



The International Mire Conservation Group (IMCG) is an international network of specialists having a particular interest in mire and peatland conservation. The network encompasses a wide spectrum of expertise and interests, from research scientists to consultants, government agency specialists to peatland site managers. It operates largely through e-mail and newsletters, and holds regular workshops and symposia. For more information: consult the IMCG Website: <http://www.imcg.net>

IMCG has a Main Board of currently 15 people from various parts of the world that has to take decisions between congresses. Of these 15 an elected 5 constitute the IMCG Executive Committee that handles day-to-day affairs. The Executive Committee consists of a Chairman (Piet-Louis Grundling), a Secretary General (Hans Joosten), a Treasurer (Francis Müller), and 2 additional members (Ab Grootjans, Rodolfo Iturraspe).

Fred Ellery, Seppo Eurola, Lebrecht Jeschke, Richard Lindsay, Viktor Masing (†), Rauno Ruuhijärvi, Hugo Sjörs (†), Michael Steiner, Michael Succow and Tatiana Yurkovskaya have been awarded honorary membership of IMCG.

Editorial

This Newsletter eventually reaches you via satellite from the tundra in Northeast Siberia, where we had snow yesterday, in contrast to at home where it is supposed to be over 30 degrees centigrade. Again, also this Newsletter appears too late, for which we apologize. It is the old story of overwhelming developments on the global peatland conservation front requiring our urgent attention (e.g. the developments with the IPCC and the FAO), combined with deadlines that could not be kept because important topical contributions were not yet in, bringing us on the slippery path of uncontrolled delay. *Nostra culpa, nostra maxima culpa.*

Important now is the preparation for the 2012 events in the Andes at the end of September, beginning of October. Our South American friends have sorted out an impressive programme and this Newsletter gives a hint of what we might expect during our 9 days in the field. Several members have announced to participate in part of the trip that we also want use to develop a global project on high mountain peatlands, covering South America, Africa, Europe and Asia. It would be helpful if everybody who plans to attend the entire or part of the events contacts us as soon as possible (and pays the due sum, see www.imcg.net!), so that the organisation can proceed smoothly. For last-minute decisions: we might still be able to accommodate additional participants, but be quick in contacting us! Also the content of the scientific Conference and General Assembly after the field trip is materializing. The agenda of the latter is in this Newsletter, more documents (e.g. contributions to an action plan 2012-2016) may soon follow. And don't forget to send us draft resolutions for the General Assembly so that not everything has to be done during the field trip.

Michael Trepel is refreshing the IMCG website continuously and has introduced a dynamic news site where we can provide more up-to-date information than the Newsletter is able to do. So keep an eye on it and send in news that you want to spread. We plan to produce the next Newsletter after the Andes events, so please send in your contributions before October 14th.

For information, address changes or other things, contact us at the IMCG Secretariat.

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A note from the Chair

Dear fellow members

The seasons are changing again, reminding me of the changing environment we live in with challenges such as climate change, pressure on natural resources and growing poverty in many parts of our planet. It always amazes me when I realize that Holocene mires and peatlands have been part of this ever changing natural landscape and were able to survive. It is disappointing then to observe that we, as a so-called civilization, have done more damage to mires and peatlands in the past 100 – 500 years than any natural process in the past 10 000 years

You might have noticed by now that I am a firm believer that we should sweep in our own backyard next to trying to save the wide world out there. We can run around trying to put out peat fires in Indonesia, protest against destruction of peatlands by the mining of tar sands in Canada or swampforest destruction in the Congo, etc, etc. However, are we also making a difference closer to home? Are we influencing the behavior of our neighbour who takes his SUV for a spin in a muddy fen or the lady next door who buys peat based horticultural products for her garden? When last did you visit a local school on World Wetlands Day (or any day for that matter) to talk about mires and peatlands, or visit one with your own family? We need to address the global challenges facing mire conservation today as we are an international body, but let's not forget the difference we can (and should) make on a local level.

Many important international wetland events are taking place this year. There is our own IMCG Field Symposium and associated Congress and General Assembly in Ecuador and Colombia; the 11th Meeting of the Conference of the Contracting Parties (RAMSAR) held in the Romania, the SWS-IUCN meetings in Florida, USA and the IPS Congress in Stockholm, Sweden. A busy year indeed! Read more about these events in this newsletter.

It is my hope that we will support our own IMCG initiatives more in 2012. The editor-in-chief of our scientific journal Mires-and-Peat, Olivia Bragg, is working hard at lifting the profile of the journal. We should all contribute more towards good papers and also be citing papers from this journal. Michael Trepel is also keen to have contributions for the website. IMCG members must consider their role in fulfilling the IMCG Strategy and Action Plan. Please visit the IMCG website at

<http://www.imcg.net/pages/imcg/mission.php>
to see where you can make a difference.

We thank Hans Joosten and his team at the Secretariat for their hard work in compiling this newsletter. Enjoy the efforts of all our contributors and I hope to meet you all in the Andes.

Piet-Louis Grundling
South Africa

IMCG Field Symposium, Congress and General Assembly 2012 in the Andes

Agenda of the tour

Day 1		Welcome in Quito (Ecuador)
21. Sep	International flights	Arrival to Quito:
Friday		Hotel for 2 nights in Quito
Day 2		Excursion to Pichincha area
22. Sep	Bus	Yanacocha reserve, GLORIA site
Saturday		Hotel in Quito
Day 3		Excursion to paramo in Papallacta - Oyacachi (Quito water supply area)
23. Sep	Bus	Short walk around Virgen de Papallacta (4000 m)
Sunday		Papallacta - Laguna Mogotes / Oyacachi (Cayambe-Coca Reserve, private road water company)
		Hosteria Cayambe area (hotel for 1 night in Cayambe)
Day 4		Excursion to Laguna San Marcos (Cayambe - Ecuador)
24. Sep	Bus	Cayambe - Laguna San Marcos
Monday		Hotel for 3 nights in Quito
Day 5		Excursion to Cotopaxi area
25. Sep	Transport	Excursion to Cotopaxi area, Mudadero, upper Rio Pita valley
Tuesday		Hotel in Quito
Day 6		Seminar with stakeholders (Quito - Ecuador)
26. Sep	Morning	Stakeholder meetings
Wednesday	Afternoon	City Tour
		Hotel in Quito
Day 7		Flight Quito - Bogota and Excursion to Laguna Verde dry paramo and Fuquene lake
27. Sep	Flight Quito - Bogota	Avianca flight AV 7378 (06h20 - 07h50)
Thursday	International flights	or Copa flight CM660 (06h00 - 07h30)
	Morning	From the airport to Neusa reservoir -Laguna Verde dry paramo with Sphagnum and Aragoa abietina paramo peatland at 3650 m
	Afternoon	Fuquene lake (2580 m) - Villa de Leiva
		Hotel campestre Fuquene for 1 night in Villa de Leiva
Day 8		Excursion to Pantano de Martos and Reserve Encenillo – Bogota
28. Sep	Morning	Pantano de Martos
Friday	Afternoon	Tonime Reservoir and Encenillo Reserve
		Return to Bogota
		Hotel campestre Guatavita for 1 night
Day 9		Excursion to Chingaza National Park
29. Sep	Bus	Spaghnum peatland of Buitrago (humid paramo at 3600 m).
Saturday		Classic Oreobolus and Plantago Peatland (3700 m)
		Laguna Seca (alternative option: Chuza reservoir and Chingaza lake)
		Hotel Suamox, Bogota (Calle 38 No. 16 - 07; tel +57 1 232 98 00)
Day 10		Excursion south of Bogota, Sumapaz area
30. Sep	Transport	Chisaca and Santa Rosa Valley
Sunday		If possible, visit to Plantago floating cushion bogs, lakes in Andabobos (3800 m)
		Hotel Suamox, Bogota (Calle 38 No. 16 - 07; tel +57 1 232 98 00)
Day 11		Seminar at the Universidad de los Andes – Bogota
01. Okt		Scientific program
Monday		Hotel Suamox, Bogota (Calle 38 No. 16 - 07; tel +57 1 232 98 00)
Day 12		Seminar at the Universidad de los Andes - Bogota and IMCG General Assembly
02. Okt		Scientific program
Tuesday		IMCG General Assembly
		Hotel Suamox, Bogota (Calle 38 No. 16 - 07; tel +57 1 232 98 00)
Day 13		Departure from Bogota to cities of origin of participants
03. Okt	Transport	Transfer from hotel in Bogota to airport
Wednesday	according to the itineraries	

General Assembly

The agenda of the IMCG General Assembly is as follows:

1. Opening and Welcome
2. Minutes of the General Assembly of 17 July 2010, in Goniadz, Poland
 1. (available in IMCG Newsletter 2010/3)
 2. Balance sheet and the statement of profit and loss
 3. Biennial report (2010 – 2012) on the state of affairs in the IMCG.
4. IMCG Action Plan 2010 – 2014
5. IMCG Membership fee
6. Election of the Main Board (with associated elections of the Executive
7. Committee members, incl. chair, by the MB)
8. Conference resolutions
9. Next venues
10. Nomination of Honorary Life Members
11. Any Other Business

IMCG Resolutions

The IMCG General Assembly in the Andes 2012 will again discuss and adopt resolutions. To streamline the procedure, IMCG members are requested to submit their draft resolution timely, i.e. as soon as possible, to the IMCG secretariat. This will enable to circulate the draft resolutions among the Main Board, and to put the drafts on our website so that everybody can send reactions (to the IMCG Secretariat). Draft resolutions should identify the apparatus and bodies to which the resolution has to be directed or sent. Examples (phrasing and content) of resolutions can be found on the IMCG website:

www.imcg.net/pages/publications/resolutions.php.

Resolutions are not always taken at heart by the governments they are addressed to. Yet resolutions remain a strong tool to influence government policies, the more so with the increasing strength of IMCG on the global peatland front.

Field information Ecuador: The Northern Andean Páramo

by Francisco Cuesta and Bert De Bievre

The tropical Andes region tops the list of worldwide hotspots for endemism and species/area ratio (Myers *et al.* 2000). A major contributor to the rich biodiversity and endemism of the tropical Andes is the páramo, a neotropical alpine ecosystem covering the upper parts of the tropical Andes from Venezuela south to northern Peru (6°30' S). Two isolated systems are located in the Sierra Nevada de Santa Marta in Colombia and in Costa Rica (Hofstede *et al.* 2003).

The Páramo extends between the upper tree line and the perennial snow border (about 3200 - 5000 m altitude) reflecting a sort of island archipelago. Its total area is estimated at 35,770 km² (Josse *et al.* 2008). The isolated and fragmented occurrence of tropical mountain wetlands promotes high speciation and an exceptionally high endemism at the species and genera level (Sklenář and Ramsay 2001). At the regional and landscape scales, factors such as climate, geological history, habitat diversity and also human influence determine Páramos biota diversity (Simpson 1974; Vuilleumier and Monasterio 1986; Luteyn 1992). Local climatic gradients further complicate within-mountain diversity patterns, with spatial community changes often occurring over short distances (Cleef 1981; Ramsay 1992; Sklenář and Balslev 2005).

The páramo ecosystem hosts 3595 species of vascular plants distributed in 127 families, and 540 genera (Sklenar *et al.* 2005). About 14 of these genera and 60% of these species are endemic to the Northern Andes (Luteyn 1999), and adapted to the specific physio-chemical and climatic conditions, such as the low atmospheric pressure, intense ultra-violet radiation, and the drying effects of wind (Luteyn *et al.* 1992). The exceptional combination of vegetation, climate, (mostly volcanic) soils, and topography

gives the Páramo extraordinary hydrological qualities (Buytaert *et al.* 2006; Poulenard *et al.* 2004). This ecosystem plays a fundamental role in sustaining the livelihoods of millions of people, providing essential ecosystem services such as water production for urban use, irrigation and hydropower generation (Buytaert *et al.* 2006; Bradley *et al.* 2006). The generation and preservation of these services strongly depend on the integrity of the ecosystem, which is expressed as a delicate inter-dependency amongst three key elements: a) hydro-physical properties of the soil, b) vegetation structure, and c) water cycle. The maintenance of these properties allows the existence of different elements of this rich biodiversity aggregated at different spatial scales.

The traditional threat to this tropical alpine ecosystem is the conversion to agricultural fields (i.e. annual crops), afforestation with exotic species (i.e. *Pinus radiata*) and extensive livestock breeding, usually combined with frequent burning (Farley *et al.* 2004). More recent threats include mining and non-sustainable tourism. As far as mining is concerned, there is little ongoing extraction yet. Nevertheless, 28 percent of the Páramo distribution in the Northern Andes is under exploration or with pending authorizations for extraction (Cuesta *et al.* 2008). Further, 43 percent of the total Páramo area in the Northern Andes is part of the National protected areas systems of the four Andean countries. Yet, the remaining 57 percent of the Páramo distribution is non-protected (Cuesta *et al.* 2008).

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The sites to be visited

In relation to accessibility we will visit paramos and wetlands in the neighborhood of the two capital cities at high altitude: Quito (Ecuador – 2800 m) and Bogotá (Colombia – 2200 m). It has to be noted that this may generate a skew. You might think that those areas are more disturbed because they are near areas with high population density. Actually, awareness of importance for the water supply for the cities made that national parks were declared quite early in these

areas, and their state of conservation is relatively good, compared to more remote areas were communities depend on paramo for grazing their livestock and even agriculture.

Please see the map with the sites to be visited. In Quito, they cover a west-east transect across the Andes, from the slopes draining towards the Pacific, to the headwaters of the Amazon river.

Recommendations

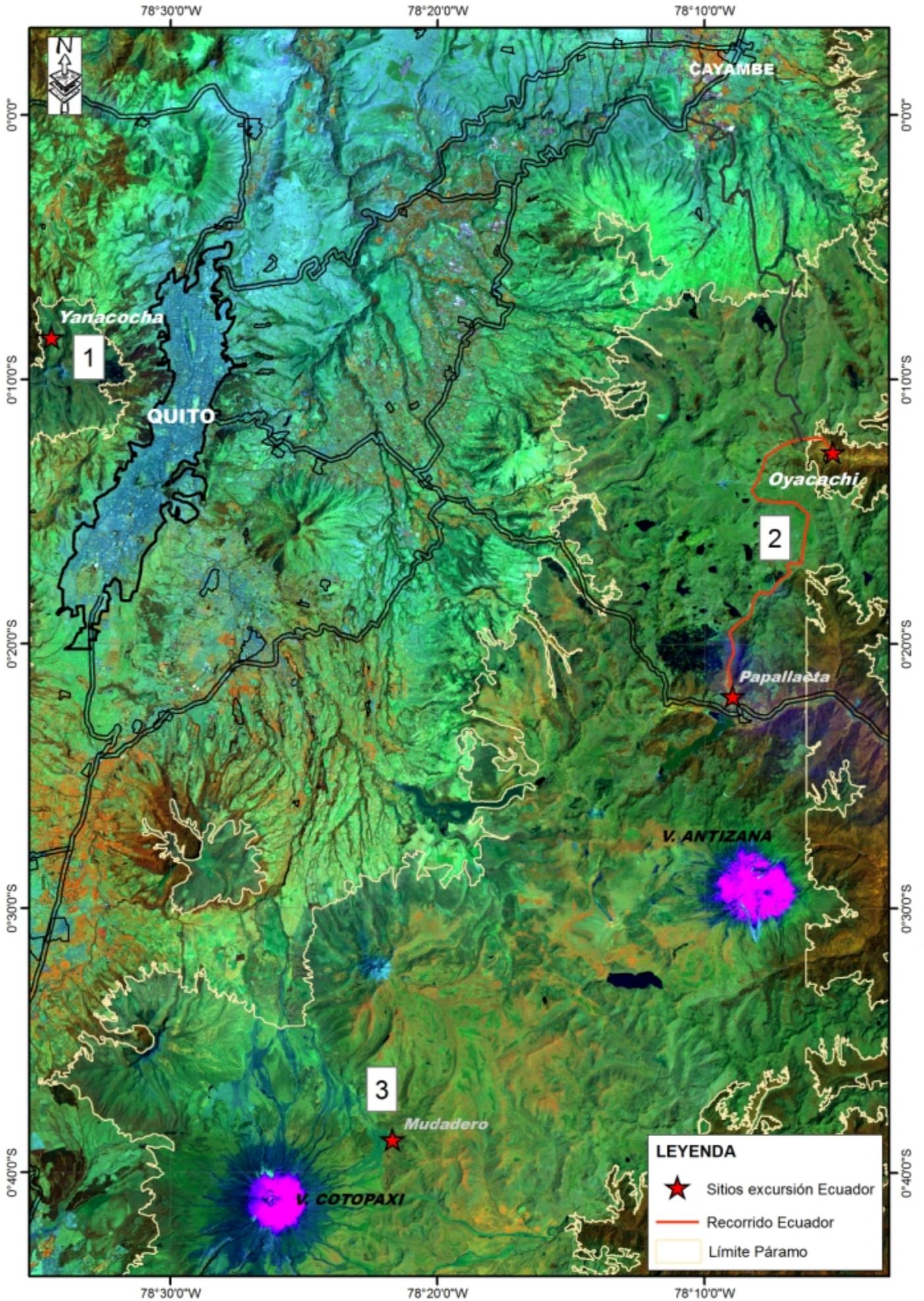
This trip goes to the tropics (we will cross the equator several times), but most of the time we will be in the *cold* tropics. The mountain climate is extremely variable, and you should be prepared for anything. If the sun comes out, temperature climbs to 25 degrees Celsius in the paramo, but one hour later, rain can be pouring, visibility reduced to a few meters, and temperature reduced to a few degrees. Clothing should be in layers, adaptability and resilience is also here the solution! Bring of course rain gear and good shoes.

The combination of equator and high altitude gives you the highest solar radiation on our planet, so *sun-block* on any exposed skin **and** hat should be your routine anytime, also in cloudy weather. Neglecting this will not only lead to annoyance, but also to injury.

We will be climbing up to altitudes over 4000m, however with no intensive walking at these altitudes. If you have any heart problems, please consult with your doctor. Altitude sickness is highly unpredictable and does attack weak and strong people. In case of a severe problem the easy, quick, and only solution is going down. We will be able to arrange this anytime.

Everything about paramo, from videos to the latest press comments, on www.paramo.org but only in Spanish ...





**Field information Colombia:
Andean mires**

by Antoine M. Cleef

Laguna Verde (ca. 3650 m, see map excursion point no. 1) is situated about 60 km NNW of Bogotá on the western chain of the Andes. Laguna Verde and surrounding bogs are the remnants of a wet depression of a former plateau glacier system. The surrounding moraine landscape supports a grass páramo with *Calamagrostis effusa* and *Espeletia barclayana* stem rosettes. The clear-water lake contains submerged *Isoetes palmeri* rosettes on the bottom associated with aquatic bryophytes and near the shore ephemerals like *Crassula peduncularis* and

a species of *Elatine*. *Xyris-Sphagnum* bog concentrates on the North side of Laguna Verde and consists of different species of *Sphagnum* (*S. magellanicum*, *S. sancto-josephense* among others) and *Xyris subulata*, *Huperzia cruenta*, *Espeletia chocontana*, *Blechnum loxense*, *Hypericum lancioides*, and *Aragoa abietina*. The endemic *Aragoa abietina* (Plantaginaceae) forms a dark-greenish shrubby cover on top of the *Sphagnum* bog. Tall ground rosettes of *Puya santosii* are frequently found here. *Oreobolus cleefii* and *Valeriana stenophylla* are common as cushions in the transition to grass paramo, where another *Oreobolus* species (*O. goeppingeri*) is very frequent in the ground layer.



