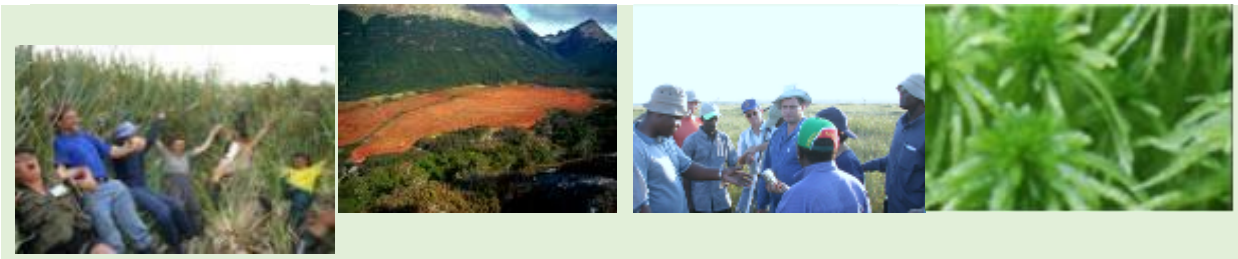


IMCG Bulletin: June 2017

Word from the Secretary-General

INTERNATIONAL MIRE CONSERVATION GROUP

www.imcg.net

Dear mire friends

Summer in the northern hemisphere: a phenomenon enabling IMCG its first Arctic Field Symposium. A good opportunity to cool off from the burning issues in the tropical parts of our world. This bulletin informs on recent developments from all over the world to support you in your own peatland conservation activities under the motto "readership allows leadership". So keep on sharing your ideas and experiences with your fellow-IMCGers by sending news, photographs and other contributions for the July Bulletin by August, 5, 2017 (when I will be freshly back from the Russian Arctic) to Hans Joosten at joosten@uni-greifswald.de.

IMCG News

Mires and Peat: higher impact factor!
Find the journal online at http://mires-and-peat.net/. No new papers were published in June 2017 (there will be some in July!), but the Impact Factor of the journal has been raised from 1.095 to 1.129, i.e. again an increase. This year, for the first time, a 5-years impact factor has also been determined, which is 1.956. The higher latter value, together with the cited half-life of 5.6 years (meaning that half of the cited papers of Mires-and-Peat are older than 5.6 years), shows that the journal publishes papers that remain topical for many years.
Send your new manuscripts on any topic relating to mires, peatlands and peat to the Editor-in-Chief Olivia Bragg: o.m.bragg@dundee.ac.uk

News from the regions

Global

Preparations for the Post-2020 Biodiversity Framework
The 15th meeting of the Conference of the Parties (COP) of the Convention on Biological Diversity (CBD) in 2020 is expected to update the Convention's current Strategic Plan for Biodiversity 2011-2020 and to assess progress in achieving its goals and the Aichi Biodiversity Targets. In Cancun last December, the 13th COP requested the Executive Secretary to prepare a proposal for a comprehensive and participatory preparatory process and timetable for that purpose (decision XIII/1, para. 34). Through notification 2017-052 Parties, other Governments, relevant organizations and indigenous peoples and local communities are now invited to provide comments and inputs to this process by **15 September 2017** by e-mail to secretariat@cbd.int. The note Approaches for the Preparation of the Post-2020 Biodiversity Framework provides an overview of some of the issues to be taken into account to facilitate initial comments and inputs from Parties and observers. The preparatory process for the Strategic Plan for Biodiversity 2011-2020 is summarized in the consultation note. The document includes a list of inputs from Parties and others, which are also summarized in a note available here. Further information and resources on the process are available on the CBD website.

IPS Annual report 2016

In its Annual report 2016 (http://www.peatsociety.org/sites/default/files/annualreport2017small.pdf) the International Peatland Society celebrates its 15th International Congress "Peatlands in Harmony" in Kuching with the words: "Content-wise, the event emphasized the increasing importance of a holistic view of peatlands, although much work is still necessary to gain a truly balanced understanding of their role in economy, environment and society." "The Congress … also received considerable media attention. However, all members were once more reminded that there is still much to do to truly achieve "wise use" and responsible management of peatlands worldwide."

It is, perhaps, forgivable, that IPS - in its global naivity - danced the tune of the Malaysian oil palm industry during the Congress. But it is a sign of bad taste that - after many peatland scientists, including the new president and many other members of IPS, did protest against the 'strategy of denial' broadcasted at the meeting (see http://onlinelibrary.wiley.com/doi/10.1111/gcb.13516/full), IPS in its annual report proudly presents the bone of contention in a picture of the opening ceremony (see below): it is oil palm, and nothing else, that in recent years has given the death stroke to almost all peatlands in Malaysia, including the most valuable ones (see also the picture on page 16 of this Bulletin).

Opening of the International Peat Congress in Kuching 2016 with children, government officials, and young oil palm plants. Left: Congress General Lulie Melling and IPS President 2012-2016 Björn Hånell. (Photo: IPC 2016)

Peatland thawing will unchain two gases much worse than carbon dioxide

There are around 1 million km^2 of permafrost peatlands on Earth and they store approximately 20 per cent of the total permafrost carbon stock which is predicted to thaw this century. Thawing of Arctic permafrost peatlands could release so much methane and nitrous oxide that our planet might never recover. Carbon will be release in the forms of carbon dioxide gas and the more dangerous greenhouse gas methane. Peatlands are likely to be water-logged following thaw, the very conditions that promote methane release. A new study, published in *Nature Climate Change*, measured rates of methane production from thawing peatlands in the boreal region of northern Canada. Permafrost thaw in these ecosystems results in the formation of wetlands that can be major sources of methane. However, contrary to expectations, it was demonstrated that very little of the methane released was derived from the decomposition of ancient plant material that was previously stored in permafrost. Most methane comes from decay of the new vegetation from the recently thawed top layers. Dr Iain Hartley, from the University of Exeter said: "To identify the most important factors controlling the effects of permafrost thaw on methane fluxes, it is really important to understand what the main source of the methane being released is. In the peatlands that we studied, the limited contribution of previously frozen

carbon to the methane fluxes, tells us that near-surface water-table dynamics and the productivity of the current vegetation is likely to be the key to driving fluxes in these systems." "For this reason, we need to improve our abilities to monitor and predict future changes in wetland extent." Professor Mathew Williams, from the University of Edinburgh and leader of the overall project, added "There are developing opportunities to use satellites to monitor wetland extent and its changes over time. However, predicting the location and timing of thaw in permafrost regions - and hence the development of wetlands - remains a challenge. Thaw is linked to rising temperatures, but, because vegetation and soils insulate permafrost, predictions also have to take account of climate change effects on vegetation. Professor Julian Murton from the University of Sussex said: "As warming of high-latitude forest and tundra regions is expected to continue in the 21st century, widespread thaw of near-surface, ice-rich permafrost is anticipated. Some areas of permafrost will get wetter on the surface, others drier. Distinguishing between such areas is important to modelling of greenhouse gas emissions."

- http://www.natureworldnews.com/articles/38647/20170628/permafrost-peatlands-methane-greenhouse-gases.htm
- https://phys.org/news/2017-06-wetland-extent-climate.html#jCp

Local permafrost thawing and wetland expansion in the Indigirka lowlands (NE Siberia). Photo: Hans Joosten.

