INTERNATIONAL MIRE CONSERVATION GROUP

NEWSLETTER

issue 2007/4, December 2007

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 (Jennie Whinam), a Secretary General (Hans Joosten), a Treasurer (Philippe Julve), and 2 additional members (Tatiana Minaeva, Piet-Louis Grundling).

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

Editorial

Indeed, we live in turbulent times. The Climate Convenion meeting in Bali might not have brought what many had hoped, but at least some progress is visible. And peatlands have for the first time reached this high level of recognition. As Achim Steiner, UN Under-Secretary General and UNEP Executive Director put it last week at the launch of the Global Assesment on Peatlands, Biodiversity and Climate Change: “Just like a global phase out of old, energy guzzling light bulbs or a switch to hybrid cars, protecting and restoring peatlands is perhaps another key ‘low hanging fruit’ and among the most cost- effective options for climate change mitigation.” Read more about the assessment in the Newsletter and on the IMCG website.

This is again a Newsletter (somewhat delayed, but "official mills grind slowly" - Dutch expression) with a special, turbulent theme: Peatlands and Windfarms. Have you already registered for the IMCG Symposium “Windfarms on Peatland’ to be held in Santiago de Compostela (Spain), 27–30 April 2008? The Newsletter provides background information and some insight in the debate.

Heat also in the continuous debate on energy peat. A short article invalidates the arguments of Finland in its attempt to deceive international climate policy by misleading life-cycle-analysis.

Good news from Poland: an important step has been set in stopping road construction and saving the marvellous Rospuda mire.

A last important item are the preparations for the IMCG Field Symposium, Conference and General Assembly 2008 in Georgia. In this Newsletter a short report on the 'try-out' excursion and a call for preliminary registration. Take the chance to see the unique Kolkheti mires with your own eyes and to support our Georgian colleagues in their struggle to safeguard this heritage. More about that in the next Newsletter.

The next Newsletter we want to devote to the remaining energy-related threats to mires including mining (of coal and lignite), oil exploration and exploitation, and hydro-electricity. Start preparing your contributions for this special that we hope to publish in March 2008! Deadline for the next Newsletter: 1 March 2008.

For information, address changes or other things, contact us at the IMCG Secretariat. In the meantime, keep an eye on the continuously refreshed and refreshing IMCG web-site: http://www.imcg.net

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ISSN 1682-1653

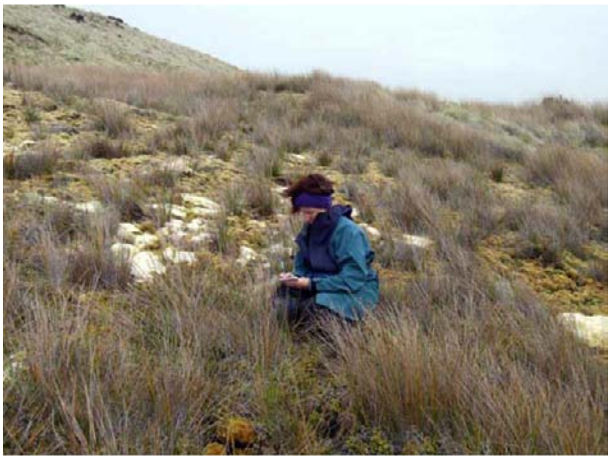
A note from the Chair

This newsletter continues the pattern for 2007 of focussing on specific issues that relate to current and emerging threats to peatlands. Past issues have looked at peat as a fuel and the use of peatlands for biomass production (and consequences for mire conservation). In this issue the focus is on windfarms on peatlands – which helps set the stage for the symposium in Spain in April 2008 addressing this issue (further details in this Newsletter).

One of the advantages of being part of the international mire community is the opportunity this provides for researchers from around the world to meet and discuss issues from their different perspectives. I have been fortunate in having Prof. Dicky Clymo visit recently, and we were able to visit several mires (and alpine areas) in Tasmania. I have corresponded with Prof. Clymo for over 20 years on aspects of *Sphagnum* ecology, but this was our first opportunity to visit Tasmanian mires together – including a Tasmanian kettlehole with *Sphagnum cristatum* and the endemic primitive conifer *Athrotaxis selaginoides*. It was reassuring to hear Prof. Clymo agree that many of our mire ecosystems do not easily fit into traditional European classifications.

I am fortunate in being a member of the Institut Polaire Français Paul Émile Victor (IPEV) visiting Ile Amsterdam in the subantarctic this (austral) summer. One of the primary aims of the expedition is to describe the *Sphagnum* peatlands that occur at 700 metres altitude on the (well named) Plateau des Tourbières, as well as looking at recovery from the past impact of cattle on these peatlands. The other project aims to help identify the possible vectors for alien species being transported to the subantarctic (as part of an International Polar Year project) and ensuring that management and operational procedures are established to minimise the risk of further alien species being introduced. Climate change has already resulted in newly disturbed ground exposed through glacial retreat and peatlands that are drying out – potential habitats for alien species to establish.

We have just arrived in the French austral region of Ile Amsterdam. The subantarctic peatlands of Kerguelen and Crozet pose an interesting contrast with those of Heard and Macquarie Islands, with different histories of settlement and exploration. The peatlands of Macquarie and Heard (Australian subantarctic islands) are relatively pristine with few alien species compared to the French subantarctic lands. Here on Ile Amsterdam it would be more useful if I was an expert in alien weed species rather than a subantarctic/alpine ecologist, as the ration of aliens to natives is about 60:20!



On Ile St. Paul

The most exciting find for me on my expedition with the Institut Polaire was to find *Sphagnum* growing on hot ground (les Terres Chaudes) on Ile St Paul. *Sphagnum* was growing on soil with temperatures of up to 60°C, but was not present when temperatures reached 70°C – fascinating to see. These *Sphagnum* peatlands are extremely species-poor, with only 36 higher plant species present. Some of the other peatlands sit in a hostile cold-arid environment where there is moisture.

The subantarctic islands have been declared nature reserves, with potential to emphasise their importance and the need for conservation management. From the arctic to the subantarctic, peatlands are a fascinating and important ecosystem – as you will see from this Newsletter, they need our research and protection.

Jennie Whinam

And on another nice note from the South, Australia's new Prime Minister Kevin Rudd has taken the necessary steps at this year's Climate Convention in Bali to ratify the Kyoto Protocol. This means that the USA remains as the only developed nation refusing to ratify the protocol.

REGISTER

Please fill out the IMCG membership registration form.

Surf to http://www.imcg.net or contact the secretariat.

Derrybrien: where the questions began.

by Olivia Bragg

On Thursday 16 October 2003, an estimated 450,000 cubic metres of peat slid down the southern side of Cashlaundrumlahan Mountain, a 365 m peak in the Slieve Aughty range in County Galway, western Ireland. The slide initially moved for less than 2.5 km, stopping on 19 October at about 195 m altitude. Although it had surrounded one house, it had not reached the minor road known as the Black Road that lay next in its path. And fortunately it was not quite heading for the nearby village of Derrybrien, which lies at the foot of the mountain. But there was rain on 28 October, and the peat began to move again. It crossed the Black Road and continued for some 1.5 km to the Owendalulleegh or 'Derrywee' River, which carried it more than 30 km into Lough Cutra where it polluted a local water supply and killed around 100,000 fish.

Catastrophic mass movements of peat are notable but not unexpected in this part of the world. A review of literature revealed a few records from such far-flung locations as the Falkland Islands (1878, 1886), subantarctic Maquarie Island (1996), Australia (1998) and British Columbia (1985); as well as one from Switzerland (1987), one from Germany (1966) and 13 from England and Scotland (1824–2003). But there were more than 30 records from Ireland and Northern Ireland with the earliest from 1697 and one, during a sudden thaw on 27 January 1890, at Loughatrorick North only 8 km from Derrybrien. Indeed, Carling (1986) calculated an average recurrence interval of only 6.3 years for mass movements of peat in Northern Ireland, as compared with 36 years for the English Pennines. On 19 September 2003, a weather system tracking across the northwestern corner of the British Isles had caused multiple landslides on peaty ground first at Channerwick in Shetland and then on Dooncarton and Barnachuille Mountains near Pollothomas in County Mayo, Northern Ireland. So was it at all surprising that three separate events occurred in the immediate vicinity of Cashlaundrumlahan the following month? The first, around the beginning of October, involved 2,000 m^3 of peat and originated only a few hundred metres from the source of the 16 October slide; and 4 km away at Sonnagh Old, 15,000 m^3 of peat moved during the same period.

The residents of Derrybrien wondered in particular whether it was just coincidence that there was a very new 9-turbine windfarm at Sonnagh Old, and construction work for a 71-turbine (60.35 MW) development – Ireland's largest and indeed one of the largest in Europe at the time – had been in progress on Cashlaundrumlahan since 02 July 2003. Eventually, in June 2004, I went with Richard Lindsay to take a look. This article gives an overview of what we found.

Cashlaundrumlahan, typically for the west of Ireland, was covered by blanket peat to a thickness of 0.4–5.5 metres (average 2.5 m). Despite the presence of peat banks providing fuel for local people (the practice of hand-cutting peat for this purpose being known as turbary), a radio mast with access road, and extensive forestry dating from the 1970s, typical blanket mire vegetation with *Sphagnum* still covered areas of open ground. The windfarm was to occupy an irregularly shaped plot of approximately 345 ha on the mountain's summit which was currently used partly for grazing, partly for turbary, and the remainder for forestry. By employing low-impact techniques claimed to require no drainage of the peatland system, the developer had been able to make rapid progress with installation during the three months before work was suspended as a result of the bog slide. More than 10 km of roads had been installed. These were of 'floating' construction, achieved by making a raft of brushwood and felled trees on the mire surface, covering with geotextile and piling 1.5 metres of crushed rock quarried from a nearby borrow-pit on top (Plate 1). This gave access for machinery to install foundations for the turbines, and 43 of these had been prepared. The procedure involved excavating peat down to soil or rock capable of bearing the weight of the turbine, then installing a concrete block or 'pad' *ca*. 1 metre thick and 15 metres square with a tubular steel 'can' cast into its centre to form the lowermost section of the turbine tower. The area of each excavation was substantially larger than that of its concrete pad, however, as a firm base was also required for the crane that would erect the turbine. The whole excavation was back-filled with crushed rock which provided both overburden to stabilise the foundation block and a hard-standing area for the construction vehicles. It seemed that the variation of peat thickness across the site had been troublesome, in that some of the hard standings lay well below the surrounding mire surface even when backfilled to the top of the can, whereas at others it had been necessary to excavate some of the mineral substratum to make sufficient depth for the foundation block (Plate 2).

Plate 1. Floating road at Derrybrien Windfarm. The effect of loading the raft of brushwood and timber with 1.5 m of rock aggregate is already evident from the angles of the tree trunks protruding at the sides of the road; it seems questionable whether this construction will continue to 'float' throughout the 25-year projected lifetime of the windfarm.

Plate 2. Two examples of turbine foundations at Derrybrien Windfarm. Above: concrete pad and steel base-can before addition of overburden at Turbine 23. This site is in shallow peat, the upper face of the concrete pad lying below the level of the peat-mineral interface. The purpose of the blue caps inside the can is to protect the electrical connections for the rotor, and the copper wire draped around the pad is the turbine's earthing net. Below: the foundation for Turbine 67, in deep peat, after backfilling with overburden. The upper rim of the can remains just visible above the finished hardcore surface. The area of peat removal is very much larger than that of the 15-metre-square concrete pad, and the permanently exposed peat faces on three sides of the excavation are already showing signs of drying-out and cracking.

The 16 October bog slide originated at the upslope edge of one of the access roads, immediately below the proposed location of the now-infamous Turbine 68. An excavator was left precariously perched on the verge as the road bowed downslope by 10–20 metres and the lower part of the peat failed over a distance of 1200–1300 metres, the width of the failure scar ranging from *ca*. 45 m at the head to a maximum of *ca*. 270 m some 750 m downslope. The ground appeared initially to have separated into distinct rafts along forest ploughing lines and drainage channels, the rafts breaking down as they moved until a flow-type movement eventually resulted.

There was another turbine site 300 metres immediately downslope (Turbine 70). It is still unclear how much work had been done on the foundation, but the access road had been built and on the same day an excavator had been cutting a culvert channel through the road to release water that had ponded behind it. The machine had broken down and had been parked a short distance along the road to await repair. The operator watched as standing trees began gliding by, and the Turbine 70 site was obliterated.

By the time we visited on 08 June 2004, much of the debris had been washed away and various works to stabilise the hillside had been completed. However, the pattern of detaching rafts of vegetation along plough lines was still evident in the mature forestry at the eastern side of the scar near Turbine 68 (Plate 3).

Plate 3. Looking downslope from Turbine 68 on 08 June 2004. The peat appeared to have separated from the plantation along plough furrows to form long ribbons that were progressively drawn into the slide.

From verbal accounts, photographs taken by others and written accounts of site inspections carried out immediately afterwards, as well as our own observations, we gradually pieced together what had actually happened to the peat system, identifying possible contributory factors as follows:

Weather was an important factor to consider because many bog slides have been attributed to heavy rainfall. In this case, however, there was no rainfall at all during the period 14–24 October, and prior to this the last three days with more than 5 mm rainfall were

05 Oct (9.1 mm), 21 Sep (13.6 mm) and 22 August (6.5 mm). Analysis of longer-term (1990–2003) rainfall records from Derrybrien showed some evidence for the predicted trend towards enhanced seasonality of weather conditions, an atypical sequence of wet and dry months during 2003, and in particular that October 2003 fell within an unusually low-rainfall autumn in a low-rainfall year (Figure 1).