Laguna de Fúquene (2540 m, no. 2) is at present a shallow lake system, quickly filled in by sediments as a consequence of agricultural land use in the lake basin. The deepest part is only 3-4 m deep and has a soft muddy bottom. The lake sediments reach down to about 60 m (spanning the last 285,000 years) and have been recovered for palaeoecological research. High resolution pollen analysis (every ca. 60 years)

combined with other proxies revealed the detailed history of climate and vegetation and pointed to the abundance of *Polylepis* forests during the Last Glacial (in contrast to the absence of *Polylepis* during the Last Glacial in Pantano de Martos) (Groot et al. 2011, Bogotá 2011). Laguna de Fúquene is unique in the world with this high resolution record of every cm. *Alnus acuminata* is common on the shores. On

the deforested slopes around the lake apparently an oak forest has been present; currently only some patches of residual forest remain. Above the Upper Forest Line is a *Calamagrostis-Espeletia* páramo, the same dry type as seen earlier today around Laguna Verde (Tausa).



Lago Fúquene (Photo: Santiago Valderrama)

In the deepest parts of Laguna Fúquene, only *Potamogeton illinoensis* and occasionally *Myriophyllum quitensis* occur. Submerged vegetation of the introduced *Groenlandia* sp. is quite abundant. Actions in the recent past to remove this species from Laguna Fúquene had no lasting effect. Floating mats of (introduced) *Eichornia crassipes* are common as well. The native floating *Limnobium stoloniferum* is locally present, as also *Azolla filiculoides* and species of Lemnaceae, all floating. Along the swampy shore floating and/or rooting communities with *Polygonum hydropiperoides*, resp. *Hydrocotyle ranunculoides* occur, as well as low shrubs of *Ludwigia peruviana* and *Bidens laevis*. Lake succession is determined by the taller plants of *Schoenoplectus* (*Scirpus*) *californicus* and *Typha angustifolia* (mixed or in pure patches). On the peaty shores *Alnus acuminata* and *Salix humboldtii* are found. Around the lake is a permanent uncontrolled land acquisition using the unsafe peat soils for cattle grazing.

In the recent past the Laguna de Fúquene was declared endangered and threatened to disappear (as was its single endemic fish species). The area is important for birding and a station for migratory birds. The safe future of lake Fúquene has up till now not been secured, because of economic interests and politics. This situation is the concern of the active NGO Fundación Humedales, whose representatives will be available for further information.

Pantano de Martos (ca. 3000 m, no. 4).

This over 700 ha large subalpine peatland is situated some km east of Guatavita on the humid Llanos side. It is reached (from the West) by a low pass at 3250 m. Pantano de Martos consists of open bog, fen and

some open water in the central part. It has been named after Gonzalo de Martos, who in 1630 undertook the first attempt to drain the area. Remnants of Andean forest (Upper Montane Rain Forest) and High Andean forest (Subalpine Rain Forest) are found on the surrounding slopes. Bamboo páramo with *Espeletia killipii* stem rosettes extends above the upper forest line (UFL) and is visible from the pass. Here is also a *Sphagnum-Xyris subulata-Puya goudotiana* peat bog with shrub of *Aragoa abietina*, *Plutarchia guascensis* and a species of *Cortaderia* and *Rhynchospora*. Where the Andean forest has been cleared, a humid type of shrub paramo has invaded the lower slopes of forest land ('paramozación'), which very slowly seems to return back to the original Andean forest. On the terminal moraine, which appears east of the depression of Pantano de Martos, potato cultivation in the past (30-40 years ago) is indicated by numerous silvery-leaved low stemrosettes of *Espeletia argentea*.



Pantano de Martos (Photo: Antoine Cleef)

1. The western part of Pantano de Martos is most intact with an oligotrophic *Sphagnum-Xyris subulata-Puya goudotiana* peatbog with *Espeletia* sp. stemrosettes. Also *Blechnum loxense* (small treefern) can be observed, and species of *Eriocaulaceae* and the (dwarf)shrubs *Symplocos theiformis*, *Gaultheria erecta*, *Pernettya prostrata*, *Hypericum prostratum* and others. In muddy hollows occasionally a small *Isoetes* species is growing. There is everywhere evidence of frequent fires, which were in the past also used for hunting. Conspicuous is a patch with abundant *Valeriana pilosa* growing on the charcoal of a former shrubland. Towards the central part of the mire the conditions are eutrophic with open water and the vegetation has more the aspect of a fen. A wide central canal drains the Pantano de Martos into the Río Lagunero passing through the terminal moraine east of the mire. The central canal and the upper Río Lagunero have been widened and deepened with 'correction' of the meanders in order to optimize discharge since

almost all surrounding Andean forests has disappeared. There is a gradient from dry to wet towards the Central Canal in the SE part of the mire, which is reflected in the disturbed vegetation.

2. *Acmispon wranglerianus* (also called Lotus) with grasses
3. Grasses (incl. one large tussock of *Calamagrostis effusa*) with Geranium
4. *Geranium* on hummocks with *Acmispon* and mosses
5. Mosses (*Breutelia*, *Campylopus*) dominant
6. *Sphagnum* – *Acmispon* – *Geranium*
7. *Sphagnum* with *Cyperus cf. rufus*
8. Open water with species of *Callitriche*, *Lilaeopsis* and *Sphagnum*
9. Open water with *Senecio formosoides* (up to 50 cm in height)
10. Low treelets and shrub of *Escallonia myrtilloides* along the Central canal.

Types (1) to (5) are related to former agricultural land use. Indicative are also *Holcus lanatus*, *Veronica serpyllifolia*, *Hypochaeris radicata*, *Rumex acetosa*, *R. acetosella* among others. *Acmispon wranglerianus* has also been introduced for fodder from California. Surely also fertilisation has been applied for the creation of meadows and potato fields some 30-50 years ago. The (1-2 m) deep drainage canal pattern is from last century. There is also a very deep drain excavated along the base of the surrounding hill at the South side draining directly in Río Lagunero. A pollen diagram of Pantano de Martos is currently under preparation (Berrio et al., in prep.). It spans about the last 45.000 years of history of climate and vegetation. Finally, we will need a common view of the expert group how to restore the Pantano de Martos. Without doubt the very first action is the reforestation with native species around the mire.

Encenillo (2900-3200 m, no. 5) is situated between La Calera and Guasca. This reserve of Fundación Natura contains different types of humid *Weinmannia tomentosa* Andean forest including a *Clusia multiflora* facies.

Chingaza (3000 – 4000 m, no. 6). The Chingaza National Park will be approached via La Calera, east of Bogotá, using an unpaved road up to the Páramo de Palacio. At about 3500 m in the frequently burned lowermost páramo (shrub páramo and *Calamagrostis*- *Chusquea* bamboo páramo) the road heads to the east along the headwaters of Río Blanco. Near the National Park entrance we enter walking 2-3 km on a lateral road to the left upslope to the Lagunas de Buitrago (3580 m). The area consists mainly of a bamboo-*Sphagnum* bog with spectacular *Espeletia killipii* stem rosettes up to 3-4 m in height.



Chingaza, Páramo de Palacio, Buitrago site at 3650 m. *Sphagnum sancto-josephense* hollow with *Xenophyllum humilis* (Asterac.) and some *Breutelia chrysea* surrounded by *Chusquea-Espeletia killipii* hummocks.

Hummocks built up by *Chusquea tessellata* bamboos reach much more height than in the *Xyris-Sphagnum* bog in the much drier bunchgrass páramo of Laguna Verde. White flowering *Werneria pygmaea* (Asteraceae) is most conspicuous in the wet hollows; normally this geophytic species is most common in shallow flush. Two remnant lakes are presently fringed by a *Sphagnum cuspidatum* zone. In the gytja bottom of the lake rosettes of *Isoetes palmeri* occur with a species of *Elatine* near the shore together with a number of aquatic bryophytes (*Ditrichum submersum*, *Symphyogyna rubescens* and species of *Riccardia* and *Jensenia*).

Turning back and entering the National Park entrance there are dense bamboo thickets (*Chusquea tessellata*, *C. angustifolia*) near the Upper Forest Line (UFL). In the steep valleys up to the former limestone mine at about 3700 m dense prominent stands with *Espeletia uribei* (up to ca. 10 m) emerge from the shrub páramo. Following the escarpment (with interesting high Andean forest patches) heading to the South a low pass will be reached before descending into the Chuza valley. On the proper crest nearby, a small cushion bog has developed (indicating colder mean annual temperature). It consists of *Plantago rigida* and *Oreobolus cleefii* and has been studied in detail by Bosman et al. (1993, 1994).

Laguna Seca in the upper Chuza valley is the next excursion stop for a walk around the lake. The shallow lake is surrounded by *Chusquea tessellata* and the forest line *Chusquea angustifolia* bamboo stands, the latter species was massively dying back during our last visit in 2009. The lake is surrounded by bunchgrass - bamboo páramo.

At lower altitude the upper forest line is present with the Park HQ buildings. Depending on the time left, a visit to Laguna Chingaza (3200 m) with aspects of the very humid *Weinmannia* rainforests is optional.



Chingaza: Laguna Seca at 3600 m about in the headwaters of rio Chuza. Morrainic paramo with bamboos of *Chusquea angustifolia* (dying back) and *Chusquea tessellata* (fresh greenish). The rounded summits of the ground moraine are covered with *Espeletia grandiflora* (stemrosettes) - *Calamagrostis effusa* bunchgrass paramo. (photograph Santiago Madriñan)

Chisacá (3650-4000 m, no. 7). The Chisacá area is situated on the divide between the Quebrada Chisacá running down to the High Plain of Bogotá and the Magdalena river ending in the Carribean and Quebrada S. Rosa running into Rio Meta and the Orinoco river. Chisacá paramo is on the northern edge of the Sumapaz páramo, world's largest páramo area with the Nevada de Sumapaz (4250 m) as the highest peak.

Climbing the valley of the Chisacá stream, shrubparamo is almost absent. It has long time ago disappeared because of agriculture. In the upper valley from about 3500 m zonal grass paramo, mostly *Calamagrostis effusa* with *Espeletia grandiflora* stemrosettes is found with patches of *Carex pichinchensis* or *Sphagnum* spp. with *Espeletia killipii* along the stream on the morainic valley floor. A series of glacial lakes is present on the watershed at about 3650 m. They are locally bordered by *Sphagnum* bog with asteraceous *Diplostephium revolutum* treelets with characteristic spherical dark green canopies. Here is also the first evidence of a *Plantago rigida* cushion bog. The mineral shores of the glacial lakes have ephemeral communities of *Crassula peduncularis* associated with species of *Elatine* and *Callitriche*. Prominent submerged communities of *Isoetes palmeri* are found growing deeper.

Bogs and fens determine the aspect on the wet valley floor with ground moraines of the U-shaped valley of Santa Rosa, south of the Chisacá watershed. *Sphagnum* bogs in various stages of succession alternate with *Carex pichinchensis* reedswamps with slow superficial seepage. Shrub and dwarf forests of *Diplostephium revolutum* indicate the end of

Sphagnum bog succession. Grayish-leaved shrub of asteraceous *Pentacalia reissiana* does so in the cyperaceous reedswamps. Downslope at ca. 3400 m are the remnants of a *Polylepis quadrijuga* dwarf forest with reddish stems at the upper forest line.

When time and safety conditions allow, the glacial valley of Andabobos (3850 m, no. 8) about 10 km to the south will be visited as well. Among the ground moraines a number of glacial lakes are present with floating ring-like cushions of *Plantago rigida*. This site is unique in having floating cushions of this species on deep cold water.

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A recent book on Climate Change and Biodiversity in the Tropical Andes is freely downloadable from http://www.iai.int/files/communications/publications/scientific/Climate_Change_and_Biodiversity_in_the_Tropical_Andes/book.pdf

Peatland side event at Ramsar meeting in Bucharest

The side event “Peatlands: global challenges and opportunities for the Ramsar Convention” took place at the Ramsar convention COP11 on Tuesday July 10 at lunch time.

It was organised by the International Mire Conservation Group, Wetlands International, the Michael Succow Foundation, the Ministry of Natural Resources and Environmental Protection of the Republic of Belarus, and APB-BirdLife Belarus. The event was attended by 30 participants, among them 11 representatives of governments, 8 international and 7 national NGOs, experts and researchers.

Ramsar Resolution VIII.17 (2002) provides Contracting Countries with a framework for Global Action on Peatlands. This framework allows to promote peatlands in other related conventions – UNFCCC, CBD, and other international initiatives.

The goal of the side event was to evaluate how peatlands are profiled within related international processes and initiatives and to estimate the progress made during the period between Ramsar COPs on both the international and national level. Since Ramsar CoP 10, the profile of peatlands has been raised considerably, both inside as well as outside Ramsar and at the national as well as at the global levels.

At the side-event the current progress within UNFCCC and IPCC processes was presented by Andrey Sirin (Russian Academy of Sciences, IPCC). Anatoly Lis, Deputy Minister of Natural Resources and Environmental Protection of the Republic of Belarus, demonstrated how international policy is implemented on a national level in policy, legislation as well as in practical work. A detailed update on practical work in Belarus was given by Viktor Fenchuk (Director APB-BirdLife Belarus) and by Alexandr Kozulin (National Academy of Sciences of Belarus), followed by questions and discussion.

The second part of the event was devoted to reporting on the latest developments in global peatland policies

with a focus on the FAO initiative presented by Jan Peters (Michael Succow Foundation). The recent publication “Peatlands – guidance for climate change mitigation by conservation, rehabilitation and sustainable use” was presented. This report (see elsewhere in this Newsletter) was prepared through a collaboration between FAO, Wetlands International, Greifswald University (Germany) and the Michael Succow Foundation. As a handbook for policymakers it supports efforts to combat climate change and includes: management and finance options to achieve emissions reductions and enhance other vital ecosystem services from peatlands; country-specific case studies illustrating the problems, solutions and opportunities of peatland management. The report can be downloaded at:

<http://www.fao.org/climatechange/micca>

The last part of the side event was devoted to an overview and analysis of the implementation of Res. VIII.17 on Global Action on Peatlands by Ramsar parties (Tatiana Minayeva, Wetlands International, CC GAP Secretariat) followed by three regional and national presentations, demonstrating the implementation of Ramsar-related policy:

- Wu Ning (International Centre for Integrated Mountain Development ICIMOD) Special requirements for conservation of high mountain peatlands in the Himalayas
- Izolda Matchutadze (Batumi Botanical Gardens, IMCG Georgia) Peatland conservation and rehabilitation in Georgia
- Chen Kelin (Wetlands International China) Peatlands in China: challenges and opportunities for conservation and rewetting

The discussion on draft Ramsar resolutions and future priorities, especially on energy issues, climate change and responsible investment, was short but productive.

Update on new IPCC Guidelines for peatland rewetting

by John Couwenberg

As we reported in our previous Newsletter, the Intergovernmental Panel on Climate Change (IPCC) is currently writing a Supplement to the 2006 IPCC Guidelines for National Greenhouse Gas Inventories, focusing on wetlands. This new guidance will cover emissions and removals from peatland drainage and rewetting. Following a Lead Author meeting in Victoria Falls (Zimbabwe) in February 2012, a first order draft was prepared and opened for review by the scientific community. The many comments provided were discussed during the third lead author meeting held in Dublin (Ireland) in June 2012. Based on the comments received, a second order draft will

be produced, which will again be open for review. This second round of review will be held in October and November 2012 and will not only involve scientific peers, but also governments who will be using the new guidance once it is completed. Details about the review of the second order draft will be announced once it is available – if you are interested in joining the review, keep an eye on the IPCC website (<http://www.ipcc-nggip.iges.or.jp>). After the second review, a final document will be prepared at the fourth lead author meeting to be held in Manaus (Brazil) in 2013. The Supplement to the 2006 IPCC Guidelines will help parties in their annual reporting

to the UN Framework Convention on Climate Change (UNFCCC) of greenhouse gas emissions and removals from the land use sector.

The schedule for the finalization of the supplement has been pushed back somewhat, because IPCC, at its 35th Session in Geneva, June 2012 decided also to produce the “2013 Revised Supplementary Methods and Good Practice Guidance Arising from the Kyoto Protocol” by the target date of October 2013. This second guidance document focuses on parties that have signed the Kyoto Protocol and must, besides reporting emissions and removals to the UNFCCC, also account for emissions and removals under the Kyoto Protocol. The reporting and the accounting

are not necessarily the same, particularly where the land use sector is concerned.

This additional ‘Kyoto-Guidance’ will update and augment the existing Chapter 4 of the Good Practice Guidance to take account of the 2006 IPCC Guidelines as well as the wetlands supplement that is currently being written. The first lead author meeting for drafting a first ‘zero order’ draft is scheduled for September 2012.

More information on the new ‘Kyoto guidance’, including a table of contents, can be found here:

http://www.ipcc-nggip.iges.or.jp/home/2013KPSupplementaryGuidance_inv.html

Canadian oil sand mining: TOTAL and science

by Ab Grootjans, with contributions of Tatiana Minaeva

The oil company TOTAL hosted an international workshop on boreal wetland reconstruction in Paris on 16th and 17th of April 2012. TOTAL is the new kid on the block to exploit oil sands in Alberta Canada, near the Athabaska River. Before they will start operations they have invited world-class scientists to initiate key international research projects. The goal is “to better understand the latest science in wetland reconstruction, identify knowledge gaps and develop a science-based process to address the risk of failure”.

Some 50 wetland scientists with experience in wetland restoration were invited, 30 from Europe and the rest from Canada or the USA. Among the researchers (from Europe and Canada/USA) who accepted the invitation, were several IMCG members, reason enough to critically consider whether and how to participate. This note was made as a preparation of the meeting; a report of the outcomes of the workshop will follow in a next IMCG Newsletter.



Exploited tar sands area (Photo: Tatiana Minayeva).



Natural patterned fens (Photo: Jiri Rezac, WWF-UK)

Oil sands exploitation is a very destructive way to abstract oil from tar sands, because it is done as open cast mining in an area consisting for a large part of mires and lakes. The mires will be completely destroyed during exploitation, while large holes filled with water and bitumen remains will be created. After termination of the mining activities the pits will be filled with a mixture of sand, peat and leftovers of oil sand. More details can be found in the article by Martha Graf and Line Rochefort, published in IMCG Newsletter 2010-1 and the After-word by Tatiana Minayeva.

Before permission is granted by the local government, an environmental assessment report (EIA) has to be produced. This document is 1) big, 2) optimistic about effects after ending mining operations, 3) optimistic about possibilities to recreate habitat conditions for endangered rare species. Local nature conservation organisations, such as the Alberta Wilderness Association or the Pembina Institute, are not convinced that the effects have been properly evaluated or that the rehabilitation process will be science-based. Much discussion was recently triggered by a publication in

PNAS (Proceedings of the National Society of America), claiming that the CO₂ emissions due to oil sand mining have been underestimated to a large extent and could be in the order of 11-47 million tons of carbon that is now stored in the peatlands. On top of that, the sequestration potential of 6-7 metric tons carbon per year would be lost. Actually, the emissions have not been underestimated, they have simply not been addressed in the environmental assessment studies. The studies have only looked at possible effects of emission of acid compounds.

Mining companies, including TOTAL, have now been allowed to start mining in the Joseline North Mine, Alberta, an area that for 40% consists of natural wetlands, mostly mires. The companies are required to reclaim successfully ca 20 % of the area as wetlands. TOTAL points out that the Province of Alberta (the regulatory agency) currently has no legislative guidelines to assist in the establishment and evaluation of such reconstructed wetlands.