Asia

Slowly oxidizing peat releases as much carbon as burning

Peat oxidation in the west of insular Southeast Asia has resulted in the release of 2.5 gigatonnes of carbon since 1990, according to researchers in Singapore, the Netherlands and the UK. Although Jukka Miettinen of the National University of Singapore believes the estimates are "not surprising", they should draw attention to the contribution of peatland oxidation to global greenhouse-gas emissions. "The constantly occurring peat oxidation emissions should not be forgotten," he said. "They may not have attracted as much attention as the highly publicized peatland fire emissions, but overall the two sources have been comparable in magnitude over the past decade." Tropical peatlands have turned from being a carbon sink to a carbon source as they are either burned or drained – the latter allowing the peat to decompose, oxidize and release carbon dioxide. Quantifying the levels of carbon emissions has not been an easy task. Gas fluxes from peatlands are affected by various factors, from the level of the water table to the types of fertilizer present in the environment. Accurate estimates require long-term field studies. In 2014, the Intergovernmental Panel on Climate Change synthesized

the results from field-emission studies of tropical peatlands. Miettinen and colleagues used this synthesis in conjunction with an updated land-cover map to revise peatland emissions in the western part of insular Southeast Asia. The researchers found that cumulative carbon emissions since 1990 were of the order of 2.5 gigatonnes, with 2015 emissions at around 146 megatonnes per year. Industrial plantations were responsible for 44% of the emissions, while small-holders were responsible for 34%, meaning that 78% in total were from managed land cover. "The estimates published in our paper are somewhat lower than earlier estimates, which resulted from conservative IPCC emission factors, but they are within a broad range estimated earlier," said Miettinen. Miettinen added that one reason peat fires receive more attention is that they are highly visible, generating lots of smog. But there have been positive developments in policy-making circles. "The countries in the region are increasingly considering measures to reduce their peat-derived carbon emissions," he said, "including the protection and rehabilitation of remaining peat swamp forests, and the implementation of best-practice water management in drained peatlands." From carbon sink to carbon source: extensive peat oxidation in insular Southeast Asia since 1990 Jukka Miettinen *et al* 2017 *Environ. Res. Lett. 12* 024014

Peatland agriculture in Central Kalimantan (EMRP, Block C): Picturesque, but from a climate point of view as bad as catastrophic fires. (Photo: Hans Joosten)

China

Rapidly growing demand for peat in China

Quoted from the IPS Annual report 2016

"China is a country with a large population and experiencing rapid economic development. Itis one of the primary markets for peat and coir in the world given that food safety and environmental conservation are at the core of China's national strategy. According to an analysis report issued by the Chinese National Committee (NC) of the IPS, China's gross peat demand in the next 10 years will reach 50 million m^3 per year. However, China's peat market is difficult to invest in at moment due to peat resource shortages and inappropriate public awareness. Shortages concerning the availability and type of peat resources have forced China to import sphagnum peat and coconut coir involving with long-distance transportation. Meanwhile, the lack of public awareness explains the need for the government's severe policy towards the extraction and use of peat resources. Therefore, it is very important to set up and implement an overarching development strategy for the

peat industry of China, including a resource allocation strategy, a public awareness strategy, a technical strategy and a product strategy. The global resource allocation strategy is one of the Chinese peat industry's strategies. As more sphagnum peat and coconut coir are needed in order to use domestic sedge peat and agricultural residues, China has declared, at the 15th International Peatland Congress, that it will import 50 million m^3 of peat and coir from the international peat market. An increasing number of foreign companies has contacted the Chinese NC [IPS National Committee] concerning cooperation on peat resources, while more than 30 of them sent their representatives to China at the end of last year. The Chinese NC has also been appealing to the central government to decrease the customs tax for peat and coir, with some success, as the customs tax for coir has decreased significantly this year."

Sedge peat extraction site in Jilin, NE China. Photo: Hans Joosten.

"Raising public awareness is important for the development of China's peat industry. Due to a lack of appropriate public awareness, peat extraction is prohibited in China, while peat use in horticulture is discouraged by the government. Meanwhile, most professional and amateur users fail to recognize the advantages offered by peat and peat products. In order to modify the government's conservative policy towards peat resource management and to increase knowledge of peat and peat products among all users, the Chinese NC has launched an awareness campaign via its public profile on the WeChat social media platform, as well as produced a series of science papers for lay publications. The WeChat public profile, which was set up in 2016, now has over 1,000 followers including high-ranking government officials. The Chinese NC also set up a WeChat group in 2016, in which more than 440 followers can participate in discussions about the peat industry via their mobile phone. A total of six articles on the peat industry and peatland management were published in magazines and newspapers last year. The technology strategy for China's peat industry is in three parts: introduction, following and innovation. The Chinese NC has introduced a wet agent produced by Turf Tech International, while a Chinese company has been selected to promote this product in China's marketplace. China has also imported two growing media production lines from Canada and Europe. Furthermore, China is going to organize a programme for appropriate delegates to visit and learn from peat industry companies in Europe. The Chinese NC has also invited a Canada environmental conservation team to China in order to restore an area of wetland that has been cut off from peatland. In addition, a national demonstration site for wetland restoration has been set up. The Chinese NC is a new member of the IPS family, whose knowledge

about the peat industry and international cooperation skills are still limited. As such, China is learning from other countries in order to reach international technical levels after three to five years, as well as developing innovative approaches to peat products and production technology."
http://www.peatsociety.org/sites/default/files/annualreport2017small.pdf

Indonesia

Palm oil companies join NGOs to save 10,000 Borneo orangutans

Some of the world's largest palm oil companies have joined forces with non-governmental organisations (NGOs) to launch an initiative to help prevent the extinction of orangutans, which has come under extreme pressure due to the aggressive expansion of the palm oil sector in Indonesia and Malaysia. Called the Palm Oil & NGO (PONGO) Alliance, its members include palm oil giants such as Musim Mas, Wilmar and Sime Darby, and numerous wildlife conservation NGOs such as Orangutan Land Trust, International Animal Rescue and Borneo Futures. The PONGO Alliance - named after the genus Pongo in which orangutans are classified - is seeking to save 10,000 of the animals in Borneo, where the population has more than halved over the last 50 years. Endemic to the rainforests of Borneo and Sumatra, orangutans have served as the lightning rod for criticism of the palm oil sector, particularly in Europe, a huge market for the world's most widely used vegetable oil. In the United Kingdom in 2008, Greenpeace activists dressed up as the apes in protest outside the headquarters of consumer goods giant Unilever, which was linked to sourcing "conflict palm oil" responsible for the destruction of vast swatches of Indonesian rainforest. That campaign led to a change in Unilever's palm oil sourcing policy that has since prompted other big buyers to follow suit.

Orangutans are classified as critically endangered, with only around 54,000 individuals left in Borneo. Their decline is a consequence of unsustainable practices in agriculture, poaching and the illegal wildlife trade. This keystone species plays a critical role in seed dispersal, and is vital to maintain the health of the forest ecosystem. This in turn benefits communities that depend on the forests. Habitat loss poses the largest threat to orangutans. The use of slash-and-burn forestry practices by the palm oil industry has been a particular source of habitat destruction, especially the draining of peatland which creates a highly flammable environment that can lead to uncontrollable forest fires and huge bouts of haze.

