since 1997, hinting that successive Indonesian governments have dragged their feet on the matter, which has led to the current crisis.

About 720 megatonnes of carbon dioxide were released into the atmosphere due to the fires in Indonesia between January and November this year, according to the European Centre for Medium-Range Weather Forecast. As a result of the fires, the World Bank has cut Indonesia's growth estimates by 0.09% in 2019 and 0.05% in 2020. The World Bank report warns that the health effects from the fires could harm the global image of palm oil, the main commodity exported by Indonesia.

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'Not sacrificing my grandchildren's future': Minister Luhut vows govt will protect environment

Coordinating Maritime Affairs and Investment Minister Luhut Pandjaitan has asserted the government's commitment to not sacrifice the archipelago's environment for economic development. Speaking during a discussion in Jakarta on Nov. 19, Luhut said Indonesia was looking for its own "equilibrium; not that used by the United States and Europe." "I will never issue any regulations that will harm the future of my children and grandchildren," Luhut said in the discussion on Indonesia's strategy toward a zero-emission economy in 2050, according to a statement from the ministry. Indonesia, he said, still had much potential in developing new and renewable energy across the country, such as geothermal and biomass. Luhut also highlighted the importance of biodiesel, especially biodiesel derived from palm oil.

The government had launched B20 biodiesel containing 80 percent diesel fuel and 20 percent fatty acid methyl ester (FAME), which is considered to have expanded the domestic crude palm oil market. "After B20, we will introduce B30, B40 and so on until B100. When this all goes well, we will reach an equilibrium in our palm oil production and domestic consumption. This will help our farmers and drop the poverty rate," Luhut said.

Luhut went on to say that Indonesia was committed to reducing its emissions as promised in 2015 in its nationally determined contribution (NDC) -- by 26 percent against the business-as-usual scenario in 2030, or by 41 percent with international support. Efforts are under way to achieve the goal by, among others measures, rehabilitating mangrove peatland, the minister went on to say.

According to the Peatland Restoration Agency (BRG), Indonesia must restore nearly 2.7 million hectares of peatland that has been destroyed during the fire season in the last four years. However, experts said the way authorities rehabilitate it – through the establishment of canal blocks -- might threaten the ecosystem, as canals would drain freshwater and cause land to become further prone to wildfires.

- https://www.thejakartapost.com/news/2019/11/19/not-sacrificing-my-grandchildrens-future-minister-luhut-vows-govt-will-protect-environment.html

Malaysia

Ministry: Oil palm plantation map for public access available in 2020

To further enhance palm oil sustainability, the government has listed four policies which include mapping out the country's oil palm plantation areas and make it available for public access, Ministry of Primary Industries secretary-general Datuk Tan Yew Chong said. He said the policy had been endorsed by the Cabinet and was expected to be out in the next few months. "We want to make it by the first quarter of 2020 and as of now about six states are ready," he told reporters at the International Palm Oil Congress and Exhibition (PIPOC) 2019 hosted by the Malaysian Palm Oil Board in Kuala Lumpur on November 19. Tan ensured that the move would not in any way jeopardise the country's safety. "The mapping is only for the public to see the oil palm plantation areas, at least they know where the reforestation (areas) are," he said. The other three policies are capping the total of oil palm cultivated areas to 6.5 million hectares, no new planting of oil palm in peatland areas and ban on conversion of forest reserves for oil palm cultivation.

- https://www.theedgemarkets.com/article/oil-palm-plantation-map-public-access-next-year-%E2%80%94-ministry

Europe




Peatlands at EGU 2020 – Vienna – Austria – 03-08 May 2020
BG 3.5 Peatlands under pressure: https://meetingorganizer.copernicus.org/EGU2020/session/35203
BG 3.21. Peatland management: https://meetingorganizer.copernicus.org/EGU2020/session/35235
BG 3.30. Carbon cycling in tropical peatlands: https://meetingorganizer.copernicus.org/EGU2020/session/35250
HS 10. Peatland hydrology: https://meetingorganizer.copernicus.org/EGU2020/session/35568

Exchange on peatland strategies in European countries

Several European countries and their policy makers have made big efforts by putting policies in place, creating incentive schemes or legislative frameworks recognizing the need for the protection and restoration of peatlands. Peatland conservation has also been recognized as an important way to protect endangered species in Europe and the European Commission has stated that, "much stronger efforts are needed" if we want to reach the 2020 EU biodiversity strategy. Despite this, restored peatland areas remain very small compared to the extent of degraded peatlands with many countries still lacking a peatlands strategy that takes into consideration the multiple ecosystem services that these unique places provide.

Table 1: Peatland area, intact and degraded areas and restoration efforts (all in km^2) in selected EU countries. Source: https://www.bfn.de/fileadmin/BfN/service/Dokumente/skripten/Skript454.pdf

Country	Total peatland area	Mire area	Degraded peatland area	Restored peatland area
Estonia	9,150	3,250	5,900	2.5
Finland	90,000	25,069	64,930	200
Germany	12,800	250	12,550	250
Latvia	9,232	3,165	6,066	10
Lithuania	6,460	1,781	4,679	64
Netherlands	2,733	150	2,583	100
Poland	12,550	2,020	10,530	7.5
Sweden	66,450	50,992	15,458	28

With the growing awareness of the importance of peatlands, including recognizing the significant contribution to GHG emissions when they are drained or degraded, several European countries are working hard to update and develop new national peatlands strategies. End October 2019, the Federal Agency for Nature Conservation (BfN) and the Federal Ministry for the Environment, Nature Conservation and Nuclear Safety (BMU) of Germany, in partnership with the Ramsar Convention Secretariat and the Michael Succow Foundation, co-hosted a best practice exchange workshop with a number of experts and key peatland stakeholders from EU Member States in Bonn, Germany. The European Peatland Strategies workshop highlighted the importance of working across sectors to take into account the different services that peatlands provide – from biodiversity, climate change, resilience, livelihoods and cultural heritage. It was a unique opportunity to exchange ideas to inform national peatland plans and strategies, highlighting key elements or criteria for content and taking experience and inspiration from different processes as well as identifying gaps in some strategies.

Representatives from the European Commission, ten countries, UNEP, Ramsar Convention, Wetlands International, IPS, and the Michael Succow Foundation, discussed and identified core elements and processes from best practices of peatland management including aspects of conservation, restoration and sustainable management, as well as implementation measures. UNEP as lead of the GPI shared the newly adopted UNEA4 Resolution on the "Conservation and Sustainable Management of Peatlands" to raise the ambition of peatland policies and its relevance as a framework for the development and upgrading of peatlands strategies and policies globally. The workshop participants also tackled the question of how to collaborate and integrate peatlands conservation at the European level while reviewing the existing practices and regulations. Through interactive discussions, participants were given a better understanding of the barriers and incentives that governments are

facing or putting in place to accelerate their commitments to Nature Based Solutions for multiple benefits, including how multiple MEAs can be advanced by prioritizing working together for peatlands conservation, restoration and sustainable management now. Participants concluded that an effective peatlands strategy will require involvement, a willingness to change, and a dialogue between all stakeholders seeking multiple and mutual benefits. It requires consideration of all aspects including politics, environment, economy, health, trade, etc., by enabling an inter-sectoral collaboration to reconcile interests and obligations of the actors involved including nature conservation, agriculture, forestry, tourism, trade and water management. As participants pointed out, national peatlands strategies and any possible European joint plan or strategy needs to work in synergy and raise international attention about the fact that peatlands issues go beyond political boundaries and when looked at holistically can provide multiple benefits across sectors.