Topography and hydrology appeared relevant, in that Turbine 68 was sited in a flush where seepage flow lines in the peat were beginning to converge to form one of the streams that drain from the peat blanket. The peat in such an area should dry out infrequently (if at all) despite drainage, because it receives seepage from above. This is also the type of location where underground peat pipes develop, although these tend to conduct water actively only during wet weather. Nonetheless, the fact that this area had also been ploughed and planted meant that it would still be drier than intact bog for the reasons given above. Thus, the conditions appeared to pre-dispose the peat to instability through relative swelling of basal peat and contraction of surface peat as in the surface rupture mechanisms described by Warburton *et al.* (2004). Moreover, water shed locally onto the mire surface in this vicinity would be focussed into the centre of the flush and routed through any cracks directly into the catotelm, potentially causing localised pressure differences within this layer especially if there was surface ponding.

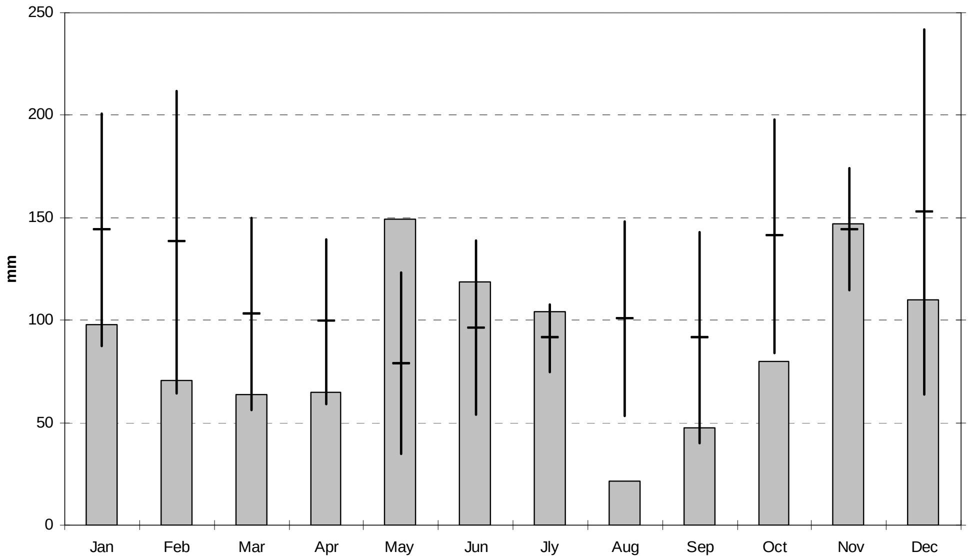


Figure 1. Comparison of Derrybrien monthly rainfall totals for 2003 (grey bars) with 14-year monthly means (black horizontal bars) and standard deviations (black vertical bars).

Land use around both Turbine 68 and Turbine 70 was solely forestry. At Turbine 68 the forest consisted of mature lodgepole pine (*Pinus contorta*) planted during the 1970s. Forestry drainage and ploughing (perpendicular to contours) had affected the site for around 30 years. Research in northern Scotland (*e.g.* Pyatt & Craven 1979; Pyatt 1987, 1990, 1993; Anderson *et al.* 1995; Anderson 2001) has shown that canopy closure occurs 10–20 years after planting on peatland, and is associated with significant changes in the peat system itself. First, bog vegetation is replaced over a period of 2–3 years by forest floor communities; and secondly the increase in interception and evapotranspiration reduces the water supply to the catotelm peat to such a degree that it begins to subside and, more significantly, to crack – first along ditches and furrows, and eventually also directly beneath the trees. The depth of cracking is typically around 1 metre, but it is not obvious on the surface because it is covered by the fibrous upper layer, which is by now reinforced by the root mats of trees and covered by a litter layer of pine needles. The area around Turbine 70 had also been planted in the 1970s, but the forest here had been destroyed by fire and re-planted with Sitka spruce (*Picea sitchensis*) during the 1990s. Thus there had been time for canopy closure and associated effects under the first planting, upon which fire and growth of a second crop were superposed. Moreover, the fact that areas of forestry had so far been felled on a ‘keyholing’ basis, clearing only the areas where trees were in the way of construction work, meant that individual parts of the peat blanket had experienced potentially complex sequences of unevenly distributed loading and unloading events, which are known to affect the engineering properties of the peat itself (see e.g. Hobbs 1986).

Windfarm construction work was also examined as a contributing factor. At the time of the slide, two machines were working at the excavation for Turbine 68, the first digging out peat (arisings) and the second piling this downslope of the road. Several drains had been breached and were discharging water into the hole, which had reached mineral soil and was probably water-filled; but nobody can (or will!) say whether the water was being managed using a procedure known as ‘overpumping’ which involves discharging pumped water onto the mire surface elsewhere. However, photographs taken within days (e.g. Plate 4) show a disconnected water pump at the southern edge of the road.

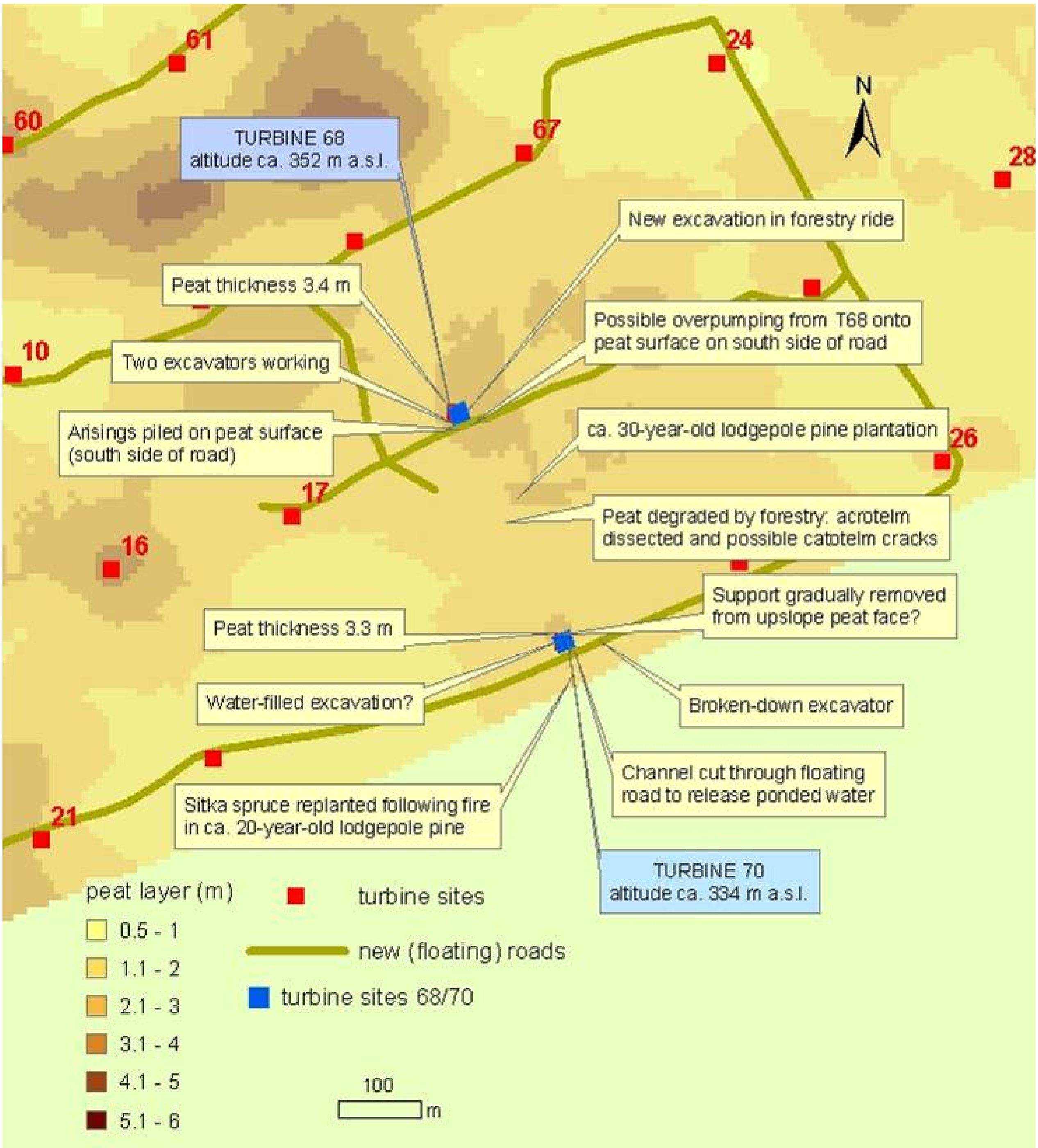


Figure 2. Factors that may have contributed to the Derrybrien bog slide. Peat thickness data were collected by Malone O'Regan McGillicuddy, Consulting Engineers, Cork.

The specific cause of the failure could not be identified even by the geotechnical experts who visited the site immediately afterwards, and so viewed all the evidence in a 'fresh' state. To us it seemed that, whilst the dry weather and condition of the site due to forestry could be predisposing factors (Figure 2), it was most probable that the slide was actually triggered at either Turbine 68 or Turbine 70, or at both sites simultaneously, by one or more of the following:

– a failure due to loading at Turbine 68 which was propagated downslope;
– this process possibly being promoted by overpumping which reduced the strength of the peat downslope of Turbine 68; and
– the collapse of the upslope face of the excavation for Turbine 70 due to removal of the water that had been supporting it, this failure being propagated upslope.

Thus the most likely triggers were activities that were directly related to wind turbine installation.

Plate 4. The site of Turbine 68 shortly after the bog slide, showing the two abandoned excavators and a disconnected water pump. The position of pump suggests that it could have been used to pump water from the excavation. (Photograph: M. Collins).

Both Galway Council (as the responsible planning authority) and the developer commissioned geotechnical reports on the bog slide. These differed in their details, but were consistent in attributing the failure to loading of the mire surface with arisings from the Turbine 68 excavation. Factors of Safety (FoS) were calculated using standard engineering techniques for assessment of the stability of soil on a slope based on rotational and translational slip models. There was also a field survey of the 43 excavated turbine sites which showed that 47% (20) of these had signs of instability. Downslope peat movement had actually occurred at five turbine sites. The analysis that was not presented was a test of the correlation between the results of the field observations and theoretical calculations; probably because, as we found when we did the test, it was unconvincing. For example:

– the sites with the lowest FoS values (i.e. the most unstable ones according to theory) were amongst those for which no actual instability was recorded;
– the highest FoS value (indicating the most stable part of the site) was obtained for an area including the proposed site for Turbine 61, where a tension crack has appeared due to settlement of the access road; and
– FoS values for sites that had been excavated without failure covered a wide range, and some of the values were lower than those obtained for excavations where failures had occurred.

This is unsurprising because we know that a variety of mechanisms can lead to failure of peat, and few (if any) of these resemble a rotational or translational failure of mineral soil (see e.g. Warburton 2004). Nonetheless, apart from commonsense changes in excavation, overpumping and monitoring procedures, the only significant recommendation that emerged from the geotechnical work was that construction could safely be resumed if a "robust drainage plan" were implemented in order to increase the 'strength' of the peat as used to calculate FoS; meaning

> *"drainage for each access road, all turbine bases and each repository site …. continuously for the life of the windfarm project and thereafter."*

By the time we visited, drainage was certainly in place (e.g. Plate 5). The windfarm was below the 300 MW threshold size for mandatory Environmental Impact Assessment (EIA) in Ireland at the time of the original planning applications; and three applications were, in any case, submitted – for separate windfarms of 23 (east), 23 (west) and 25 (centre) turbines respectively. Nonetheless, the developer had voluntarily undertaken EIA for the first and third proposals. The prospect of such aggressive drainage was rather at odds, we felt, with the impression given by one of these documents, which included the statement:

> *"construction of turbine bases does not result in long-term drainage of the surrounding peat."*

The prospect of comprehensive and permanent drainage of the whole of the summit peat blanket of Cashlaundrumlahan seemed to introduce new and significant implications that had not been considered by the EIA documents; for example for the quantity and quality of runoff feeding streams and rivers as well as choices for future use of the peatland after the timber was harvested. Would it also promote shrinkage and even accelerate aerobic decomposition of the peat, leaving the turbine bases and their anchoring overburden standing proud of the ground surface; and might this affect the stability of the turbines themselves? And how fast would the peat blanket be oxidised to carbon dioxide and water under the new drainage regime; and how might this affect the real saving in greenhouse gas emissions that would be achieved by this particular windfarm? We did a 'worst-case' calculation of the total CO_2 release that would result from oxidation of all of the 7,100,000 cubic metres of peat that the developer's data indicated was present within the windfarm boundary, and compared it with standard estimates of CO_2 savings for energy derived from wind *versus* fossil fuels. It seemed that oxidation of this quantity of peat would almost totally cancel out the projected saving in CO_2 emissions from 10 years of operation of the entire Derrybrien Windfarm, if calculated using Irish data for the CO_2 saving per unit of wind power generated. Using a more conservative UK emission savings figure, peat oxidation at this scale would cancel the CO_2 savings anticipated from just under 20 years of windfarm operation – i.e. almost the whole projected lifetime of the Derrybrien facility. And this took no account of the non-peat CO_2 emissions incurred in the manufacture, transport, installation, maintenance and decommissioning of the turbines or the effect of removing the forestry. Whilst the calculation was rough and based on an extreme scenario, it did seem to indicate a need for better information on the potential effects of drainage on the peat, and even for assessment of the windfarm project against "do-nothing" and "peatland restoration" alternatives.

Plate 5. Drain dug to release water from the excavation for Turbine 2. Note the rock reinforcement that is required to stabilise the sides of the excavation and the telemetric monitoring equipment in the background that will detect any movement of peat which, at this location, would descend directly onto housing in the village of Derrybrien.

The project developed into a full evaluation of the planning procedure that had been followed at Derrybrien in the context of EIA requirements, and the University of East London eventually produced a 240-page report (Lindsay & Bragg 2004). The Derrybrien Windfarm has since been completed and commissioned, apparently without further mishap; the question of peat stability is now fully on the agenda for developers considering new windfarm proposals for the almost ubiquitously peat-blanketed uplands that express the oceanic climate of the British Isles; and the whole EIA process for windfarms is becoming increasingly thorough, at least in the UK. However, at least one question arising from this initial experience – namely how permanent roads can possibly be laid or 'floated' across intact mire without, sooner or later, requiring drainage – remains. This is amongst the issues discussed by Richard Lindsay elsewhere in this newsletter.