Developing a sound legal framework requires a solid scientific background. This is where we as scientists come in. TOTAL expects that we will fill the knowledge gaps that exist in restoration / rehabilitation / reclamation / and all other terms that mean nothing, unless properly defined. Mr Greg Stringham, vice-president of the Canadian Association of Petroleum Producers (CAPP), stated that they did not have to restore living peatlands, but that "they have to restore the land to a sustainable condition, a similar but not identical state". "We have not said that we will restore peatlands, although we are working on it". The CAPP vice-president promised that they will return the land "to a sustainable landscape that is equal to or better than how we found it". So, the Canadian Association of Petroleum Producers is very confident that they will successfully change the former mire landscape again into something good, whatever that may be. In this situation the role of the scientist is to bring high quality basic science to the decision making bodies, to improve methodologies for Environmental Impact Assessment, and to develop restoration plans for after-mining. An even more demanding task would be to educate oil company employees, from CEOs to workers in the field, and also other groups of stakeholders. Their involvement in decision making must be based on facts, not on slogans. Knowledge networks that exist within IMCG or NGOs like Wetlands International could assist in getting this job done.

At present, the legislation and policy of Alberta is not sufficiently considering conservation in their decision making schemes. However, the Ministry of Environment and Water of Alberta has recently issued a (draft) policy document on compensation

measures, in which more consideration is given to the variety of wetland types and wetland functions. This document is based on an ecosystem approach and when adopted could bring some change in "business as usual" practices. Canada is a Contracting Party to the Ramsar Convention on Wetlands, and Resolution VIII.17 of this convention calls contracting parties to develop relevant national legislation on peatland conservation. Canada has retrieved its signature from the Kyoto Protocol, thus besides the Ramsar Convention, little legislation remains to avoid major CO₂ emissions due to oil mining. Despite the lack of legal tools to prevent environmental damage, much more environmental friendly results could be achieved when spatial planning of the Alberta government would be better. For instance, provincial regulations require that the walls of tailing ponds are to be kept without vegetation, which leads to increased pollution by mineral deposits, both in tailing ponds and in adjacent lakes and peatlands. Furthermore, the demand to use 100 % of ore in the licensed areas forces oil companies to use much more space than is wise.

Examples like these, probably motivated TOTAL to organize their workshop. Compared to the Canadian Association of Petroleum Producers, TOTAL appears to be less confident that something good will come after termination of mining. They probably hope that bringing together scientists from all over the world will help to fill gaps in knowledge on how to undo the damage done. However, they appear to think that we are still unsure about "which components are required to reconstruct a successful wetland ecosystem", "which established criteria have been developed to assess reconstruction success" and "what are natural and anthropogenic (oil sand process water) stressors that may affect wetland reconstruction success". I think that these questions will not fill in knowledge gaps, because the objective of what to do during after-mining is wrapped in clouds by using unspecified terms as reconstruction, reclamation and wetlands. What should be answered is the question which ecosystem services of untouched mires can be reconstructed and to what extent. And most of all: how sincere are oil companies in cleaning up the mess they have made and to restore at least a part of the ecosystems affected by mining. Are they willing to accept independent review of the planned research and restoration activities? As IMCG we have participated in exchange of restoration experiences many times in our field excursions, but also in symposia and field trips in Germany and Japan, where we exchanged knowledge and commented on planned and executed restoration projects in the field. We will keep IMCG members informed on the outcomes of this meeting..

TOTAL or not TOTAL

by *Tatiana Minaeva*

After the oil company TOTAL had invited several IMCG members to participate in a wetlands restoration discussion workshop, Ab Grootjans raised the question on the role of a scientist in such discussion, and more particularly on how an IMCG member should behave. In this paper, I share some experience on cooperation between a non-governmental organization (NGO) and organizations that are active in the peat or oil business.

The IMCG has been working with the International Peat Society (IPS), an organisation dominated and largely funded by peat extractors, for some time on several projects. For instance, in 2002 we jointly published the book “The Wise Use of Mires and Peatlands”, and since 2000 we worked together on preparing and lobbying Ramsar resolution VIII.17 on the Guidelines for Global Action Plan on Peatlands, adopted by Ramsar COP8 in 2002. In that framework also the Coordination Committee on Global Action on Peatlands was launched and we initiated the Global Peatland Initiative (GPI), which received considerable funding from the Dutch government. We also worked together with IPS in publishing a nice brochure “Peatlands: do you care?”, and organized joint activities during Ramsar meetings in Uganda and Korea. IMCG and IPS publish together the scientific peer reviewed journal “Mires and Peat”, and IMCG participated in the development of the IPS „Strategy for Responsible Peatland Management“. Whereas the latter document was eventually not signed by IMCG, all projects have been successful and each partner achieved its own goal. Our common goal has always been to promote the values and functions of peatlands and to develop a legal decision making framework for conservation and wise use of peatlands.

I will present some other examples of partnerships between NGOs and oil companies. Wetlands International is a well-known NGO with much experience in coalition forming with the oil industry, in this case the oil company TNK BP in Russia. This coalition worked on mitigation plans for oil abstracting activities within the borders of a Ramsar site. Wetlands International (WI), and also WWF, Greenpeace, the Biodiversity Conservation Centre and Birdlife Russia, participated in a consultation process about possible effects of the company's operations on the ecosystems. Birdlife was the only NGO that was paid by the oil company, for monitoring bird populations. All other partners invested their own time in making mitigation plans and evaluating results of mitigation measures. Since 2004, Wetlands International is also working with Surgutneftegaz in Western Siberia on the mitigation of impacts during their operations in wetlands. Wetlands International was involved in developing methodologies and guidelines, but also in improving legislation and facilitating the involvement of local experts and organizations. In both cases NGOs were

confronted with the fact that Russian legislation allows oil companies to work within Natural Protected Areas. Of course, none of these NGOs supports the crazy idea of permitting oil exploration in a protected area. So, we all try to persuade authorities to forbid this, but at the same time we cooperate with companies to mitigate their current activities in such areas. Of course, we can fuel international protest and go to the Strasburg Court or whatever – but in this case we consider cooperation for mitigation to be a more constructive approach.

Wetlands International has since several years a partnership with Shell. This partnership deals with Shell projects in several countries. Alberta, Canada is one of the regions where such cooperation exists. We work together on environmental effects of oil sand abstraction on natural wetlands. Our main goal here is to bring a ‘conservationists vision’ into the decision making process. In practice this means the introduction of an “ecosystem approach” into planning, restoration and other compensation activities. We work with the company on a number of problems related to implementing practices in pilot areas, complying to international conventions and regulations on biodiversity, water management, ecosystem services, climate change, and mitigation capacity and also with local government on legislation to upscale the results of a pilot project.

In such formal relationships with business partners, three issues may arise: (i) money, (ii) green washing, and (iii) knowledge flow.

(i) Money: A partnership between a rich oil company and a poor NGO that is mainly financed by donations can be very tricky. But, if they want, the management of a large company like Shell can move away from the usual “business-consultant” relationship (with the rule: “who pays, decides”) to a “helicopter view” of information exchange on equal levels. With the peat industry we actually had the same experience, but with large oil companies it is less easy to work on the same level. It really costs a lot of patience to make them aware that they are not ruling the world. Sometimes it looks so hopeless, that one is tempted to give up, as for instance the Pembina Institute, an environmental NGO in Canada, did.

(ii) Green washing. To avoid green washing, partners must develop clear communication strategies and rules. How to use logos, how to bring results into the open, confidentiality issues etc. There are plenty of mechanisms to avoid green washing – but this point should be clearly pronounced and agreed between partners: “No green washing”. And partners should monitor each other.

(iii) Knowledge flow. The concern is that during communications workshops, and negotiations companies could use partners as a cheap source of knowledge and ideas. Personally I have no objections if good conservationist ideas get into the heads of company management people for free. My main

concern is that my partners, since they are used to strong sectorial thinking, may not be in a position to really use this knowledge properly. They can even misuse our ideas. That is why we need project based partnerships on the implementation level. And of course publishing our results in peer reviewed journals is a good medicine to treat the illness.

My personal considerations regarding the TOTAL workshop are as follows: If the IMCG or its members accept the invitation-, then the IMCG position

towards oil sands and potential partnership principles should be presented. If our approaches and ideas to restore wetlands are of interest to TOTAL, there are two ways to proceed: 1. initiate project based activities within a partnership in which principles and approaches are clearly explained. Or 2. involve single IMCG members in the “business-consultant” agreements. In the latter case, however, members must make clear that they are not presenting views and principles of the IMCG..

Oil sands: McClelland Lake wetland complex

by the Alberta Wilderness Association

Located 90 km north of Fort McMurray, just east of the Athabasca River, the McClelland Lake watershed includes a unique system of wetlands, the McClelland Lake Wetland Complex. The wetland complex’s importance is due to its unusual combination of biophysical features and ecological functions.

McClelland Lake is the largest natural water body between Fort McMurray and the Athabasca River delta. Two of Alberta’s largest patterned fens lie on either side of the lake (a fen is a peat wetland fed by groundwater). The McClelland Lake fen to the southwest has built up over 8000 years since the last glacial retreat; it is intricately patterned, with hundreds of narrow treed ridges separating long, narrow, shallow pools of water. The watershed also features 12 sinkhole lakes, rare in Alberta.

McClelland Lake Wetland Complex is an important stopover and breeding area along one of North America’s major migratory bird routes. 205 bird species have been recorded within or in the vicinity, of which about 115 stay to breed. The endangered whooping crane has been seen on several occasions in these wetlands. The fen is home to other species of concern, including the Canadian toad, sandhill crane, yellow rail, black tern, and short-eared owl. There are over twenty rare or endangered plant species and a rare vegetation community. The watershed catchment area of 330 km² drains in a northeast direction, through the McClelland Lake Wetland Complex and into the Firebag River. In 2009, the Lake, fen and sinkhole lakes were confirmed as provincial Environmentally Significant Areas (ESAs).



McClelland Lake and Fen (photo: Alberta Wilderness Association)

Alberta Wilderness Association (AWA) and other environmental organizations have a longstanding interest in the McClelland watershed. In 1994 the Northeast Alberta Wild Coalition and AWA proposed as the top northeast Alberta priority the designation of the Fort Hills area as a Provincial Park and designation of McClelland Lake, patterned fen and sinkhole lakes as an Ecological Reserve. In 1996, after a four year process, the Government of Alberta designated the wetland complex off-limits for oil sands development under the Fort McMurray-Athabasca Oil Sands Integrated Resource Plan (IRP). In 1999 the McClelland fen was recommended for protection under the Special Places program by the provincial Boreal Forest Subcommittee. In 1998, Koch Industries' subsidiary Koch Oil Sands Ltd. acquired the Fort Hills area oil sands leases; it held 78% ownership, with UTS Ltd. acquiring the remainder. Koch Oil Sands was renamed TrueNorth Energy in 2000, and in June 2001 submitted an application and Environmental Impact Assessment (EIA) to the Alberta government to develop the Fort Hills oilsands mining project. At TrueNorth's request, in June 2002 the Government of Alberta quickly amended the area IRP after minimal public consultation to allow for mining of 45% of the fen. Even so, the amended IRP states that "surface mining within the Athabasca Clearwater RMA shall maintain the water table, water chemistry and water flow within limits as indicated by natural fluctuations to maintain ecosystem diversity and function of the McClelland Lake wetland complex where surface mining is not allowed".

In its True North Energy decision 2002-089, the Alberta Energy and Utilities Board (EUB) accepted True North Energy's request to withdraw the portion of its EIA describing impacts to the wetland complex. This EIA had stated that water table disruptions from mine dewatering and other lease disturbances would likely kill peat-forming mosses, ending peat production on the fen. Instead, the EUB granted True North Energy its request to develop a plan by a company-led committee of regulators and stakeholders to mitigate the mine's effects on the unmined portion of the wetland complex. AWA has not joined this committee, which it regards as a means to legitimize mining in the upper McClelland watershed that supports the complex with groundwater flows, and therefore facilitate the destruction of the entire wetland complex.

In 2003, Koch shelved the Fort Hills mine, citing cost concerns and market and regulatory uncertainties; in 2004 it sold its Fort Hills holdings. The 2008 economic downturn also delayed development of the Fort Hills mine. After a series of ownership changes, as of December 2010 Suncor Energy Inc. owns 40.8%, Total E&P Canada Ltd. owns 39.2% and Vancouver B.C.- based Teck Resources Ltd. owns 20% of Fort Hills. In December 2010 Suncor announced that, subject to final Board approvals in 2012, they would develop Fort Hills to commence in 2016.

There is still time to avert the strip mining of the upper McClelland watershed that supplies the McClelland wetland complex with groundwater. The companies must submit a plan six years before operations start in the McClelland watershed to show how mining will not affect water flow, level and chemistry in the unmined portions of the wetlands; so far, no such plan has been submitted, though it is being developed.

There has been no demonstration yet that the upper half of a boreal peatland watershed can be mined for decades while preserving the lower portion's water table, flow and chemistry. It would be highly irresponsible to allow the McClelland wetland complex to be a test case. The concern is that Alberta regulators will rubber stamp a plan based on unproven assertions – just as for 40 years, regulators accepted tar sands industry claims that toxic tailings ponds would soon settle out, or that the industry was not depositing contaminants in the Athabasca River. Surface mining should not proceed in this watershed. The Government of Alberta's upcoming land use plan for the Lower Athabasca region represents an important opportunity to secure the future of this outstanding ecological area through a protected area designation. Another opportunity is through Canada's national government fulfilling its environmental responsibilities regarding biodiversity, water and migratory bird impacts of oilsands. To encourage these actions, it is vital that responsible decision makers, investors and consumer groups, insist that Canada and Alberta leave intact the most important ecological areas in the tar sands region, including the McClelland watershed.

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Peatlands and the EU Water Framework Directive: Is the Cynderella syndrome persisting?

by Michael Trepel

The European Water Framework Directive (WFD) is in force since December 2000. The directive has ambitious aims: achieving a good ecological and chemical status of all water bodies in Europe till 2015. In 2010 most member states have published the first river basin plans and programs of measures for their river basin districts. Most surface water bodies fail to achieve the aims set by the directive because the water bodies are hydromorphologically altered and receive too high nutrient inputs from diffuse and point sources.

When reviewing the river basin plans and programs of measures it becomes clear that mires and peatlands are largely neglected. It seems that the Cinderella syndrome is still alive among European water managers. This is a pity, because mires and peatlands offer several opportunities for integrated water management to support the implementation of the Water Framework Directive in Europe.

Wetlands in the Water Framework Directive

The directive itself does not use the term peatland or mire; instead it uses the term wetland. The directive has two strong connections with wetlands. Article 1 defines the purpose of the directive.

WFD – Article 1 – Purpose

The purpose of this Directive is to establish a framework for the protection of inland surface waters, transitional waters, coastal waters and groundwater which:

(a) prevents further deterioration and protects and enhances the status of aquatic ecosystems and, with regard to their water needs, terrestrial ecosystems and wetlands directly depending on the aquatic ecosystems;

Mires and peatlands are (semi-)terrestrial ecosystems with distinct water needs which encompass (and often directly depend on) aquatic ecosystems. Through Article 1 mires and peatlands are protected by the Water Framework Directive against further deterioration.

Secondly, wetland restoration is explicitly suggested as a supplementary measure for the programme of measures.

WFD – Annex VI: Lists of measures to be included within the programmes of measures - Part B

The following is a non-exclusive list of supplementary measures which Member States within each river basin district may choose to adopt as part of the programme of measures required under Article 11(4): ... (vii) recreation and restoration of wetlands areas...

Benefits of mires and peatlands for sustainable water management

Mires and peatlands support several ecosystems services for sustainable water management and thus for the implementation of the Water Framework Directive. In principal peatlands can improve water quality, slow down flood waves and maintain aquatic biodiversity. The services offered by a single peatland are mainly controlled by its landscape setting and hydrogenetic character. The potential services are modified by water management and land use intensity. Most mires in Europe do not fully realize their natural regulation services anymore, because drainage and land use for agriculture, forestry and peat mining have altered flow patterns from the basin and through the peatland.

The Water Framework Directive is implemented in Europe with a simultaneous top-down and bottom up approach. For better addressing mires and peatlands in future implementation processes it is necessary to work on both levels.

One reason why mires and peatlands are not present in most water manager's minds is that the relations and benefits to European directives are not known. Table 1 gives an overview of connections between European policy and peatland activities.

Table 1: Connections between European Environmental Directives and peatland management

European Environmental Directives	Links with peatland management
Water Framework Directive (2000/60/EC)	<ul style="list-style-type: none"> - nutrient retention - maintaining aquatic biodiversity - natural hydromorphology
Habitat Directive (92/43/EEC)	<ul style="list-style-type: none"> - nutrient retention - maintaining aquatic and semi-aquatic biodiversity - natural hydromorphology
Floods directive (2007/60/EC)	<ul style="list-style-type: none"> - natural hydromorphology - flood retention areas
Marine Strategy Framework Directive (2008/56/EC)	<ul style="list-style-type: none"> - nutrient retention

Managing and rewetting peatlands in Europe will support several directives at the same time and additionally reduce the greenhouse gas emissions from the land use sector. The synergies between these directives are not fully used in the environmental and agricultural sector, because most environmental authorities stick to sectoral planning. Integrating peatlands in a modern environmental policy must follow a large scale transdisciplinary approach that

includes water managers, nature conservationists, economists as well as agriculture and flood managers. Such an approach is not an illusion. It was practiced in the past when draining peatlands for agricultural purposes. The suggestions of the European Commission in the CAP reform head in this direction.

Next to this top-down approach, good case studies are needed as examples for illustrating how peatland management contributes to river and lake restoration. A prominent example is the restoration of the river Skjern peatland in Denmark, where canals and dikes from the 1960s were removed and the former flood area restored.

Technical guidance offered by the Commission

In the beginning of 2012, the European Commission published its Technical Report No. 6 with the title 'Technical Report on Groundwater Dependent Terrestrial Ecosystems' (<http://tinyurl.com/wfd-tr6>). The report is a helpful document for the identification of groundwater dependent ecosystems. However, findings of mire hydrology are not included. Again, it seems that peatlands are systematically neglected by water managers in Europe. The report defines four types of groundwater dependent wetlands. The first are groundwater fed springs. But, the authors of the report exclude spring areas connected to rivers and lakes; because they consider them as aquatic ecosystems. Water managers frequently argue with the same logic, and consider springs and floodplains not as an aquatic ecosystem but as a semi-terrestrial ecosystem. In fact, all mires are fed by different proportions of groundwater, surface water and precipitation. The distinction between truly groundwater dependent and partly groundwater dependent given in the report seems to be too strict and hydrologically wrong.

Raised bogs are also not considered as groundwater dependent ecosystems, because they are fed by precipitation. However, the water table in a raised bog presents the first aquifer. Experience from several peat mining sites has shown that lowering the groundwater table around a raised bog will lower the (ground)water table in the bog itself. Thus since decades bog restorations call for a wide buffer zone around bogs. Without a hydrological buffer zone most rewetting activities in raised bogs will be ineffective.

The methods suggested in the technical report for identifying groundwater dependent ecosystems refer to soil properties and habitat types. But they fail to name organic soils as a prominent identifier of (formerly) high groundwater levels.