The PONGO Alliance officially launched on June 13, 2017, at the Roundtable on Sustainable Palm Oil (RSPO) conference. Notably, the PONGO Alliance is targeting orangutan populations outside of palm oil companies' own concession areas, as orangutans tend to roam across large areas. There are various obstacles to the PONGO project, however, as Bornean orangutans are more solitary than their Sumatran cousins, and their mating cycles are slow. According to the World Wide Fund for Nature, Bornean Orangutans usually give birth to a single baby, and only every five years at the most frequent. Another issue is the increasing fragmentation of orangutan populations, as deforestation destroys more of their habitat, making it harder for their populations to recuperate. The PONGO Alliance will be working towards creating wildlife corridors to join isolated patches of forest, to enable fragmented orangutan populations to breed, Carolyn Lim, corporate communications manager at Musim Mas, told Eco-Business. "As an industry we need to do something to stop this iconic species from declining - and save the skin of our industry."
http://www.eco-business.com/news/palm-oil-companies-join-ngos-to-save-10000-borneo-orangutans/

Wetlands International Indonesia launches the Indonesian Peatlands Partnership Fund

Yani Saloh, Fund Manager (ysaloh@wetlands.or.id)

In response to peatland fires in 2015, the government in 2016 pledged to restore 2 million hectares of Indonesia's peatlands by 2020 under the coordination of Peatland Restoration Agency BRG. Restoration of two million hectares of peatland, using conservative estimates, would result in 146 million tons of CO_2 per year not being emitted. Restoration means blocking human-made drainage canals to raise the water table and to re-create anaerobic conditions. This will keep the carbon locked up as well as create the right hydrological conditions for peatland adapted species to be re-established.

BRG has three restoration approaches: rewetting (through canal blocking and canal backfilling); revegetation of bare peat (nursery development, seedling and transplantation) and revitalization of local livelihoods (zero burning agriculture, paludiculture, fishery, ecotourism, animal husbandry and beekeeping, etc.). Beyond climate benefits, restored peatlands would also improve local livelihoods as they are an important source of

food, water and biodiversity for millions of rural people. These are the same people that suffer first and most from the annual fire and haze problem — in large part caused by the burning of drained peatlands.

However, restoring peatlands is not cheap. The World Bank estimates that financing Indonesia's peat restoration target to rehabilitate 2 million hectares would cost approximately Rp 27 trillion ($2 billion). In 2017 the Indonesian government allocated Rp 860 billion from the state budget to work on 400,000 ha. This is only 12.5 percent of what is required. So how to fill the gap? It is not all about money — even with unlimited funds, the government cannot succeed in isolation. A key part of the solution is intense coordination, effort and cooperation between all stakeholders; national and local governments, the private sector, civil society organizations and last but not least, peatland communities. Plenty of constructive meetings recently have identified why peatlands matter, how to help and what research is needed to solve the problem. That's great. But we have to remember the aim of argument and discussion is not victory, but progress. And we must start making progress now. There are three elements required for success.

Purun harvest in Central Kalimantan, Indonesia. Photo: Hans Joosten

Firstly, it is critical for all stakeholders to get behind BRG in its efforts. This is of interest not only to environmentalists, those concerned with social development and rural livelihoods should see this as a great opportunity too. And so should the city dwellers who are perennially engulfed in haze.

Secondly, protect all remaining peat swamp forests and facilitate and support agricultural practices on rewetted (non-drained) peatlands. Paludiculture is the cultivation of plant species that are adapted to wet peatland conditions and have economic value. Examples of paludiculture are sago for the production of noodles, purun grass for handicrafts, tengkawang, which produces edible oil, jelutung, which produces natural rubber and rattan for basketry and furniture. Some communities have practiced paludiculture for centuries. These practices should be reinforced, studied and promoted among other communities and civil society organizations by learning and knowledge exchanges. With this local wisdom, improving peatland productivity can be leveraged, whilst helping to reduce fire risks and GHG emissions.

Thirdly, construct partnerships between communities and concession holders. Of 2.49 million hectares of degraded peatland assigned for restoration by BRG, 1.4 million ha is under concession so collaboration between neighbouring land-users is critical.

A small grants program for community-based peatland conservation, restoration and sustainable development, recently launched by Wetlands International, aims to support government restoration efforts by facilitating

partnerships and promoting paludiculture. In addition to granting money to local groups, the program will provide training to improve the managerial and technical capacity of local communities. This will improve management practices in peatland areas, project and financial management, monitoring and evaluation and raise further awareness about good peatland management. With the right skills and financial support, communities can achieve the main objectives for community-based peatlands conservation, restoration and sustainable development, complementing the larger scale efforts of the government.

The Environment and Forestry Ministry states that around 1 million hectares of peatland in BRG priority areas could be utilized for the welfare of communities. Environmental partnerships are needed to unlock this potential by fostering community livelihoods in line with sustainable peatland-based economic activities. A blend of traditional and modern science, community-based peatland conservation, and landscape level partnerships, supported technically and financially, is what is needed to deliver measurable change — lower emissions and higher productivity from Indonesia peatlands. This will help us all breathe a bit easier, while also helping Indonesia to achieve its emission reduction commitments globally.

- https://www.pressreader.com/indonesia/the-jakarta-post/20170623/281706909683434
- https://indonesia.wetlands.org/news/press-release-wetlands-international-indonesia-launches-a-new-initiative-the-indonesian-peatlands-partnership-fund-a-small-grants-programme-to-support-community-based-peatland-conservation-restora/

Handicrafts sales booth in Central Kalimantan. Photo: Hans Joosten.

Peatland restoration monitoring online

The World Resources Institute (WRI) Indonesia, together with other environmental organisations like the Madani Foundation for Sustainability, has recently launched the www.pantaugambut.id website. The pages are planned to contain WRI's analysis of the government's commitment to restore 2 million hectares of peatland by 2020. Several regulations and attempts, both by central and regional administrations, have been done to fulfill this target so far, including a moratorium on the issuance of permits for primary forests and peatland in 2015. The website will also provide space to share stories, personal experiences, and ideas about peatland restoration, as well as a map of peatlands and the restoration projects. Peatland mapping continues to be one of the problems hindering restoration efforts. See www.wri-indonesia.org/en/our-work/project/pantau-gambut for more information. *(*

Wildfires' 'killer haze' tracked with Twitter as it spreads

To help it keep on top of active fires and save lives, the Indonesian government is trying out a tool that monitors references to haze on social media. Called Haze Gazer, the tool taps Twitter data to reveal where haze hotspots are – as well as how locals respond to government-issued evacuation notices. The software was built by a team from the University of Kassel in Germany and the United Nations Global Pulse office in Jakarta. Global Pulse is a programme set up to use big data for humanitarian ends. The government previously had no way to track citizen's movements in real time. "They asked what kind of information is available," says Jong Gun Lee at Pulse Lab Jakarta. The team suggested looking at Twitter because Indonesia has the fifth-largest number of Twitter users in the world, producing 4.1 billion tweets in 2016.