Acknowledgements

The staff of Hibernian Wind Power provided every possible assistance during our visit to the Derrybrien Windfarm, which was arranged by Martin Collins of Derrybrien. Except where specifically attributed, photographs were taken on 08 June 2004, either by the author or by Richard Lindsay.

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Predicting the impact of windfarm developments upon blanket bog habitat: approach and professional standards in the case of the controversial proposed Lewis Windfarm

by Tom Dargie, CEnv MIEEM

Summary
In this article I defend my work undertaken on peatland habitats for the proposed Lewis Windfarm development. This work has been attacked by the Royal Society for the Protection of Birds and their objections were used by the Scottish Wildlife Trust and IMCG. This paper shows how these attacks were flawed and often based on questionable professional standards.

Background
The proposal for a very large windfarm located predominantly on blanket bog within the Lewis Peatlands SPA/Ramsar site, the second largest area of peatland in Britain, was bound to be highly controversial from the outset, given its location within nature conservation designations of international importance.
The Lewis Windfarm development has changed since the original application in 2004 (234 turbines, 170 km of road plus other infrastructure), shrinking to 181 turbines and 141 km of road plus other infrastucture in a revised 2006 layout, with a further required reduction to 176 turbines coming as a condition of local planning approval by Western Isles Council in 2007. The application is currently being considered by the Scottish Government in terms of approval, rejection or public inquiry. Approval is likely to be challenged in the European Court.
Strong objections on various environmental grounds have been made by many organisations and individuals, including Scottish Natural Heritage (SNH) as statutory advisor to the Scottish Government. The main focus of concern has been on bird impacts but work on habitats for the 2004 and 2006 versions of the Environmental Statement (ES) has been particularly attacked by the Royal Society for the Protection of Birds (RSPB), with Richard Lindsay of IMCG as its peatland expert. Other organisations have based their habitat objections on this material, including the Scottish Wildlife Trust and the IMCG.
As examples of the degree of concern, the IMCG 2007 letter of objection to the Scottish Government describes the ES approach to peatland issues as:
– based on information which is ill-prepared;
– uses an approach which is ill-conceived and naïve;
– adopts highly-questionable positions on various ecological issues;
– favours a minimalist view of impact evaluation, instead of identifying the realistic scale and extent of combined impacts.

This is strong stuff.

My group was responsible for habitat work in the Lewis Windfarm ES and I reject most if not all of the criticism directed at it. Actually, when comparing the criticism with ES material, published literature and official guidance and using an evidence-based approach, many very serious flaws are identified in the counterarguments to our case.
This article considers a few key contentious issues in the Lewis debate, set in the wider context of blanket bog hydrology, baseline survey, ecological assessment, monitoring and site management during construction and operation of a windfarm upon blanket bog. It might contribute towards the emerging themes for the forthcoming IMCG symposium in Santiago de Compostela, particularly the formulation of wise use guidelines for windfarms sited on present or past blanket bog (e.g. afforested bog).

About the author
Tom Dargie, CEnv MIEEM is Senior Partner of Boreas Ecology and Peatland Habitats Adviser to Lewis Wind Power and Npower Renewables
He has campaigned, researched and advised on UK peatlands over 37 years, particularly for Thorne Waste where in 1972, as a member of the “Bunting Beavers”, he helped build dams in new deep drains threatening the best remaining habitats with active bog in old peat cuttings and extraction canals. That work led the UK Nature Conservancy Council, reluctantly, to declare a small SSSI which over time has produced a National Nature Reserve and SSSI/SAC/SPA/Ramsar status for very large areas of the remaining Humberhead Peatlands. He has continued work on this site and is responsible for three quinquennial surveys of re-wetting indicators for English Nature. He has contributed several ES chapters on habitats to windfarm developments on blanket bog and over the past 10 years has acted as Project Ecologist for three large windfarm construction and monitoring projects in Scotland involving 95 turbines and over 30 km of floating road at Novar (Ross-shire), Causeymire (Flow Country, Caithness) and Farr (Monadhliath Mountains, Inverness-shire).
For the record, Tom Dargie has, from the outset of involvement in 2001, advised Lewis Wind Power (a consortium of AMEC Wind and British Energy) to abandon the Lewis proposal due to the international conservation status of most of the site and a low likelihood of approval under European law. However, as Prime Minister Margaret Thatcher once said, advisers can only advise.

Four (of many) bones of contention

1 Habitat and hydrology work for the LWF ES

Habitat survey was undertaken in 2002 and 2003 over an area of almost 25,000 ha in the northern Lewis Peatlands (Fig. 1), based on an approach agreed in advance with SNH under scoping discussion. Air photos were used in the field to divide the area into >5,000 polygons, each described using a microtopographic framework which allowed recording of vegetation types, extent, structure, erosion and peatland condition using >50 attributes. A team of seven highly qualified field surveyors was trained to use this system. Their combined peatland experience extends over more than 100 years. Results were captured as a GIS database. In addition, a minimum of 5 quadrats (specified in an SNH brief) was recorded for each of the main vegetation types present, based on the UK National Vegetation Classification (NVC). Results were then used for ecological assessment, including an ecohydrological account of the eroded character of this part of the Lewis Peatlands. All of the above work was the responsibility of Boreas Ecology, led by me.

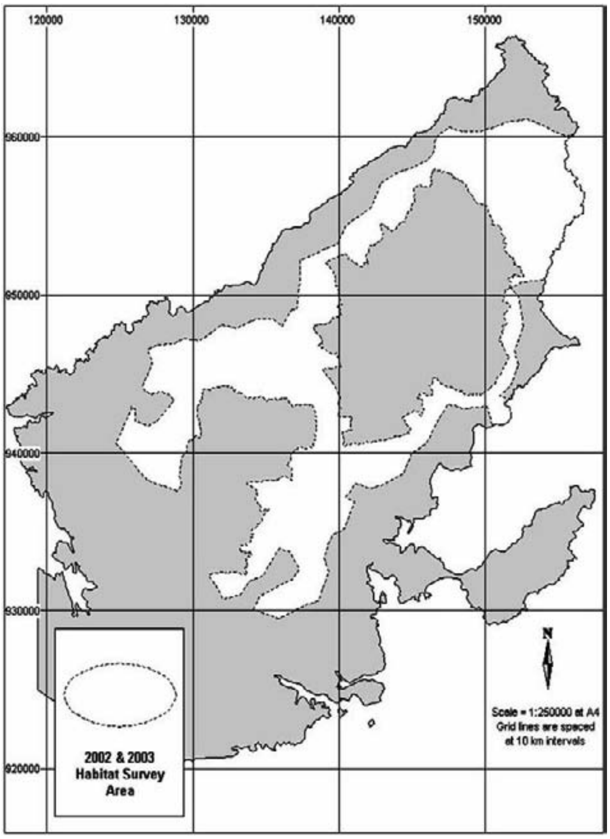


Figure 1. Part of the Isle of Lewis and Harris with the Lewis Windfarm Habitat Survey Area in white

A separate hydrological baseline and assessment covering >50,000 ha was undertaken in the same period and was based on a catchment approach. This work also covered issues of peatland erosion, water quality and a separate study on peatslide risk. These studies were the responsibility of Enviros Consulting Ltd.

There was liaison in the assessment phase between the two sets of studies and habitat GIS data were used as part of the hydrological work. Habitat data were used to define areas of wet peatland, surrounding them with a 50 metre no-go buffer. This information was used by developers in designing the windfarm layout, avoiding the most sensitive habitats.

Criticism of our work fails to acknowledge the separate ES authorship of habitats and hydrology, the different sizes of ground used for assessment and the avoidance of sensitive habitats in the windfarm design. The criticism places much importance on catchment-based methods for understanding peatland hydrology, undertaking hydrological assessments and protecting the integrity of peatlands. Indeed, a catchment approach is recommended by the Ramsar Convention. Like all UK assessments by hydrology professionals our work has been catchment-based. What it does not do, however, is adhere to the formal hydromorphological methodology specified in UK guidance for the selection of land as peatland SSSIs (but neither does a major 1987-89 Nature Conservancy Council [NCC] survey of the Lewis Peatlands). In my opinion this formal method is not necessary. It is misrepresented as a well-applied field technique. It has in fact been rarely used, even for its main purpose (designation of UK SSSIs). It is unproven as a framework for hydrological assessment as part of a major development ES.

2 The identification of blanket bog vegetation types

The ES habitat survey concluded that dry peatland conditions were dominant in this sector of the northern Lewis Peatlands. Three NVC vegetation types (M17b dry blanket bog, M15c wet heath, H10b dry heath) were found to be the most extensive, making up almost 60% of the survey area. Wetter NVC blanket bog types (e.g. M1 bog pool, M17a wet blanket bog) make up only about 10% of survey ground, with *Sphagnum* cover (recorded if present for all polygons) estimated as only 12%. The largest extents of M1 bog pool vegetation are present in the floors of eroded peat gullies, particularly in two types of eroded ground categorised as either stable or regenerating. There is very little evidence in GIS data or additional notes for clear, rapid regeneration of eroded ground (cases exist but they make up only about 2% of the survey area). This contrast between extensive dry peatland surfaces and restricted wet blanket bog is illustrated in Figs 2 and 3.

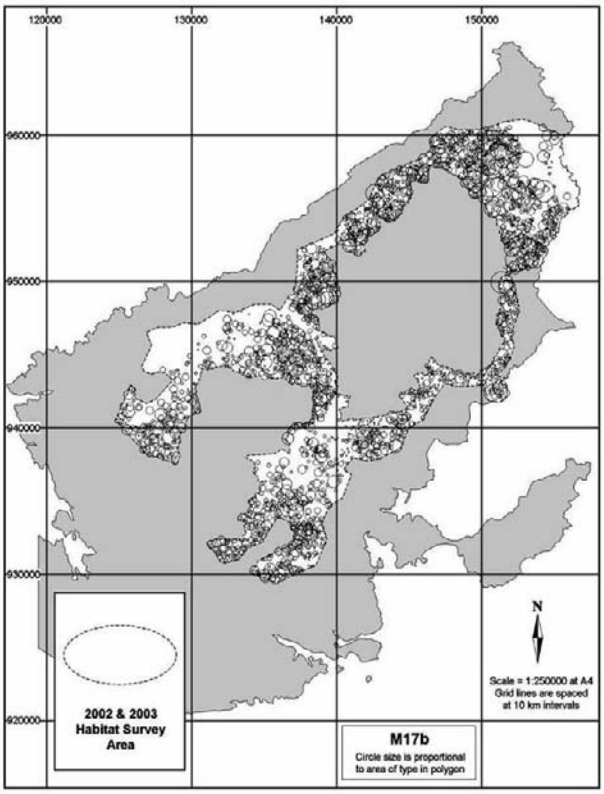


Figure 2. Distribution of dry blanket bog
(M17b Scirpus cespitosus - Eriophorum vaginatum *mire,* Cladonia spp. *sub-community)*
Circles located at polygon centres containing this cover type. The largest circle represents a maximum polygon area of 53 ha for this cover type. Total M17b extent is 6236 ha.

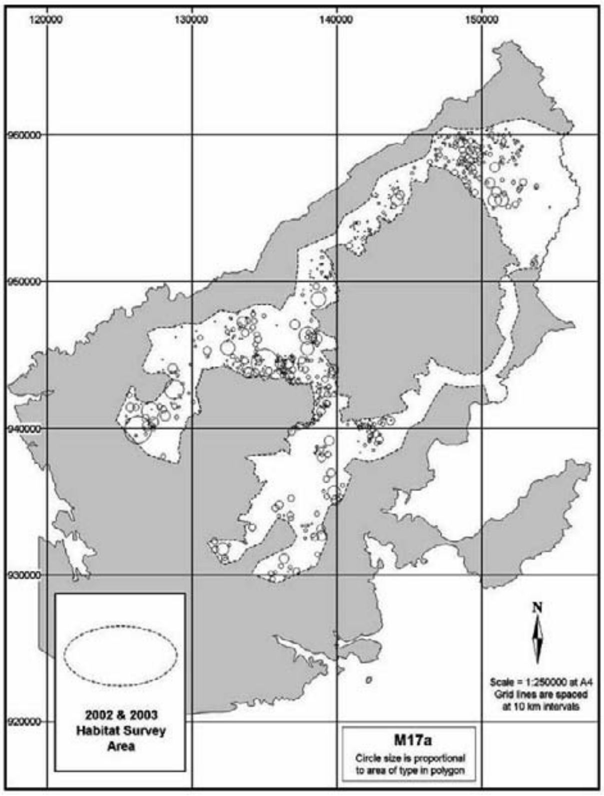


Figure 3. Distribution of wet blanket bog
(M17a Scirpus cespitosus - Eriophorum vaginatum *mire,* Drosera rotundifolia - Sphagnum spp. *sub-community)*
Circles located at polygon centres containing this cover type. The largest circle represents a maximum polygon area of 26 ha for this cover type. Total M17a extent is 604 ha.

These results of our ES have been refuted as an inaccurate summary of habitat conditions. It has been claimed that wet ground is much more extensive and furthermore that widespread peatland regeneration is present. This would mean that the Lewis Peatlands show a recent switch to wet conditions after thousands of years of erosion.

Our findings, however, are in line with earlier published NVC surveys of the northern Lewis Peatlands that also conclude that dry conditions are extensive or dominant. The earlier surveys include one by Hulme which was used by Rodwell for the published NVC description of Lewis conditions, and which was also used in a major 1987-89 Nature Conservancy Council (NCC) survey of the Lewis Peatlands supervised by Richard Lindsay. Lindsay fails to quote this data in his recent work, however, in which he challenges our ES results.