- https://www.bfn.de/themen/internationaler-naturschutz/projekte/workshop-moorschutzstrategien-in-europa.html
- http://www.globalpeatlands.org/?p=16675

Belarus

A new law on the conservation and use of peatlands in Belarus

Tatiana Minayeva (Tatiana.minayeva@care-for-ecosystems.net) [3]

A new national law "On the Preservation and Use of Peatlands" (Об охране и использовании торфяников, further 'Law on Peatlands') has been adopted by the Parliament of the Republic of Belarus ('Byelarus') and officially issued in December 2019. The Law on Peatlands is the result of long term preparatory work of a large group of experts from the State Association for Research and Production, the Scientific and Practical Center of the National Academy of Sciences of Belarus on Bioresources and the Institute of Nature Management of the National Academy of Sciences under the leadership of Nina Tanovitskaya and Alexander Kozulin. The Law on Peatlands gives a stronger legal status to the National Strategy of Peatlands Conservation and Sustainable Use (further 'Peatland Strategy'), endorsed in 2016. The new law opens new opportunities for Belarus to meet its obligations within the Paris Agreement.

Future decision makers on Belarusian peatlands guided by Viktor Fenchuk (Yelnya, 2015). Photo: Tatiana Minayeva.

[3] Disclaimer – this review expresses the personal view of the author, who may also provide more details

The Law on Peatlands provides Belarus with an easy and clear way for the national reporting of “drainage and rewetting” of peatlands under the Climate Convention (UNFCCC), and hence with the possibility to pledge high emission reductions under the Paris Agreement in its Nationally Determined Contribution 2020 and beyond. However, the example of Belarus is hardly replicable in other countries and sustainable under other conditions.
The Law on Peatlands is based on the key principles and ideas of the Peatland Strategy, which has the status of a recommendation, despite its adoption by the Council of Ministers. The Law on Peatlands, as well as the Peatland Strategy, follows strong prescriptive principles. The frame of the Law on Peatlands is as follows. The Government is responsible for giving a designation to every peatland. On the basis of detailed inventory, a appointed organisation creates a so-called “peatland register”, in which for every peatland the land use is prescribed, for example, conservation, rewetting, forestry, agriculture or peat extraction. The register is permanently updated. Some general principles are also available in the Law on Peatlands. Chapter 3 prescribes to maintain all intact peatlands in their natural condition, to limit use to already disturbed peatlands, and to carry out agriculture in such a way that the loss of peat is minimized.
Chapter 23, however, identifies so-called “directions of use of peatlands” and principles on how to assign peatland to this or that use. From that part of the law, it becomes obvious, that the text of the law could be interpreted in such a way, that in some cases natural peatlands unfortunately also could be assigned for drainage. Yes, indeed, point 2 declares that all non-disturbed peatlands could be used only in a way not changing their natural features. However, later in the same article, the legal mechanism is described, how it should be implemented. The peatlands are assigned for protection in line with the other law “On Nature Conservation”, which has different criteria than peatland naturalness. While the use of peatlands is explained in all details directly in the law itself, there is a trick in the law with the assignment of peatlands to the category of so-called “most valuable types of peat”, which could be used for peat extraction. In the same chapter, the most valuable peat type is defined as “not decomposed oligotrophic peat”. Such peat is available mostly from natural peatlands, and peat extractors will fight for that peat.

Poster in the information centre of the Natural Protected Area “Zakaznik Yelnya”. This zakaznik was founded by the group of Alexander Pidoplichko in 1967. Photo: Tatiana Minayeva.

A very positive feature of the Law on Peatlands is that it puts together all terms related to peatlands that currently are found in various “State Standards” and scientific publications. Clear terminology fixed by legislature is a crucial condition for solving any issues on land use. The law gives the possibility to integrate legislation from various sectors (water, forest, land management, protection of animals and plants, fire management, melioration, management of radioactive lands etc.) and establishes the priority of the Law on Peatlands in case of contradictions with sectorial legislation.

The planning of peatland use in line with the new Law is clear and transparent. An expert group will periodically update the register of peatlands, as it used to be organised in the Soviet Union. Hence, the country is in a position to report without problems how much peatland has been rewetted and drained. This means that Belarus can include clear numerical indicators on GHG reduction by sustainable peatland management in its Nationally Determined Contribution.

The question arises, how sustainable such scheme could be in a market economy. Is society ready to control land use on peatlands if land becomes private property?

Peatlands are the natural environment for many people in Belarus whose livelihoods depend directly on the ecosystem services provided by natural peatlands (mires): water, food, biomass, recreation capacity. The authors of the Peatland Strategy and the Law on Peatlands presented the background ideas of both documents to the Belarusian public in the popular book “Peatlands of Belarus: towards sustainable use” (Kozulin, A., Tanovitskaya, N., Bambalov, N., et al., 2017)[4]. The awareness of peatlands values is traditionally very high in Belarus. Information on peatlands’ values and threats is a usual part of the environmental education programs in protected areas, museums, universities and schools. Social and economic studies would be useful to assess if a totally centralised regulation of peatland use would be sustainable in other conditions.

Fragment of the poster explaining in a sketch the danger of CO_2, released from a drained mire

Ivan Borok, director of “Zakaznik Yelnya” natural protected area near a poster on the significance of peatlands and mires for the environment and the sustainability of the planet. Photo: Tatiana Minayeva.

The modern approach would be a general Strategic Impact Assessment for peatland use in the entire country and an Environment Impact Assessment based on an evaluation of ecosystem services in every particular case of land use planning involving peatland. Such an approach, including a detailed peatland inventory and an annually updated peatland register, would, in any case, be an excellent basis.

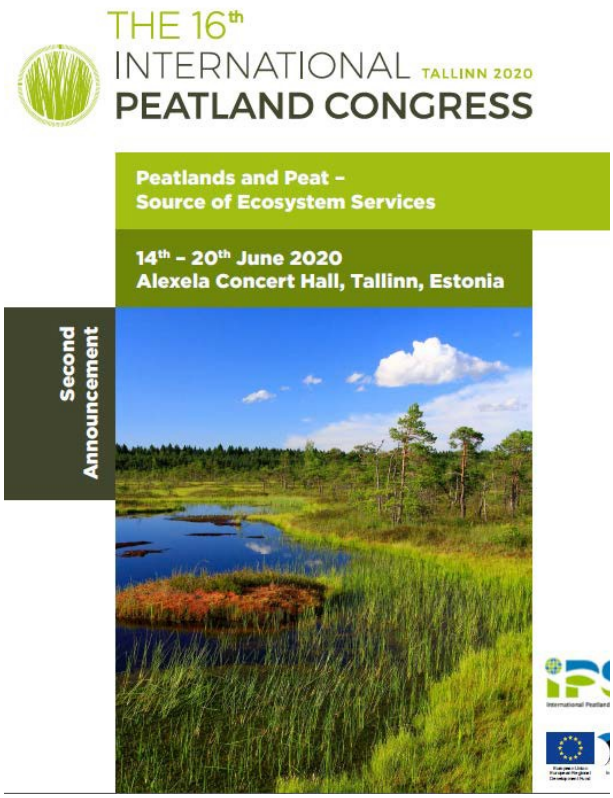
It is time for the entire European continent from Ireland to the Urals to finally agree on a complete ban on the disturbance of intact peatlands. Such an approach would be in line with the ideas of the founder of the concept of sustainable peatland use and the initiator of this work: Ivan Tanovitsky (1980)[5].

With all these comments, the titanic work of the team deserves great appreciation.