This technical report is not suitable to support an integrating view on wetlands. The main problem is that most wetlands are excluded per definition because they are only partly depending on groundwater flow and quantity. However, ecohydrological research in many mires has shown that drainage or groundwater abstraction alters water

levels and flow patterns significantly and lead to deterioration of these groundwater dependent ecosystems.

Pressure from the European Commission?

The European Commission has started with evaluating the river basin plans and programs of measures delivered by the member states. In a letter to the German water director, the Commission asks, why Germany has not mentioned wetland creation as a multi-functional measure. Apparently, the Commission did not apply the right search terms (Feuchtgebiet = wetland) to the document during the evaluation process, and overlooked that some river basin plans (e.g. Eider, Schlei / Trave) have included an explicit chapter on peatland rewetting. However, implementing peatland rewetting is in fact becoming more difficult due to increased land hunger of the agricultural sector.

Activities for including peatland rewetting in water management activities are hindered by agricultural policy which still supports drainage based intensive agriculture including crop production on organic soils.

The suggestions for the EU Common Agricultural Policy (CAP) reform have included organic soils for the first time. It is suggested, that conversion of organic soils from grassland to arable land is restricted on farm level from 2011 onward. While it is a good idea to prohibit arable use of organic soils, the reference year 2011 is not a good choice, because it is based on the misconception that land use *change* instead of land *use* is responsible for the environmental problems associated with organic soils.

Cinderella and the water management

Why is it that peatlands are neglected in the water management sector and only play a marginal role in the implementation of the water framework directive? The answer to this question can probably be found in the past. Water authorities have for a long time drained wetlands and shortened rivers. They were in most countries responsible for the land melioration programs, and the authorities responsible for the implementation of the water framework directive now were directly responsible for wetland drainage in the past. The ecohydrological thinking behind the ideas of the Water Framework Directive has still not arrived in the minds of many water boards on the local level nor in the water administration. At present it is still common usage to consider peatland rewetting solely as a nature conservation activity instead of – what it is – an integrated water management activity. Changing this way of thinking and behaving is urgently needed. The way ahead for IMCG is twofold:

- Inform about synergies of peatland rewetting on all levels
- Demonstrate success of restoration sites in case studies.

Strengthening regional peatland fire prediction and early warning system: ASEAN Technical Workshop

20-21 March 2012, Kuala Lumpur, Malaysia

by Faizal Parish & Noor Azura

In the past 15 years, more than 4 million ha of peatlands in SE Asia has burnt generating smoke clouds covering 5 countries and causing massive environmental and social impacts. Preventing peatland fires is a top regional priority. The last three years have been relatively wet in the region but a new El Nino Drought is expected in the next 18 months.

A regional workshop was held in Kuala Lumpur on 20 & 21 March 2012 to discuss ways to further refine a Peatland Fire Prediction and warning system for SE Asian Countries. It was attended by 41 participants from various government agencies, research institutions and NGOs in the ASEAN region.

The workshop was jointly organised by the ASEAN (Association of Southeast Asian Nations) Secretariat and the Global Environment Centre (GEC) in association with the Government of Malaysia through the Ministry of Natural Resources and the Environment (NRE) and the Forestry Department of Peninsular Malaysia (FDPM). The workshop is a part of the APFP and SEApeat Projects, funded by IFAD-GEF and European Union respectively. The technical workshop was also supported by the ASEAN Specialised Meteorological Centre (ASMC) and Malaysian Meteorological Department, and their efforts and support are gratefully acknowledged.

The workshop followed on from an earlier meeting in July 2010, which identified the basic needs of the system, building on the existing Fire Danger Rating System (FDRS) established following the 1997/98 regional fire and haze event. The system generates and uploads daily fire danger rating maps four hours after real-time information on temperature, rainfall and wind speed is received from a network of weather stations in Malaysia. Since 2010, the Malaysian meteorological Department has further developed the system – increasing the number of ground weather stations from 39 to 168 and incorporating a new data layer to show fire danger in relation to peatlands. The system is also integrated with Google Earth – so that danger rating maps can be overlain with a range of geographic features. The FDRS generates warnings on the risk of forest and peatland fires so that relevant departments can use it as a guide in preventing fires in high risk areas. The risk factor is also affected by ground conditions and soil type. The risk factor is illustrated in the form of maps, with areas coded in blue, green, yellow and red to indicate the risk of fire as shown in Figure 1. Maps are also generated at a lower level of detail for seven other ASEAN countries (see Figure 2)

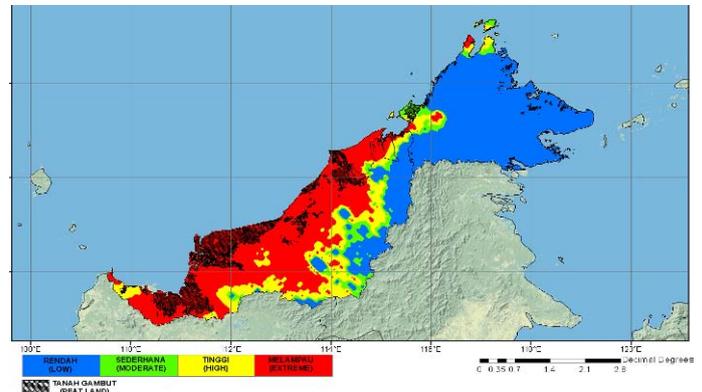


Figure 1: Example of FDRS map for northern Borneo – showing high risk of surface (bush) fires in most peatlands in Sarawak State on 21 March 2012.

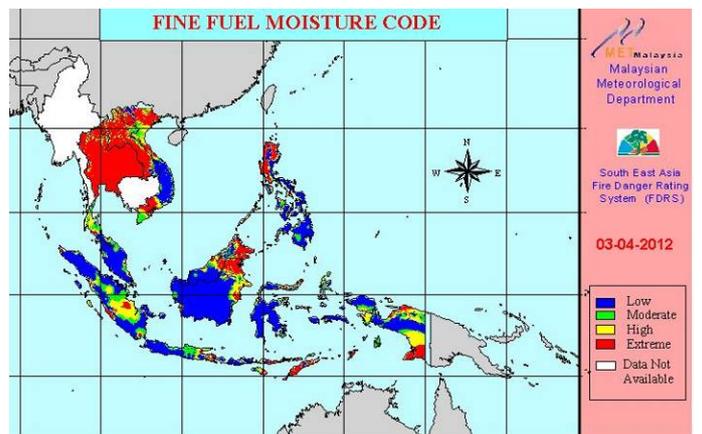


Figure 2: FDRS map for ASEAN countries 3 April 2012

The aim of the workshop was to review the development of the system, propose measures for further enhancement and discuss the best measures to promote use of the system in peatland fire prevention. Recommendations from the meeting included:

1. Add additional overlays to show peatland distribution in other ASEAN countries
2. Incorporate a short term (1-7 days) prediction capability by integrating forecasted temperature and rainfall data
3. Enhance usage of the FDRS through
 - The development of a generic Standard Operating Procedure (SOP) for dissemination of FDRS warnings
 - Incorporation into existing fire and haze, peat working group SOPs
 - Promote use of the warnings by priority user groups including local governments, plantations, managers of fire prone peatlands.

Dieback of the endemic *Azorella macquariensis* cushion plant on Sub-Antarctic Macquarie Island

by Jennie Winham

Azorella macquariensis is the major peat former in the feldmark on Macquarie Island. The cushion plants can form peats of up to 1 metre deep. Dieback in *Azorella* and the subsequent erosion and loss of peats is likely to result in a major loss of carbon from the ecosystem.

Azorella macquariensis (Apiaceae) is a perennial cushion-forming herb that is endemic to Macquarie Island which lies approximately 1500km SE of Hobart in the sub-Antarctic. It is the major peat former in the feldmark on Macquarie Island. The cushion plants can form peats of up to 1 metre deep. Dieback in *Azorella* and the subsequent erosion and loss of peats is likely to result in a major loss of carbon from the ecosystem.

Azorella macquariensis is largely restricted to feldmark vegetation, which occurs at attitudes between 200 to 400 m and covers roughly half the island. Macquarie Island is 34 km long by 5.5 km wide at its broadest point. Feldmark vegetation cover varies from over 50% in sheltered areas to less than 5% in exposed sites, with *Azorella macquariensis*, bryophytes and lichens being the dominant vegetation (PWS 2006). *Azorella macquariensis* occurs over the full range of the feldmark, but has suffered major losses across the island as a result of dieback.

Azorella macquariensis is closely related to *Azorella selago*, a common feldmark species on other sub-Antarctic islands.

Azorella macquariensis was listed as endangered on the Tasmanian *Threatened Species Protection Act* in 2009 and as critically endangered on the *Australian Environment Protection and Biodiversity Conservation Act* (Threatened Species Section 2012).

Catastrophic decline

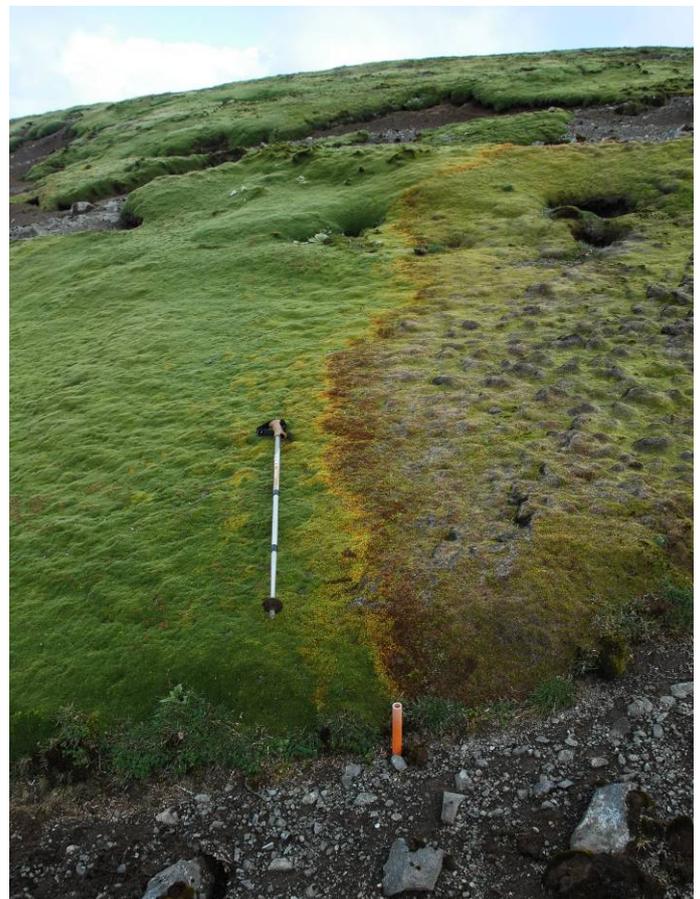
Although abundant and widespread on Macquarie Island, *Azorella macquariensis* has undergone a recent catastrophic decline. The decline is due to factors that are currently unknown and under investigation. The dieback was first noted and documented in December 2008 (Bergstrom, unpublished data). Dieback was not evident in March 2008 during botanical surveys undertaken on the island (Rudman, Bergstrom & Whinam, pers. comm). By March 2009, dieback was evident across the entire range of the species, with approximately 90% of cushions dying in the worst affected sites.

Dieback is most extensive in the northern third of the island where the majority of the habitat is severely affected by dieback. Initially, the southern third of the island had appreciable patches of habitat where disease is absent or only of limited expression. The extent of dieback affected cushions has continued to increase across the whole of the island, with only a small amount of regrowth or recruitment observed in some dieback affected areas. It is estimated that a

population decline of at least 50% has occurred since 2008. There is no indication in the literature of any dieback being recorded in other cushion plants worldwide (N. Gibson 2009, pers. comm.).

As *Azorella macquariensis* is the main structural component of feldmark, the loss of *Azorella macquariensis* through this epidemic will cause severe modification to the ecosystem and is likely to lead to major erosion problems and decline of associated species. This may impact on the success of regeneration from soil stored seed.

Logistical and quarantine restrictions impose severe limitations on managing the response to the dieback. Management challenges include infrequent access, availability of expertise in the field and high costs.



Azorella dieback on subAntarctic Macquarie Island. The 'yellow line' is symptomatic of much of the dieback observed on the island. It is unclear whether primary pathogens are involved. There appears to be no correlation between the health of the surface plants and the tap root. There is no consistent pattern in the movement of the yellow discolouration across areas of cushion plant. The dead cushions are then subject to erosion of the organosols by the extreme weather conditions, as well as colonisation by species such as *Agrostis magellanica*.

Climate change

Although feldmark is a habitat identified as being at risk from climate change, there is no current data to demonstrate a decline in extent or quality of the species' habitat. Climate data shows warming of Macquarie Island of over half a degree in 50 years (Pendlebury & Barnes-Keoghan 2007, Tweedie & Bergstrom 2000). Analyses of climate data has shown periods where the annual monthly temperature is above average and where average monthly precipitation is below average, suggesting a change to drier conditions (Whinam & Copson 2006)

Climate change may increase the risk of alien species, including pathogens, establishing on the island or allow existing species to become more aggressive, either directly or through changed interactions with other species.

Impact of rabbits or rodents

Feldmark is the only vegetation community on Macquarie Island that is not currently showing significant adverse impacts of rabbit grazing. Rabbits occasionally 'scrape' the cushions but have not been observed to have major detrimental effects on *Azorella macquariensis*. Rabbits, rats and mice are currently the subject of a vertebrate pests eradication program (PWS & BCB 2007).

Management Strategy: What has been done?

A collaborative program resulting in a species recovery plan has been developed between Australian Antarctic Division, and the Parks & Wildlife Service, Royal Tasmanian Botanical Gardens and Resource Management and Conservation divisions of the Department of Primary Industries, Parks, Water and Environment.

Biosecurity measures have been implemented as a precaution in case a pest or pathogen is causing the dieback. Both intra and inter island biosecurity risks are under management.

An investigation into the cause of the dieback is underway that includes determining whether a pathogen is involved, as well as investigating environmental associations and physiological susceptibility to environmental stress.

Dieback extent and severity mapping has been undertaken to identify areas free or minimally affected by dieback. Three areas are currently declared as Special Management Areas where access is strictly controlled.

A small ex-situ population of *Azorella macquariensis* plants are held at the Royal Tasmanian Botanical Gardens and on Macquarie Island. Seed has been banked at the Tasmanian Seed Conservation Centre.

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Feldmark with Azorella macquariensis and mosses on the plateau (200-300 metres a.s.l.) of Macquarie Island

The Janus face of Belarus: on peat extraction and peatland rewetting

by Annett Thiele

The serious economic crisis since early 2011 combined with deteriorating relations with Russia have aroused in the Belarusian government the need to increase utilisation of in-country energy sources. Old fashioned, but influential nature exploiters spread the rumour that huge amounts of peat are available for extraction in the peatlands of Belarus and - as a result - the council of ministers, the officials directly under the president, adopted the resolution 'On some issues of peat extraction and optimization of the system of protected areas'. This resolution, however, neither solves issues of peat extraction nor optimizes the system of protected areas. In fact, it does quite the opposite.

Looking into the details, the officials discovered that the envisaged peat resources are located in natural or near-natural peatlands with national and international conservation status. Lacking any understanding of the ecological importance of these conservation areas, eight sites, with an area of 3500 ha, were planned to be drained and cut-over to provide energy for five cement plants. The threatened conservation areas include the International Bird Area (IBA) site Vyhanaščanskija baloty and two sites, Moračna and Dakudaŭskaje that just have been rewetted with UNDP-GEF and BMU-ICI grants. After having in the last years rewetted 17 sites (28,000 ha) and having supported several other projects connected with peatlands, UNDP-GEF is now evaluating the meaningfulness of further support to peatland rewetting in Belarus.

In a large ICI (International Climate Initiative) project, the German Ministry of Environment BMU supports the development of mechanisms to sell voluntary carbon credits from peatland rewetting in Belarus (Tanneberger & Wichtmann 2011). This process is shortly before its breakthrough and would make Belarus to the first country in the world selling carbon credits on the voluntary market under VCS (Verified Carbon Standard) rules. These activities are respectfully recognized in neighbouring countries and further projects are planned to spread the experience. But the apparent Belarus schizophrenia of on the one hand high level government decisions stimulating peat extraction and on the other hand lower governmental entities (e.g. the Ministry of Nature Resources and the Academy of Sciences) and non-governmental organizations (BirdLife Belarus) pursuing peatland conservation, rewetting and restoration let the whole story appear inconsistent, to say the least. The government risks losing millions of dollars from international donors and carbon markets with the realisation of this resolution.

Furthermore, simple economic considerations and some knowledge of the peat extraction infrastructure in the country make clear that huge investment costs would be required to build new briquetting facilities on the sites where there are none, like in Vyhanaščanskija baloty and other sites, and to install

the drainage system and to start the work. Technicians able to lead a peat briquetting plant are lacking. The government would be forced to educate new people for work that is dirty and - as all low level governmental jobs - not very well paid.



Most peat in Belarus is extracted by peat milling.

The reactions in the digital and printed media were remarkable, with numerous critical articles from dedicated journalists and interviews with national and international experts. Media reactions could only appear after the resolution was signed and published, as public participation is not considered while formulating resolutions. Noticeable were the press conferences and seminars organised by GEF and colleagues from the Ministry of Nature Resources and the Academy of Sciences, stating officially that these plans are unacceptable. This open protest took place for the first time during Lukashenka's presidency, as ministries have to follow and execute the decisions of the president.

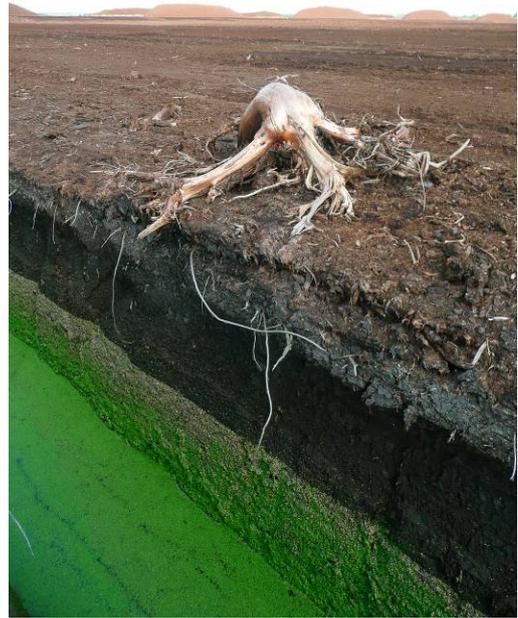


Expanding peat extraction: a dead end street for Belarus?

The resolution is a desperate gasp of a half dead economic system, searching for possibilities to decrease the import needs for energy. Soon it will be revealed that expansion of peat extraction is not a

source of income but a money grave. As a consequence – so is the expectation peat extraction will expand at two sites, where infrastructure is already in place (Pcič, Sviatoje). For the other sites the economic nonsense will be demonstrated by the planning entities and accepted by the high level officials. Furthermore the chances that the program will not be fully realised are quite high as Russia has offered a good deal with low gas prices for the coming years, which will support the state apparatus and provide income from gas utilisation and processing. Lastly, the government already starts to understand that subsidizing a totally uneconomic product is senseless. So there is hope that economic reasoning will save the last natural peatlands of Belarus.

Tanneberger, F. & Wichtmann, W. (eds.) 2011. Carbon credits from peatland rewetting: Climate – biodiversity – land use. Science, policy, implementation and recommendations of a pilot project in Belarus. Schweitzerbart Science Publishers, Stuttgart, XII + 223 p. €39.80 (English) or €29.90 (Russian).