It has been suggested that our conclusions are based on an insufficient number of quadrats and that our quadrat data show considerable mis-identification. We have, however, followed accepted standard procedures and our results are in line with earlier NVC descriptions of the site.

On the basis of “corrected” proportions, critics claim wet peatland to be much more extensive (e.g. M17a wet blanket bog is increased from 604 ha to 3722 ha) covering a 2-3 times larger area. These “corrected” proportions are based on a non-standard method of NVC assignment, however, which is a major deviation from recommended practice authored by Professor Rodwell and published by the Joint Nature Conservation Committee (JNCC). Applying this non-standard method to NVC surveys destroys the structural integrity of NVC data and could ultimately discredit the UK NVC system.

A quotation from respected independent NVC experts has been used to back up a claim that, contrary to our findings, H10b dry heath cannot be found on deep blanket bog peat. This quote is incorrect, however, and upon inviting their opinion, the quoted experts agree that H10b dry heath is present in Lewis Peatlands and Shetland peatland NVC surveys.

Findings and conclusions of a recent multi-proxy peatland stratigraphy study produced for SNH by a leading UK Quaternary scientist (Tony Stevenson) have been misrepresented to debunk our findings. We have addressed this issue in our rebuttal of the RSPB report and I invite you to follow the link at the end of this article. It is too detailed and specialist an issue to deal with in this Newsletter article.

In our rebuttal of the RSPB report, we show that there is a very strong correlation between peatland quadrats and Ellenberg moisture scores. NVC quadrat sets from multiple vegetation surveys in Lewis Peatlands are significantly different and form a moisture continuum. We show that there has been a major change in the balance and location of vegetation types in the period between 1976 and 2003. This is interpreted as a regional drying pattern, suggesting that the Lewis Peatlands are indeed getting drier.

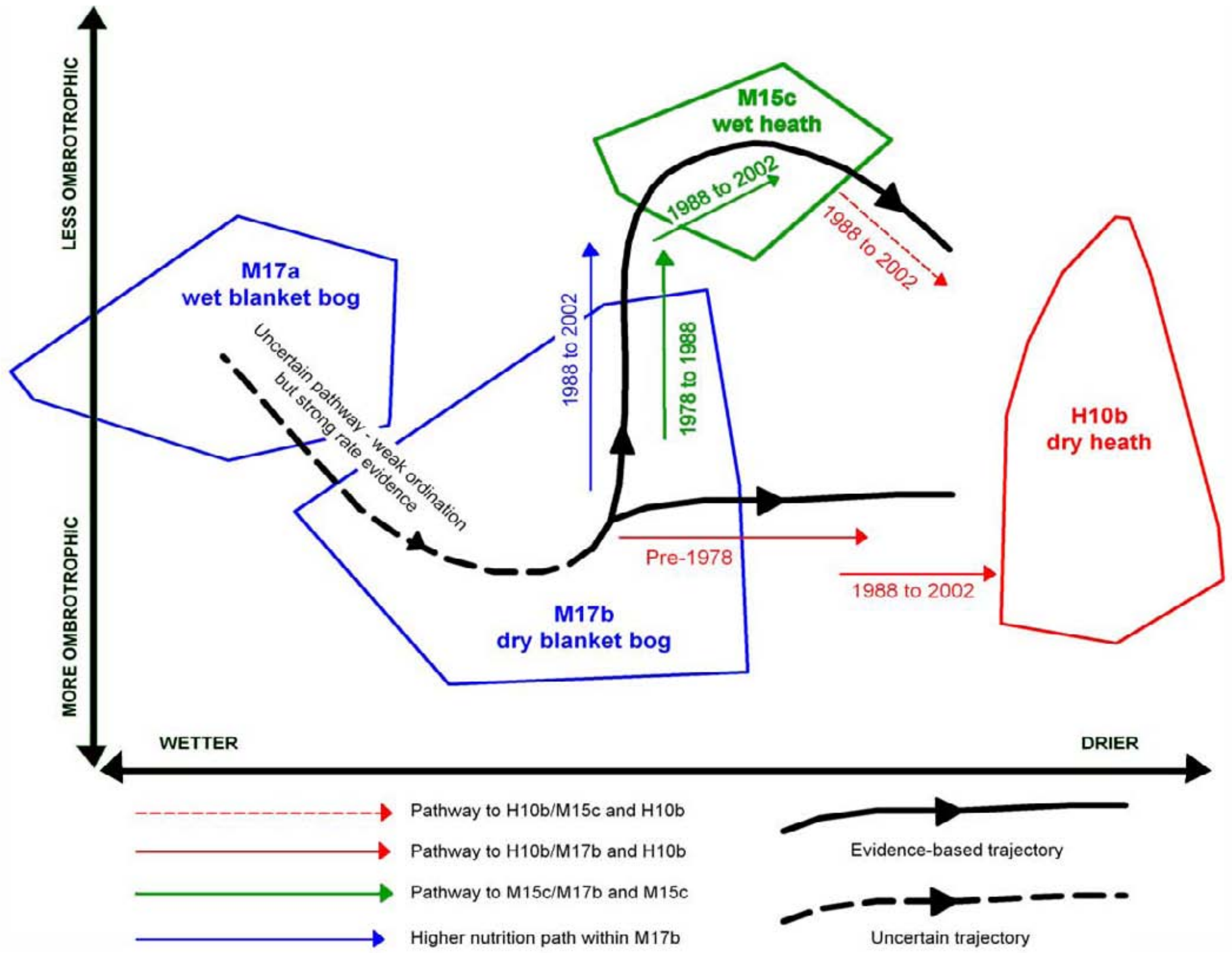


Figure 4. The Lewis Drying Hypothesis: possible pathways of vegetation change in the Lewis Peatlands over the past 3- 4 decades

3 Are the Lewis Peatlands getting wetter or drier?

The RSPB report (increasing wetness) and our findings (increasingly dry conditions) are diametrically opposite. There is little evidence for the re-wetting assertions. A forthcoming report from the University of East London is promised to contain further evidence. That report has yet to be submitted to the Scottish Government.

In our rebuttal of the RSPB report, we look in detail at further evidence for the 'Lewis Drying Hypothesis'. We examined four NVC surveys covering the Lewis Peatlands between 1976 and 2002/2003, including the 1987-89 NCC study of Lindsay. It also considers two published remote sensing studies covering 1977 and 1992 Landsat images. Remote sensing work by Boreas Ecology is extended to a 2003 Landsat TM scene which is trained using ES and SNH Lewis Peatlands SAC surveys (the latter dated 2001/2). The results (Fig. 5) show dry peatland increasing over time at the expense of wet conditions. These results suggest that >600 ha of wet peatland are being converted to dry surface conditions on an annual basis. 2002 image analysis shows drying to be largely confined to the northern and central sectors of the Lewis Peatlands SPA/Ramsar site. This is interpreted as a 'dry shift' event, to use current palaeoenvironmental terms.

The detailed mechanisms causing regional drying on such a scale are at present not understood. The ES and our RSPB rebuttal include speculative ideas concerning an evolving subterranean peat pipe network which might dewater wet ground rapidly. As yet, no work mapping peat pipe characteristics has been done on Lewis, although extensive recent work by Dr Joe Holden on UK blanket bog shows pipe densities which would fit North Lewis erosional conditions.

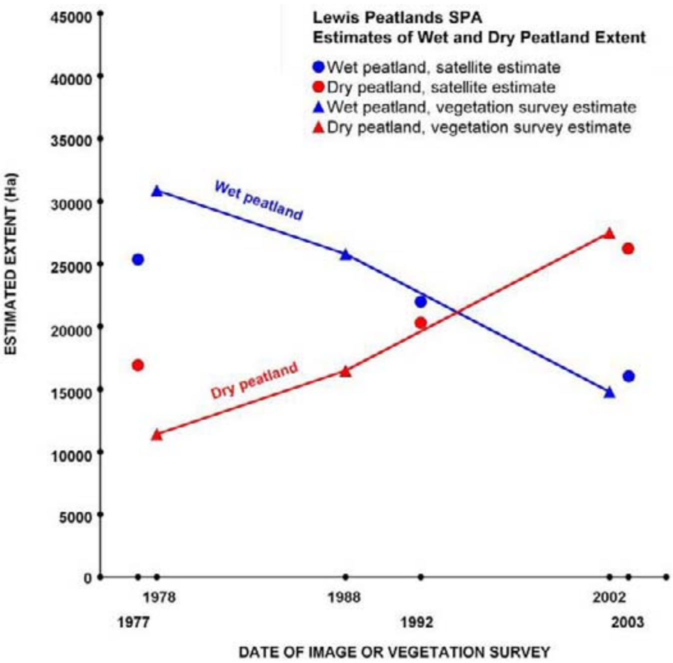


Figure 5. Trends in Lewis peatland wetness: validation of the Lewis Drying Hypothesis

4 The distance of drainage effects on blanket bog

This issue is responsible for claims that the ES is minimalist in its assumptions of direct and indirect effects of development, underestimating the area of affected ground by up to a factor of 30 according to the RSPB report.

Assumptions in the ES are based on field observations on many eroded UK blanket bogs, which show that dry conditions are usually confined to within very short distances of drains or erosion gullies due to very limited drawdown.

Literature review of peatland vegetation and hydrology, especially on hydraulic conductivity, shows that it is very difficult indeed to drain a blanket bog using ditches. An important Dundee review shows that the hydraulic conductivity of blanket bog is much lower (by several orders of magnitude) than fen or raised bog peats. Dundee values are corroborated by Irish soil physics work and recent North Pennines work by Holden and Burt using compressible soil theory. Long-term Pennine observations by NCC staff on vegetation change around drains installed 40 years earlier show that drying effects rarely extend further than 10 metres and are usually much less.

The RSPB itself has published statements that most Flow Country ditches are not seriously affecting surrounding ground beyond about 2 metres of either side of a ditch. This has been confirmed by Boreas Ecology around old drainage ditches at Causeymire Windfarm.

Boreas Ecology has carried out a year of confirmatory research using dipwell and piezometer transects at Farr Windfarm during construction, mainly examining the effects of floating roads and deep excavations upon water levels and hydraulic conductivity, with water level results compared with control sets unaffected by infrastructure. This work is published as Appendix 11E in the Lewis 2006 ES Addendum. No serious effects were observed further than 10 metres and most were within 1 – 5 metres at most.

In contrast, critics of the ES often avoid reference to science, misrepresent, or casually dismiss it. This also lies at the basis of the claim that ES statements on effects are underestimated by a factor of 14 to 30. Firstly, the ES data are misquoted and ES assumptions on selection of buffer distances around infrastructure under worst-case and realistic scenarios are not addressed. Peatland ecohydrological research by Dr Kevin Gilman is casually dismissed. Secondly, citing a paper by Dan Boelter examining drawdown by ditches in two lacustrine peat basins in North America (both with a mature black spruce cover, i.e. not comparable with the Lewis situation), Boelter's observational distance (50 metres) is misquoted as 200 metres. Based on this misquote, the assumption is made that drawdown and drying (wastage) effects will occur over 250 metres.

Thirdly, an unrepresentative case study, Holme Fen Post[1] is used to indicate the scale of peat wastage by drying and oxidation. Our modelling work on ditch drawdown shows that this raised bog peat (in a dry climate with deep ditching and water pumping) is likely to exaggerate Lewis oxidation losses by a factor of at least 1000.

North Lewis windfarm impacts versus recent and ongoing habitat change on blanket bog – which is more serious?

To conclude, it is possible to use our ES and rebuttal material to compare the windfarm effects on habitats (2007 ES figures, Realistic Impacts Scenario) with other major UK blanket bog losses and habitat change identified via the Lewis Drying Hypothesis.

The windfarm development will:

– destroy 266 ha of blanket bog
– damage 275 ha of ground which should largely recover via succession mainly as relatively dry blanket bog
– change a further 280 ha of ground beyond ditches and disturbance due to changes in hydrology; this area will still remain as blanket bog.

We consider the above figures precautionary and change due to damage and altered hydrology will likely be notably lower. In the long term, 20 years after de-commissioning with the roads left in place, total habitat loss might only be around 300 ha. This is a significant amount within an international conservation site, but is also a relatively small footprint for what is a very large peatland (58,984 ha). The international site is not notified for its peatland habitat interest under EC SPA or Ramsar

[1] a cast-iron column that was sunk into Holme Fen till its top was level with the peat surface in 1852. It now rises more than 5 m above ground level.

citations. The long term structure and function of the peatland habitats is not under threat.

Compare that level of loss and long term threat to overall loss of blanket peat in Scotland using published SNH data (41% in the period 1947-88, perhaps 4% of the world resource, amounting to perhaps 400,000 ha), mainly due to afforestation. There has been no significant change in peatland loss in Scotland since the Flow Country battle was won in the late 1980s.

The windfarm long-term losses also represent only half of the annual change from wet to dry peatland, as derived from the Lewis Drying Hypothesis. As part of this switch the Lewis Peatlands are probably now no longer a carbon sink but are a likely source as widespread natural drying steadily removes active blanket bog surfaces.

In short, we think that the proposed development will have a significant but only slight negative influence on blanket bog habitat.

References

The following web sources contain the key documents covered in this document:

– Lewis Windfarm Environmental Statement, particularly Chapter 11 Habitats (including four appendices, 11A, 11B, 11C and 11D) and the Baseline Habitats Survey which is included as a Technical Report. There is also relevant material in Chapter 18 Carbon Savings. Together, these comprise my contributions to the ES. In addition there is a further Chapter 11 Habitats (including five appendices, 11A, 11B, 11C, 11D, 11E) in the LWP 2006 Addendum. These sources can be obtained at http://www.lewiswind.com/application/environment
– Lindsay (2005) Lewis Windfarm Proposals - observations on the official Environmental Impact Statement. http://tinyurl.com/2o9ymb
– RSPB Scotland Objection Letter, Annex 1, January 2007: http://tinyurl.com/37qag7.
– Lindsay (2007) RSPB Scotland Objection Letter, Annex 1, January 2007: Appendix 1 Comments on (LWP 2006) Addendum to the Environmental Statement: http://tinyurl.com/38rvu2.
– The Boreas rebuttal of the RSPB report, together with a recent but out-of-date paper on windfarm impacts on peatland: www.boreasecology.com

Acknowledgements

I would like to thank Hans Joosten for the invitation to make this defence of Lewis Windfarm work on habitats. John Couwenberg edited and much-improved a draft version. Research is continuing and I hope to present a fuller version of this article as a paper at the Santiago de Compostela meeting in late April.