To test whether Twitter could be used to monitor wildfire haze, the researchers analysed 29 million tweets posted in 2014 by more than 575,000 people from the Indonesian island of Sumatra – about 1 per cent of the island's population. Using geolocation data attached to tweets with hashtags mentioning the haze, the team was able to map hotspots as they appeared. During peatland fires, government sensors on the ground monitor the air quality in local areas. Lee says data from the tweets matched up with readings from the sensors. The tweets also revealed people's movements. When air quality gets especially bad, authorities issue evacuation notices via television, radio and SMS. Haze Gazer can reveal whether people are acting on that advice. "When we looked at mobility patterns together with air quality we could see people leaving bad air quality areas," says Lee. Using tweets to check if people are moving after an evacuation notice could be useful, says David Jones, CEO of Rescue Global, a non-profit NGO working in disaster risk reduction and response. But, he thinks it is important to be aware of the limitations of Twitter data. It would be risky to place too much trust in it.
https://www.newscientist.com/article/2139177-wildfires-killer-haze-tracked-with-twitter-as-it-spreads/

After the fire (Kalimantan). Photo: Hans Joosten.

Unilever suspends sourcing from Indonesian palm oil supplier

Global consumer goods firm Unilever has suspended sourcing from an Indonesian-based palm oil supplier which was found to be in breach of policy on deforestation and peatland clearance. Ongoing deforestation and peatland clearance by Sawit Sumbermas Sarana (SSMS) and its subsidiaries was demonstrated through satellite images in a recent investigation by Chain Reaction Research. The study found that Unilever's ongoing trading with SSMS might damage its sustainability reputation. As such, Unilever has joined the ranks of Wilmar International, Apical and Golden Agri-Resources (GAR) in suspending trading with SSMS. Unilever has confirmed it will not resume sourcing palm oil products from SSMS until "clear progress" has been made on the

implementation of a remedial action plan. In the meantime, the Anglo-Dutch firm is actively engaging with SSMS and relevant NGOs and stakeholders to determine a way forward for SSMS to address the proven grievances.

- http://www.sustainablebrands.com/press/unilever_suspends_sourcing_indonesian_palm_oil_supplier_amid_deforestation_allegations
- https://seekingalpha.com/article/4084391-unilever-suspends-sourcing-sawit-sumbermas-sarana-deforestation

Oil palm fruit bunches supplied to the mill. Photo: Hans Joosten

Australia

Australia/Tasmania

Pollen studies confirm large age of buttongrass moorlands

Treeless vegetation has dominated landscapes of the Dove Lake area (Tasmania) since the Late Pleistocene, and models of landscape evolution that invoke late- Holocene replacement of a rain forest-dominated landscape by moorland have to be rejected. These are the conclusions of a study testing competing hypotheses about the timing and extent of Holocene landscape opening. Quantitative land-cover estimates were made using pollen records from sediments from Dove Lake, Tasmanian Wilderness World Heritage Area, Australia. Regional land-cover estimates for forest and non-forest plant taxa show persistent landscape openness throughout the Holocene (average landscape openness ~50%). Buttongrass (*Gymnoschoenus sphaerocephalus*), an indicator of moorland vegetation, showed higher values during the early Holocene (11.7–9 ka) and declined slightly through the mid-Holocene (9– 4.5 ka) during a phase of partial landscape afforestation, whereas rain forest cover reduced (from ~40% to ~20%) between 4.2 and 3.5 ka, likely in response to regional moisture decline. http://onlinelibrary.wiley.com/doi/10.1111/jbi.13040/abstract

Buttongrass moorland in Tasmania. (Photo: Hans Joosten)

Europe

EU invests €8.1 million to aid cross border environmental recovery

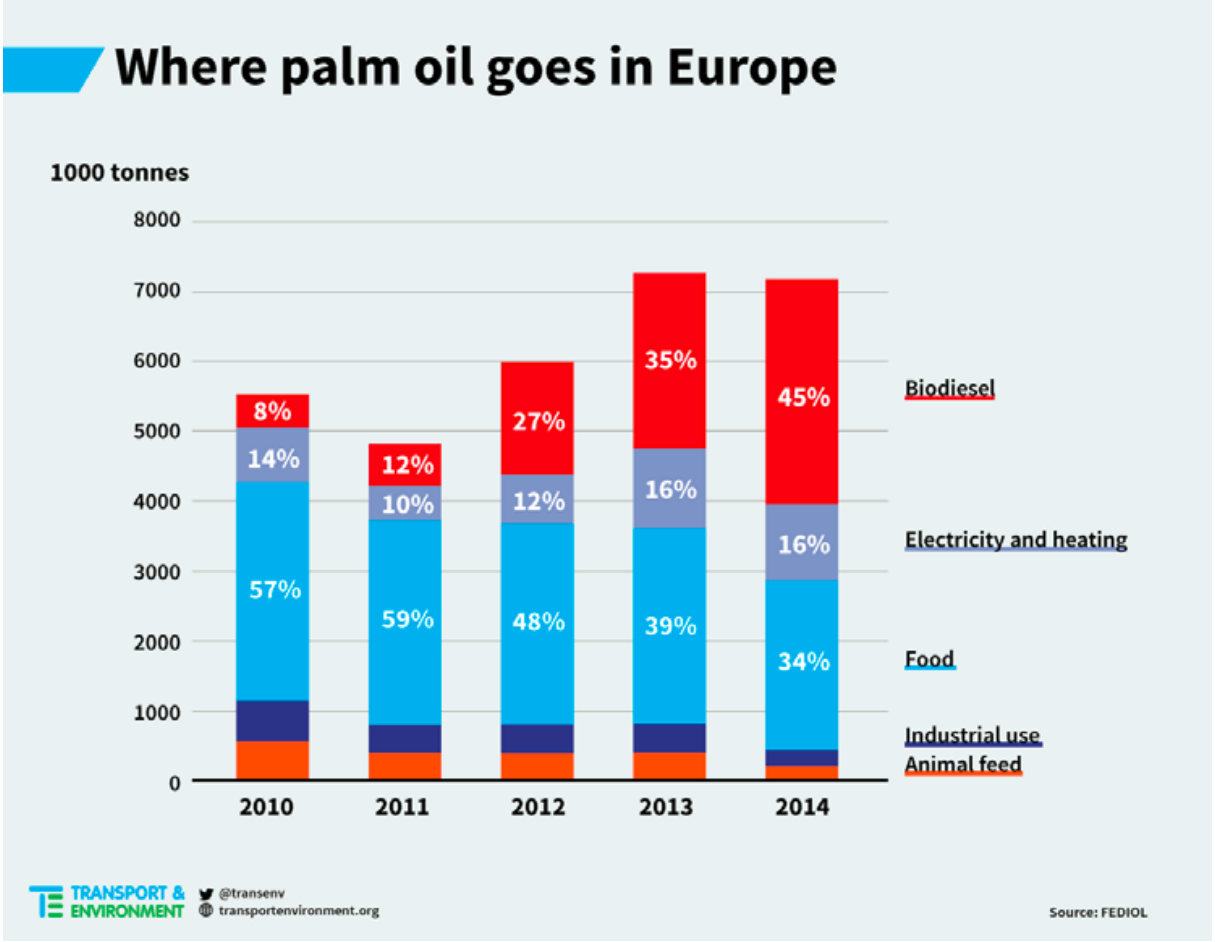
The Special EU Programmes Body has announced that a new cross border environmental project, called Collaborative Action for the Natural Network (CANN) is to receive €8.1 million of funding under the EU's INTERREG VA Programme. In the five year project CANN will help to improve the condition of protected habitats and priority species and restore natural habitats,within Northern Ireland, the border region of Ireland and Western Scotland. The protection of these habitats and species will allow the region to meet targets set under the EU's Birds and Habitats Directives along with realising the benefits from the many ecosystem services (e.g. carbon storage, alleviating flooding and visual and cultural landscapes) provided by these areas. In total, CANN will produce seven species action plans and 25 conservation action plans improving the conservation status of 3,150 hectares of land designated as being a Special Area of Conservation. The project will also deliver a series of education and outreach programmes to help increase awareness of local communities to potential value of natural habitats and endangered species. Match-funding for the project has been provided by the Department of Agriculture, Environment and Rural Affairs in Northern Ireland, the Department of Housing, Planning, Community and Local Government in Ireland along with Scottish Natural Heritage. http://www.farminglife.com/farming-news/eu-invests-8-1-million-to-aid-cross-border-environmental-recovery-1-7998962