Will we have new black deserts in Belarus?

Investing in Peatlands: Demonstrating Success

BES / IUCN UK Conference 26-28 June, Bangor (UK)

Ecologists from across the UK, Europe and from as far away as Tibet descended upon Bangor University to consider the major challenges and opportunities facing the restoration and conservation of the globe's peatlands. The meeting was organised jointly by the British Ecological Society and the IUCN UK National Committee Peatland Programme and, alongside fascinating discussion, featured a beer specially brewed for the conference – incorporating, perhaps unsurprisingly, Welsh Bog Myrtle, which can be found on peatlands across the UK.

Despite the vibrant social programme at the meeting, delegates took the issues raised very seriously. As well they might as peatlands face tremendous pressures and threats worldwide. Peatlands cover 3% of the Earth's land surface but contain 30% of the world's soil organic carbon. Degraded peatlands account for 6% of the globe's total annual carbon dioxide emissions, a level which has increased by 25% since 1990. Mankind's activities have turned peatlands from a net sink to a source of carbon.

Professor Hans Joosten, University of Greifswald, speaking on the first day of the conference, expressed his deep concern at these figures by explaining that 80% of the world's peatlands are in fact still pristine. Therefore, more carbon is being emitted from the 20% of peatlands which are degraded than can be stored by the remainder. Given the threats facing peatlands, the potential to release greatly increased amounts of carbon is therefore tremendous.

Yet peatlands are not only significant as carbon stores. They provide vital habitats for numerous species, whilst also contributing to clean water downstream, buffering against flooding and also providing an important role in cultural heritage. Ben Gearey, University of Birmingham, delivered a fascinating presentation reflecting on the significance of peatlands in preserving archaeological remains such as 'bog bodies', trackways, leather and textiles. The anoxic conditions and water-logged environment is responsible; none of these materials would be preserved on dry sites. Dr Geary's presentation introduced a conflict that many ecologists may not have considered before; that the restoration of peatlands and archaeological conservation could in some cases be at odds. Dialogue and cooperation is needed to ensure that conservation measures do not inadvertently damage sites and records, whilst the ecosystem services framework provides an important tool to value, promote and protect the archeo-environmental resource provided by peatlands.

The precise threats to peatlands depend on their location. However, in general, agriculture is the major threat, particularly drainage and overgrazing by livestock. Peat extraction for energy generation and horticultural substrates are significant threats, as is afforestation of peatlands in temperate zones. Deforestation, for example rainforest clearance in

Indonesia and Malaysia to make way for oil palm plantations, is a major threat to coastal peatlands in the tropics.

When drained, peatlands become vigorous sources of carbon dioxide and nitrous oxide. Dry peatlands are also highly susceptible to fire. When ignited, for example by arson or a lightning strike, peatlands can burn ferociously for extended periods of time. Annual peatland fires in Malaysia and Indonesia are a particular concern. In 1996-97 the burning of peatland in these countries accounted for 6% of global carbon emissions, whilst the haze the fires produce each year has major public health implications.

So, as presentations across the conference made clear, peatlands are vitally important but under threat. How can ecologists, practitioners and policy-makers work together to conserve and restore these habitats? Fundamentally, the restoration of peatlands focuses on re-wetting. This is often done through ditch blocking and the removal of trees. Yet with so much pressure on land for the production of food for a growing population, will removing land from agricultural production prove palatable to farmers and to policy-makers? Professor Joosten suggested that paludiculture, or 'wet agriculture', could provide a useful solution in some cases. Agriculture, grazing and forestry on re-wetted peatlands is possible, he argued, reducing emissions and producing renewable resources (biomass for fuel for example).

As overarching approaches to peatland restoration, partnership working, well thought out policy and the importance of communicating to the public were the three main messages that delegates took away from the meeting. Peatlands in a single catchment may be managed and farmed by multiple landowners and tenants; working with all of them will be fundamental for success. As will involving local communities; a project by the RSPB on the Lake Vrynwy nature reserve in Wales saw 1,000 school children visit, whilst the organisation ran a demonstration day for local farmers to show the process of drain blocking to re-wet the land.

Industry and Government can be leaders in tackling peat degradation. A presentation from Bord na Móna (the Irish Turf Board), emphasised the importance of engaging land-owners and turf cutters in developing a National Peatland Strategy. Turf cutting and use, practised in Ireland for hundreds of years, is a hugely emotive issue, and there are significant infringements of laws against turf extraction from Special Areas of Conservation. Bord na Mona owns 80,000 Hectares of peat, with 60% under active peat extraction. The Board aims to produce a rehabilitation plan for each of its 130 sites.

The economic benefits, alongside the biodiversity benefits, of investing in peatland restoration were succinctly presented by Ruth Waters, Natural

England. An analysis by Mike Christie, Aberystwyth University, as part of Natural England's three upland pilot projects, showed that restoration of peatlands in the uplands could deliver £1.31 – £2.96 for every pound spent, whilst for every £1 not spent, allowing the uplands to decline, society would stand to lose £5.20. The development of Payment for Ecosystem Services (PES) schemes may offer an opportunity to finance the peatland restoration that is needed; an 'action plan' for the development of PES in England is expected from Defra before the end of this year.

Significant opportunities may exist for investment in the carbon stocks locked up in the UK's peatlands. For example, on Wednesday it was announced that Defra's Ecosystem Markets Taskforce has ranked peatland restoration as the top opportunity for investment in the environment by the business community. Yet if businesses are to pay to restore peatlands, counting this in their company carbon accounts under Greenhouse Gas Accounting Guidelines, it's important that this has real environmental value. Mark Reed, University of Aberdeen, introduced the 'UK Peatland Carbon Code'; standards and protocols to ensure that projects aimed at peatland restoration lead to high environmental returns, have real carbon sequestration benefits and minimise trade-offs with other ecosystem services. In order to assess the carbon sequestered by peatland projects, there is a need to develop remotely sensed proxies for carbon stocks – far more cost effective than direct measurement. Vegetation cover can act as a proxy for water table depth, which is itself a proxy for carbon storage, for example. The next stage in the development of the Code is to explore 'bundling' payments for carbon sequestration with that for other ecosystem services, such as water provision or flood-risk attenuation.

The development of guidance on peatland re-wetting by the Intergovernmental Panel on Climate Change

(IPCC), due to be released next year, could also offer a policy opportunity to capture the carbon value of peatlands as a tool for restoration. However, individual signatories to the UN Framework Convention on Climate Change (UNFCCC) have to choose whether to adopt this activity before the next period of the Kyoto Protocol begins in 2013. The IPCC guidance will not be published until the end of next year, leaving the official state of the science behind this 'uncertain' until then. The EU is currently negotiating a proposal on Measuring, Reporting and Verification (MRV) of emissions for Land Use, Land Use Change and Forestry (LULUCF) to count towards EU targets. In line with the UNFCCC position, the EU are likely to make this a voluntary commitment for Member States. Peatlands would be far more likely to benefit from mandatory commitments, and the Department for Energy and Climate Change in the UK should be encouraged to push the EU to make this so.

This is a snapshot of the breadth of discussion and dialogue from the meeting in Bangor. The symposium provided a fascinating and wide-ranging overview of the challenges facing peatlands, the partnership projects which are currently taking place around the world to restore these degrading habitats and the policy opportunities that currently exist (reform of the CAP, the EU Nature Directives and the Water Framework Directive) or are on the horizon (PES, carbon markets), to facilitate further work. The IUCN UK National Committee Peatlands Programme highlighted an ambitious target at the meeting: to restore all of the UK's peatlands. Ecologists and conservationists in the UK are already world-leading in this field. The energy and enthusiasm at the meeting indicated that they will be well able to meet this objective, with adequate financing and the right policy context in which to work.

Meika Jensen

Norwegian mires: redlisted and selected

by Asbjørn Moen

Introduction: variation, protection and use

Mires and peatlands cover ca. 30 000 km² (ca 10 %) of the land surface of Norway. Scarcely any other country in Europe has a greater variation in hydromorphological types (raised bogs, blanket bogs, palsa mires, sloping fens, string fens, etc.) than Norway. Also the plant cover is very diverse, e.g. including 51 of the 54 species of *Sphagnum* in Europe (K.I. Flatberg info 2012). This large variation is related to the comparatively cold, predominantly moist and largely variable climate, and large variation in geology and topography.

Scientists at NTNU Museum of Natural History and Archaeology have been responsible for the scientific basis of the national plan for mire nature reserves in Southern Norway. More than 1000 localities were studied in the field between 1969 and 1983, and a large amount of scientific material was collected (e.g. 25 000 herbarium specimens). About 300 nature reserves have been established in mire localities, based on the mire plan.

More than 7000 km² of peatland have been destroyed as 'living' mire ecosystems during the last centuries. In 2009, it was decided by the Norwegian Government that draining of mires in order to increase forest production was forbidden. At the same time it was proposed to forbid all ditching. However, the result has been that the Minister of Agriculture asked the farmers to reduce mire ditching to a minimum. Still mires are ditched for agriculture in Norway, and mires of high protection value have been destroyed even in the last year. We are awaiting new decisions by the Norwegian Government in the near future.

New nature diversity act and new research projects

A new nature diversity act was approved by the Norwegian Parliament in 2009, and the Minister of Environment and Development stated that the act "signals a new era in Norwegian nature management". During the past years, a number of nature conservation projects have been started in Norway, e.g. on: Norwegian nature index, Evaluation of protected areas, Red lists of species and nature types, Selected nature types etc.

In my department at NTNU we have established a group of mire ecologists with Dr. Anders Lyngstad, Dr. Dag-Inge Øien and myself at the core. We have contributed to all the aforementioned projects, and some additional ones, during the last years. Here I give a summary of three mire projects and some of the recently published reports.

1 Mire knowledge project – Last year we started (in cooperation with the Directorate of nature management) a project on increasing the knowledge of mires in Norway. The project is based on the material from the mire nature reserve plan, and

additional publications from Norway and neighbouring countries. The first project will last until 2013, and we think it will continue. There are three subprojects:

- a. Mire material: secure and systematize the material further and make it more easily available for research
- b. Aerial photos: digitize and secure information on analog photos, and map mire types based on interpretation of new digital aerial photos
- c. Hay fens: give a survey of existing knowledge and propose prioritized localities in Southern Norway for monitoring and management

2 Red list of mires (as a part of the list of nature types) – Few (if any?) countries have published such red list for nature types as produced in Norway last year. The Norwegian Biodiversity Information Centre (NBIC; Artsdatabanken in Norwegian; www.biodiversity.no) is responsible for all types of red list work in Norway. A new species red list was published in 2010, and the red list for nature types was published in 2011. The nature type list is as far as possible based on the same preservation criteria (IUCN) as the red list of species. The red list for nature types contains risk assessments for nature type (ecosystem) degradation and disappearance in Norway. A new system for typification of nature types in Norway (NiN; cf. Habitat Type Database at NBIC, Norwegian only) has been used for description of nature types. The red list was worked out by 11 expert groups, and our research group was responsible for the red list of mires. Ten mire types are classified as endangered:

- Critically endangered (CR): Fen margin of rich hayfen
- Endangered (EN): palsa mire, two types of rich fen in lowlands (mainly Boreonemoral and Southern boreal zones), open rich hayfen
- Vulnerable (VU): typical raised bog (concentric, eccentric, plateau), oceanic bog (atlantic raised bog, ridge raised bog, blanket bog), open lowland springfen, spruce springfen, lowland springfen,

The red list of species is also available in an english version. As a part of the work on the red list of species, a publication 'Environmental conditions and impacts of red list species' was made; including a chapter on mires (Moen et al 2010). An english version of the red list for nature types will be printed in spring 2012.

3 Norwegian mires as selected nature types – The designation of selected nature types was introduced by the new diversity law (2009) and promises to be an important tool for Norwegian nature management. We are involved in different projects to give a scientific background for nature types to be selected

by the government. Until now, five nature types are selected, among them Norwegian hayfens. As mentioned, we have during the next years a project on hay fens, including giving a list of the most valuable hay fens for restoration and management. Among the candidates for the list of selected types are raised bogs, blanket bogs and other important, threatened mire types. In 2011, we completed projects for the Norwegian nature management on giving a scientific basis for action plans for both 'Typical raised bogs' and 'Oceanic bogs' (Moen et al. 2011a,b). Our reports are written in Norwegian, with an English summary. These reports were for a large part based on basic research from neighbouring countries: Sweden and Finland regarding typical raised bogs, and Great Britain and Ireland regarding oceanic bogs (including blanket bogs). However, in boreal, oceanic areas in Norway the climate and the mires are different from mires in other countries, and basic research on Norwegian oceanic mires should be given high priority.

We believe that both raised bogs and oceanic bogs in near future will be included in the list of selected

nature types; and in the reports we suggest an action plan including:

- increasing the knowledge of mires; including research, use of aerial photographs etc.
- put programs into action for restoring and monitoring mires in protected areas
- rewetting and restoring bogs to enhance carbon storage.

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The two reports can be found here:

http://www.ntnu.no/nathist/bot_rapport

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Regional News

News from United Kingdom Climate Change Assessment Tool

Scientists at the Centre for Ecology & Hydrology (CEH) and its partners have developed a new web-based tool to help wetland managers in England and Wales project the impacts of climate change in the next 50 years. The tool was formally launched on World Wetlands Day, 2 February 2012. The tool allows the user to plug-in various details of their wetland, such as geographical location, wetland type, and subject of interest (plants, birds, archaeology etc.). Water source is one key input; currently the tool works for rainfall and river wetlands, functionality for groundwater-fed wetlands will follow shortly. The tool uses data from the UK Climate Projections programme and interactive results are presented based on 10,000 realisations of future climate. The outputs show whether there is likely to be large, medium, or negligible impact on the wetland. In order to access the climate change tool.

http://www.ceh.ac.uk/sci_programmes/Water/Wetlands/ClimateChangeAssessmentToolforWetlands.html

Peatlands UK's top business opportunity

A report, launched June 2012, ranks a carbon funding for peatlands as the UK's top business opportunity from the natural environment. "A Peatland Carbon code will provide the scientific basis for peatland restoration in quantifying the carbon and other benefits, and will give confidence for investors." says Mark Reed, leader of the Valuing Nature Network peatlands project. Clifton Bain, Director of the IUCN's UK Peatland Programme says: "Peatlands are a vast carbon store, and of great wildlife importance. Investing in conserving and restoring them is a key tool to help deliver our climate change obligations. This code will help secure the funding necessary to deliver a pioneering nature-based solution to a global challenge" More information: www.valuing-nature.net/peatland-carbon-funding-proposal-ranked-uks-top-business-opportunity-natural-environment

News from Ireland Cutting up the heritage

2012 has seen heavy discussions on traditional turf cutting in Ireland. Between 1997 and 2002, Ireland had designated 55 raised bogs as Special Areas of Conservation to protect active raised bog, a priority habitat under the EU Habitats Directive. This means logically that peat cutting in these areas should not occur, but in fact it continued. In a recent report to the Convention on Biological Diversity the Irish

government admits: "It is estimated that there has been a 99% loss of the original area of actively growing raised bog in Ireland, and one-third of the remaining 1% has been lost in the last 10 years" (www.cbd.int/doc/world/ie/ie-nr-04-en.pdf).

The Irish authorities were of course supposed to have brought an end to damaging activities being carried out in these 55 SACs many years ago, but the issue has been fudged politically for over a decade now. In clear breach of the EU Habitats Directive, in 1999 the Irish authorities unilaterally granted ten year 'derogations' to allow peat extraction to continue within the SACs for 'domestic use'. The first of these unlawful derogations - in respect of 31 SACs - expired in 2008, but it was extended for two years by the Irish government. However, that 'derogation' finally expired at the end of 2010, and the second derogation - in respect of the remaining 24 raised bog SACs - has expired at the end of 2011. As Friends of the Irish Environment suspected that large-scale damaging activities were continuing throughout many of the 55 SACs, they visited 33 of the 55 sites in May 2011 and reported the shocking results to the European Commission and the Irish government. (see http://www.friendsoftheirishenvironment.net/cmsfiles/files/library/ie_designated_raised_bogs_report_2011_final_25_may_2011.pdf).



Monivea bog, near Athenry, Co. Galway. A priority habitat Natura 2000 site: one of the EU's most important peatland sites. Decimated by machine cutting on the weekend of 26/27 May 2012 – more than 50 plots were cut. NPWS rangers and the Gardaí reportedly "monitored" the cutting but did not intervene.

The Irish government established a Peatlands Council and a Peatlands Forum to involve the Irish Farmer's Association, the Turf Cutters and Contractors Association, Bord na Mona, as well as other representatives of turf-cutting and environmental groups in decision-making. As a result, a report was published in 2012 and a national plan for the conservation of the protected bogs was agreed to be drafted. Also compensation packages are being offered, including a relocation to alternative bogs or

alternatively, if this is not available, a payment of € 2,000 or the delivery of 15 tonnes of turf to each home for 2012. Families who want to cease cutting turf completely can apply for a payment of annually € 1500 for the next 15 years, and a one-off sign-up payment of € 500. In practice, however, peat extraction continued in 2012. A new survey of Friends of the Irish Environment found 17 of the 22 sites surveyed to have been cut by machines this year. See the spectacular shocking/depressing photos under http://www.friendsoftheirishenvironment.net/cmsfiles/files/library/peat_aerialsurvey_turfcutting_sacs_2012.pdf



At least 20 plots have been cut so far this year at Lough Ree bog, between Roscommon and Lough Ree.

In June 2012, police removed equipment used for cutting peat on a bog in County Galway but were confronted by protests of around 150 turf-cutters. A digging device, which had not been removed, was set on fire during the night by unidentified actors.

The Irish Peatland Conservation Council has called on Minister for Heritage Jimmy Deenihan to “get tough” on those responsible for illegally cutting turf on raised bogs designated for protection under the EU habitats directive.

“It is a shameful disgrace...that people still feel the need to go out and destroy the natural heritage of Ireland and to celebrate this behaviour using social media sites,” said Dr Catherine O’Connell, the council’s chief executive. “There’s more to the bog than turf. Bogs provide a wide variety of services to people, including a source of water, a natural carbon storing bank, a refuge for endangered plants and animals, a method of controlling flooding and an amenity for people.” According to the Turf Cutting and Contractors Association the “disconnect” between Irish and EU law “places our members in the invidious position of being obliged...to assert and defend their rights...allegedly transgressing foreign EU law”. Friends of the Irish Environment “deeply regretted” the turf-cutters’ decision. “Any further cutting on protected bogs will increase the likelihood of an emergency injunction against the State, which would be a huge political embarrassment ... and run the risk of lump sum and daily fines that taxpayers

can ill afford.” “The European Commission will not and cannot allow Ireland to set a precedent of disregarding EU law in this way. What we have to remember is that the habitats directive was negotiated and adopted unanimously by all EU member states including Ireland.”

The lack of awareness is clearly expressed in the Chairman’s Address on the website of the Turf Cutters & Contractors Association: “... we are fully in favour of conservation and have proved beyond any doubt that turf cutting & conservation can co-exist. Even the most extreme opponents of domestic turf cutting have admitted that our bogs that are designated are the most pristine in Europe, if not the world. It’s a credit to the people over the generations for the way they have kept their bogs.” In fact most protected sites in Ireland are heavily mutilated and no raised bog has been left pristine. Only a few sites can still provide an idea how a natural bog should look like. Within Europe, several countries, including the Baltic and Scandinavian states, have done a far better job in protecting less damaged raised bogs. Ireland is THE example that co- existence of turf cutting and conservation is a dangerous illusion.