We want your pictures for our postcards!

To engage more people in mire conservation we need outreach material. Beside our newsletters and web-site we mainly reach people through personal contacts during field excursions and professional meetings. For this purpose we have recently reprinted an updated version of the IMCG flyer and we want to produce a new series of postcards promoting IMCG and mire conservation worldwide.

The first series of IMCG postcards is nearly out of stock. The concept behind the postcards was to visualize important topics related to mire conservation in our work on every continent. For the second series of postcards we ask you to send us your (high-quality) picture with a short story of less than 300 words and basic geographical information (location, country and continent). The pictures should reflect both the main topics of IMCG: biodiversity, climate change, energy and water, and our global dedication.

Ideas to visualize these themes are for biodiversity for example rare plants and animals or threatened landscapes. Climate change can be highlighted with melting permafrost, desertification and high mountain mires. The energy topic can be pictured with peat and peat cutting, biofuels, and infrastructure including windfarms, oil fields or dams. The water theme is strongly connected with climate and desertification.

From your feed back we will select the hottest pictures for mire conservation and use them for our new postcard series. Furthermore we well use them for a poster and on our web page.

Please send your pictures and your short texts to Michael Trepel (mtrepel@ecology.uni.kiel.de).

Your pictures will be evaluated by a professional jury and the winners will receive either a copy of the Wise Use Book or the book on Weber and the Augstumal Mire and of course a set of postcards.

If you do not have a good picture to submit, you still can support the work of IMCG by sponsoring us in this project or otherwise. For further details contact the IMCG secretariat at info@imcg.net or contact Michael Trepel (mtrepel@ecology.uni-kiel.de).

The carbon balance of windfarms on peatland

by John Couwenberg and Hans Joosten

One highly contentious issue in the peatland windfarm debate concerns the carbon balance. On the one hand carbon emissions are saved by offsetting fossil energy sources, on the other hand the carbon sequestration and storage function of (part of) the peatland is lost and carbon is released by building and maintaining the windfarm.

With respect to offsetting fossil fuels, calculations of CO_2 emission reduction have been made in comparison with emissions from coal generated electricity only (in the UK 0.86 t/MWh or ~3 t/GJ). Taking the current mix of energy (coal, gas, nuclear), however, emission reduction would amount to only half that amount (in the UK 0.43 t/MWh or ~1.5 t/GJ). Electricity generation using natural gas has relatively low emissions (0.3 t/MWh or ~1 t/GJ), but it is expensive and it is likely that wind generated electricity will rather replace this expensive electricity than the cheap coal generated type, which reduces the actual emission reductions.

It is sometimes argued that due to increased use of renewable energy the emissions of future electricity generation will be lower (ca 0.3 t/MWh or ~1 t/GJ) and that such a lower number should be used when calculating emission displacements over the life span of a windfarm. Wind energy itself is part of these renewable energies, however, and emission reduction must be placed against emission from fossil fuels, not against other renewable energy sources. Like other renewable energy, wind energy displaces emissions from non-renewable energy sources only.

Wind based electricity is only generated on windy days. On days without wind, a backup system is needed. Ideally such a system should consist of electricity generated with another renewable energy source, but this is rarely the case. For backup an electricity plant is needed that runs all year round, as such plants cannot simply be switched on and off with a change in the weather. Back up plants are running already at present in order to guarantee continued electricity in case of mishaps in the main electricity plants, but the fact that they still need to be run after switching to wind generated electricity means their emission should be taken into account. There are developments in terms of storing electricity in batteries and particularly also through so called pumped storage in which excess electricity is used to pump water to a high reservoir from where it is released to generate electricity in times of shortage (cf. the Braamhoek pump storage scheme near the Watervalvlei peatland, South Africa, see next IMCG Newsletter).

Building, maintenance and operation of the windfarm will also result in CO_2 emissions. These include emissions from steel and cement production and quarrying as well as from transport, erection, road building and maintenance. Such emissions are of course also involved with building, maintaining and operating conventional electricity plants, where particularly also procurement of the energy source needs to be taken into account. In the end a windfarm emits far less CO_2 per unit energy from construction, maintenance and operation than conventional plants.

Windfarm development on peatland will result in degradation of the peatland. This means that in the affected area of peatland, carbon sequestration will no longer take place and moreover, that carbon will be released from oxidising peat layers. The main question is how large the affected area will be. In an utter worst case scenario, construction could result in erosion and peat slides, affecting very large parts of the peatland and resulting in major releases of carbon from the peat store. The possibility of large scale erosion and peat slides certainly needs to be taken into account and avoided at all costs. Windfarm developers should better err on the side of caution as a peat slide will not only negatively affect the carbon balance of the windfarm, but certainly also public opinion.

Even if successful efforts are possible and put into avoiding large scale erosion and peat slides, building and maintaining a windfarm on peatland inevitably results in peatland degradation. Opinions vary on the extent of such degradation beyond the borders of the actual roads and platforms. The type of peatland plays a large role in this respect. On an acrotelm-mire (sensu Joosten & Clarke 2002), the effect of a single ditch may progressively extend into the entire peatland. In case of a surface flow mire (sensu Joosten & Clarke 2002), the effect will be much more limited.

Even if efforts are put into avoiding large scale erosion and peat slides, building and maintaining a windfarm on peatland inevitably results in peatland degradation. Opinions vary on the extent of such degradation beyond the borders of the actual roads and platforms. The type of peatland plays a large role in this respect. On an acrotelm-mire (sensu Joosten & Clarke 2002), the effect of a single ditch may progressively extend into the entire peatland. In case of a surface-flow mire (sensu Joosten & Clarke 2002), the effect will be much more limited.

An acrotelm-mire depends on its upper peat layer (the acrotelm in the hydrologic sense) as a regulation device that combines large storage with limited permeability. Because of high storage capacity of the upper peat layer, water losses result in limited water table drawdown. A distinct gradient in hydraulic conductivity results in reduced run off in case of such a drop in the water table. The functioning of the acrotelm depends on fresh peat being added to the top. Only very few Sphagnum species (worldwide 5 or 6 species!) have the right properties to produce such an acrotelm structure. Drainage will locally result in habitat loss of such species and consequently to the loss of the ability to (re)produce a functioning acrotelm As a result increasingly large parts of the mire will progressively dry out and peatland degradation will “eat” its way through the entire peatland. This will take time, however, as the water stored in up stream wetter parts of the mire will be able to counteract part of the drainage losses. There are plenty of examples of drained actotelm bogs that locally still contain good examples of peat forming bog vegetation after decades of marginal drainage. The effects of local drainage along roads and turbine platforms will likely remain limited during the life-span of a windfarm and much depends on restoration measures whether degradation and carbon losses will continue afterwards.

In surface-flow mires repeated water table drawdown has resulted in strongly decomposed peat with a small storage capacity, resulting in deep water table drawdown also in case of limited water losses. The water is forced to mainly flow over the surface, hence the name surface-flow mires. Surface flow mires can only endure in wet climates where the water level only rarely drops. Their overall low hydraulic conductivity means that surface-flow mires can occur on and with steep slopes. In surface-flow mires the effects of local drainage are limited to the immediate vicinity and are unlikely to spread far into the mire (otherwise these mires could not have such steep slopes). The majority of blanket bog habitat consists of surface-flow mires.

The ability to sequester carbon through peat formation will be lost in the affected area. Yearly accumulation rates of typical blanket bogs amount to less than 0.75 t $CO_2 \cdot ha^{-1} \cdot a^{-2}$. With respect to losses from peat degradation, calculations have been made where the entire volume of peat of the affected area is considered lost. This is an extreme worst case scenario and highly unlikely to occur in blanket bogs (apart from extreme erosion and peat slides) – certainly not over the life span of a windfarm and certainly not with appropriate restoration measures afterwards. The unlikely, extreme worst case scenario is often quoted to show that the carbon balance of windfarms on peatland may actually be negative compared to electricity generation using fossil fuels. Other calculations take 5% of the entire volume of peat. It would be more appropriate to use CO_2 emission values of drained blanket bogs, however. These are unlikely to surpass 5 t $CO_2 \cdot ha^{-1} \cdot a^{-1}$. Adding the high estimate of 0.75 t $CO_2 \cdot ha^{-1} \cdot a^{-1}$ associated with the lost ability to sequester carbon, we arrive at 5.75 t $CO_2 \cdot ha^{-1} \cdot a^{-1}$. Applying this 5.75 t $CO_2 \cdot ha^{-1} \cdot a^{-1}$, for example, to the entire Lewis peatland (28000 ha), we arrive at 161 Kt CO_2 emitted per year, which amounts to 3.2 Mt CO_2 over the 20 year life span of the windfarm. In these 20 years the windfarm would have offset 20 Mt CO_2 (using an offset of 0.43 t CO_2/MWh, a capacity factor of 0.4 and back up losses of 20%). CO_2 losses from peatland degradation would thus amount to 16% of the total CO_2 emission savings from offsetting fossil fuels.

Applying the already high estimate of 5.75 t $CO_2 \cdot ha^{-1} \cdot a^{-1}$ to the entire surface area of the Lewis peatland is dubious. If instead peatland degradation is taken to be limited to a zone surrounding the actual constructions of on average 50 m wide, this would amount to about 2000 ha, resulting in emissions of 11.5 Kt CO_2 per year or 230 Kt over the life span of the windfarm, which amounts to slightly more than 1% of the total CO_2 emission savings. Even when applying a high estimate of a 200 m wide zone of peatland degradation, carbon losses will not surpass 5% of the carbon savings.

There are plenty of reasons to be against windfarms on peatlands – the loss of wilderness and biodiversity, the loss of beauty and inaccessibility – but the carbon balance does not provide an additional argument. It should be stressed, however, that this only applies when large scale erosion and peat slides can be avoided. Whether this is the case and whether careful planning is enough to guarantee the stability of the entire bog is still unclear. Like with all developments it should be clear that pristine mires should be saved from destruction and put (or held) under protection.

Picking up bad vibrations?

Mycologist Prof. Dixie Dean has petitioned the Scottish Government to look into the impact on invertebrates and fungi of sub- and ultra-sonic vibrations transmitted directly through wind turbine support structures into the ground.

Possible damage to the natural environment caused by mechanical vibrations transmitted directly through turbine support structures into the surrounding terrain has never been researched.

Such vibrations may harm soil and peat fungi and impact invertebrate species, interfering with their abilities to feed and mate and affecting the food chains they are part of. Vibrations may in time destroy the very fabric of peat, leading to erosion and peat slides.

Many fungi and invertebrates species are vulnerable to small environmental changes and need large areas for relatively small but crucial populations to survive.

Windfarms and Peat : conflicts from a confluence of conditions

by Richard Lindsay

It is a great irony of our times that one of the major actions of society in responding to rising greenhouse gas emissions should fall so disproportionately on the richest of our long-term carbon stores, namely peatlands. It may be ironic, but it is hardly surprising. The environmental conditions that give rise to extensive peat deposits all along the Atlantic coastline of Europe are the very same conditions that the renewables industry seeks for optimal exploitation of 'onshore' wind energy.

The strong, energy-rich westerly winds of the Atlantic bring an almost continuous stream of moist air across the land-mass of this Atlantic seaboard – most notably across Britain, Ireland, Norway, north-west France and northern Spain. Where the land is gently-rolling rather than rugged, it tends to remain waterlogged all year round and thus lends itself to paludification whereby a cloak of peat comes to blanket much of the landscape. A more rugged landscape drains water more rapidly and thus where slopes exceed some 30°-40°, blanket-peat formation becomes much reduced. These rugged landscapes are also of little interest to the renewables industry, because access is so difficult, but the gently-rolling landscapes of Europe's blanket mires are a different story. Here the gentle slopes rising to high ground mean that access roads are relatively easy to construct while the broad high plateaux offer large expanses of ground combined with high wind speeds.

The consequence of the oceanic climate for this gentle terrain is that if wind-farm developments go ahead, they must often do so across continuous expanses of peat that may be 5 metres or more in thickness. Such peat deposits represent a considerable density of carbon – a density greater than any other ecosystem component in Western Europe – but one which is only retained as long as the peat remains waterlogged. How, then, do windfarms affect this natural waterlogging? Indeed *do* windfarms affect this waterlogging?

These are critical questions, and to a significant degree they still remain to be answered. This is in part because certain key aspects of windfarm construction are relatively new and un-tested. It is also, however, because various fundamental aspects of peatland hydrology have yet to be satisfactorily described and then translated into real-life conditions. In terms of the former constraint – novel, un-tested techniques – research and testing of such techniques requires peatland ecologists and engineers to work together over a considerable number of years if the long-term effects of these techniques are to be determined. The latter issue – gaps in our present knowledge and understanding of peatland ecohydrology – is more amenable to immediate research effort. Some valuable work has been and is being done in this area, but it is a case of too little, too late to provide answers for existing wind-farm developments or those already in the planning system.

Given this context and background, the majority of work concerned with assessing potential impacts of wind-farm developments has tended to be restricted almost entirely to the production of Environmental Impact Statements (EISs) by the developers, and then critical evaluations of these by environmental groups. Very little independent fundamental research work is currently being carried out into the specific issues of wind-farm development on peat. It is probable, though by no means certain, that such independent, fundamental research is regarded by most funding bodies as the natural constituency of the wind-farm industry. There appears to be plenty of government money available to fund reviews of existing information about various key aspects, but there is little independent funding for actual new research. The industry, meanwhile, is pouring its resources into production of EIS documents in support of development proposals. Furthermore, both proposal and associated EIS tend to be significantly influenced by time constraints imposed by the planning process and by investment backers. Consequently there is little opportunity to undertake useful amounts of fundamental research within the framework of an EIS.