Europe's contribution to deforestation set to rise despite pledge to halt it

Europe's contribution to global deforestation may rise by more than a quarter by 2030, despite a pledge to halt such practices by the end of this decade, according to a leaked draft EU analysis. Despite signing several international pledges to end deforestation by this decade's end, more than 5Mha of extra forest land will be needed annually by 2030 to meet EU demand for agricultural products, the EU study predicts. "It is hypocritical for Europe to portray itself as a climate leader while doing little to slow its own insatiable appetite for the fruits of destroyed forests." said Sebastian Risso, a spokesman for Greenpeace. Land clearances for crop, livestock and biofuel production are by far the biggest causes of deforestation, and Europe is the end destination for nearly a quarter of such products – beef, soy, palm oil and leather – which have been cultivated on illegally deforested lands. According to the draft EU feasibility study, which is meant to provide officials with policy

options, the "embodied" deforestation rate – which is directly linked to EU consumption – will increase from between 250,000-500,000ha in 2015 to 340,000-590,000ha in 2030. The figures do not encompass forest degradation or the impacts of lending by EU financial institutions. According to The Guardian, the report's methodology has also been criticised within the European commission, where some officials say that its projections are too conservative and do not account for European bioenergy demand. The EU has signed several pledges to halt deforestation by 2020 within accords that include: the UN Convention on Biological Diversity, the UN Sustainable Development Goals, the UN Forum on Forests, the New York Declaration on Forests, and the Amsterdam Declaration.
https://www.theguardian.com/environment/2017/jun/30/europes-contribution-to-deforestation-set-to-rise-despite-pledge-to-halt-it

Motorists are the top consumers of palm oil in Europe.
In 2015, 46 percent of all the palm oil used in the Europe Union ended up in the tanks of cars and trucks. By 2014, EU palm oil demand had reached 3.22 million metric tons, an increase of 2.76 million metrics tons since 2010. During the same period, EU consumption of soybean oil used for biodiesel contracted by 555,000 metric tons to 440,000 metric tons in 2014. This demonstrates growing demand for palm oil as a soybean oil substitute by refiners. At the same time, it is clear that EU demand for palm-oil based biofuels has driven deforestation and peatland conversion in SE Asia and elsewhere. The recent report, For Peat's Sake, found that biofuels may be worse for the environment than diesel, using direct and indirect emissions as a comparison metric. The report states: The latest analysis performed for the European Commission ascribes a carbon footprint to palm oil biodiesel that is almost three times higher than that of fossil diesel, due largely to its indirect land use change emissions. http://d5i6is0eze552.cloudfront.net/documents/Publikasjoner/Andre-rapporter/For-peats-sake-Climate-implications-of-palm_May2017.pdf?mtime=20170531170131



The use of palm oil in the EU.
https://www.transportenvironment.org/sites/te/files/publications/2016_05_TE_EU_vegetable_oil_biodiesel_market_FINAL_0_0.pdf

Large scale restoration of extracted peatlands is taking off in Estonia

Edgar Karofeld (edgar.karofeld@ut.ee)

Because of its large peatland area and long history of peat extraction, Estonia contains ca 9400 ha of abandoned extracted peatlands, most of which were abandoned without restoration during or shortly after the end of Soviet period at the beginning of 1990s. Because of their large area, deep drainage and lack of viable plant propagules, their spontaneous re-vegetation is very slow. Extracted peatlands have a large negative impact on the environment ranging from degradation of mire habitats threatened in European Union to high fire risk, fragmentation of natural habitats and huge emission of greenhouse gases. Drained and extracted peatlands are the second largest source of human-made GHG in Estonia after oil-shale exploitation and exceed emissions from traffic several times. Therefore, it is essential to restore peatlands after the end of peat extraction. So far big scale restorations by the Estonian State Forest Management Centre were carried out on the edges of drained peatlands and have focused on blocking of drainage ditches and tree removal. Restoration of extracted peatlands has been carried out on Hara, Viru and Rannu peatlands. Scientists from the University of Tartu restored experimentally an area in Tässi peatland to study the effect of several factors on restoration.
Thanks to support from the European Union Cohesion Fund measure "Reclamation of polluted areas and water bodies" activity "Reclamation of drained, exhausted and abandoned peat areas", large scale restoration of extracted peatlands will now take off in Estonia. The total budget for restoration is 5.8 million EUR, 85 % from EU and 15 % as co-financing from the State Forest Management Centre. The aim is to restore at least 2000 ha of extracted peatlands by 2023 by re-establishing the water regime and plant cover typical for mires and, from a longer perspective, also the functioning of mires including carbon fixation and peat accumulation. Priority is given to extracted peatlands located on or bordering protected areas and to milled extracted peatlands with poor ability for spontaneous re-vegetation and the greatest negative effect on the environment, although some block cut peat areas will also be restored.

Restoration site on the edge of Tässi peatland in Central Estonia (abandoned in the middle of 1980-s) a few years after restoration. Photo: Edgar Karofeld.

Scientists of the Institute of Ecology and Earth Sciences, University of Tartu, won the project "Methods for restoration of water regime on extracted peatlands and monitoring". In co-operation with engineering companies they will work out restoration plans for at least eight extracted peatlands to evaluate different restoration methods and select the ones most suitable for local conditions. The effect of restoration on the

water regime, re-vegetation, GHG fluxes, different species groups and mire functioning will be evaluated. For this purpose, modern methods varying from satellite and UAW images and GHG flux measurements to classical geobotanical studies will be carried out engaging students from different specialities.

Diverse land use on peatland in Germany: forest, peat extraction, grassland, rewetting. Photo: Hans Joosten.

Germany

Landscape water management and peatland conservation

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In a workshop in Ammersbek near Hamburg (June 2017), some 30 experts from water boards and authorities, environmental administration, nature conservation, and science discussed how landscape water management can be improved to support peatland conservation and what hinders water boards in playing a more active role in this respect. The workshop was jointly organised by the German MoorDialog project of Greifswald Mire Centre, and the German Peat Society. Most peatlands in Germany are drained and used for agriculture or forestry and water boards are responsible for their water management.

Drained peatlands in agricultural use are responsible for 4 % of the German greenhouse gas emissions and a source of significant nutrient emissions to surface waters. At the same time, subsidence caused by peat oxidation, soil settlement and erosion increases the costs of water management and infrastructure. Remarkably, agricultural and water management policies fail to address this issue proactively, inspite of severe problems in the economic use of peatlands. Rewetting has until now largely been restricted to nature conservation projects focusing either on re-establishing peat formation or on preserving/restoring rare peatland flora and fauna through dedicated management. In Germany, only few rewetting projects had greenhouse gas emission reduction as the central aim. During the workshop, participants discussed why water managers do not pick up this issue spontaneously.