News from Switzerland Peat free Switzerland?

Pronatura Switzerland increases its activities against the use of peat in horticulture with a new guide for peat free gardening and an information platform (www.pronatura.ch/torffrei) with information where to buy peat-free products etc. In 2011, the Bundesrat has announced to consider a peatering-out strategy for Switzerland and studies are now made into the possibilities. The political pressure has caused one of the two major Swiss retailers (Coop) to drastically reduce its sales of peat: from 2013 the company wants to have its own brands peat free. Simultaneously, Coop obliges its providers to lower the peat content in their products massively. In 2016 only 5% of the sold potting soils should consist of peat. Announcement of this decision stimulated other firms to join the initiative, including Migros. These firms only supply the hobby market, so a lot still has to be done to make Switzerland entirely peat free.

News from Germany German peatland conservation fund

At the end of 2011 NABU and Volkswagen Leasing have initiated the German Peatland Conservation Fund and confirmed their successful cooperation for the next five years. With the ‘NABU-Moorschutzfonds’ it will be possible to finance additional peatland conservation projects in Germany for biodiversity conservation and climate change

mitigation. Combination with subsidies will allow to multiply the money available in the fund. NABU has in the last years considerably increased its peatland conservation efforts and has succeeded to involve strong partners from the industry. Since 2009 NABU implements important peatland restoration projects with financial support of VW Leasing and the new 1.6 million Euro large Moorschutzfonds will allow to support further projects.

News from Germany and South Africa AllWet

There is a long history of mire research at the Chair of the Vegetation Ecology (since 2010 Chair of Restoration Ecology) at the Technische Universität München in Freising Weihenstephan. Many experts have conducted their peatland research and many students left the University gaining very good fundamentals in mire ecology and peatland restoration. The cooperation with colleagues in southern Africa begun in 2000 with modest financial support of the "Stifterverband für die Deutsche Wissenschaft" and one single Diploma thesis dealing with the effect of frequent fires on the vegetation of Okavango Delta. Since then the cooperation grew year by year and resulted in numerous international projects on peatland evaluation, mapping, conservation and restoration especially in South Africa, Botswana and Mozambique.

There was a break in the joint peatland studies during the last years, but this break seems to be over. Last year in April Jan Sliva from the TUM visited again the main peatland key players in South Africa (refer e.g. to the IMCG Newsletter 2011/1, p.13-14) and started to develop together ideas how to move the peatland research in the region further.

Based on talks with the South African colleagues the Chair of Restoration Ecology decided to take the opportunity of the foreseen 2nd call of the program "ACP Science & Technology" of the European Union and has started the preparation of a proposal for a large international project '*AllWet – Alliance for Wetlands*' with several partners from South Africa, Mozambique, Swaziland and the Netherlands. Originally the publishing of the call was expected in early spring 2012, but regrettably the European Commission postponed the call to the last quarter of this year.

Nevertheless, the preparation of the application was financially supported by the German Academic Exchange Service (DAAD). Thanks to these funds three preparatory workshops could be organized in The Netherlands and South Africa in November 2011 and in Germany in December 2011, where all potential project partners could discuss all conceptual and methodological issues relevant for the planned application.

The active cooperation with southern African partners started to function again and soon we could harvest the first fruits of our common efforts.

Recently, the DAAD approved another application of the Chair of Restoration Ecology for a new cooperation project '*AllWet RES Alliance for Wetlands – Research and Restoration*' that will be implemented in 2012–2015. Coordinated by TUM, a consortium of two German (TUM and Humboldt Universität Berlin – Research Unit Soil and Habitat Sciences) and two South African universities (University of KwaZulu-Natal, School of Development Studies, Durban; University of the Free State, Centre of Environmental Management, Bloemfontain) shall improve basic and applied knowledge about the possibilities and limitations of restoration and wise use of degraded wetlands in southern Africa. The project should contribute especially to a better understanding of their ecosystem functions and services for local societies.

The close interdisciplinary cooperation among postgraduate students and young researchers of the four universities will allow to investigate efficient methods of site mapping and evaluation, soil science and hydrology, biotic diversity, restoration potential as well as socio-economic feasibility and acceptability. The study area is located within the 'Maputaland Coastal Plain' that stretches along the Indian Ocean from St. Lucia in KwaZulu-Natal up to Maputo in Mozambique in the north. The close integration of research and teaching will improve the knowledge on wise use of southern African wetlands. Recommendations for sustainable land use, restoration and conservation shall be developed and disseminated among local stakeholders.

Contact: sliva@wzw.tum.de

News from Canada Burns Bog before the federal court

The Canadian government must live up to the terms of a conservation covenant it signed to protect Burns Bog in Delta, according to a legal challenge before the Federal Court of Canada. The federal government agreed in the covenant, signed 2004, to:

- Maintain in perpetuity a large, contiguous, undeveloped natural area for the purpose of protecting the flora and fauna that depend on the bog.
- Manage the bog as a functional raised bog ecosystem as understood by the best science of the time.
- Maintain the extent and integrity of the water mound and the peat that encloses it.
- Prevent any occupation or use of the bog that will impair or interfere with the current state of the bog.

The Burns Bog Conservation Society argues that construction of the four-lane South Fraser Perimeter Road alongside the bog is having a negative impact on fish, migratory birds and at-risk wildlife, as well

as the hydrology of the bog. The society wants the Canadian government to use its federal powers to ensure protection of the bog. Ottawa argues the society has failed to show it has the standing to bring the claim before the court and contends it has no "fiduciary or trust-like duty" to the society to protect the "ecological balance" of Burns Bog. Jay Straith, the lawyer representing the society, said the issue warrants a full hearing, not a quick dismissal, because the case could have implications on the enforcement of other conservation covenants signed by the Canadian government across the country. He said the impact of the highway could be minimized by raising it off the bog, similar to the elevated highways that run through the Florida Keys.

In 2004, a total of \$73 million was spent to purchase 2,042 hectares of Burns Bog as a regional ecological conservancy area, including \$28 million from the Canadian government, \$28.6 million from British Columbia, \$10.4 million from the Greater Vancouver Regional District (currently Metro Vancouver), and \$6 million from the Delta municipality. (Vancouver Sun July 13, 2012). More information under:

<http://www.vancouversun.com/technology/Canada+must+meet+legal+obligations+protect+Burns+conservation+society/6932071/story.html#ixzz21LrIfAMs>

News from Indonesia

Deforestation ban makes slow progress

Stopping deforestation and reducing atmospheric carbon emissions by keeping carbon locked up in trees takes more than just banning forest clearance, as Indonesia is finding out. The country is halfway through a two-year moratorium on the issuing of new permits to clear forests on 65 million hectares of land. The initiative is part of a US\$1-billion deal with Norway to protect the South East Asian nation's forest and cut the country's greenhouse-gas emissions by 26% by 2020.

But as increasingly accurate forest maps and data on clearance permits become available, it is becoming clear that the moratorium is having little effect on deforestation rates and carbon emissions. However, the Indonesian government has confirmed its commitment to its climate-change pledge by extending the protected area and stripping a palm-oil firm of a permit to develop carbon-rich peatland. Progress is slow in part because the clearance-permit ban is not as radical as it at first seemed. An analysis from the Centre of International Forest Research CIFOR, published last October, found that 42.5 million hectares of forest covered by the moratorium are already protected under Indonesian law, with only 22.5 million hectares receiving extra protection. An updated version of Indonesia's forest map, published in May 2012, shows that the government has included a further 862,000 hectares of forest under the ban, but it has also excluded another 482,000 hectares, so the net additional protected forest is 380,000 hectares. Priority should be to protect the

11.5 million hectares of forests growing on carbon-rich peatland, as they would after deforestation release up to eight times more carbon into the atmosphere than would dryland forests growing on mineral soil. (Nature 31 May 2012) doi:10.1038/nature.2012.10762

Peatland definition and mapping

A panel of experts convened in Jakarta last May stated that a uniform definition of peatland will very much enhance policy-making. Information on the establishment of the Indonesia Climate Change Center (ICCC) was given by Rachmat Witoelar, President's Special Envoy for Climate Change at a U.S. – Indonesia Comprehensive Partnership event in May 2012. Mr. Witoelar explained about ICCC's four program areas, including Peatland and Peatland Mapping; Monitoring, Reporting and Verification (MRV); Lower Emission Development Strategies (LEDS); and Climate Resilience. On the occasion, the ICCC portal and the 'One Map' initiative as a nationally standard peatland mapping was also presented. As one of its first tasks, the ICCC recently convened a panel of experts from several ministries, experts from Hokkaido University, and members of several NGOs to assess the definition of peatland and peatland mapping in Indonesia. The aim is to adjust existing definitions and to encourage continuing improvement of maps of peatlands. The panel of experts proposed to establish a peatland definition, based on carbon content in the soil and the peat depth. More information: <http://iccc-network.net>

News from Brunei

Wetland forest conference

The International Conference on Wetland Forests was held in Bandar Seri Begawan, Brunei Darussalam from 21-23 March 2012 and was attended by more than 150 participants from over 10 countries. The conference was co-hosted by the Forestry Department of the Ministry of Industry and Primary Resources of Brunei Darussalam and Wetlands International. The Conference proposed that Brunei Darussalam could play a key role in the ASEAN region having some of the best remaining examples of primary peat swamp forests which provides an excellent opportunity for whole peat dome studies on all aspects of ecology, hydrology, biodiversity, soil sciences and carbon flux, as well as the range of benefits that can be provided by sustainable managed flooded forests for people and the environment. The Heart of Borneo initiative provides a very important framework for conserving the biodiversity values of the region's wetland forests. The meeting heard about the significant land use changes that have happened throughout South-east Asia and their impacts on the wetland forest ecosystems, including mangroves, peat swamp forests and riparian and freshwater swamp

forests. While on the one hand the conversion and degradation of these valuable systems is continuing, there is an increasing awareness of their values and the need for sustainable management. Regarding peat swamp forests, serious concerns were raised on their status and degradation in SE Asia. The wide spread conversion and drainage of peat swamp forests has led to some of the largest environmental problems that this region is experiencing. The meeting learned, however, that the worst may still be to come. Subsidence of drained peatlands through compaction and peat carbon oxidation will in many cases be to levels at which further gravity drainage becomes impossible. This impact is inevitable and a matter of decades. This means that agricultural drainage on most tropical peatlands is fundamentally unsustainable, as pump drainage is not economically feasible due to high rainfall in the region. Current land- uses, including extensive peat land areas occupied by oil palm and pulp wood plantations, may thus lead in the next 25-50 years to major and extensive flooding or land loss along major coastal stretches and thus to significant social and economic impacts in many coastal areas of the South-east Asian region.

In this regard the excellent state of Brunei's peat, freshwater and mangrove swamp forests stands out and bodes well for sustainable development options in various economic sectors, including the emerging international carbon trade. They also provide an interesting site for international research in terms of genetic and species biodiversity. Much information was exchanged by the conference participants on the urgent needs as well as options for landscape-scale restoration measures in order to safeguard the peatland carbon store, reduce greenhouse gas emissions, and protect or reinstate other valuable ecosystem services. The focus of restoration studies should be on the rehabilitation of hydrology, reinstatement of forest cover, fire control and the full involvement of local communities at every stage in the process. Rehabilitation involves the restoration of both social as well as natural capital. The challenges are immense but so are the opportunities.

Countries in SE Asia were encouraged to redouble their efforts to conserve and sustainably manage wetland resources in the region. Some recommendations were formulated specifically for the consideration of Brunei Darussalam:

- Brunei can both derive benefit from and contribute to international agreements, initiatives, networks and organizations in the field of wetland forest biodiversity and ecosystem conservation, with a link to Green Economy. It is therefore recommended that Brunei accede to the Convention on Wetlands (Ramsar 1971), join the East Asian Australasian Flyway Partnership, become a member of Wetlands International and strengthen its action to implement the ASEAN Peatland Management Strategy; in particular develop a National Action Plan on Peatlands (NAP);

- Recognising the high quality of most of the wetlands in western Brunei and taking into account earlier and ongoing studies by local and international institutions, develop an integrated research, management and conservation program for the wetlands of Belait District/Belait river catchment;

- Noting that drainage, sand extraction and infrastructure development (including ongoing and planned road construction) are already impacting and will be further leading to peatland degradation and fires in the Badas peat dome, it is recommended that further sand extraction in the Badas dome (South of the bypass road) is restricted; further road development ceased and remaining forest protected. To prevent further degradation it is recommended to develop and implement an active fire prevention plan including avoidance of further drainage and restoration of the damaged sections of the dome, including hydrological restoration and reforestation. The government of Brunei Darussalam is furthermore encouraged to:

- Carry out economic valuation of its wetland forests
- Develop appropriate wetland eco-tourism as a sustainable development alternative
- Develop capacity for wetland management in all sectors relevant to the wise use of wetland forests of Brunei, involving training courses such as those arranged under the ASEAN Peatland Forest Project / ASEAN Peatland Management Strategy
- Explore options for carbon financing for management of mangrove and peat swamp forests.

The International Conference on Forest Wetlands was organized with financial support from the Brunei Ministry of Industry and Primary Resources, Wetlands International, Permian Global and Global Environment Center.

News from Malaysia

Rehabilitation of Raja Musa Forest Reserve

In the State of Selangor, Peninsular Malaysia, about 1,000 ha of Raja Musa Forest Reserve (RMFR) peat swamp forests was degraded as a result of illegal encroachment, followed by open burning and draining of forested peatlands. Numerous drainage canals were dug during the illegal farming activities to constantly channel peat water out from the peat swamp forest, resulting in low water levels and peat drying. Therefore, in 2009, about 850 small dams were placed at 50-70m intervals to block the canals. The canal blocks were done manually using plastic bags filled with earth, supported by mangrove poles. A total of 7,600 plastic bags and 2,500 mangrove poles were used. The task required 70 personnel from the Forestry Department of Selangor 30 days to complete. Since then, more small blocks have been established to enhance the regulation of peat water. Natural regeneration at the degraded site occurs slowly as the edge of the forest is located about 3km away. In addition, the area had been subject to

repeated burning, depleting the seed bank. Therefore, assisted regeneration with replanting was applied. In the last four years (2008-2011), a total of 52,289 seedlings have been planted in 60 hectares. Tree planting was carried out in areas dominated by lallang (*Imperata cylindrica*) and fern (*Stenochlaena palustris*). Species that were planted included Ramin (*Gonystylus bancanus*), Mersawa Paya (*Anisoptera marginata*), Mahang (*Macaranga pruinosa*) and Tenggek Burung (*Euodia roxburgiana*). Regular patrols for fire incidents are carried out as fire prevention is essential for the success of a rehabilitation programme.



For the first time in forest management history in Malaysia, community groups were invited to participate in the rehabilitation activity in a peat swamp forest. Since the start of the programme in 2009, a total of 2500 volunteers from around the country and various organisations have participated in the rehabilitation programme. Apart from giving nature a much needed helping hand, these volunteers were also educated in the importance of peat swamp forests. After three years of hard work, the degraded site is now covered with vegetation, thus preventing emission from the bare peat soil through oxidation. Increased water table also prevents further CO₂ emission. However, the RMFR rehabilitation programme is still in its infancy and a lot of work still needs to be done. The Rehabilitation Programme of Raja Musa Forest Reserve is a collaborative programme between the Selangor Forestry Department and Global Environment Centre. The programme aims to rehabilitate 1,000 ha of degraded areas within the forest reserve through improvement of water management and planting of tree seedlings. The programme is supported by local partners and financial assistance from corporate and international donors.

News from the World Eurasian methane

As the second most important greenhouse gas, methane might play a considerable role in our planet's future. But it's not clear just how big some of the wetlands that are emitting the gas actually are and how climate change will affect them. A team from the US, Russia and China has used a terrestrial ecosystem model to investigate likely methane emissions from Northern Eurasia into the 21st century. Northern Eurasia accounts for 60% of the terrestrial land cover north of 40°N and contains vast areas of wetlands, especially peatlands. Xudong Zhu and colleagues from Purdue University US, Russian Academy of Sciences, Marine Biological Laboratory, US, Massachusetts Institute of Technology, US, and Chinese Academy of Sciences estimated that current net methane emissions in Northern Eurasia are 20–24 Tg per year, with around two-thirds being emitted during summer. The researchers found that the uncertainty in wetland extent had a larger effect on future terrestrial methane emissions than the uncertainty in future climate. According to the researchers, satellite sensors may not detect a large part of wetlands, and global datasets that do not consider specific conditions of wetland distribution and diversity, could “seriously underestimate the real extent of wetland areas”. The team used the Terrestrial Ecosystem Model (TEM), which is a process-based biogeochemistry model. They found that during the 1990s, some ecosystems in Northern Eurasia acted as a source of atmospheric methane (producing up to 10 g per square metre per year), while some dry ecosystems consumed up to 2 g per square metre per year. Typically boreal forests emitted and consumed the most methane, because of their vast areas of wetland; grasslands and wet tundra areas were also significant methane sources. Western Siberia was a major source of atmospheric methane whereas western and southern parts of Northern Eurasia acted as strong sinks, and other areas were weak sinks. The study did not consider human-induced disturbances, which could either inhibit methane emission, for example by draining wetlands, or enhance it, by creating ditches or dams.

Peatland restoration map

The International Peat Society and its Commission V on “Restoration, rehabilitation and after-use of peatlands” have launched a prototype of an IPS map for peatland restoration and rewetting projects. The map is based on Google Maps and can be opened at www.tiny.cc/peatrestmap. Each project pin linked on the map contains basic information on the project title, location, grid reference, type, area in ha, management, keywords, links to additional information and contact data. If you want to add project sites in your country, please send the relevant data to catherine.farrell@bnm.ie, ask her to invite

you as map editor, or request a preset information sheet from her. More information on IPS Commission V can also be found at www.peatociety.org/about-us/commissions-and-working-groups/c5-restoration.

Lulie Melling not IPS vice-president

One of the surprising outcomes of the June 2012 International Peat Congress in Stockholm was that Lulie Melling was NOT elected as vice-president of the International Peat Society for the period 2012-2016. Within the IPS the tradition has grown that the National Committee that organises the 4 year's International Peat Congress provides the chairperson for the 4 years following that Congress. When the Annual Assembly of National Representatives of the IPS in 2010 had decided that the 2016 International Peat Congress would be held in Kuching (Malaysia) the IPS Peat News (No 6/2010, 30 June 2010) announced : "International Peat Congress 2016 in Malaysia – Dr. Lulie Melling becoming IPS President 2016 - 2020!" Peat News continued: "This means, at the same time, that Dr. Lulie Melling will be IPS President for the period 2016 - 2020 and 1st Vice President for 2012 - 2016, after the International Peat Congress in Stockholm, when current 1st Vice President Prof. Björn Hånell takes over the position of IPS President from Mr. Donal Clarke."

Dr. Lulie Melling is Director of the Tropical Peat Research Laboratory Unit at the Chief Minister's Department in Kuching, Sarawak, Malaysia. Whereas some of her scientific work has high standards, in the last years she takes a one-sided propagandistic pro-palm oil approach in which she knowingly presents wrong and incomplete data. One of her favourite statements is that carbon dioxide emissions from oil palm plantations on tropical peatland are lower than that of pristine peat swamp forest. She presents her – what she calls – "breakthrough scientific findings" to "counter accusations from western non-governmental organisations that oil palm plantations on peatland had increased greenhouse gases emission" (e.g. Star Online Saturday July 17, 2010).