Thus Olivia Bragg and I have spent the last three or four years focusing not, as we would have preferred, on fundamental research into the issues of wind-farm development, but instead on examining the information *coming from the wind-farm industry itself* in the form of EIS documents because this has been the nature of the requests that have come in to us. Olivia's article in this Newsletter Newsletter outlines a dramatic early case-study which raised a whole range of issues that have since come up again and again in the various windfarm proposals with which we have been involved. What I would like to do is consider some of the general issues that have emerged.

Environmental Impact Statements: single best-case scenarios

The Environmental Impact Statement is the key to the planning process for developments such as major windfarms, at least within the European Union. It is through the EIS document (or sometimes series of documents) that decision-makers and consultees are informed about the nature of the development and its potential impacts. Unfortunately most EISs are not very good. Indeed the EIS for the wind-farm development at Derrybrien (Co Galway, Ireland) was so poor that the Irish Government is now being taken to the European Court of Justice for granting planning consent on the basis of such an EIS. The main weakness in every EIS document that Olivia and I have examined has been the failure to set out alternative impact scenarios. Almost invariably the EIS adopts a single impact scenario – generally a best-case scenario generally favourable to the development – rather than acknowledging that there are other possibilities which are as, if not more, likely than the presented scenario. This is a serious failing because the EIS must be read and understood by a wide range of consultees, many of whom cannot be expected to have sufficient grasp of the peatland environment to recognise that alternative sets of impacts exist; they rely on the EIS to alert them to such possibilities. This responsibility has become all the greater with the adoption of the Århus Directive, which states that the public must be fully involved in major decision-making. Clearly the public cannot be fully involved if an EIA fails to ensure that the public is first fully informed.

Another major failing of most EIS documents, as already indicated above, is the tendency to describe and predict 'best-case' conditions. This clearly tends to present the development proposal in the best possible light, but again fails the Århus test because consultees need to know what may happen if best-case conditions do not prevail. While for much of its life a development may indeed enjoy such best-case conditions, significant impacts are most likely to occur during those occasions when conditions or circumstances become less than optimal that significant impacts are likely to occur. This is particularly so if the management system of the development is geared only to best-case circumstances, as apparently occurred in the case of the catastrophic Derrybrien bog-slide. It is extremely rare in an EIS to find an open and realistic exploration of less-than-ideal scenarios followed by discussion of the possible consequences and practical control measures needed under such circumstances. Often an EIS will provide only the most general of comments, such as, "Should liquid peat be displaced, measures will be put in place to contain this flow," but no practical details are then given as to how this might be achieved, even though such an occurrence may represent a potentially major impact.

Finally, there is the question of certainty. EIS documents are remarkably confident documents, reading as though almost everything is known, all can be predicted, and all possible eventualities have been catered for. The ultimate expression of this can be found in the EIS for Derrybrien, which concludes: "No impacts of an exceptionally severe nature (e.g. contamination of an aquifer, destruction of a unique habitat) are possible through the construction and operation of this project". Such *hubris* was severely punished three years later, when 2 kilometres of peat slid from the hillside during windfarm construction devastating a 20 kilometre stretch of an important river and lake system was. The lesson is that we do *not* know everything and currently cannot know everything – there are major areas of uncertainty in the fundamental science. The EIA Directive requires developers to acknowledge and explain areas of uncertainty. However, this is rarely done and thus the EIS fails yet another Århus test because consultees cannot be expected to know the limits to knowledge at the cutting edge of peatland research – the EIS must help them understand where such uncertainties lie.

These, then, are the basic failings of most wind-farm EIS documents. But what of the development itself? What are the possible impacts to the peatland environment?

A 'typical' wind-farm development proposal

In recent years it has come to feel as though there is an 'industry template' for wind-farm development on peat, because time and again the construction process follows the same basic pattern. It is thus quite easy to describe a 'typical' wind-farm development:

- turbines are spaced at intervals of at least 450 to 500 metres;
- turbines are now often more than 90 metres high with a total blade arc of more than 80 metres in diameter;
- turbine bases involve excavation to 'competent bedrock', then construction of a concrete foundation measuring at least 20 x 20 metres;
- next to each turbine there is a wide hard-standing area which must also be excavated and then backfilled with crushed rock, to be used by cranes and other heavy machinery for construction and maintenance;
- at least one service road connects with all turbines to provide access for construction and maintenance;
- if the peat is less than 0.5 metres deep, this service road will normally be constructed by excavating the peat and constructing on bedrock/competent sub-base;
- if the peat is more than 0.5 metres deep, the road will be constructed using a 'floating' technique whereby a geotextile is laid on the peat surface (possibly after stripping off the vegetation as 'turves' for use elsewhere), and then between 0.5 and 1.5 metres thickness of crushed rock, interleaved with several layers of geotextile, is loaded on top to make a running surface;
- it is usually stated that, because the road will 'float' on the peat surface, there will be no need for side-drains along the road verges, but amongst the finer details there is often reference to the need for side-drains;
- where there is a recognised need for a water crossing beneath the road, a sediment trap will prevent release of sediment into downstream water-courses;
- it is normally assumed that the roads will be left in place when the wind-farm is decommissioned (usually planning permission is requested for a wind-farm life of around 25 years).

The various aspects of construction raise a number of important issues for the peatland environment. These issues are explored in the remainder of this article. They can be grouped into issues to do with roads, issues to do with excavations for infrastructure, issues of slope stability, questions of water quality, impacts on the blanket-mire wildlife, and finally impacts on the blanket mire landscape.

Wind-farm roads

Although the most tangible evidence of a windfarm is the turbines themselves, rising 100 metres above the landscape, it can be argued that these are neither the most significant nor the most extensive impact of a windfarm development. The most extensive components of wind-farm infrastructure are almost invariably the construction and maintenance of service roads. These cut across the blanket mire landscape as a continuous network, in some cases extending for 100 kilometres or more. These road-lines must cross the peat somehow, and this is generally achieved either by excavating away the shallower peats, or by 'floating' them over the deeper peats.

Hydrological disruption by roads

Whichever option for drainage is used, the continuous road-lines represent marked disjunctions in at least the surface hydrology of the blanket mire. Whereas drain lines typically represent disjunctions of the surface hydrology over distances of several hundred metres, the continuous nature of road systems means that they can represent surface-water disjunctions that extend for several kilometres. This is not to say that any water must travel kilometres before it is able to circumvent the road. Cross-drains are generally provided at intervals along the road. However, the line of disruption runs for kilometres.

It is important to distinguish between disruption upslope from a road and disruption downslope. Upslope disruption will depend on whether a drain is installed alongside the upslope side of the road. If it is, then any upslope disruption is likely to be associated with drying, slumping, cracking and oxidative wastage of the peat along the drain margins, coupled potentially with development of erosion gullies upslope. How extensive any of these phenomena might be in any given circumstance cannot yet be determined and continues to be the subject of fundamental research. Furthermore, the extent and nature of the impact will vary according to the local condition of the peatland in the vicinity of the construction. Any road-side-drains are generally connected to occasional cross-drains that pass under the road at crossing points and feed the water away downslope in order to prevent ponding within the side-drain.

If, on the other hand, there is no road-side drain, water seeping from upslope regions exhibits a tendency to pond along the upslope side of the road. Although it might be argued that the road material is likely to be more porous than peat, with continued use this is unlikely to remain so because fine-ground material increasingly blocks voids in the rock-fill matrix. Such ponding is a concern for at least two reasons. Firstly, it represents water that would normally have carried on to feed areas of the landscape downslope from the road. Secondly, it has considerable significance for slope stability. The first of these issues is considered below, while the question of slope stability is discussed later in the present article. It is worth pointing out at this juncture that if the side-drains and cross-drains are not regularly maintained, they can become choked and they too then become sites of significant water ponding.

Downslope from the road, conditions are not particularly influenced by whether there is an upslope road-side drain or not. The over-riding effect downslope from the road will be drying of the bog surface. In effect, the presence of the road cuts off, to a greater or lesser extent, water that would normally seep continuously down the slope, each region feeding the area successively downslope from it. The road disrupts this pattern of flow, leaving the downslope regions short of water. Precisely how short of water is an issue that is still the subject of much fundamental research, but once again the potential extent and nature of such impacts is likely to vary along the length of the road, reflecting local conditions.

Whether or not there is an upslope side-drain, there will be occasional water crossings beneath the road to allow water to continue on its journey downslope. However, these cross-drains are generally distributed at intervals of 50 metres or more, and thus the outflow from such drains can only feed a relatively small part of the downslope bog surface. Indeed in many cases these cross-drains are fed directly into water-courses and so the formerly diffuse surface-seepage is converted into highly localised channel flow which contributes nothing to the water budget of the bog downslope.

Whether or not the outflow is fed downslope into a water channel, during periods of high rainfall the resulting outflow volumes are likely to be very much greater than those to which either the bog surface or the existing channel are adapted. The volume and power that can be generated during intense rainfall is quite remarkable. Consequently the outflow regions of the cross-drains tend to suffer from surface erosion as the bog surface or water channel are scoured by the highly-focused fluxes emerging form the outflow. Meanwhile adjacent areas of the downslope bog surface may be drying and even cracking as a result of reduced surface-water inputs. The extent to which deeper, sub-surface inputs through voids and peat pipes can overcome this surface-water deficit continues to be the subject of fundamental research and cannot yet be determined with any precision.

The distances over which such hydrological – and thus ecosystem – impacts may be felt have been cited in various documents as anything from 2.5 metres to 250 metres or more. The shorter distances have been based on short-term, limited studies at established windfarms, while the longer distances are based on evidence of extensive impacts such as erosion associated with established drains. In fact any single impact-distance applied to a whole development is meaningless because conditions on the ground vary so much even within a few tens of metres – dry erosion gullies may give way to wet, re-vegetating gullies, then to smooth wet blanket bog, which may then give way to pool systems. Predicted impact distances should reflect these changes in ground condition but they rarely, if ever, do so.

Excavated roads

Where the peat is excavated to create a road on competent sub-soil, it is obvious that the road completely severs the hydrological continuity of the peat mantle. The road in effect becomes a wide drain between 5 – 15 metres wide. More specifically, it becomes a drain that cuts right down to the mineral sub-soil, so the question of water movement through sub-surface voids and pipes does not arise in terms of water supplies to the downslope parts of the bog.

Such excavations often cut through peat pipes, which may be visible as dry holes in the sides of the cutting, or more usually appear on the upslope cutting as seeping outflows, or on some occasions can even be gushing fountains. Although figures are now emerging about the proportions of mire water budgets that are accounted for by such pipes, it is not yet at all clear what the implications of disrupting the pipe networks might be for the mire ecosystem as a whole.

For the blanket bog downslope of excavated roads there is in effect no water input from upslope, so the downslope bog is likely to become drier. The implications of this are likely to be many and varied, encompassing such factors as altered plant species assemblages, changing microtopography, changes to the engineering properties of the peat, and possible implications for slope stability. It is not yet possible to quantify such changes in any given locality with any degree of certainty.

Floating roads

These have become the engineering method-of-choice for wind-farm developers when faced with peat deposits of 0.5 metres or more. The remarkable thing about the approach is that there is almost no published scientific literature either to support this choice or to justify the claimed benefits of the construction method. Engineering literature exists in abundance for the difficulties of building on peat and the engineering solutions developed to overcome these. Considerable evidence even exists for the problems resulting from attempting to 'float' construction on peat. Published, peer-reviewed evidence for successful (i.e. successful in terms of both engineering and low ecological footprint) construction on peat using the 'floating' method is, in contrast, remarkably difficult to find. Indeed it is widely stated in the engineering literature that for stable construction on peat it is necessary either to build on piles that go through the peat to the sub-peat mineral, or that peat should be pre-loaded with materials to 'get the worst of the subsidence' out of the way before construction starts. However, this pre-loading does not prevent subsequent subsidence, it merely slows it down.

We have not yet seen a wind-farm EIS where the floating road technique is supported by published research from independent, peer-reviewed sources. Generally there is no attempt to provide any sort of supporting evidence other than, occasionally, brief anecdotal comments. It is tempting to suggest that this lack of supporting evidence in the EISs reflects an absence of such evidence in the published literature – a suggestion endorsed in discussions with engineering colleagues.

It seems that the method has been devised as a cheap alternative to pre-loading (expensive and time-consuming) and piling (very expensive and time-consuming), and a pragmatic response to the enormous engineering difficulties of excavating a road to mineral sub-base through peat thicknesses of 5 metres or more. That it might not work as envisaged, at least in the long term, does not even seem to have been considered as a possibility.

It does not take long to find ample peer-reviewed literature that points to the inevitability of a crushed-rock road carriageway sinking into any peat that it crosses. The rate of sinking certainly varies depending on the condition and depth of the peat prior to construction. Some parts may sink slowly and not so far into the peat within wind-farm timeframes, while other parts are likely (on the basis of published evidence and actual observation) to sink quite rapidly and considerably. Again, this will depend on the varying conditions found along the proposed road line. Such behaviour has important implications for potential environmental impacts but is rarely, if ever, addressed in EIS documents.

If parts of a wind-farm road sink markedly, the running surface is likely to become waterlogged and thus unusable for vehicles. As all roads must be maintained in a state where they are usable by heavy machinery at all times, such sinking means that fresh supplies of crushed rock must be brought in to raise the running surface back above the surface of the bog water-table. This then establishes a regime of positive feedback because an even greater weight has now been placed on the weak peat and so it compresses even more, leading to further subsidence. There are main carriageways in Britain where the thickness of road material is now in excess of 2 metres and yet the road surface continues to subside.

The need for continued addition of material to stretches of the running surface means that there will be continued need for quarrying, a continued need for heavy vehicle use, and a continued source of fresh road-surface disturbance potentially releasign sediment to associated watercourses. This is rarely, if ever, acknowledged in EIS documents – apparently because of the underlying assumption that 'floating roads' will indeed float – an assumption not yet borne out by the available evidence.