One possible reason is the lack of background knowledge of the water boards' staff. Subsidence, for example, is a slow process and its effects on yields and costs are difficult to observe over short time periods. Furthermore, water managers are responsible for large areas with many different municipalities, land owners and farmers. Convincing everybody to agree with rewetting measures can be time consuming or even unpromising. Round tables or land transfer could be suitable methods in this respect.

Secondly, alternative sustainable land use forms, which can be summarized under the term 'paludiculture', can under the current economic and legal conditions not compete with drainage-based, subsidized agricultural practises that do not take long-term ecological and economic effects into account.
Thirdly, over-simplistic solutions do not sufficiently recognize the diverse conditions in peatland water management. Peatlands in Germany differ in size, stratigraphy and climatic conditions, and consequently also in water management. In the western part of Germany, climate is oceanic and rainfall abundant all year round. Large peatlands are often surrounded by dikes to prevent them from flooding and drained by a dense drainage network and pumping. In contrast, many river valley fen peatlands are only drained by gravity and land use depends on fluctuating water levels in the river systems, which often requires intensive macrophyte management. In the eastern part of Germany, climate is continental, rainfall is limited, and water management infrastructure is not only used for draining but also for irrigating the peatland. Here, infrastructure maintenance and active water level management require knowledge on agreed environmental threshold levels, which adequately take economic and agricultural conditions into account. Furthermore, every federal state has different programs and possibilities for funding site adapted land use. In general, water boards do not have any capacity for co-funding rewetting programs. Representatives from water boards suggested that demonstration projects should be implemented throughout Germany to show that cost-effective wet peatland use is feasible under specific regional conditions. This will lead to better acceptance of rewetting in the agricultural sector and will generate imitation effects.
Finally it was concluded that wise use of peatlands on a large scale is only possible if farmers and water boards together are put on the track. Both groups need information on the negative consequences of drainage-based agriculture and want to see practical solutions to these problems.

Ireland

IPCC establishes monitoring scheme for endangered Large Heath bog butterfly

The Irish Peatland Conservation Council (IPCC) is currently establishing a rigorous monitoring methodology for the endangered Large Heath butterfly. IPCC's Lodge Bog Nature Reserve, Co. Kildare will be used as a demonstration site and to build a monitoring toolkit for this species. The National Biodiversity Data Centre (NBDC) is currently putting together a five-year butterfly atlas and the Large Heath is one of the species identified for targeted recording. Once trialled and perfected, the methodology will be rolled out for volunteers on other raised bog sites across Ireland in 2018 and beyond. IPCC hosted a Large Heath monitoring workshop on June 11, led by butterfly expert Jesmond Harding to train volunteers from all over Ireland to identify and monitor Large Heath butterflies. The Large Heath Butterfly (*Coenonympha tullia*) is confined to bog habitats and has therefore, lost much of its habitat due to drainage, afforestation, peat extraction and turf cutting. The species has been listed as threatened in the 2010 Red List of Irish Butterflies and is the only Irish butterfly with a threat status (Vulnerable) in the European Red List of Butterflies. For more information contact Katie Geraghty, IPCC's Conservation Officer, at bogs@ipcc.ie

Norway

Norway bans public procurement of palm oil-based biofuels

This June, the Norwegian government voted to ban palm oil-based biofuels in public procurement of fuels and public transport. The Norwegian Parliament – the Storting – voted that the regulation shall enter into force as soon as possible. Furthermore, the Norwegian Parliament called for the retail biofuels industry to not use biofuels that exceed the EU's minimum greenhouse gas emissions reductions targets.
In response to the Norwegian government decision, Nils Hermann Ranum, Rainforest Foundation Norway, said: "It is highly positive that Norway has now followed up on last year's pledge to ensure deforestation-free supply chains through the government's public procurement policy with this strong commitment. It is now incumbent on other consumer countries to follow suit. In particular, the EU should take urgent steps to reduce the consumption of commodities, such as palm oil biodiesel, that are linked to rainforest destruction and accompanying greenhouse gas emissions, biodiversity loss and human rights violations. A revision of the EU biofuel policy, to avoid biofuels that drive deforestation and are worse for the climate than fossil fuels, is urgently needed."

Similarly, in 2016, the Norwegian government voted to ban any palm oil products purchased by its central and sub-central governments. Importantly, on April 3, 2017, the European Parliament voted for a resolution to phase out the use of non-sustainable vegetable oils for biofuels by 2020. The resolution called for independent audit and monitoring to guarantee that deforestation and peatland conversion does not occur. The resolution also called for a single, mandatory set of certification mechanisms. It states that it: "Acknowledges the positive contribution made by existing certification schemes, but observes with regret that RSPO, ISPO, MSPO, and all other recognised major certification schemes do not effectively prohibit their members from converting rainforests or peatlands into palm plantations; considers, therefore, that these major certification schemes fail to effectively limit greenhouse gas emissions during the establishment and operation of the plantations, and have consequently been unable to prevent massive forest and peat fires; calls on the Commission to ensure that independent auditing and monitoring of those certification schemes is carried out, so as to guarantee that the palm oil placed on the EU market fulfils all necessary standards and is sustainable; notes that the issue of sustainability in the palm oil sector cannot be addressed by voluntary measures and policies alone, but that palm oil companies should also be subject to binding rules and a mandatory certification scheme."

The Norwegian government's policy changes are important to Neste as Neste is the sole supplier to the Norwegian market of palm oil-based biofuels. With a market cap of close to USD 10 billion and over 5,000 employees globally, Neste is one of the largest buyers of palm oil products for biofuels globally. In 2016, Norwegian national biofuel consumption was 450 million liters. 39 percent of this national consumption– or 175 million liters – was palm oil and palm fatty acid distillate (PFAD), both used as a palm-oil based biofuel in Norway. While no public data is available describing how much of the overall Norwegian biofuel market and its palm oil based feedstocks are purchased by the Norwegian government, Norwegian government procurement is assumed to be a small percentage of the market. Nonetheless, the Norwegian government's decision will decrease palm oil biofuels sales in Norway.

http://www.valuewalk.com/2017/06/neste-oil-faces-revenue-risk-norwegian-market-public-procurement-ban-palm-oil-based-biofuels/?all=1

*Remnants of the only conifer (*Dacrydium beccarii) *dominated peat dome in Borneo near Lawas, Sarawak, Malaysia, and part of the national Kayangeran Forest Reserve since 1925 (background), recently sacrificed to oil palm (foreground). Photo: Hans Joosten (24 August 2014).*

United Kingdom

Forest-to-bog restoration: a new best practice procedure

A recent paper in the Scottish Forestry Journal looked at the impact of forestry operations on globally important freshwater pearl mussel populations and mitigation measures to conserve mussels. Many forestry plantations were created on peat soils requiring extensive drainage systems that then feed into natural watercourses. These drains release significant amounts of sediment and nutrients into natural watercourses to the detriment of freshwater pearl mussel populations as well as other aquatic animals. When trees are felled, either as part of rotational forestry or for forest-to-bog restoration, large amounts of sediment can be released into natural watercourses. In one forest block in the north of Scotland mitigation measures in the form of plastic piling dams were installed into forestry drains prior to harvesting. This simple and low cost action prevented the release of sediments into watercourses containing freshwater pearl mussels.