Also at the 2012 Peat Congress in Stockholm she presented this message. And again – after a lot of criticism – she had to admit that the methods she uses (in which she does not separate between autotrophic and heterotrophic respiration) are not suitable for contributing to a sensible discussion into the climatic effect of converting peat swamp forests into oil palm plantations. This knowledge, however, does not withhold her to repeat the wrong statement time and again in the popular press. This "selective use of the truth" in combination with her aggressive and often embarrassing discussion technique annoys growing parts of IPS and has apparently resulted in her not being elected IPS Vice President for the period 2012-2016.

Indeed, a prudent decision. Whereas it is indeed time that IPS widens its view to countries outside northern

regions, it is clear that with a president behaving like Lulie Melling the International Peat Society would rapidly lose its credibility as a global platform for all peatland stakeholders...

Ramsar Convention outcomes

The 11th meeting of the Ramsar Convention on Wetlands concluded July 2012 in Bucharest, Romania, with the adoption of 22 resolutions on issues addressing the wise use of wetlands in 162 signatory countries. While many of the resolutions provide needed guidance to address threats facing wetlands, resolutions to address cross-sectoral challenges such as climate change and energy remained weak. While the Ramsar Resolution on Climate (www.ramsar.org/pdf/cop11/dr/cop11-dr14-e-climate-rev2.pdf) recognises the major role of the conservation, restoration and wise use of wetlands, in particular peatlands, in cutting the release of carbon globally, the text entirely disregards the recent significant incentives adopted in this respect at the UN climate convention in Durban in 2011, such as the new incentives created under the Kyoto Protocol and opportunities under the Reducing Emissions from Deforestation and Forest Degradation (REDD+) and Nationally Appropriate Mitigation Actions (NAMA), to restore and better manage peatlands. Furthermore, all references to funding for climate change mitigation activities by wise use and restoration were removed from the final Resolution, as were the paragraphs that would urge and encourage the development of energy policies to reduce the impacts of the energy sector on wetland carbon fluxes.

Permian peatland preserved in volcanic eruption

An ancient peat swamp forest has been brought to life through analyses of fossils in a layer of volcanic ash that preserved the flora in an almost unprecedented level of detail. Reconstructing former ecosystems mostly involves piecing together fragmented information from various places and times. Only when a large area is covered instantaneously researchers can get a full picture of the composition of the ecosystem. Floods have as a disadvantage that they often bring in organisms from other areas and wash local inhabitants away. Hermann Pfefferkorn from the University of Pennsylvania in Philadelphia and his colleagues have unearthed one such time capsule from 298-million-year-old rocks in northern China — a 'forest Pompeii' where the weight of falling volcanic ash ripped leaves from twigs, toppled trees and then buried the lot.

The researchers reconstructed the ancient ecosystem by analyzing the positions of individual plants over an area of more than 1,000 m², as they reported in the Proceedings of the National Academy of Sciences in February 2012. Next to a low canopy of tree ferns,

the peat forest contained trees that looked like feather dusters, with trunks twice the height of telephone poles, vines and small spore-bearing trees that scientists think are close relatives of the earliest ferns. The team's findings "provide a view into the guts of a coal-forming swamp in its prime", says Scott Elrick, a geologist with the Illinois State Geological Survey in Champaign. (Nature 20 February 2012, doi:10.1038/nature.2012.10061)



Artist's impression of a peat forest in northern China 300 million years ago, based on plant fossils preserved in a huge volcanic ash-fall.

FAO International Partners Launch Peat and Climate Change Mitigation Initiative

Considering that peatland drainage and peat fires contribute to almost a quarter of carbon emissions from the land use sector, the Food and Agriculture Organization of the UN (FAO) has worked with

Wetlands International to develop an informal network of organizations committed to reducing emissions from peatlands.

The initiative, called the "Organic Soils and Peatlands Climate Change Mitigation Initiative," was launched on 17 May 2012, at the UNFCCC Climate Talks in Bonn, Germany. At the launch event, FAO released the initiative's first publication titled "Peatlands - Guidance for Climate Change Mitigation by Conservation, Rehabilitation and Sustainable Use." The publication is targeted at policy makers and technical audience and presents a decision support tree to consider opportunities in cultivated and uncultivated peatland. It also includes summaries of greenhouse gas (GHG) emissions quantification methodologies. The publication outlines ten steps of strategic action on peatlands that includes: identifying the location and status of peatland worldwide; improving methodologies of measuring, reporting and verifying (MRV) peatlands; preventing further degradation of peatlands; engaging in restoration; applying climate financing mechanisms to peatland activities; and sharing experience on peatland conservation, restoration and management.

Additional partners in the initiative include, the IUCN UK, the Global Research Alliance on Agricultural Greenhouse Gases, the Center for International Forestry Research (CIFOR), and the International Centre for Integrated Mountain Development (ICIMOD). Within the FAO, the initiative is being led by the Mitigation of Climate Change in Agriculture Programme (MICCA). <http://www.fao.org/climatechange/micca/peat/> (in English, Spanish and French)

New and recent Journals/Newsletters/Books/Reports/Websites

Patberg, W. 2011. Solute transport in Sphagnum dominated bogs. The ecophysiological effects of mixing by convective flow. PhD thesis, University of Groningen, 132 p.

This thesis tests the hypothesis that buoyancy-driven water flow is an effective mechanism to translocate nutrients in Sphagnum peatlands. Convective flow in water-saturated Sphagnum layers may occur when the temperature difference between day and night is sufficiently large. During the night, the surface of the peatmoss layer cools, which results in a denser and colder water layer on top of warmer water. When the density difference become large enough the cold water in the top layers sinks and warm water rises. This thesis provides direct evidence for the transport of solutes by buoyancy flow. Moreover, it is demonstrated that buoyancy flow transport nutrients in such quantities that it, relative to other transport mechanisms (diffusion, internal transport and capillary transport) plays an important role in the redistribution of nutrients in a water-saturated Sphagnum layer. The occurrence and starting times of buoyancy flow development were very well predictable on the basis of the vertical hydraulic conductivity of Sphagnum profiles and the difference in temperature between day and night. This allowed mapping the occurrence of peatlands throughout the world where buoyancy will occur several days each month during the growth season. Buoyancy will also play an important role in the redistribution of CO₂. Uptake and assimilation will result in CO₂ depletion in the zone of the capitula where most photosynthetic activity takes place. In contrast, in the lower acrotelm CO₂ is released as a consequence of the decomposition of organic material. Buoyancy flow is very likely an important mechanism in replenishing CO₂ in the upper Sphagnum layer and in thus enhancing photosynthesis.

Zinck, A. J. & Huber, O. 2011. Peatlands of the Western Guyana Highlands, Venezuela. Properties and paleogeographic significance of peats. Springer, Ecological Studies 217, 295p.

Description of the (small) peatlands and peats from the 'tepui' plateaus of Venezuela. Except for reporting on little known peatlands, the book contains rather little new information in view of its size.

Natural England 2011. Guidelines for monitoring peatland restoration. Natural England Technical Information Note, TIN097, 31 p.

Download: <http://naturalengland.etraderstores.com/NaturalEnglandShop/TIN097>

Bonnett, S.A.F., Ross, S., Linstead, C. & Maltby, E. 2011. A review of techniques for monitoring the success of peatland restoration. University of Liverpool, Natural England Commissioned Reports, Number 086. 189p.

Complements the Guidelines mentioned above with more detailed information on monitoring techniques, especially with respect to peat, flora and fauna, hydrology and biogeochemistry.

Download: <http://naturalengland.etraderstores.com/NaturalEnglandShop/NECR086>

Commissariat Général au Développement Durable 2011. Evaluation économique des services rendus par les zones humides. Enseignements méthodologiques de monétarisation. Commissariat Général au Développement Durable, Études et documents, N°49, 220p.

Report on the ecosystem services of wetlands, based on a literature study and on the assessment of the economic values of services provided by the wetlands in the Parc Naturel Régional des marais du Cotentin et du Bessin. Downloadable under: www.developpementdurable.gouv.fr/IMG/pdf/ED49.pdf A summarizing paper 'Les méthodes et les valeurs de référence pour la valorisation des services rendus par les zones humides' was published in the journal 'le point sur' (September 2011, no. 97): <http://www.developpementdurable.gouv.fr/IMG/pdf/LPS97.pdf>

Fansa, M & Both, F. (eds.) 2011. "Ö, schaurig ist's, übers Moor zu gehen". 220 Jahre Moorarcheologie. Landesmuseum Natur und Mensch, Oldenburg, 260 p.

Beautiful well illustrated book on peatland archaeology with special attention to the many corduroy roads and associated findings in Northwest German bogs.

Both, F., Fansa, M & Gräf, J. 2011. Faszination Moorleichen. Landesmuseum Natur und Mensch, Oldenburg, 119 p.

Fascinating book about the bog bodies and body remnants conserved in the museum in Oldenburg (NW-Germany). With results of various new analyses.

Blanchard, O. 2011. Tourbières. À l'épreuve du temps. Néo Editions - Le Château, Autrey-les-Gray, 80 p..

Colourful book on the peatlands of the French Jura. Obtainable via www.cpiehautdoub.org

Natur und Landschaft Heft 2/2012. Schwerpunktheft zum Thema „Moorschutz“.

Special issue on peatland conservation with papers on the status of peatlands worldwide, emissions from agricultural peatlands, peatland conservation areas in Natura 2000 and in 'Großschutzgebieten' (large conservation areas), MoorFutures: innovative financing of peatland rewetting in Mecklenburg-Vorpommern, peatland conservation strategies, initiatives and programmes in Germany, and the position statement of the peatland rich federal states on 'Potentials and aims of peatland and climate conservation'. More information: www.natur-und-landschaft.de/artikel/index_artikel.htm

Hydrological Sciences journal. Special issue on 'Ecosystem Services of Wetlands' (December 2011).

With papers from Europe, Tanzania, Nepal, Mexico, South Africa, Colombia, United Arab Emirates, Israel and India and includes diverse wetlands such as floodplains, wadis, coastal marshes, lakes and flooded forests. The papers describe key ecosystem processes that are essential for understanding of thresholds to change and finding mitigating solutions. A major finding is the trade-off in ecosystem services that result from different management practices. More information: www.tandfonline.com/toc/thjsj20/56/8

UNEP Yearbook 2012, UNEP, Nairobi.

With special focus on the benefits of soil carbon. Managing soils for multiple economic, societal, and environmental benefits. With much attention to peatlands. Download: www.unep.org/yearbook/2012/pdfs/UYB_2012_FULLREPORT.pdf

Çolak, A.H. & Gunay, T (eds.) 2011. Turbalıklar (Mire/Peatland-Moore). T.C. Orman ve Su İşleri Bakanlığı, İstanbul, 471 p. Çolak, A.H. & Gunay, T (eds.) 2011. Gizemli Yaşam Alanları Olarak Turbalıklar (El Kitabı). T.C. Orman ve Su İşleri Bakanlığı, İstanbul, 318 p.

Two extensive and well-illustrated books in Turkish about peat and peatlands in general and especially those in Turkey. Integrates much information from recent English and German publications. With contributions of IMCG members like Hans Joosten, Jaanus Paal, Michael Succow, Michael Steiner and Tiemo Timmermann.

Raudsepp-Hearne, C., Claesson, G. & Kerr, G. 2012. Ecosystem Services Approach Pilot on Wetlands. Integrated Assessment Report <http://www.environment.gov.ab.ca/info/library/8493.pdf>

Gardner, R.C., Bonells, M., Okuno, E. & Zarama, J.M. 2012. Ramsar Briefing Note on avoiding, mitigating, and compensating for wetland loss. Ramsar, Geneva.

This third publication in the Ramsar scientific and technical Briefing Note series is a supporting background document to Draft Resolution XI.9, "An Integrated Framework and guidelines for avoiding, mitigating and compensating for wetland losses" for the Conference of the Contracting Parties in Bucharest in July 2012. The publication provides examples of the variety of approaches that Contracting Parties have taken in adopting the 'avoid-mitigate-compensate' sequence in laws and policies throughout the Ramsar regions, ranging from wetland-specific and biodiversity-related laws and policies to more general environmental impact assessment instruments. Available under <http://www.ramsar.org/bn/bn3.pdf>.

The Ramsar Scientific and Technical Briefing Notes series is prepared by the Convention's Scientific and Technical Review Panel (STRP) in order to share relevant, credible and interesting scientific and technical information on wetlands with a broad audience. Read more about this series at www.ramsar.org/cda/en/ramsar-documents-strp-strp-bn/main/ramsar/1-31-111^E25610_4000_0__

Ramsar Technical Report No. 6, Healthy wetlands, healthy people: a review of wetlands and human health interactions. Ramsar, Geneva, 106 p.

This report, published jointly with the World Health Organization (WHO), focuses on providing advice to wetland managers and decision-makers on the range of often complex issues concerning wetlands and human health and well-being. The benefits of wetland ecosystems for human health can be approached in at least three interrelated ways: by recognizing the human needs that are met by water in its setting; by recognizing the health products that come from wetland ecosystems; and by recognizing the economic value of wetlands in a full sense to sustainably improve their socio-economic conditions. The information in the report should help to facilitate wetlands and human health to maintain and improve wetland ecological character and people's health. Available under www.ramsar.org/pdf/lib/rtr6-health.pdf

Alexander, S. & McInnes, R. J. 2012. The benefits of wetland restoration. Ramsar Scientific and Technical Review Panel's Briefing Note 4. Ramsar, Geneva, 20 p.

Reviews the importance of wetland ecosystem services and the role of restoration in maintaining them, with brief case studies, describes methods of prioritizing potential restoration projects, and provides a wealth of links to additional materials. Available under www.ramsar.org/bn/bn4.pdf.

Marsden, K. & Ebmeier, S. 2012. Peatlands and Climate Change. SPICe Briefing 12/28. The Scottish Parliament.

This briefing describes the ecosystems services provided by peatlands in Scotland, with particular emphasis on their importance for climate change mitigation. Available under: http://www.scottish.parliament.uk/ResearchBriefingsAndFactsheets/S4/SB_12-28.pdf

D'Astous, A. 2012. Approches par communautés et par traits pour l'évaluation du succès de restauration d'une tourbière. MSc thesis Département de Phytologie, Université Laval Québec.

Long term evaluation of the vegetation of Bois-des-Bel peatland, restored by the 'moss layer transfer' technique, revealed differences in vegetation structure and composition for the reference ecosystem, the non-restored section and the nine years old restored section. The restored section had higher abundances of Sphagnum, which increased its dissimilarity from the non-restored section and of herbaceous species, which increased the difference with the reference ecosystem. Traits of herbaceous species found ten years after restoration were different and more uniform than those found in the reference ecosystem, but they seemed to converge toward the latter. For herbaceous species, the former ditches of the restored section had higher traits functional diversity than peat fields ten years after restoration. Thus, the creation of shallow or deep ponds could increase diversity of the restored site. Download: www.gret-perg.ulaval.ca/uploads/tx_centrecherche/D_Astous_MScThesis_2011.pdf

Matthews, P, Hughes, J and Dowse, G. 2012. The state of Scotland's lowland raised bogs in 2012: interim findings from a survey of 58 Scottish lowland raised bogs and analysis of change since 1994/95. Scottish Wildlife Trust, Edinburgh.

Some of Scotland's most important assets in the fight against climate change are badly damaged, but can be repaired, a new report says. The Scottish Wildlife Trust has undertaken the most comprehensive survey of lowland raised bogs in the last 15 years. The Trust says it would cost £43,500 to bring a typical lowland raised bog to good condition. The capital cost of restoring all of Scotland's lowland raised bogs to good condition is estimated at £21m. This money could come from many sources including business sponsorship of a local bog, lottery and rural development funding, or local people raising funds for a site near them. Lowland raised bogs would require annual investment to maintain their quality. Scotland's lowland raised bogs are incredibly important. They comprise 40% of the lowland raised bogs of the UK and are amongst the rarest habitats in Europe. Lowland raised bogs contain and trap a

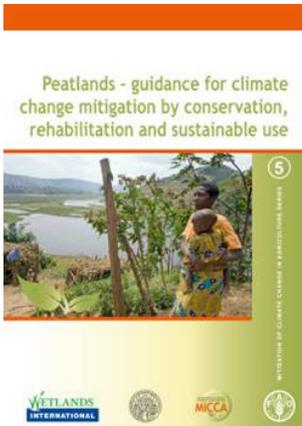
significant amount of carbon. Protecting them will contribute significantly towards meeting Scotland's ambitious carbon emission targets, as well as protecting valuable biodiversity. Scottish Wildlife Trust Director of Conservation Jonathan Hughes, speaking at the Scottish Parliament during a discussion on the report said: "This major survey has shown that almost all lowland raised bogs in Scotland are damaged. We found that 97% of sites had been artificially drained. Dry bogs lose their special plants and mosses and release carbon into the atmosphere. Rewetting such bogs is not only good for wetland wildlife, it is also good for the fight against climate change as wet bogs actively take up carbon dioxide from the atmosphere. "The report has lots of grounds for optimism. We have estimated the cost to repair all our lowland raised bogs at just £21m, a small amount of money for the benefits it would bring society. "We can also be optimistic that the owners of the bogs want to act as 95% of those we questioned were supportive of grant-aided restoration measures being carried out on their sites. The appetite is definitely there to do something about this problem. "And we can make a huge difference. The majority of our raised bogs can be restored and we have the technical know-how. By removing woodland and scrub, installing dams to retain water and grazing sheep to inhibit scrub invasion, we can protect these little pockets of wilderness for generations to come." Minister for the Environment Stewart Stevenson said: "I am very happy to see this study. Scotland's lowland raised bogs are remarkable ecosystems. While, as the report says, the majority have been disturbed over the years, it is encouraging that restoration is feasible in many cases and that good management does not need to be expensive. I welcome the positive steps in this report for land managers to protect and enhance these precious natural resources."

Download: http://scottishwildlifetrust.org.uk/docs/002_057_publications_policies_The_state_of_Scotlands_lowland_raised_bogs_June_2012_1339165562.pdf

Field Studies Council 2012. Field Guide to Sphagnum Mosses in Bogs. Field Studies Council Occasional Publication 148. O'Reilly and Trat, 8 p.

Produced in association with the Moors For The Future partnership, IUCN and the Heather Trust, this new fold-out chart forms a straightforward photographic identification guide to the more important Sphagnum mosses found growing in bogs throughout the UK. Specially taken photographs of the leaves and shoots of each species are accompanied by further ID notes in the text (including guidance on commonly confused species), a guide to the major colours of each species and scale. Text on the reverse side covers the formation, importance and restoration of Sphagnum bogs.

Joosten, H., Tapio-Biström, M.-L. & Tol, S. (eds.) 2012. Peatlands – guidance for climate change mitigation by conservation, rehabilitation and sustainable use. Mitigation of Climate Change in Agriculture Series 5. FAO, Rome, L + 96 p.