[4] http://biobel.by/images/Novosty/All/Design%20final%20pages%20WEB.pdf

[5] Тановицкий И.Г. Рациональное использование торфяных месторождений и охрана окружающей среды. Минск, 1980, 37 с. – Tanovitsky, I.G. The wise use of peatland deposits and environment protection. Minsk, 1980. 37 pp.

Estonia



https://www.ipc2020.com/

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https://sisu.ut.ee/biogeomon2020

Finland

Hydrology of undrained peatlands is often affected by drainage of surrounding areas

Finnish peatlands are under a bigger pressure from land use than has generally been realised. More than half of the peatland area has been drained, and most of the remaining undrained peatlands are bordered by drained areas. A study by the University of Eastern Finland and the Finnish Environment Institute investigated the current status of undrained peatlands. The research is part of the SHIFTMIRE project funded by the Academy of Finland, led by docent Teemu Tahvanainen from the University of Eastern Finland.

The discharge of water from the catchment area to the peatland is an important part of peatland hydrology. According to the results, 85 percent of the undrained peatland area is at least partly bordered by drained areas. The drainage of the margins of a peatland can cut off water flow from the catchment and cause major changes in vegetation and ecosystem. Hydrological disturbances are most common in the middle boreal zone, with high abundance of peatlands and peatland use. On average, 42 percent of the catchment area of an undrained peatland is hydrologically disconnected from the catchment by ditches in the peatland margin, in the middle boreal zone. Possible implications of such disturbance include vegetation change and likely loss of biodiversity, but there is also potential for increased peat growth and carbon sequestration.

In Finland, the area comparisons between drained and undrained peatlands are well known. This new study shows that even undrained peatlands are usually not hydrologically natural, however. "Disruptions in hydrology are a threat to biodiversity but changed mires still have significant natural values, and there are cases where margin drainage is found to enhance carbon sequestration in the mire", says project researcher Antti Sallinen.

The study also updated data on areas of mires and peatlands in Finland. The total area of peatlands is 8.3 million hectares, of which 58 percent has been drained. The undrained area consists of 219,200 separate patches of peatlands. Area of undrained open mires is two million hectares. Of this, 70 percent is in Lapland, north of the Rovaniemi-Kuusamo line. In south, peat-covered areas are mostly drained woodlands that are predominantly classified as forests in international typologies.

https://phys.org/news/2019-12-hydrology-undrained-peatlands-affected-drainage.html

France

New book publication: Les tourbieres et la tourbe. (Peatlands and peat) by Hervé Cubizolle

Peatlands have been present on Earth for about 400 million years. Peatland ecosystems have a global distribution and contributed to the evolution of the first terrestrial flora and fauna and provide scientists with a valuable research ground. These soils are all the more valuable because they are under serious threat and are endangered in many countries. However, the current interest in wetlands and biodiversity has led, for example in Europe, to legislative and regulatory measures to safeguard and the preservation of these ecosystems. The book offers a considerable amount of knowledge, without equivalent in the French language. Organized in 4 parts and 11 chapters, it deals with all aspects of peatlands and peat: the vocabulary specific to this ecosystem, the soils, fauna, flora, origin, geographical distribution, peat use, ecosystem services, threats to peatlands and actions taken for their preservation or rehabilitation. The general bibliography of more than 60 pages is accessible online on a website dedicated to the book. For more information: https://www.lavoisier.fr/livre/agriculture/les-tourbieres-et-la-tourbe/cubizolle/descriptif-9782743024765

Germany

What do peatlands have to do with climate protection

New educational materials prepared by the German federal Ministery of Environment, Nature Conservation and Nuclear Safety: https://www.umwelt-im-unterricht.de/wochenthemen/was-haben-moore-mit-klimaschutz-zu-tun/

Ireland

European investigation into turf-cutting on protected bogs

The European Commission has been asked to investigate turf-cutting on protected bogs after the Government's own reports admitted the practice was continuing. A complaint sent to the commission cites the country's official Habitats Assessment Report, which found turf-cutting was continuing at 22 raised bogs designated Special Areas of Conservation (SAC) and six that are Natural Heritage Areas. It also includes social media posts from recent months where turf-cutters boasted of cutting at 53 protected bogs. Reference is also made to information supplied by the Department of Culture, Heritage and the Gaeltacht to the Peatlands Council that 282 individual plots within peatland SACs were cut during 2019. Friends of the Irish Environment (FIE), which lodged the complaint, also raised concerns about remarks by Heritage Minister Josepha Madigan last November in which she said she might seek exemptions to continue cutting at 14 protected sites. "This proposal is astonishing from a government that is supposed to be addressing climate change across all departments, without even considering the impact on Ireland's dwindling biodiversity," the FIE said. It is the second time the FIE has brought the complaint to the commission. A previous investigation was closed in 2013 after assurances were received that action was being taken to stop cutting.

- https://www.independent.ie/irish-news/european-probe-looms-into-turf-cutting-here-on-protected-bogs-38836339.html

AIT to research use of peatland for freshwater fish production

New research looking at using peatlands and poor agricultural land for freshwater fish production is underway at the Athlone Institute of Technology. A team of researchers at the college's Bioscience Research Institute is investigating the use of naturally occurring microalgae to help mitigate disease and improve fish health in freshwater fish farms. Carried out in partnership with Bord na Móna, the initiative is part of its move away from peat harvesting in favour of farmed fish in new inland fisheries. Aquaculture, which is the breeding, rearing and harvesting of fish, is now the fastest growing food production sector and will provide an estimated 62% of fish for human consumption by 2030. The initiative will reportedly provide jobs for workers, which will ultimately help presesrve rural communities in the Midlands.

- https://www.shannonside.ie/news/local/ait-research-use-peatland-poor-ground-freshwater-fish-production/

Fishing on former peat extraction site in Peene valley, Germany. Photo: Hans Joosten.

Latvia

Conference on peatland restoration in Riga

On 28–30 June 2020, University of Latvia is organising an international conference "Restoring peatlands on climate". The event will take place in Riga, Latvia, and will include two excursions to explore the Latvian peatlands and to learn about the peatland restoration experience in Latvia. The conference is organised within LIFE Peat Restore project. The aim of the conference is to bring together professionals of peatland restoration and researchers who study various aspects of peatlands, especially peatland-climate relation, to share knowledge and experience. The conference will focus on the following topics: role of peatlands in climate change mitigation, greenhouse gas measurements and indirect assessment methods and their development, with special emphasis on GEST approach, peatland restoration for climate and biodiversity – experiences from different countries, and monitoring of restoration success.

The conference circular, including broader information on registration, abstract submission, excursion, participation fees etc. is available here. Registration is open until 16 March 2020. The preliminary programme is available here. More on LIFE Peat Restore project: https://life-peat-restore.eu/en/.

Madiesenu Mire, Latvia. Photo: Mara Pakalne.

Netherlands

Andre Jansen & Ab Grootjans (eds.) 2019: **Hoogvenen: Landschapsecologie, behoud, herstel, beheer**. Noordboek Natuur Gorredijk, 392 pp., ISBN 9789056155520, hardcover.