This management practice of blocking forestry drains prior to harvesting is relevant to all forest-to-bog restoration projects as it will have major benefits to water quality and aquatic biodiversity downstream of the harvesting site. Forest Enterprise Scotland is now rolling out this practice to all its sites across Scotland, irrespective of the presence of freshwater pearl mussels..

http://www.iucn-uk-peatlandprogramme.org/news-and-events/news/forest-bog-restoration-new-best-practice-procedure

Richard Lindsay checking the depth of peat cracks in forestry ditches in Scotland. Photo: Hans Joosten

Cutting trees in the Flow country

In a new video, National Geographic explains why non-native conifers are being cut down to restore the peatlands of the Flow Country.

http://video.nationalgeographic.com/video/magazine/170411-ngm-scottish-moors-forsinard-climate-change-peat-bog-scotland

Flow Country exhibition launched in Edinburgh

A major exhibition outlining the national and global significance of Scotland's Flow Country opened at the Royal Botanic Garden, Edinburgh, on 14th June. The exhibition will enable thousands of visitors across the UK to learn about and experience the magic of the Flow Country of Caithness and Sutherland, an area widely recognised as the best peatland of its type in the world. The Botanics will host the exhibition until 25 September when it will move to the Glasgow Science Centre before beginning a tour of fifteen other venues across the UK. The exhibition is part of the Peatlands Partnership's Heritage Lottery funded "Flows to the Future project".

Professor Des Thompson of Scottish Natural Heritage gave a lyrical speech in which he highlighted the special qualities of the Flow Country and its continuing need for protection. "The Flow Country is vast – in fact it is so big in extent that you sometimes need several Ordnance Survey maps simply to get to one mountain spied on the horizon. Studded with hummocks, hollows, pools and dubh lochans, it is no wonder that the Gaelic language has more than 100 words to describe 'peat'. Nowhere else in Britain, can you be so alone yet so absorbed by the landscape." He continued: "It can be silent, it can be buoyant with the sounds of special birds, it can be ferociously windy, and often incessantly rain drenched - and on many days all of these things. The dreich, oceanic climate is perfect for blanket bog formation - 15% of this globally important habitat here in Scotland." As well as stunning imagery, the exhibition includes films, peatland artefacts and hands-on children's activities. There is a virtual reality 3D landscape model that allows visitors to fly over the bog as well as taking a virtual walk through the pools and unusual peatland plants. You can find out more at www.theflowcountry.org.uk.
http://www.iucn-uk-peatlandprogramme.org/news-and-events/news/flow-country-exhibition-launched-edinburgh

Munsary peatland in the Flow Country, Scotland. Photo: Hans Joosten.

Call for experts-IUCN UK PP Commission of Inquiry: Deadline 19th July

The Commission of Inquiry on Peatlands (2011) successfully brought together peatland evidence from across the UK in a concise and accessible format. However, in light of a number of emerging peatland topics and new evidence, the IUCN UK Peatland Programme is proposing an update. An online consultation for the update has resulted in topic areas on which evidence is thought to be rapidly evolving, unclear, or where consensus is needed to foster joint action for peatlands.

The IUCN UK Peatland Programme recently announced its 'Call for Experts' to support the Commission of Inquiry Update 2017/18 on the topics Peatlands and Forestry, Fen Peatlands, and Peatland Catchments

In addition to these new topics, aspects of the 2011 Commission of Inquiry will be updated to reinforce key messages and recommendations. This will include updates to the State of UK Peatlands, Peatland Biodiversity and Funding for Peatland Management and Restoration.

If you have any questions, contact Dr Emma Goodyer: Emma.Goodyer@iucn.org.uk
http://www.iucn-uk-peatlandprogramme.org/commission-inquiry/call-experts

IUCN National Committee United Kingdom
Peatland Programme

Peatlands for Birds: Fens, Mires, & Bogs

The conference 'Peatlands for Birds: Fens, Mires, & Bogs' (6-8 September 2017, Sheffield) will discuss how Britain's peatlands could or should be managed and restored to provide future resilient, sustainable habitats at landscape levels. It will examine ecology and conservation for restoring upland and lowland peatlands specifically, for birds. Further information & details: http://www.ukeconet.org/peatlandsforbirds.html

*Golden plover (*Pluvialis apricaria*). Photo: Gillian Day)*

North America

United States of America

SWS San Juan Statement on Climate Change and Wetlands

SWS issued the Society of Wetland Scientists San Juan Statement on Climate Change and Wetlands at the 2017 SWS Annual Meeting in San Juan, Puerto Rico, on June 5 - 8, 2017. Over 200 attendees signed the statement in support. The Statement reads as follows:

"The following participants at the Society of Wetland Scientists 2017 Annual Meeting encourage policy makers in all countries to continue their collaborative efforts to develop and implement international policies, such as the Paris Climate Agreement, to mitigate global climate change and, in doing so:

- Ensure the protection of existing carbon banks in wetlands and encourage carbon sequestration;
- Maintain or restore wetlands for their biodiversity and ecosystem services, including climate resiliency;
- Request all wetland managers and scientists to share this statement and support local to global efforts to combat climate change for the betterment of humankind."

http://sws.org/About-SWS/news.html

Peatland conservation relevant papers June 2017

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

1. Future extinction risk of wetland plants is higher from individual patch loss than total area reduction: http://www.sciencedirect.com/science/article/pii/S0006320717301982
2. Holocene vegetation and fire dynamics at Crveni Potok, a small mire in the Dinaric Alps (Tara National Park, Serbia): http://www.sciencedirect.com/science/article/pii/S0277379117301750
3. Detrital events and hydroclimate variability in the Romanian Carpathians during the mid-to-late Holocene: http://www.sciencedirect.com/science/article/pii/S027737911730358X
4. Modelling Holocene peatland dynamics with an individual-based dynamic vegetation mode: http://www.biogeosciences.net/14/2571/2017/
5. Exploring mechanisms of compaction in salt-marsh sediments using Common Era relative sea-level reconstructions: http://www.sciencedirect.com/science/article/pii/S0277379117303554