Any submerged road-fill material obviously also represents a substantial hydrological disjunction within the peat. Whether the material has higher or lower hydraulic conductivity than peat will depend on a great many things. What can be reasonably concluded is that the hydrological regime will not be the same as before, both in terms of surface and sub-surface flows. The environmental implications and impacts of this would be very difficult to predict and should be acknowledged as such, but we have found nothing to this effect in the EIS documents we have examined.

In fact the practical response to the sinking and consequent flooding of roads on some sites often has been to install major drainage works alongside some, if not all, of the wind-farm site roads. Thus one of the main advantages claimed for the floating road system – that drainage is not required – has proven to be based more on hope than experience. Clearly, if such a drainage system is required, then the environmental implications become much more extensive than otherwise envisaged. Issues such as peat drying, cracking, oxidative wastage and erosion of the peat – together with water management and sediment control – will all feature more prominently than before. That these implications are not generally explored in relation to road construction reflects both an undue reliance on the 'floating road' concept and a failure to consider alternative scenarios.

Slope stability issues

The events of October 2003 at Derrybrien (see elsewhere in this Newsletter) have brought into sharp focus the possible repercussions of wind-farm construction on peat. These possibilities are, it is safe to say, that these are much more extensive, catastrophic and far-reaching than probably anyone had previously imagined.

Whilst the consequences of this event have been largely social and ecological, its origins relate more directly to issues of engineering and slope stability. Indeed the engineering properties of peat are so singular that engineers must address a significant number of issues not generally encountered, or at least not encountered to such a degree, when undertaking construction activities on other forms of soil. These issues arise because peat often contains up to 98% water and only 2% solid matter by weight - about the same proportion as is found in a jellyfish.

Building on jelly is never going to be easy, but because peat is only formed and maintained because it is waterlogged, engineers must also allow for the fact that any peat which dries out as a result of construction will steadily oxidise and be lost either to the atmosphere as carbon dioxide, or as dissolved organic carbon (DOC) in water-courses. This means that the ground surface on which construction is being undertaken will steadily sink as the soil is lost to these two pathways – an issue already discussed above in relation to 'floating' roads.

Of more general concern to engineers when constructing on unconsolidated materials, however, is the question of slope stability – essentially the tendency of such unconsolidated materials to undergo 'mass movement' (i.e. landslides) when disturbed. Much guidance is available about this, and almost all of it concerns mass movement of mineral soils. Relatively few engineering studies have looked at the question of mass movement of peat. That there *is* mass movement of peat is amply demonstrated by peat-slides recorded from as far a-field as England, Scotland, Ireland, Switzerland, Germany, British Columbia, Australia and the Falkland Islands. Not only that, but the number of peat-slides recorded for the northern Pennines of England alone emphasises the relatively common nature of these events within peat-covered landscapes.

Two key factors influence the likelihood of such an event. Firstly, there are various conditions that predispose an area of peat to instability. These conditions include the presence in the peat of weak layers, zones of seepage-water collection and vertical cracks, as well as, physical – particularly linear – disruption of the surface layers. Secondly, there are factors that act as triggers to mass movement. These include sudden loads being placed on the surface, large volumes of water entering cracks and lubricating the peat-mineral interface, and the saturation of weak layers within the peat.

Clearly the process of wind-farm construction, with potentially-deep excavations of peat for turbine bases etc., disruption of the surface hydrology as a result of road construction, and the likelihood of drying and cracking where drainage is required, not only introduces a number of potential triggers, but also gives rise to various conditions that may pre-dispose the peat to mass movements.

Increasingly, those proposing developments on deep peat are being required by planning authoroties to undertake formal slope-stability assessments in order to demonstrate that mass movement is unlikely to occur. Such slope-stability assessments have been standard procedures for slopes where there is a possibility of mass movement, and the process is thus fairly well established for mineral soils. There are, however, three basic weaknesses in this approach when applied to peatlands.

Firstly, the standard method of measuring slope stability involves the calculation of 'Factors of Safety' (FoS) for locations across the site; a FoS of 1 or less is taken to be a slope that will fail. One of the key parameters in FoS calculations is the height of the water table in the soil – a high water table tending to reduce the FoS markedly. Unfortunately the calculation of FoS values in relation to peatland sites often uses unrealistically low water levels; such levels might be typical for a mineral soil, but do not correctly reflect the high water tables generally found in peat bogs. More realistic water-table depths tend to give rise, according to developers' own figures, to FoS values that are much closer to the widely-accepted threshold of 1.4, but this is rarely if ever explored or discussed within EIS documents.

The second key weakness in the estimation of slope stability is that methods currently used to obtain data on soil properties for use in FoS calculations are regarded by a number of leading engineers as being unsuited for peat soils. Indeed engineering colleagues at my own university, as well as others at University

College, Dublin, are currently investigating more appropriate ways of measuring the physical properties of peat because current methods provide such poor results. Consequently where slope-stability analyses for wind-farm developments have been carried out, they are inevitably based on values that, like the assumed position of the water table mentioned above, do not reflect reality on the ground. Finally, these slope-stability models assume that the peat soil, and thus the calculated FoS values, will remain unchanged throughout the life of the road system. The road life may, in effect, be indefinite and almost certainly extends beyond the life of the wind-farm. Whereas for a mineral soil it may be largely true that the nature of the soil will remain constant over time, for a peatland system it is certainly untrue – the characteristics of the soil itself will be changed by the presence of the wind-farm infrastructure, both in the short term and in the longer term. Unfortunately, it is almost impossible, for any particular location, to say just what these changes might be. Consequently, the predicted long-term impacts rarely, if ever, address this important issue.

Sediment loading, habitat loss and wildlife impacts

These, then, are some of the issues that have arisen time and again from reviews of EIS documents associated with proposed wind-farm developments. Other factors which are undoubtedly of considerable importance are sediment loads in freshwater systems, loss of habitat, and of course the possible disruption to bird life in the area. Each of these has the potential to further increase the environmental footprint of the wind-farm development substantially.

In general, windfarms introduce a fairly constant level of background sediment loading, but with the possibility of superposed major impacts occurring as essentially sporadic events linked to construction activity, slope instability ranging and weather events. Whereas measures to deal with background loading and general construction impacts are usually described in EIS documents, violent sporadic events are poorly catered for in most cases. A single such event every few years can have more impact than all the other sources of sediment loading combined – as demonstrated by the Derrybrien incident.

Loss of the peatland habitat that will vanish beneath the proposed infrastructure is an obvious impact. However, it is often argued that the habitat lost in this way is of low quality and thus that the impact is equally low. Of course this argument depends on how the habitat is assessed, and against which quality criteria. Many EIS documents convey a possibly unconscious desire to demonstrate, or at least to emphasise, the presence of poorer-quality features at the expense of high-quality ones. This is perhaps most evident in the interpretation of official definitions for ‘active blanket bog’ – indeed sometimes there are even attempts to re-define the term itself, despite the fact that the established definitions have been agreed at EU level.

The issue of bird impact obviously relates partly to loss of suitable habitat, but the more high-profile question is that of bird deaths due to collisions with moving turbine blades. A great deal has been written about this already, and as it relates more directly to bird behaviour than to peatland ecology, the issue will not be explored further here, other than to observe that large raptors appear to be at particular risk. As these generally have low breeding rates and can take several years to reach breeding age, reports of high mortality rates – for example for sea eagles in Norway – are obvious causes for concern.

Mire landscapes

Though not strictly an ecological issue, there is no doubt that the blanket mire landscapes of Atlantic Europe represent some of the ‘wildest’ remnants of Europe’s present landscapes. They act as a counterpoint to the highly regulated landscapes that dominate almost all of lowland Europe, and attract many seeking a ‘wilderness’ experience. Those who live and work in blanket mire regions observe that these peat-dominated expanses are actually working landscapes, and they are quite correct in the sense that sheep grazing, and sporting management for deer or grouse, represent the major land use for these areas. However, the fact remains that they have existed in much the same form for anything between 2,500 years and 8,000 years, and they are perceived as wilderness. While it is certainly true that some experience great pleasure in the sight of wind turbines, it is also true that the establishment of large industrial structures across Europe’s open blanket mire landscapes utterly transforms the landscape character. Whether this is a negative or positive thing depends on your point of view, but the dramatic nature of the change is indisputable...

Conclusions

As a rule wind-farm proposals now legally require that they be supported by an Environmental Impact Statement. Although the scale and scope of such EIS documents various enormously, from the ludicrously brief to the scale of a *magnum opus*, it is a rather depressing and worrying fact that we have yet to see a wind-farm EIS that accurately reflects what we believe to be the true nature of key issues. In particular, we have yet to be shown published, independent, peer-reviewed evidence for the long-term impacts of the major construction activity now associated with wind-farm development – namely floating roads. The science – both engineering and eco-hydrological – supporting this major new approach to road construction on peat appears to be almost completely absent. The proponents of this construction method are almost exclusively wind-farm developers, and no-one seems to question whether their assurances of suitability and success are based on any real evidence. Is it just me, or is there a sense of the Emperor’s new clothes here...?

At this point they came in sight of thirty forty windmills that there are on plain, and as soon as Don Quixote saw them he said to his squire, “Fortune is arranging matters for us better than we could have shaped our desires ourselves, for look there, friend Sancho Panza, where thirty or more monstrous giants present themselves, all of whom I mean to engage in battle and slay, and with whose spoils we shall begin to make our fortunes; for this is righteous warfare, and it is God's good service to sweep so evil a breed from off the face of the earth.”

Illustration by Gustav Doré

“What giants?” said Sancho Panza.

“Those thou seest there,” answered his master, “with the long arms, and some have them nearly two leagues long.”

“Look, your worship,” said Sancho; “what we see there are not giants but windmills, and what seem to be their arms are the sails that turned by the wind make the millstone go.”

“It is easy to see,” replied Don Quixote, “that thou art not used to this business of adventures; those are giants; and if thou art afraid, away with thee out of this and betake thyself to prayer while I engage them in fierce and unequal combat.”

So saying, he gave the spur to his steed Rocinante, heedless of the cries his squire Sancho sent after him, warning him that most certainly they were windmills and not giants he was going to attack. He, however, was so positive they were giants that he neither heard the cries of Sancho, nor perceived, near as he was, what they were, but made at them shouting, “Fly not, cowards and vile beings, for a single knight attacks you.”

A slight breeze at this moment sprang up, and the great sails began to move, seeing which Don Quixote exclaimed, “Though ye flourish more arms than the giant Briareus, ye have to reckon with me.”

So saying, and commending himself with all his heart to his lady Dulcinea, imploring her to support him in such a peril, with lance in rest and covered by his buckler, he charged at Rocinante’s fullest gallop and fell upon the first mill that stood in front of him; but as he drove his lance-point into the sail the wind whirled it round with such force that it shivered the lance to pieces, sweeping with it horse and rider, who went rolling over on the plain, in a sorry condition. Sancho hastened to his assistance as fast as his ass could go, and when he came up found him unable to move, with such a shock had Rocinante fallen with him.

“God bless me!” said Sancho, “did I not tell your worship to mind what you were about, for they were only windmills? and no one could have made any mistake about it but one who had something of the same kind in his head.”

We are fighting windmills, not monstrous giants. We should not lose our mind over our love for mires, but remain honest and factual in our arguments and clear-headed in our disputes.

Windfarm development on peatlands at Serras Septentrionais of Galicia (NW Spain)

by X. Pontevedra Pombal, Juan Carlos Nóvoa-Muñoz, Antonio Martínez Cortizas, Ana Mª García Arrese,Cármen Nieto Olano, Felipe Macías Vázquez and Eduardo García-Rodeja

Galicia is the part of the Iberian Peninsula with the widest distribution and variety of mires, and the southern limit of European blanket bog (Pontevedra-Pombal et al. 2003). Within Galicia, the Serras Septentrionais (Serra do Xistral, Montes do Buio and Macizo da Toxiza) have the highest concentration and the best examples of these mire ecosystems.

In 1998 there were no windfarms in the area. Now, 10 years later, there are 23 (about 680 turbines, 580 MW in total, representing 25% of the Galician Wind Plan). Despite efforts to protect the mire ecosystems within the EU Natura 2000 network and part of the Biosphere Reserve 'Terras do Miño', the huge expansion of windfarms has affected all types of mires in a variety of geomorphological locations. A summary of the history of the windfarm development in the Serras Septentrionais of Galicia follows.

1. The use of wind energy in Galicia

Wind has been used as a secondary source of energy in Galicia since the XVI century, when several windmills were documented. There is evidence of about 100 traditional windmills, used mainly for grain milling, from that time up to the first half of the XX century (Bas & Varela, 1999).

Interest in using wind to generate electricity was stimulated by the petroleum crisis of 1973. In Spain, after some experimental windfarms, the first that was connected to the electrical network was installed in the Ampurdán (Cataluña) in 1984 (five 24kW turbines). The first windfarms in Galicia were installed on the coast, in the Estaca de Bares (twelve 360kW turbines in 1986) and in Cabo Vilano (22 turbines installed between 1989 and 1992, with unit power between 100 and 1200 kW). Studies began in 1990 to plan and define the wind potential of Galicia, which was finally established to be some 5500 MW. Following this preliminary work the autonomous government approved the Galician Wind Plan in 1997 and a modified version in 2001. This plan envisaged the installation of 2800 MW in 1997-2007. At present, Galicia hosts more than 22% of Spain's total installed capacity at 2603 MW (01 January 2007), with planned increases to 3400 MW by 2010 and 6500 MW by 2012.

In 1995 the Government of Galicia adopted a decree whose aim was to regulate the use of wind energy, including a procedure for the authorization of facilities smaller than 100MW. The authorization of these facilities required, among other things, the presentation of a windfarm project statement and an Environmental Impact Assessment (EIA).