The Netherlands once had more than a million hectares of raised bog. Of this, some 7500 hectares remain, protected as nature reserves. Raised bogs are sensitive to nitrogen precipitation and desiccation, but restoration at landscape level contributes greatly to water buffering, CO_2 storage and the achievement of nature conservation objectives. The book 'Hoogvenen' offers a wonderful overview of the origins, ecology and biodiversity of this landscape and also describes all Dutch bog areas. In Hoogvenen, scientists and site managers bring together all natural history knowledge, linked to relevant cultural-historical developments. From a landscape ecology perspective, they answer questions such as: what exactly is a raised bog? How can the seemingly simple peatmoss plant form complete landscapes? Which plants and animals live in bogs and how do they survive in the extreme bog environment? Hoogvenen is a reference work for everybody who wants to know how the bogs work and how they can be successfully managed and conserved. https://www.libris.nl/boek/?authortitle=andre-jansen-ab-grootjans/hoogvenen--9789056155520/

Court orders bigger cuts in emissions

The highest court in the Netherlands has upheld a ruling requiring the government to slash greenhouse gas emissions to at least 25% of 1990 levels by the end of 2020. The case was brought to court six years ago by the Urgenda environment group in a bid to force ministers to go well beyond EU targets. However, the chances of the government reaching the prescribed target look slim. By the end of 2018, emissions were down only 15% on 1990 levels. Dutch environment researchers believe that levels could be cut by 23% by the end of 2020 but believe the reduction could be as low as 19%. The government in The Hague presented its climate accord at the end of June, with plans for a 49% cut in greenhouse gas emissions by 2030 and phasing out coal-fired power generation starting in 2020. In November, under pressure to act over a nitrogen pollution crisis, Dutch ministers announced a cut in the daytime speed limit to 100km/h. The Council of State forced the government to act in that case as well, by declaring that rules for granting building and farming permits were in breach of EU law protecting nature.

In its decision on Friday 20 december, the Council of State said it had based its ruling (in Dutch) on the UN climate convention and the state's legal obligation to protect the lives and well-being of Dutch citizens. "There is a great deal of consensus in the scientific and international community over the urgent need for a reduction in greenhouse gases by at least 25% by developed countries," the court said.

- https://www.bbc.com/news/world-europe-50864569
- https://uitspraken.rechtspraak.nl/inziendocument?id=ECLI:NL:HR:2019:2006

Russia

Workshops and symposia

Tatiana Minayeva (tatiana.minayeva@care-for-ecosystems.net)

The branch of mire science of the Russian Botanical Society will, unfortunately, not organise in 2020 the symposium with the traditional name **"Galkina readings"**, which has been held annually already for ten years in Sankt-Petersburg at the beginning of the year. The "Galkina readings" are a good platform for meeting mire scientists from all over Russia, to exchange ideas and to involve young people. IMCG bulletins have reported on some previous symposia. The proceedings of the 2017-2019 Symposia (in Russian) can be found under https://www.binran.ru/science/publikatsii/materialy-konferentsiy/galkinskie-chteniya/

The devoted team of organisers – Tatiana Yurkovskaya, Victor Smagin, Grigory Tyusov, Olga Galanina, Valentina Nyeshatayeva – asked for a break. It seems that now the meetings will become biannual. That is also not bad.

This year on **September 12-14, 2020** the traditional mire symposium **"Mires of Northern Europe"** will be held in Petrozavodsk (see later in this Bulletin)**.** These meetings take place every five years and are organised jointly by a team lead by Oleg Kuznetsov of the Laboratory of Mire Ecosystems of the Karelian Research Centre of the Russian Academy of Sciences and colleagues from Finland from the Finnish Environment Institute (SYKE), lead by Tapio Lindholm and Raimo Heikkilä. The deadline for registration form submission is February 18, 2020. For more details: https://www.mire2020.ru/

Significant dates in 2020 for the Russian writing mire world

Tatiana Minayeva (tatiana.minayeva@care-for-ecosystems.net)

April, 11, is the 95th birthday of Viktor Masing (died 18.03.2001). Viktor Masing was an outstanding Estonian scientist, biologist and philosopher. He published in the 1970-80s several theoretical essays on mires and peatlands in Russian bringing modern views to mire science in the Soviet Union. Together with Marina Botch he wrote and published the book "Mires of the USSR" (both in Russian and English), which is till now the main handbook of most mire scientists in the former USSR.

March, 20, will be the 90th birthday of Stanislav Vompersky, academician of the Russian Academy of Sciences. He developed a school of experimental peatland hydrology while working on forest melioration sites. He was for many years director of the Institute of Forest Sciences RAS and founder of the laboratory of peatland hydrology, which still exists today.

June, 7, is the 140th birthday of Vladimir Sukachyov (1880 – 9.02.1967), who developed the concept of biogeocoenosis (1942) and biogeocoenology as a systematic science. Sukachyov spent some time with Weber in the Bremen peatland research station and inspired by Weber published in 1912 a popular book about peatlands development and functioning. There are rumours that this book inspired Lenin to issue the "Decree on Peat" in 1918, soon after the socialistic revolution in Russia, which became the start of massive peatland

drainage for electrification and supported extensive systematic research of peatlands in Russia and further in the Soviet Union.

June, 21, is the 80th birthday of Konstantin Khmelev (1940 – 3.07.2001), a mire scientist who devoted his life to studying peatlands in the steppe region of Russia.

September, 4, will be the 90th birthday of Tatiana Yurkovskaya, the grand old lady of Russian mire science and IMCG Honorary Life Member (see: http://www.imcg.net/modules/download_gallery/dlc.php?file=51&id=1311230214)

December, 17, is 85th birthday of Sergey Meyen (1935 – 30.03.1987), an outstanding Russian paleobotanist, theoretician of biology, philosopher and science fiction writer.

International symposium Mires of Northern Eurasia: Biosphere function, diversity, management

We are happy to invite you to the 'Mires of Northern Eurasia: Biosphere function, diversity, management' international symposium which will be held in Petrozavodsk, Republic of Karelia, September 14-18 2020.

Mire ecosystems are an essential part of the landscapes of the forest and tundra zone where they can occupy extensive areas. The mires of the North have unique functions for the biosphere and great economic importanc. The countries of Northern Eurasia have long traditions in mire research and land management. Intensive economic involvement in the second half of the 20th century required the development of strategies for the management and conservation of mire diversity. Extensive work has been carried out in many countries and regions to restore disturbed mires and create artificial mires during recent decades. International scientific cooperation has successfully been addressing these issues and new research methods have been developed and implemented, in connection with the advent of new technical capabilities. The symposium will allow participants to share their results, to discuss research methods, and to outline future tasks and prospects for cooperation.

The key topics planned to discuss on the symposium are:

1. Biological diversity and structure of mire biota: mire plant and animal communities and populations;
2. Modern techniques of mire research;
3. Dynamics, functions, other ecological tasks of intact and transformed mire ecosystems;
4. Mires and climate: the past and the present;
5. Scientific basis for mire restoration;
6. Management and ecosystem services of mires under contemporary conditions.

Working languages: Russian (with synchronous translation for English-speakers) and English.

If you are interested in participating, please register before 16.02.2020: https://www.mire2020.ru/

Oleg Kuznetsov on Essoila mire, Karelia. Photo: Hans Joosten.

Spain

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United Kingdom

Flow Country Research Conference 6: Understanding Dynamics

If you haven't done so already, remember to register for the next Flow Country Research Conference to be held in Thurso on the 17-19th of March 2020! Abstracts (300 words, title and author list and preferred format) can be sent by email directly to conference.flows@uhi.ac.uk. We can accommodate poster presentations as well as oral presentations (15 minutes or 5 minute "speed presentations") and strongly encourage PhD students to consider presenting their projects. Sponsors for the conference include SNH's Peatland Action and NERC. For any queries, please email Roxane Andersen (roxane.andersen@uhi.ac.uk).