6. Major and trace elements in *Sphagnum* moss from four southern German bogs, and comparison with available moss monitoring data: http://www.sciencedirect.com/science/article/pii/S1470160X17300924
7. Testing the moss layer transfer technique on mineral well pads constructed in peatlands: https://link.springer.com/article/10.1007/s11273-017-9532-4
8. Do understorey or overstorey traits drive tree encroachment on a drained raised bog?: http://onlinelibrary.wiley.com/doi/10.1111/plb.12569/full
9. Growing season carbon gas exchange from peatlands used a source of vegetation donor material for restoration: https://link.springer.com/article/10.1007/s11273-017-9531-5
10. Rare plant translocation between mineral islands in Biebrza Valley (northeastern Poland): effectiveness and recipient site selection: http://onlinelibrary.wiley.com/doi/10.1111/rec.12539/abstract
11. The initiation and development of small peat forming ecosystems adjacent to lakes in the north-central Canadian low arctic during the Holocene: http://onlinelibrary.wiley.com/doi/10.1002/2016JG003662/abstract
12. Amount and stability of recent and aged plant residues in degrading peatland soils: http://www.sciencedirect.com/science/article/pii/S0038071716303753
13. Environmental dynamics and carbon accumulation rate of a tropical peatland in Central Sumatra, Indonesia: http://www.sciencedirect.com/science/article/pii/S0277379117301622
14. Emission and distribution of phosphine in paddy fields and its relationship with greenhouse gases: http://www.sciencedirect.com/science/article/pii/S004896971731080X
15. How warm? How wet? Hydroclimate reconstruction of the past 7500 years in northern Carpathians, Romania: http://www.sciencedirect.com/science/article/pii/S0031018216307763
16. IPS Annual Report 2016: http://bit.ly/2sLBlFB
17. How old is the Tasmanian cultural landscape? A test of landscape openness using quantitative land-cover reconstructions: http://onlinelibrary.wiley.com/doi/10.1111/jbi.13040/abstract
18. A probabilistic method of assessing carbon accumulation rate at Imnavait Creek Peatland, Arctic Long Term Ecological Research Station, Alaska: http://onlinelibrary.wiley.com/doi/10.1002/jqs.2952/full
19. Soil paludification and *Sphagnum* bog initiation: the influence of indurated podzolic soil and fire: http://onlinelibrary.wiley.com/doi/10.1111/bor.12200/abstract
20. A high-accuracy map of global terrain elevations: http://onlinelibrary.wiley.com/doi/10.1002/2017GL072874/abstract
21. Drivers of landscape evolution: multiple regimes and their influence on carbon sequestration in a sub-tropical peatland: http://onlinelibrary.wiley.com/doi/10.1002/ecm.1269/abstract
22. Dissipation of micropollutants in a rewetted fen peatland: A field study using treated wastewater: http://www.mdpi.com/2073-4441/9/6/449
23. Reindeer droppings may increase methane production potential in subarctic wetlands: http://www.sciencedirect.com/science/article/pii/S003807171630815X
24. For peat's sake. Understanding the climate implications of palm oil biodiesel consumption: http://d5i6is0eze552.cloudfront.net/documents/Publikasjoner/Andre-rapporter/For-peats-sake-Climate-implications-of-palm_May2017.pdf
25. Fuel peat production technology – Training material: http://www.theseus.fi/bitstream/handle/10024/126627/JAMKPUBLICATIONS1402012_web.pdf?sequence=1&isAllowed=y
26. Synergistic use of peat and charred material in growing media – an option to reduce the pressure on peatlands?: http://www.tandfonline.com/doi/abs/10.3846/16486897.2017.1284665
27. Contemporary carbon fluxes do not reflect the long-term carbon balance for an Atlantic blanket bog: http://journals.sagepub.com/doi/abs/10.1177/0959683617715689
28. How temporal patterns in rainfall determine the geomorphology and carbon fluxes of tropical peatlands: http://www.pnas.org/content/114/26/E5187.abstract
29. Multi-date, multi-sensor remote sensing reveals high density of carbon-rich mountain peatlands in the páramo of Ecuador: http://onlinelibrary.wiley.com/doi/10.1111/gcb.13807/abstract
30. Experimentally increased nutrient availability at the permafrost thaw front selectively enhances biomass production of deep-rooting subarctic peatland species: http://onlinelibrary.wiley.com/doi/10.1111/gcb.13804/abstract
31. Deep peat warming increases surface methane and carbon dioxide emissions in a black spruce dominated ombrotrophic bog: http://onlinelibrary.wiley.com/doi/10.1111/gcb.13806/abstract
32. Historical and projected trends in landscape drivers affecting carbon dynamics in Alaska: http://onlinelibrary.wiley.com/doi/10.1002/eap.1538/abstract
33. Limited contribution of permafrost carbon to methane release from thawing peatlands: http://dx.doi.org/10.1038/nclimate3328

34. Molybdenum-based diazotrophy in a *Sphagnum* peatland in northern Minnesota: http://www.biorxiv.org/content/early/2017/06/28/114918
35. Forest management and freshwater pearl mussels - A practitioners' perspective from the north of Scotland: http://www.iucn-uk-peatlandprogramme.org/sites/www.iucn-uk-peatlandprogramme.org/files/PearlMusselDrainsPriorFellingPaper2017.pdf
36. Abundant carbon substrates drive extremely high sulfate reduction rates and methane fluxes in Prairie Pothole Wetlands: http://onlinelibrary.wiley.com/doi/10.1111/gcb.13633/abstract
37. Warming of subarctic tundra increases emissions of all three important greenhouse gases – carbon dioxide, methane, and nitrous oxide: http://onlinelibrary.wiley.com/doi/10.1111/gcb.13563/abstract
38. Long-term enhanced winter soil frost alters growing season CO2 fluxes through its impact on vegetation development in a boreal peatland: http://onlinelibrary.wiley.com/doi/10.1111/gcb.13621/abstract
39. Direct and indirect climate change effects on carbon dioxide fluxes in a thawing boreal forest–wetland landscape : http://onlinelibrary.wiley.com/doi/10.1111/gcb.13638/abstract
40. Recent ^{210}Pb, ^{137}Cs and ^{241}Am accumulation in an ombrotrophic peatland from Amsterdam Island (Southern Indian Ocean): http://www.sciencedirect.com/science/article/pii/S0265931X17300747
41. The hydrological functioning of a constructed fen wetland watershed: http://www.sciencedirect.com/science/article/pii/S004896971731505X
42. Legacy effects of drought alters the aquatic food web of a northern boreal peatland: http://onlinelibrary.wiley.com/doi/10.1111/fwb.12950/abstract
43. Assessing tectonic subsidence from estimates of Holocene relative sea-level change: An example from the NW Mediterranean (Magra Plain, Italy): http://journals.sagepub.com/doi/abs/10.1177/0959683617715688
44. Ammonium and nitrate are both suitable inorganic nitrogen forms forthe highly productive wetland grass *Arundo donax*, a candidatespecies for wetland paludiculture: http://www.sciencedirect.com/science/article/pii/S0925857417302392
45. Acclimation to light and avoidance of photoinhibition in *Typha latifolia* is associated with high photosynthetic capacity and xanthophyll pigment content: http://www.publish.csiro.au/FP/FP16356
46. Tundra is a consistent source of CO_2 at a site with progressive permafrost thaw during 6 years of chamber and eddy covariance measurements: http://onlinelibrary.wiley.com/doi/10.1002/2016JG003671/abstract
47. Human impact on open temperate woodlands during the middle Holocene in Central Europe: http://www.sciencedirect.com/science/article/pii/S0034666717300209
48. Holocene peatland development and vegetation changes in the Zoige Basin, eastern Tibetan Plateau: http://engine.scichina.com/publisher/scp/journal/SCES/doi/10.1007/s11430-017-9086-5?slug=abstract
49. Implementing northern peatlands in a global land surface model: description and evaluation in the ORCHIDEE high latitude version model (ORC-HL-PEAT): http://www.geosci-model-dev-discuss.net/gmd-2017-141/
50. Species-specific flowering cues among general flowering *Shorea* species at the Pasoh Research Forest, Malaysia: http://onlinelibrary.wiley.com/doi/10.1111/1365-2745.12836/abstract
51. Restoration of peatland by spontaneous re-vegetation after road construction: http://onlinelibrary.wiley.com/doi/10.1111/avsc.12329/abstract
52. Indirect effects of invasive Burmese pythons on ecosystems in southern Florida: http://onlinelibrary.wiley.com/doi/10.1111/1365-2664.12844/abstract