Although the majority of peatlands still in a natural state, many peatlands are drained and degraded as they have been used for centuries by humans for productive purposes such as agriculture, forestry, grazing and peat mining. Including emissions from peat fires, the CO₂ emissions from drained peatlands globally amount to some 2 Gigatonnes per year and currently represent almost 25% of the CO₂ emissions of

the entire land use, land use change and forestry sector (LULUCF). Unlike the emissions connected to forest clearance, which are largely instantaneous, the emissions from drained peatlands continue for decades and even centuries, i.e. as long as the peatland remains drained and the peat keeps oxidizing. By the conservation, restoration and better management, organic soils and peatlands can make a substantial contribution to reducing atmospheric greenhouse gas (GHG) concentrations while simultaneously providing other vital environmental services and contributing to food security and poverty reduction. This report aims to provide countries rich in peatlands and organic soils with information on incentives to reduce emissions and enhance co-benefits, that exist and develop in the compliance market, the voluntary market and other mechanisms. The report informs on the methodological guidance and data available for quantifying GHG emissions from organic soils and provides practical solutions to attenuate possible concerns of countries for technical complications with respect to MRV and accounting problems. The information in this report was brought together by a team of expert authors from Wetlands International, the FAO Mitigation of Climate Change in Agriculture (MICCA) programme, Greifswald University, Climate Focus and ATLAS Environmental Law. Downloadable under: www.fao.org/climatechange/micca/peat

Wilson, D., Renou-Wilson, F., Farrell, C., Bullock, C. & Müller, C. 2012. Carbon Restore – The potential of restored Irish peatlands for carbon uptake and storage. The Potential of Peatlands for Carbon Sequestration (2007-CCRP-1.6) CCRP Report. Environmental protection Agency, Johnstown Castle, Co.Wexford.

Industrial cutaway peatlands are highly degraded ecosystems that release significant quantities of carbon dioxide (CO₂) to the atmosphere annually.

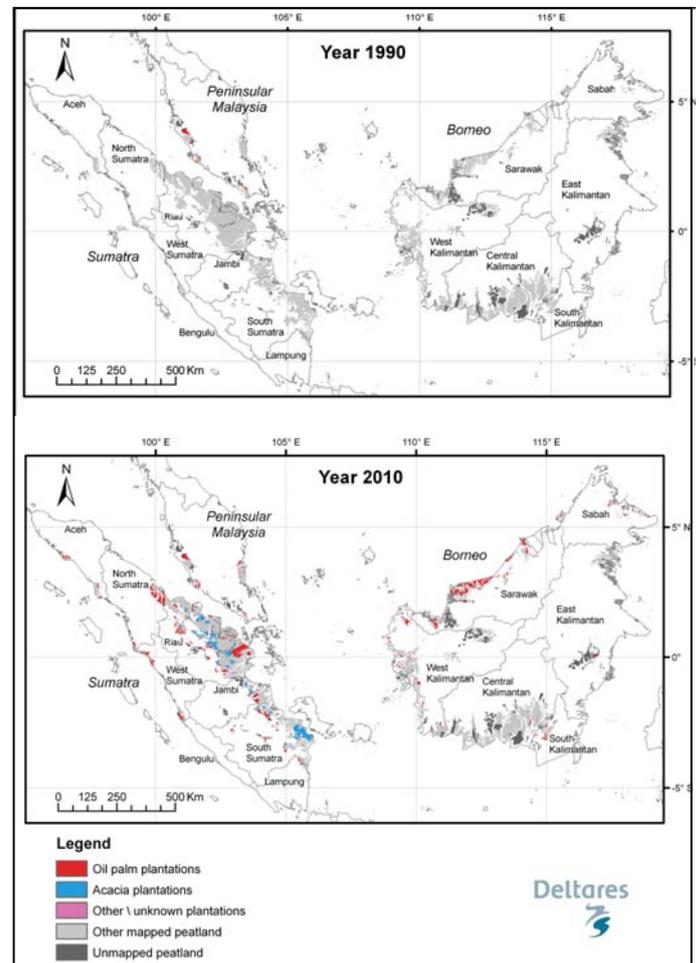
Their restoration offers the potential to reduce CO₂ emissions and to re-establish the carbon (C) sink function characteristic of natural peatlands. In this study, CO₂, methane (CH₄) and nitrous oxide (N₂O) fluxes were quantified over a 12-month period (1 January to 31 December 2009) at a rewetted industrial cutaway peatland at Bellacorick, Co. Mayo. The site was restored in 2003, and this has resulted in a persistently high water table level throughout the study site and the extensive recolonisation of the former bare peat substrate by a range of vascular and moss vegetation. These include: (i) soft-rush-Sphagnum moss-dominated communities, (ii) Sphagnum moss-dominated communities, (iii) bog cotton-dominated communities, (iv) bare peat and (v) open water. For the period of the study, the vegetated communities were net annual CO₂-C sinks, sequestering an average 279±246g C m⁻² yr⁻¹. Conversely, they were also significant net annual CH₄-C sources of 10.1±3.6g C m⁻² yr⁻¹. The bare-peat and open-water areas were net CO₂-C sources, releasing 40 and 53g C m⁻² yr⁻¹ respectively to the atmosphere. N₂O emissions were negligible throughout the study period. Calculation of the global warming potential (GWP, 100-year horizon) showed that the soft-rush-Sphagnum and bog cotton communities were net GHG sinks (i.e. causing a potential cooling effect on the climate). In contrast, the Sphagnum moss-bog cotton communities, bare peat and open-water areas were net GHG sources (i.e. causing a potential net warming impact on the climate). The current project assessed the potential economic value of restoration in terms of avoided losses and gains of C (€tonne CO₂-eq ha⁻¹) through the use of a number of timeline scenarios. These followed the peatland from the cessation of peat extraction (Tzero), through rewetting (T1) and on to the present day (Tpresent). The results show that in the period T1 to Tpresent, an estimated 75 tonnes CO₂-eq ha⁻¹ was mitigated by the restoration actions at Bellacorick – resulting in an estimated value of €1506 ha⁻¹ in avoided losses. In addition, net C sequestration at the peatland during the 12-month period of this study (Tpresent) was worth an estimated €118 ha⁻¹ yr⁻¹. The results from this study indicate that restoration at Bellacorick has been successful with regard to re-establishing the C sink function. This observation highlights the potential use of restored industrial cutaway peatlands for C offsetting. However, there are a number of caveats. Firstly, studies elsewhere have shown that inter-annual variation in GHG fluxes is a characteristic feature of peatlands in general. As such, care should be taken in interpreting the results presented in this report as they represent a single 12-month period only. Secondly, the ongoing dynamic changes in vegetation composition observed at the study site may lead to a similar level of change in GHG fluxes in the future. Thirdly, while the results from this study indicate that some aspects of ecological functioning have been restored at Bellacorick, it may not be possible to recreate conditions to the same

extent in other degraded peatlands. Given that 30,000ha of industrial cutaways may be available for restoration/wetland creation in Ireland over the next 20 years, it is critical that appropriate GHG management plans are in place prior to the cessation of peat extraction. The plans should include a detailed assessment of the physical and nutrient characteristics of each cutaway site and should seek to identify the best approach for the avoidance of GHG emissions in the first instance (e.g. drain blocking, shallow inundation, etc.). The plans should also identify the potential of each cutaway site in regard to C sequestration in the medium/long term, and highlight the criteria required to achieve those objectives.

Miettinen, J., Hooijer, A., Tollenaar, D., Page, S., Malins, C., Vernimmen, R., Shi, C. & Liew, S. Ch. 2012. Historical analysis and projection of oil palm plantation expansion on peatland in Southeast Asia. International Council on Clean Transportation, Washington, 54 p.

This study demonstrates that the area of industrial oil palm (OP) plantations in the peatlands of insular Southeast Asia (Malaysia and Indonesia, except the Papua Provinces) has increased drastically over the past 20 years. From a small area in 1990 to at least 2.15 million hectares in 2010, expansion has affected every region of Malaysia and Indonesia reviewed here. Oil palm development on peat started in Peninsular Malaysia, spread to Sarawak and Sumatra, and is now picking up speed in Kalimantan. Over each time interval included in the analysis (1990 - 2010, 2000 - 2010, and 2007 - 2010), OP expansion accelerated in all the areas considered, except those where peatland was limited. The 2010 extent of OP plantations on peatland may nearly double to 4.1 Mha by 2020, according to both a linear approach that projects recent trends into the future and a conservative non-linear approach that takes into account long-term trend changes since 1990. Very recent trend changes, such as the rapid acceleration in OP expansion over 2007 - 2010, might bring the OP area by 2020 to 6.2 Mha. The lowest projection of OP area by 2030 is 6 Mha. Researchers have investigated whether expanding OP plantations on peat in Indonesia would be constrained by local regulations. The constraints tested were a) the total extent of peatland, b) the extent of peat less than 2 m thick, and c) the extent of peat where current land allocation zoning allows conversion to peatland. The investigators also considered whether competing agricultural uses of peatland could limit OP expansion. The findings indicate that none of these factors would limit OP expansion up to 2030 in most areas reviewed, and that a possible slowdown in districts where a "shortage" of peatland may occur could easily be offset by a further acceleration in other regions. They therefore conclude that projected OP expansion may indeed become reality. The analysis does not take into account developments in

global demand for palm oil or possible policy changes in response to concerns regarding the environmental implications of peatland deforestation and drainage.



Rasran, L. 2012. Klimaschutz natürlich! Die Bedeutung von Mooren für Natur und Klima. NABU, Berlin, 24 p.

Information brochure about the role of peatlands in climate change mitigation with an overview of management options. With focus on Germany. Download: http://www.nabu.de/imperia/md/content/nabude/naturschutz/moorschutz/klimaschutz-nat_rlich.pdf

Wich, S., Riswan, Jenson, J., Refisch, J. & Nellemann, C. (eds.) 2011. Orangutans and the economics of sustainable forest management in Sumatra. UNEP / GRASP / PanEco / YEL / ICRAF / GRID-Arendal. 84 p.

This study explores opportunities for a more sustainable pathway to development and looks for reconciliation between forest and biodiversity conservation and economic progress. It focuses on two pilot sites on the island of Sumatra, namely Tripa swamp and the mountain forests of Batang Toru, both hosting significant orangutan populations. The assessment quantifies the economic trade-offs between unsustainable and sustainable forms of land use, and considers the role of Reducing Emissions

from Deforestation and Degradation (REDD) and broader Payment for Ecosystem Services (PES) schemes in achieving balanced conservation and development objectives. The tropical rainforests where Sumatran orangutans occur hold some of the most spectacular biodiversity on the planet: Sumatran tigers, Sumatran elephants, and Sumatran rhinoceroses are notable endemic fauna among a bewildering diversity of other animal and plant species. Nevertheless, they are among the fastest disappearing forests in the world as they are rapidly being converted to other land uses such as oil palm and timber plantations. Only around 8,641km² of orangutan habitat now remains on Sumatra, which equates to 17% of the remaining forest in Aceh and North Sumatra. Of this, 78% is within the Leuser Ecosystem, which is situated in Aceh and North Sumatra. The coastal peat swamp forests on the western edge of the Leuser Ecosystem represent only 11% of the remaining forest area where orang-utans occur, but hold 31% of the orangutan's total numbers and are therefore critically important to their conservation. In both Aceh and North Sumatra, the rate of forest loss is highest in peatlands, mainly due to draining and burning for oil palm expansion. During 1985-2007 forest loss on non-peatland below 500 m was 36% in Aceh and 61% in North Sumatra. For forest on peat swamps forest loss was 35% in Aceh and 78% in North Sumatra. Deforestation is driven by both global demand for products such as vegetable oil and timber, and a more localized demand for agricultural products. For orangutan habitat in the Leuser Ecosystem on peatlands, 79% of the deforestation during the 1985-2007 period was attributable to oil palm expansion, compared with 19% for non-peatland forest. The drivers of deforestation are facilitated by road expansion (both legal and illegal) as settlers, agriculturalists or loggers move in along the roads. Forest conversion for other land uses is often considered key to the rapid economic development of Indonesia. However, such conversion also comes at a cost. The same forests that are being turned into oil palm or timber plantations and other land uses fulfil an important role in the lives of the local people, provide for much of their livelihood and can help ensure important ecosystem service functions such as water regulation for irrigation of agricultural lands, disasters and risk reduction and the regulation of climate at local and global scales. Although globally the scientific evidence to support a strong relationship between deforestation and water flow remains weak, residents and studies in both Aceh and in North Sumatra have reported around 50% reduction in water discharge in as much as 80% of the rivers as a perceived result of deforestation, with some 20% being completely dry compared to before. The carbon value of forests on non-peatlands is estimated at USD 3,711 – 11,185 per ha for a 25-year period. This value is higher than that for all other land uses assessed (agroforestry, sustainable logging and coffee, among others) except for oil palm, which has a value in the range of that of

carbon (Net Present Value of USD 7,832 per ha). For forests on peatlands the range of net present values for carbon credits from avoided deforestation (USD 7,420 – 22,090 per ha for a 25-year period) are sufficient to offset the opportunity costs for the conversion of primary forest to oil palm plantation. Including the value of other ecosystem services (USD 3,735 per ha for a 30-year period) in the comparison could make forest conservation even more competitive than that of all alternative land uses. Thus strong economic growth may be achieved through prioritizing forest conservation while meeting the increasing demand for oil palm and other agricultural products by enhancing yields and steering new agricultural development towards already low current use value lands. An opportunity cost analysis for the Tripa swamp and the Batang Toru mountain forests indicates that to offer an alternative to the most profitable land use change (from undisturbed forest to oil palm), a carbon market price of approximately USD 10 per tonne of carbon dioxide equivalent (tCO₂e) would be required. Although carbon prices are dependent on a number of factors, USD 10/tCO₂e is well within the range of voluntary market prices that have been achieved to date by REDD projects (USD 9.43 – 17.00/tCO₂e). Given the extent of illegal activities, it is important that the support and valuation of ecosystem services, and payment for such, through carbon markets or otherwise, are closely followed by monitoring and law enforcement on the ground. A fully strengthened effort on organized crime by linking to other initiatives such as FLEGT (Forest Law Enforcement, Governance and Trade) and other relevant UN agencies including INTERPOL, as certain illegal activities threatening forests cannot be addressed solely through law enforcement at the national level.

Schutten, J., Verweij, W., Hall, A. & Scheidleder, A. 2011. Technical report on groundwater dependent terrestrial ecosystems. Common Implementation Strategy for the Water Framework Directive (2000/60/EC) Guidance Document No. 6. European Commission, Technical Report - 2011 – 056, 32 p.

The EU Water Framework Directive aims to establish a framework for the protection of inland surface waters, transitional waters, coastal waters and groundwater. For groundwater, the environmental objectives include a good groundwater status, which is a combination of good groundwater quantitative status and good groundwater chemical status. The purpose of this report is to collate current available experience, contribute to clarification of terms and suggest pragmatic technical solutions for the implementation of the provisions regarding the interaction of groundwater bodies with directly dependent terrestrial ecosystems. See further the contribution of Michael Trepel elsewhere in this Newsletter.

Langdon PG, Hughes PD, Brown A (eds). 2012. Peat Stratigraphy and Climate Change Special Issue Quaternary International Volume 268, Pages 1-166

www.sciencedirect.com/science/journal/10406182/268

Fritz, C. 2012. Limits of Sphagnum bog growth in the New World. University of Nijmegen/University of Groningen, The Netherlands, 193 pp.

This doctoral thesis is a product of a cooperation between four universities, Groningen, Nijmegen, Greifswald and Ushuaia. It was initiated during the IMCG conference and field excursion in Tierra del Fuego, Argentina in 2005. Jan Roelofs (Nijmegen), Ab Grootjans (Groningen), Hans Joosten (Greifswald) and Rodolfo Iturraspe (Ushuaia) decided after the successful trip to Tierra del Fuego that more research on Southern hemisphere peatlands was urgently needed. The thesis is the results of this meeting on the airport of Ushuaia.

The author studied the competition between higher plants, in particular cushion plants of the genus *Astelia pumila* and *Sphagnum magellanicum*. In the Southern Hemisphere higher plants, such as *Astelia pumila*, dominate over *Sphagnum* in many bogs and other nutrient-poor peatlands. This dominance of higher plants is thousands of years old and not linked to man-made disturbances. Cushion bogs cover large parts of the Patagonian coast, but also in mountainous peatlands in New Zealand and Tasmania, given sufficient rainfall.

In the Northern Hemisphere *Sphagnum* usually wins the competition over higher plants. Only when conditions for root growth improve (e.g. lower water level as well as higher nutrient concentrations), higher plants increase biomass production and consequently may become dominant. The author studied the competition between *Sphagnum* mosses and higher plants in Tierra del Fuego and also in New Zealand. He evaluated growth conditions of *Sphagnum* mosses with emphasis on nutrient availability, hydro-climate and methane, and investigated adaptations of higher plants, such as deep roots, to overcome adverse growth conditions in bogs. Patagonian *Sphagnum magellanicum* mosses are well adapted to nutrient-poor environments. Eco-physiological experiments revealed that nitrogen

uptake efficiency of *Sphagnum magellanicum* is amongst the highest reported in literature. Such a thorough nitrogen immobilisation permits *Sphagnum* mosses to monopolise atmospheric nutrient inputs. Biomass production and foliar nutrient concentrations of higher plants remained low despite 3 years of substantial nutrient addition. In contrast, growth doubled in *Sphagnum magellanicum* when nitrogen and phosphorus were provided in excess. Interestingly, nutrient addition stimulated desiccation of *Sphagnum* by decreasing the density of mosses. A reduced water-holding capacity resulting from lower moss density potentially impairs *Sphagnum* growth, especially in climates where desiccating winds dominate like in Patagonia. The author found that a large quantity of air-filled roots from cushion plants dominate wet soils in Patagonian peatlands, where *Sphagnum* becomes overgrown by cushion plants. Oxygen transport and release by roots of cushion plants was so effective that soils became oxic even below the water level. It was concluded that cushion plants 'themselves' provide oxic soil conditions upon which roots can grow and access nutrients efficiently. As a result, cushion plants form 5–10 times more root biomass than the aboveground biomass of cushion plants and *Sphagnum* mosses, respectively. Their roots may become as long as 200 cm and benefit from low summer temperatures, which reduce stress from anoxia. Methane emission and methane production became suppressed as a result of complete oxygenation that reaches beyond the bulk root mass. Interestingly, cushion plants have the special ability to store carbon dioxide as peat without fuelling methane emissions. Evidence was provided that a moisture deficient moss surface due to desiccating winds is probably the most limiting factor of *Sphagnum* growth in Patagonia, next to low atmospheric nutrient inputs. In contrast, cushion plants have evolved several adaptations to harsh growth conditions. Thick leathery leaves grow close to the surface protect cushion plants from cold and dry winds. By growing in dense stands, cushion plants are able to conserve and recycle nutrients. However, the large investment in root biomass makes cushion plants vulnerable to shading (e.g. by fast growing plants) and disturbances such as prolonged flooding and frost periods. By forming a dense clonal vegetation, however, the establishment of competitive higher plants is strongly limited.

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UPCOMING EVENTS

See for additional and up-to-date information: <http://www.imcg.net/imcgdia.htm>

Mires and their catchment areas

*6 - 8 September 2012, Schorfheide-Chorin,
Werbellinsee, Germany*

More info: www.dgmtv.de

IMCG Field Symposium and Conference

Andes, 21 September – 3 October 2012

See elsewhere in this Newsletter and www.imcg.net

Mires and peat as a raw material - GeoHanover 2012

1 - 3 October 2012, Hannover, Germany

More info: www.dgmtv.de

Renaturierung der Heiden und Moore im Hohen Venn

4 - 6 October 2012, Eupen, Belgium

<http://biodiversite.wallonie.be/fr/kolloquium.html?IDC=3883>

International Conference on fresh water governance for sustainable development

5 - 7 November 2012, Drakensberg, South Africa

For more information visit:

www.wrc.org.za/freshwater/Pages/default.aspx

ISHS-IPS “International Symposium on Growing Media and Soilless Cultivation”

17-21 June 2013, Delft, the Netherlands

More info: www.grosci2013.nl