- https://www.eventbrite.co.uk/e/flow-country-research-conference-6-understanding-dynamics-registration-83152652823

Scottish and UK governments have no records on commercial peat digging

The Scottish and UK governments have no idea how much peat has been dug from the ground for commercial purposes and sold in garden centres, despite both administrations viewing the preservation of peatlands as a priority to combat the climate crisis. The Conservative Party made a promise in its manifesto for the general election that the party would "invest in nature" and restore peatlands, while the Scottish Government has allocated £11 million to restore degraded peatlands. Neither government has data on how much peat has been extracted over the last five years, however, prompting environmental groups to call for an end to commercial peat extraction. They are also urging gardeners to demand peat-free compost from garden centres.

Environmental activist Donald Campbell had submitted a freedom of information request to the Department for Environment, Food and Rural Affairs (Defra) in London asking how many cubic metres of peat had been extracted in Scotland, and the UK as a whole, in each of the last 10 years. He also asked whether Defra expected to meet its target to phase out the use of peat in garden products by 2020.

In reply Defra said it did not hold information on cubic metres extracted, explaining that the "monitoring of peat use in gardening products was last undertaken in 2016 based on sales in 2015."The Scottish Government was also asked how much peat has been extracted in Scotland over the past decade, and Campbell requested details of sites where commercial peat extraction is taking place, including the names of companies involved. The Scottish Government said it does not hold the information, prompting environmentalists to express concern.

They included Sarah Robinson, director of conservation at Scottish Wildlife Trust (SWT), who said that peat bogs are a "hugely important" store of carbon as well as a habitat for "many rare and specialist species". She urged gardeners to demand peat-free compost from their local garden centres and said: "Currently around half of the peat consumed in the UK comes from bogs in this country, while the rest is imported from Ireland and the Baltic States. Ending peat extraction here without tackling the demand for peat-based products will only lead to further damage to bogs in other parts of Europe."

According to SWT, Scotland has lost 94 per cent of its raised bogs over the last 200 years and that protecting and restoring those that remain is a "vital step" towards tackling both the climate emergency and a "crisis facing biodiversity". Robinson explained that extracting peat from healthy bogs, or damaged bogs which could be restored, is now against Scottish planning policy. She continued: "However, many people will be alarmed to learn that peat is still being removed from more than a dozen sites in Scotland because of historic mineral rights, which in some cases date back 70 years. Many of these sites could still be restored to functioning, healthy bogs." "At the moment, purchasing the mineral rights will be very costly for local authorities. We have asked the Scottish Government to make funds available for local authorities to buy out these permissions, and to put a cap on the amount of compensation that companies can receive."

Charlie Nathan, head of planning and development at the Royal Society for the Protection of Birds in Scotland, thought it was "incredible" that the Scottish Government does not have comprehensive data on commercial peat extraction and called for an end to the industry. "The government is funding peatland restoration across the country, yet at the same time, peat is still being dug up for sale in some places. Peatlands are one of our biggest carbon stores and this perverse situation needs urgent action," Nathan said. "We are aware that the chief planner has recently written to planning authorities to seek a better understanding of the location and extent of extraction in their areas, however this will require sufficient and directed investment from the government," he added. "There is also a need for a levy on peat-based horticultural products to support a market for sustainable horticultural alternatives and to ensure peat is not imported into Scotland from other countries. We urge the Scottish Government to act on this issue now."

Scottish Greens environment spokesperson, Mark Ruskell MSP, said that given the Scottish Government called a climate emergency, "you'd think the least they would do is measure any damage being done to our environment." He also condemned the Tory Party and said that if the Conservatives were "serious about this, they would have done it years ago." Ruskell added: "Peat is vital for storing carbon, as well as an important part of Scotland's biodiversity. It is as important to Scotland as the rainforest is to Brazil. That's why we need to be restoring our peatlands, not allowing them to be ripped up or burnt. Progress starts with closing the loopholes that allow them to be destroyed for potting compost."

Emma Goodyer, manager of the IUCN UK Peatland Programme, said that the "threat to rare lowland peatland habitats and species" as well as the costs to society from the loss of peatland services such as carbon and water, makes a "strong case for ending the extraction of horticultural peat". She added: "There are now many modern peat-free composts which work as effectively as peat across a wide range of applications. Much of the material used for peat replacement also contributes to recycling, such as commercial green compost, or uses by-products e.g. wood fibre from forestry waste."

The Scottish Government said that "restoring peatland has an important part to play in delivering our climate change ambitions" and that ministers intended to "phase out the use of horticultural peat by increasing uptake of alternative growing media substrate". A government spokeswoman said: "The impact of peatland degradation on climate change cannot be overstated – particularly in Scotland, where around 25 per cent of the country is covered in peat soil. If all of the carbon dioxide from that peatland were released it would be the equivalent of more than 120 years of our emissions being released at once." She added: "We are committed to delivering the peatland restoration targets set out in the climate change plan. We are currently updating the plan which will set out actions to deliver on our climate change ambitions. We understand the important contribution peatlands make in helping to mitigate the effects of climate change and the role individuals can play by reducing our use of domestic horticultural peat."

According to a 2017 report by IUCN UK Peatland Programme, there have been examples in England – eg Bolton Fell, Wedholme Flow and Humberhead Peatlands – where the peat extraction rights of a peat producing company was bought out by the UK government, in order to halt extraction and commence the restoration of bogs. These cases resulted in compensation payments of several million pounds. The Conservative Party manifesto for the 2019 General Election said: "The UK should act decisively to protect this overwhelmingly valuable ecosystem by setting an end date to peat extraction, peatland burning and the sale of peat products."

The Department for Environment, Food and Rural Affairs in London did not respond to requests to comment.

- https://theferret.scot/peat-digging-records/

Another step forward for Flow Country world heritage bid

A BID to get the Flow Country of Caithness and Sutherland recognised as a World Heritage Site has taken "a very important step" forward, according to project coordinator Joe Perry. He said the initial part of the process was completed the week before Christmas with the submission of the technical evaluation to the UK Government. "The Department for Digital, Culture, Media and Sport will assess our technical evaluation in mid-January, before deciding whether or not we can proceed to stage two which involves a full nomination document going to Unesco in 18 to 24 months' time." He believes there is a strong case for the Flow Country being the most important blanket bog in the world. "With such a strong focus on climate change in the world's media at the moment, we really feel it is time for a peatland World Heritage Site – there isn't one at the moment," he said. "This remarkable carbon store is so important to tackling this huge threat and World Heritage Site status could raise the profile of peatlands around the world, at the same time as putting Caithness and Sutherland firmly on the map." The Flow Country of Caithness and Sutherland is the largest expanse of blanket bog in Europe. It covers about 4000 square kilometres and is of global importance.

- https://www.johnogroat-journal.co.uk/news/another-step-forward-for-flow-country-world-heritage-bid-188699/

Peatland Learning & Training

There is a recognised need to embed peatland learning and training in education not only to share understanding of the importance of UK peatlands to broad audiences but to inspire peatland managers of the future. A Scoping Study was commissioned to investigate opportunities to provide peatland learning opportunities to school and further education (FE) school/college partnership students within local communities across a National scale. Following that study a Pilot Proposal has been developed to detail theoretical pilot units or teaching elements.

- Scoping Study: Proposed learning & training opportunities in peatland management
- Pilot Project: Proposed learning & training opportunities in peatland management
- https://www.iucn-uk-peatlandprogramme.org/resources/peatland-learning-training

The Flow Country, Scotland. Photo: Hans Joosten.

Call for action to protect and restore important peatlands

Analysis for WWF by Ricardo assessed the impact of a wildfire on the scale of the one which burnt for almost six days on part of the Flow Country in the far north of Scotland in May 2019. The study used an approach based on International Panel on Climate Change (IPCC) methods and estimated that 174,000 tonnes of carbon was lost from the peatland into the atmosphere during the fire. This is the equivalent of 6.2 days of daily average

greenhouse gas emissions in Scotland. WWF Scotland is now calling for urgent action to protect and restore peatlands, described as "vital carbon stores", including increased, multi-year funding from the Scottish Government of at least £20 million per year. WWF Scotland said that the level of climate emissions from peatland wildfires can depend on the severity of the fire and also the prior condition of the peat. Healthy peatlands in good condition will release around five times less carbon during wildfires, compared to a peat bog that has been drained.

- https://www.heraldscotland.com/news/18042498.call-action-protect-restore-important-peatlands/

Muirburn on Scotland's moors not main culprit for wildfires, say gamekeepers

Moor burning is not the leading cause of wildfires in Scotland, gamekeepers have said after an analysis of data. A report by the National Trust for Scotland, the conservation charity, had said that up to 60 per cent of wildfires were caused by people setting heather alight. However, a study of official figures from 2009 to 2019 has now shown that nearly 90 per cent of big wildfires arose from other causes such as barbecues, campfires and discarded cigarettes. It was found that less than 10 per cent of large wildfires could reasonably be attributed to muirburn, the burning of old heather on moorland to promote new growth.

- https://www.thetimes.co.uk/edition/scotland/muirburn-on-scotlands-moors-not-main-culprit-for-wildfires-say-gamekeepers-btk8l6m0k

Refilling the Carbon Sink

Long seen as wastelands, Scotland's bogs are now the scene of an intense restoration effort in which millions of exotic trees are being felled to fight climate change.

- https://www.biographic.com/refilling-the-carbon-sink/

Grouse moors should face tougher regulation, says government-commissioned review

Grouse moor estates should be brought under licence within five years unless bird of prey populations on or near shooting estates recover significantly, a government-commissioned panel has concluded. The Grouse Moor Management Group – established in 2017 – was commissioned by the Scottish government to investigate the environmental impact of grouse moor estates after the country's nature regulator, Scottish Natural Heritage (SNH), reported that one third of tagged golden eagles had disappeared on or around driven grouse moors in Scotland. Just before Christmas, the expert group led by Alan Werritty, professor of geography and environmental science at the University of Dundee, published its long-awaited report looking into grouse moor reform.

The panel rejected calls from animal rights groups to outlaw driven grouse moors. Instead it advised the government that if there was "no marked improvement" in the ecological sustainability of grouse moor management, then failing estates should be brought under licence within five years. To avoid regulation, grouse moor estates would need to be able to prove that populations of breeding golden eagles, hen harriers and peregrines on or within the vicinity of grouse moors were in a "favourable condition" it added.

Following the publication of the review, first minister Nicola Sturgeon told members of the Scottish Parliament that the government was reviewing the recommendations of the report, including whether or not to move to a licensing scheme "much earlier than the five-year timeframe that was suggested by the review group".

Some gamekeepers have been prosecuted for using poisoned baits, traps, shooting and nest disturbance of raptors in the past, while several estates have been banned from controlling birds altogether because of suspected systematic persecution, but prosecutions are still rare. The review has backed proposals for tougher maximum penalties for wildlife crimes with a maximum term of imprisonment of up to five years and fines of at least £40,000.

In a joint press statement, the Scottish Gamekeepers Association, BASC, Scottish Countryside Alliance, Scottish Association for Country Sports and Scottish Land & Estates said the shooting review would equate to a "seismic change" for moors in Scotland. "This report has recommended a barrage of measures that will leave the grouse shooting sector engulfed by legislation and red tape. On top of that, penalties for wildlife crime in Scotland are about to get much tougher," the statement said. But some conservationists have criticised the report for not going far enough. Sarah Robinson, director of conservation at the Scottish Wildlife Trust, said it lacked detail on how environmental improvements will be measured. "We call on the Scottish government and SNH to set out what evidence they will use and what standards need to be met, to show whether regulation is required," she said. Duncan Orr-Ewing, head of species and land management at RSPB Scotland, said more urgency was now

needed to address the "criminality and poor land management practices on Scottish grouse moors that have been highlighted for decades". *To view the report in full click here*

- https://www.endsreport.com/article/1669561/grouse-moors-face-tougher-regulation-says-government-commissioned-review
- https://www.commonspace.scot/articles/14992/washout-grouse-moor-review-does-not-go-far-enough-campaigners-say

North- and Central America

Canada

Is it time for Canada and the world to create carbon parks?

Over the last 134 years, more than 8,300 parks and protected areas have been established across Canada that protect wildlife, examples of different habitats, spectacular scenery, recreational areas and places of cultural importance. In a world where rapid climate change is impacting the stability of our planet's health and threatening the well-being of future generations, we need a new type of protected area. Nature plays an important role in carbon storage and reducing carbon pollution. When we lose forests, wetlands and grasslands, we lose species and habitats. But we also lose the carbon that these lands store in soil, roots and stems.

Carbon parks and reserves would support Canada's internationally agreed upon Target 1 commitment to protect 17 per cent of land and inland waters by 2020. Target 1 also includes conserving areas that are of particular importance for ecological services, meaning places that conserve nature's benefits to people. In a world that is quickly warming and shifting to a new abnormal, carbon storage is a service that we desperately need.

There are few other places on the planet that have as much carbon stored as Canada. It's been estimated that our northern lands hold an amount of carbon that is equivalent to one-fifth of all the carbon dioxide in the atmosphere today. The release of this carbon would be like a carbon bomb going off. It would move the Earth into uncharted levels of atmospheric carbon dioxide.

Much of our Canadian carbon is stored in peatlands, a type of wetland often referred to by its Cree name: muskeg. Peatlands cover only three per cent of the planet's surface, but store more carbon than all of the world's forests combined. Canada has more peatlands than any other nation, and most of these are still intact. Protecting our peatland along with forests and grasslands that hold carbon can be Canada's most important global contribution to climate change.

Carbon parks in Canada could play a critical two-for-one role in climate change. Wetlands, forests and grasslands store carbon, but also help to buffer nature and people from the increasing number of extreme weather events, such as floods and drought. The protection of these places also protects the quality of our drinking water and provides places for recreation.

We are a big country blessed with a rich endowment of nature, but it could slip away without our action.

Climate change brings a new urgency to expand our protected areas system with new parks and Indigenous Protected and Conserved Areas, and by working with private landowners through organizations such as the Nature Conservancy of Canada and the Natural Heritage Conservation Program.

By incorporating carbon storage and climate change adaptation into protected areas, we can accelerate the conservation of our lands and waters, and reduce climate uncertainty for our children.

- https://www.thestar.com/opinion/contributors/2019/11/17/is-it-time-for-canada-and-the-world-to-create-carbon-parks.html

South America

Peatlands in South America an asset in climate action efforts

New maps of tropical and subtropical peatlands suggest these carbon-rich wetlands are more widespread in South America than on any other continent, with significant deposits in the Andean mountains. These recent findings indicate the need for more research to validate their extent and location, and for a closer collaboration between scientists, local communities and authorities to sustainably manage them.

The IUFRO World Congress 2019 held 29 September – 5 October 2019 in Curitiba, Brazil, convened scientists as well as policy-makers from Peru and Colombia around the role of tropical peatlands and ways to better manage these ancient landscapes. "The massive scale, isolation and unavailability of most tropical South American

peatlands have partially protected them from large-scale human degradation, in contrast to their heavily disturbed Southeast Asian counterparts" said Kristell Hergoualc'h, a scientist with the Center for International Forestry Research (CIFOR). Hergoualc'h pointed out the need for more comprehensive assessments to inform the protection and sustainable management of peatlands, especially in the face of population growth and global warming. Her research team, for example, studied a 350,000-hectare area in the Amazonian Ucayali-Marañón river basins that has natural stands of the *Mauritia flexuosa* palm. The sweet, yellow fruit of the palm is harvested throughout the Peruvian Amazon for subsistence and commercial purposes, often by cutting down the tree. "What we found is that 73 percent of the peatlands in the area were degraded, largely due to the unsustainable harvesting of *Mauritia flexuosa* fruits," said the scientist.

Erik Lilleskov, a researcher with the U.S. Department of Agriculture U.S. Forest Service, agreed with Hergoualc'h on the importance of better mapping peatlands, noting they are the most carbon-dense ecosystems globally. "Their degradation is a really big deal, given that their carbon stock rivals what is in the atmosphere and they can continue accumulating carbon for millennia," said Lilleskov, who participates in the Sustainable Wetlands Adaptation and Mitigation Program (SWAMP) alongside CIFOR. SWAMP's work involves exploring one of the least known types of peatlands. "Until the last few years, tropical mountain peatlands were hidden in plain sight because they did not fit the same search image as lowland peatlands, so they did not even show up in global mapping efforts or national maps," Lilleskov said. The program's research in Colombia, Ecuador and Peru has demonstrated that tropical mountain peatlands are much more widespread than previously thought, and that they store several times more carbon per unit area than rainforests, achieving depths of up to 11 meters.

Monica Maldonado studying bofedales peatlands in the Peruvian Andes. Photo: Hans Joosten.

Andean mountain peatlands provide pasture, farmland, and clean water for millions of people in the region, but they are under pressure from such practices as ditching and overgrazing. Hence the importance of developing accurate national peatland maps as a basis for better policies in the region, emphasized Lilleskov.

National research centers are playing an important role in furthering the understanding of peatlands; raising awareness of their importance among policy-makers, and fostering community engagement. In Colombia, for instance, the Biological Resources Institute Alexander von Humboldt has produced the first map of the country's non-coastal wetlands, noted former Director Brigitte Baptiste. The study, conducted in collaboration with 17 universities and regional institutions, revealed that wetlands make up almost one third of Colombia's inland territories — 27 million hectares as opposed to the 3 million accounted for in the previous national inventory.

The new data is unlocking a number of other research and management initiatives, including restoration of flood plains and the declaration of certain swamps as protected areas. “The scientific evidence and discussions with the Colombian Government (that resulted in the new map) have really provided a new source for decision-making,” said Baptiste. Another example is the Research Institute of the Peruvian Amazon (IIAP). The institution is promoting the sustainable harvesting of the *Mauritia flexuosa* palms in the largest peatland in South America, the Pastaza-Marañón basin, while studying the drivers of peat accumulation in palm swamp forests.

Mauritia flexuosa *in Brazilian Amazonia. Photo: Hans Joosten.*

“Our interdisciplinary research is raising the profile of peatlands among decision-makers and other stakeholders,” said IIAP expert Jhon del Águila Pasquel, noting the economic and cultural importance of these ecosystems. “Research is important because we knew there was a problem, but did not have the evidence to inform decision-makers,” he explained.

For Biodiversity director with the Peruvian Ministry of Environment José Álvarez another critical issue is communicating scientific evidence to decision-makers in a way that is understandable and actionable: “We scientists often have the data, but need to get better at making sure it reaches the right person at the right time.” Álvarez highlighted the importance of involving communities, not only in resource management, but in all planning and decision-making around national ecosystems. “We need a joint effort by local actors and the authorities at various governance levels,” he said.

Peatlands store large amounts of carbon, but are not always included in national climate change strategies. Panelists mentioned a number of reasons beyond poor political will: the lack of national peatland maps, adequate political institutions and regulations, and adequate ways of financing the preservation and restoration of wetlands are some of them. Other challenges are specific to each country. In Colombia, for instance, all wetlands are public property but, in the past two centuries, significant portions ended up in the hands of private owners. “One of the first duties of the government is to reclaim the ownership and management of these wetlands as mandated by the Constitution,” said Baptiste.

The sustainable management of peatlands is a pressing challenge, especially in the face of climate and land use change. Peatlands in the region are under pressure from large-scale infrastructures, urbanization as well as illegal mining and encroachment by agribusinesses.

Hergoualc’h pointed out that stopping the loss of peatlands is about fixing governance and getting the incentives right. “The key lessons on how to adequately manage a resource are always the same: Understand the drivers and the incentives that generate the current behavior; understand the vested interests in the ‘status quo’; and

identify tradeoffs so they can be managed," she said. For Álvarez and Baptiste, it is important to foster economic activities that are sustainable from an environmental and a social perspective and cater to a global market of conscious consumers. Deforestation-free supply chains for cosmetics and foodstuffs and ecotourism are two of the possibilities they mentioned.

Another vital aspect highlighted by several panelists was awareness. Lilleskov noted that valuing wetlands requires an understanding of their ecological and economic value when left intact: "People need to better understand their value to support their protection."

- http://www.foreststreesagroforestry.org/news-article/peatlands-in-south-america-an-asset-in-climate-action-efforts/
- https://forestsnews.cifor.org/63213/sudamerica-el-manejo-sostenible-de-las-turberas-es-un-desafio-a-resolver-con-urgencia?fnl=es

High-Andean peatland in Chingaza National Park, Colombia. Photo: Hans Joosten.

Peatland conservation relevant papers Nov. 2019 – Jan. 2020.

Collected by Hans Joosten: joosten@uni-greifswald.de

1. Contribution of the land sector to a 1.5 °C world: https://www.nature.com/articles/s41558-019-0591-9
2. Re-assessment of phosphorus availability in fens with varying contents of iron and calcium: https://link.springer.com/article/10.1007/s11104-019-04241-4
3. Weakening of the 'enzymatic latch' mechanism following long-term fertilization in a minerotrophic peatland: https://www.sciencedirect.com/science/article/abs/pii/S003807171930183X
4. Unraveling the importance of polyphenols for microbial carbon mineralization in rewetted riparian peatlands: https://www.frontiersin.org/articles/10.3389/fenvs.2019.00147/full
5. Evaluating restoration success of rewetted peatlands: Recovery potential, temporal dynamics and comparison of monitoring approaches: https://mediatum.ub.tum.de/doc/1484578/1484578.pdf
6. Tropical forest and peatland conservation in Indonesia: Challenges and directions: https://besjournals.onlinelibrary.wiley.com/doi/full/10.1002/pan3.10060
7. Exploration of the importance of physical properties of Indonesian peatlands to assess critical groundwater table depths, associated drought and fire hazard: https://www.sciencedirect.com/science/article/pii/S0016706118313338
8. Patterns and drivers in spring and autumn phenology differ above- and belowground in four ecosystems under the same macroclimatic conditions: https://link.springer.com/article/10.1007/s11104-019-04300-w
9. Protecting Patagonian peatlands in Chile: https://science.sciencemag.org/content/366/6470/1207

10. No support for carbon storage of >1000 GtC in northern peatlands: https://eartharxiv.org/hynm7/
11. Concept Note on "Responsible Management of Tropical Peatland": https://www.jica.go.jp/english/news/field/.../20191202_01_02.pdf
12. Perpetual haze: Pulp production, peatlands, and the future of fire risk in Indonesia: https://auriga.or.id/wp-content/uploads/2019/11/Perpetual-Haze.pdf
13. Land use-driven historical soil carbon losses in Swiss peatlands: https://link.springer.com/article/10.1007%2Fs10980-019-00941-5
14. An increase in methane emissions from tropical Africa between 2010 and 2016 inferred from satellite data: https://www.atmos-chem-phys.net/19/14721/2019/
15. The Cape Wetland Restionaceae of New Years Peak under a changing climate: https://www.preprints.org/manuscript/201912.0008/v1
16. Paludiculture: can it be a trade-off between ecology and economic benefit on peatland restoration?: https://iopscience.iop.org/article/10.1088/1755-1315/394/1/012061
17. Preservation and recovery of mangrove ecosystem carbon stocks in abandoned shrimp ponds: https://www.nature.com/articles/s41598-019-54893-6
18. Synchronous growth releases in peatland pine chronologies as an indicator for regional climate dynamics — A multi-site study including Estonia, Belarus and Sweden: https://www.mdpi.com/1999-4907/10/12/1097
19. De toekomst van ons veenweidelandschap: over vernatten, optoppen en veenmosteelt: https://www.landschap.nl/wp-content/uploads/2019-3_Smolders-etal.pdf
20. From bog to fen: palaeoecological reconstruction of the development of a calcareous spring fen on Saaremaa, Estonia: https://link.springer.com/article/10.1007%2Fs00334-019-00748-z
21. Biological nitrogen fixation in peatlands: Comparison between acetylene reduction assay and $^{15}N_2$ assimilation methods: https://www.sciencedirect.com/science/article/abs/pii/S0038071719300112?via%3Dihub
22. Road crossings increase methane emissions from adjacent peatland: https://agupubs.onlinelibrary.wiley.com/doi/abs/10.1029/2019JG005246
23. A multiscale productivity assessment of high Andean peatlands across the Chilean altiplano using 31 years of Landsat imagery: https://www.mdpi.com/2072-4292/11/24/2955/pdf
24. The effect of mixing peatland burning remains as fly ash and peat soil on its California Bearing Ratio value: https://iopscience.iop.org/article/10.1088/1757-899X/673/1/012025
25. Precession-scale climate forcing of peatland wildfires during the early middle Jurassic greenhouse period: https://www.sciencedirect.com/science/article/pii/S0921818119305363?dgcid=raven_sd_via_email
26. Controls of *Sphagnum* growth and the role of winter: https://esj-journals.onlinelibrary.wiley.com/doi/full/10.1111/1440-1703.12074
27. The effects of winter stress on *Sphagnum* species with contrasting macro- and microdistributions: https://www.tandfonline.com/doi/full/10.1080/03736687.2019.1626167
28. Reviews and syntheses: Greenhouse gas exchange data from drained organic forest soils – a review of current approaches and recommendations for future research: https://www.biogeosciences.net/16/4687/2019/bg-16-4687-2019-discussion.html
29. Upwind forests: managing moisture recycling for nature-based resilience: https://www.researchgate.net/publication/337840349_Upwind_forests_managing_moisture_recycling_for_nature-based_resilience
30. Peatlands: the challenge of mapping the world's invisible stores of carbon and water: http://www.fao.org/documents/card/en/c/ca6842en
31. Carbon dioxide fluxes and vegetation structure in rewetted and pristine peatlands in Finland and Estonia: http://www.borenv.net/BER/pdfs/ber24/ber24-243-261.pdf
32. Sustainable peatland management in Indonesia:Towards better understanding of socio-ecological dynamics in tropical peatland management: https://edepot.wur.nl/499309
33. Assessing the health impacts of peatland fires: a case study for Central Kalimantan, Indonesia: https://link.springer.com/article/10.1007/s11356-019-06264-x
34. Recovery of the CO_2 sink in a remnant peatland following water table lowering: https://www.sciencedirect.com/science/article/pii/S0048969719346042
35. Interactions between labile carbon, temperature and land use regulate carbon di oxide and methane production in tropical peat: https://link.springer.com/article/10.1007/s10533-019-00632-y
36. Which practices co-deliver food security, climate change mitigation and adaptation, and combat land-degradation and desertification?: https://onlinelibrary.wiley.com/doi/full/10.1111/gcb.14878
37. Open digital mapping for accurate assessment of tropical peatlands: https://www.researchgate.net/publication/337572197_Open_digital_mapping_for_accurate_assessment_of_tropical_peatlands

38. 14 kyr of atmospheric mineral dust deposition in north-eastern China: A record of palaeoclimatic and palaeoenvironmental changes in the Chinese dust source regions: https://journals.sagepub.com/doi/abs/10.1177/0959683619892661
39. Gradually increasing forest fire activity during the Holocene in the northern Ural region (Komi Republic, Russia): https://journals.sagepub.com/doi/full/10.1177/0959683619865593
40. Self-facilitation and negative species interactions could drive microscale vegetation mosaic in a floating fen: https://onlinelibrary.wiley.com/doi/abs/10.1111/jvs.12851
41. Assessment of agricultural activity on drained organic soils: http://www.epa.ie/pubs/reports/research/climate/Research_Report_299.pdf
42. Tropical forest and peatland conservation in Indonesia: Challenges and directions: http://researchonline.ljmu.ac.uk/id/eprint/11808/1/Harrison%20et%20al%202019%20Tropical%20for%20and%20PSF%20consn%20Indonesia%20-%20challenges%20and%20directions.pdf
43. Impact of peatland restoration on soil microbial activity and nematode communities: https://link.springer.com/article/10.1007%2Fs13157-019-01214-2
44. Comparison of soil hydraulic properties estimated from steady-state experiments and transient field observations through simulating soil moisture in regenerated *Sphagnum* moss: https://www.sciencedirect.com/science/article/pii/S0022169419312247
45. Productive lowland peatlands: https://www.iucn-uk-peatlandprogramme.org/sites/default/files/2019-11/COIFens_ProductiveLowlandPeatland.pdf
46. Peatland science and conservation: Contributions of the Greifswald Mire Centre, Germany: https://link.springer.com/chapter/10.1007/978-3-030-30069-2_28
47. Climates of the last three interglacials in subtropical eastern Australia inferred from wetland sediment geochemistry: https://www.sciencedirect.com/science/article/abs/pii/S0031018219307503
48. Postglacial floral and climate changes in southeastern China recorded by distributions of n-alkan-2-ones in the Dahu sediment-peat sequence: https://www.sciencedirect.com/science/article/abs/pii/S0031018219307497
49. A multi-proxy analysis of hydroclimate trends in an ombrotrophic bog over the last millennium in the Eastern Carpathians of Romania: https://www.sciencedirect.com/science/article/abs/pii/S0031018219302445
50. Linking Holocene vegetation dynamics, palaeoclimate variability and depositional patterns in coastal successions: Insights from the Po Delta plain of northern Italy: https://www.sciencedirect.com/science/article/abs/pii/S0031018219307023
51. Peat brGDGTs-based Holocene temperature history of the Altai Mountains in arid Central Asia: https://www.sciencedirect.com/science/article/abs/pii/S0031018219307242
52. Wetlandscape size thresholds for ecosystem service delivery: Evidence from the Norrström drainage basin, Sweden: https://www.sciencedirect.com/science/article/pii/S0048969719354452
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