According to the decree, responsibility for the authorization of windfarms below 25 MW fell to the Government of Galicia, whereas the Government of Spain must authorize projects above this power. Due, among other reasons, to greater flexibility of formalities, the rule resulted in the fragmentation of windfarm macroprojects, the same company presenting several adjacent projects, each for less than 25 MW capacity. EIA studies had to be performed for each individual project and, consequently, evaluation of the cumulative environmental impact of the whole installation was impeded. Although the legislation was amended in 1997, the promoters continued presenting projects of less than 25 MW or increased the power of previous projects (to 50MW) by increasing the power of the turbines.

Windfarm at Soán and aerial view of the area occupied by Nordés and Soán Windfarms

At the end of 1997, GESTENGA (Galician Energy Efficiency Agency) asked the Department of Pedology and Agricultural Chemistry of the University of Santiago de Compostela to provide an EIA for the installation and operation of the windfarm ‘Xistral’ promoted by the energy company ENDESA-MADE. The Department stressed the need to study in detail the environmental characteristics of the area, a single biogeographical area (presence of relevant wetlands, vegetation, fauna, geomorphology, soils, etc.), that had been proposed to be subject to different degrees of environmental protection. In parallel, the society INEUROPA EÓLICA OF XISTRAL, S.A. had obtained authorization for the construction of three windfarms (Nordés, Soán and Cadramón) in an area of 3138 ha in the Serra do Xistral. In these circumstances, and given the existence of other similar projects in the area, it was decided to address the Environment Secretariat of the Galician Government, noting: i) that the windfarms proposed in the Serras Septentrionais could irreversibly affect various mountain peatland and wetland formations, ii) the need to assess the exploitation of the wind potential of the Serra do Xistral as a whole rather than for each project or promoter individually, and iii) the presence of unique peatland ecosystems in the area which represent the southern limit of distribution at European level. Subsequently, a preliminary study was proposed with the objective of finding ways to manage and use natural resources without prejudice to environmental quality.

The proposal was supported by GESTENGA, the Department of Industry of the Government of Galicia and by the Association of Promoters of Wind Energy in Galicia (APEGA), so several teams of the Department of Pedology and Agricultural Chemistry of the University of Santiago de Compostela were charged with the task of delimiting the most important surface formations in the areas affected by the construction of windfarms, with the following objectives:

(a) to assess the environmental characteristics (geological, geomorphological, pedological, etc.) prior to the construction of windfarms;

(b) to assemble detailed cartographic information on formations of particular ecological, scenic, scientific, etc. value, paying special attention to peatlands and soils;

(c) to carry out a detailed survey in the areas to be developed as windfarms in order to evaluate the various alternatives for implementation;

(d) to implement hydrological studies to control the quality of waters affected by windfarms; and

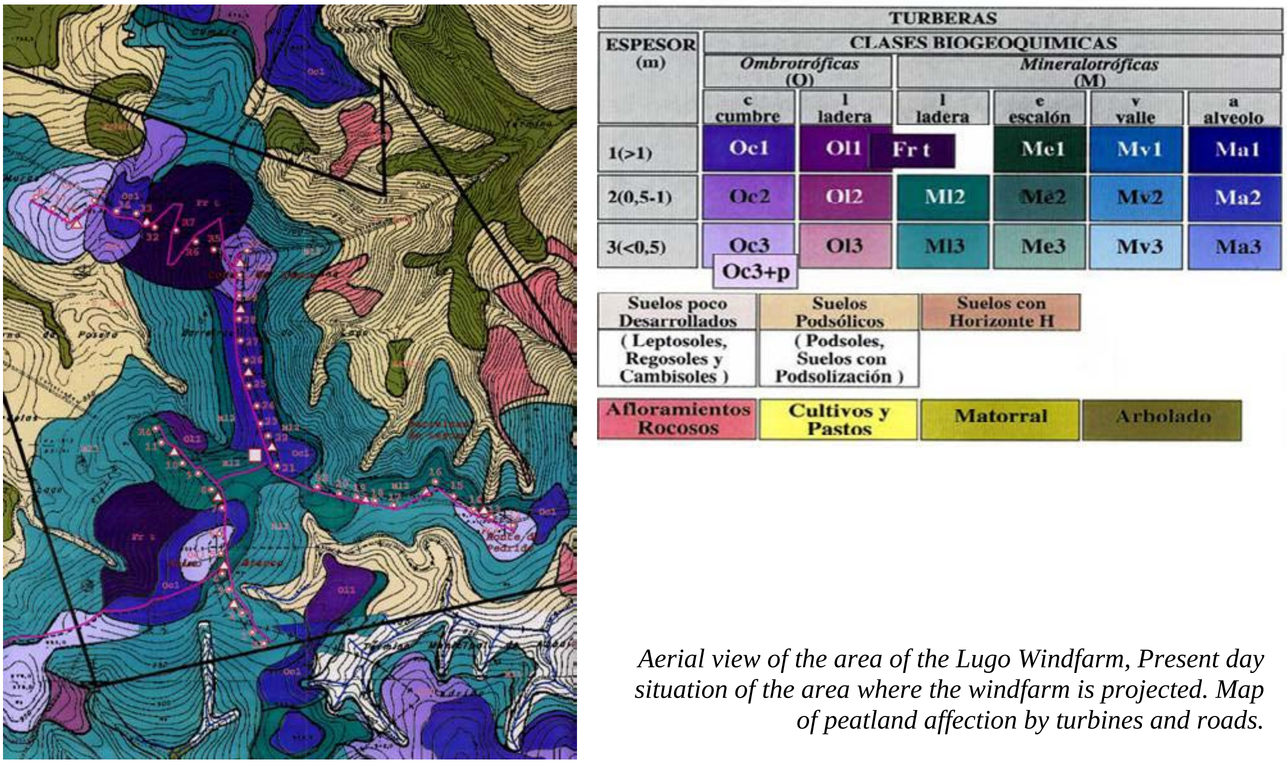
(e) to monitor and advise during the construction of the windfarms.

The first tasks were performed between 1998 and 2000. The results of this work were reported individually for each windfarm project, the reports being entitled ‘Study of soil formations affected by the windfarm <NAME> with particular attention to the peatland areas’. These reports were then included in the EIA documents.

2. Methods

The study for each windfarm project was completed in three stages. First, all existing information on the physical environment (climate, geology, geomorphology, soils and vegetation) was assembled. A first map of the study area incorporating this information was then prepared. This was based on published maps at scales 1:50,000 – 1:10,000) and aerial photography (1:18,000) and included the locations of all of the proposed infrastructure. The resulting map was then populated with information obtained during fieldwork, including a detailed delimitation and characterization of peatland and peat depth classes obtained by systematic sounding. This information was presented at 1:10,000 scale. Mires were first classified on the basis of their biogeochemical conditions (ombrotrophic or minerotrophic), their topographic position (summit, slope, valley, weathering alveolus, morphological step) and thickness (>1 m, 0.5 – 1 m, < 0.5 m). The map legend is shown in the figure below. Land use was also included to enable consideration of the impact on vegetation, especially on deciduous forests and heathland. Finally, in the areas directly occupied by windfarm infrastructure, detailed mapping (1:2,000 scale) was conducted for a zone about 50 metres wide around all planned infrastructure.

The results of these studies were used to prepare proposals to minimise the environmental effects of each windfarm. Current cartographic information on the various natural systems in the general area and on the areas directly affected was used to help define ‘prohibited’, ‘permitted with restrictions’ and ‘not limited’ areas. By taking account of environmental considerations and constraints during the early stages of project design, it was possible to save time and money, during both the project design phase and the subsequent phases of impact assessment and implementation of mitigation measures that are part of an EIA study. The administration took the report and the EIA study into account, along with other information documents, in assessing the environmental impact to reaching a final decision on each windfarm.



Aerial view of the area of the Lugo Windfarm, Present day situation of the area where the windfarm is projected. Map of peatland affection by turbines and roads.

3. Windfarm development at Serras Septentrionais

In Serras Septentrionais, 25 windfarm projects were studied, involving more than 800 turbines with a capacity of 600 MW in an area of some 20,000 ha. The projects were submitted by 4 promoters (one with 13 projects, another with 12, and two with 5). Most of the individual projects did not exceed 25 MW, although one was approaching 50 MW. The number of turbines per project ranged from 16 to 75, and these would be aligned along one or, more frequently, several watersheds. The turbines would be between 31 and 55 m high, with rotor diameter between 30 and 62 m and power between 330 and 1300 kW. These would be set on square platforms of 13 to 17 m wide and concrete bases of variable depth depending on the nature of substrate. Other associated infrastructure included the access roads (4.5 to 6 m wide, 3 to 10 km long) and their flanking ditches (0.2-1.0 m wide), the electrical cable trenches (0.4-2.0 m wide, 0.8-1.25 m deep), transformers, and in many cases a control building. In total, more than 180 km of access roads and 200 km of trenches were planned; these would directly occupy 200 ha of ground and would affect an area of slightly more than 10,000 ha (see table below).

Following detailed studies, and also considering the wind potential of the area, the windfarm projects were analysed as follows:

a) In previously approved windfarms where construction had begun, this had already induced alteration of the peatlands (Cuadramón, Soán and Nordés). The procedure consisted of complementary studies to implement re-thinking of civil engineering practice, at the beginning of the work and during its

execution. The studies were mainly designed to minimise the impacts on peatland through:
- limitation and control of cuts and incisions in peatlands;
- control of the depth of excavation;
- avoiding soil loss by water erosion and preventing modification of hydric soil conditions;
- prevention of landscape change resulting from the destruction of unique landforms and the creation of artificial landscape features;
- restoration of the vegetation in affected areas; and
- preventing changes in mire dynamics that may affect their persistence and stability as well as the associated flora and fauna.

Table: Summary of the Windfarm projects at Serras Septentrionais (Galicia, NW Spain).

		Surface (ha)	Number of turbines	Transformation Centers	Turbine rows	Roads (m)	borrow pits (m)	Electric Substation	Power MW
Nordés	Alabe	804,0	36	4	6	8.090	8.564	X	20,25
Soán	Alabe	1.072,0	36	4	4	4.950	4.950	X	19,5
Ampl Soán	Alabe	1.262,0	39	5	3	6.290	6.318	X	18,75
Cadramón	Alabe	473,0	33	6	4	8.600	12.293	X	22,5
Ventoada	Alabe	475,0	36	5	5	8.666	12.064	X	22,5
Lomba	Alabe	475,0	32	5	4	12.700	13.024	X	21
Refachón	Alabe	986,0	21	3	2	4.754	5.670	X	15,75
Leste	Alabe	444,0	28	4	8	6.733	7.530	X	21
Mareiro	Alabe	889,0	37	5	3	9.549	10.040	X	27,75
Terral	Alabe	682,0	45	4	3	8.635	11.930	X	21
Monte Mayor N	Alabe	585,0	24	3	3	4.724	6.190	X	12,75
Monte Mayor S	Alabe	998,0	30	3	3	3.681	6.635	X	22,5
Labrada	Alabe	473,0	29	5	4	5.575	10.675	X	21,75
Montouto	Norvento	1.243,0	49	0	7	9.150	9.150	X	32,34
Coruxeiras	Norvento	1.937,0	75	0	10	18.739	14.196	X	49,5
Gamoide	Eurovento	1.497,0	37	0	6	8.226	10.875		48,1
Buio	Eurovento	2.425,0	25	0	5	2.808	9.538	X	37,7
Rioboo	Eurovento	1.085,0	16	0	3	4.264	10.322		20,8
Pena Luisa	MADE	671,0	33	0	1	5.000	5.000	X	21,78
Pedra Chantada	MADE	358,0	37	0	2	9.000	13.000		21,78
Leboreiro	MADE	406,0	42	0	5	8.000	5.000	X	21,12
Silán	MADE	119,0	20	0	3	5.000	9.000		13,2
Pena Grande	MADE	146,0	37	0	4	4.000	4.500	X	24,42
Lugo (Xistral)	MADE	637,0	37	0	5	7.500	5.000		24,42
Escoiras	MADE	650,0	26	0	5	6.045	6.045	X	17,16
TOTAL		**20.792,0**	**860**	**56**	**108**	**180.679**	**217.509**	**20**	**599,3**

These actions resulted in the elimination of seven turbines to reduce impacts in peatland areas, changes in the routing of several roads, installation of a system for runoff water treatment in a control building, the construction of tracks by compaction to avoid incision in the mires, and changing the location of one electrical substation.

b) In the windfarms that had not yet obtained approval, the first step consisted of the proposal of preventive environmental measures such as:
- definition of a minimum area of energy exploitation;
- preservation of points of geological interest;
- preservation of peatland areas;
- preservation of formations of vegetation of natural interest and priority;
- limitation of areas of occupation;
- setting the routes of roads and ditches;
- removal of wind platforms for installation of turbines;
- relocation and resizing of the turbine bases;
- installation of wires buried under or at least following the tracks; and
- minimizing the number of electrical substations

These measures prevented the construction of two windfarms, namely Lugo (37 turbines) and Leboreiro (42 turbines). A third, Escoirás (26 turbines), was not built due to its proximity to a feldspar mining area. They also prompted the removal of turbines from several windfarms, the elimination and/or alternative routing of tracks, the removal of platforms and the relocation of the lines of electrical cable trenches.

Besides the above-mentioned changes in the windfarm projects, the following preventive environmental measures were proposed:
- construction of tracks by compaction and/or use of geo-textile materials;

– control of areas of blasting and excavation;
– training on environmental matters during civil engineering work;
– measures to store and preserve soil materials during the civil engineering work, with the obligation to restore slopes and incisions immediately;
– preservation and redistribution of hydrological pathways and the use of techniques to slow down drainage; and
– restoration of the original vegetation.

Finally, in certain cases, environmental compensation measures were proposed, such as:
– re-vegetation with species of local heaths; and
– participation in public outreach programmes and activities like the 'Sotavento' Demonstration Windfarm which incorporated 'peat' and 'heath' classrooms.

4. Final remarks

The wind potential of the main peatland area of the Iberian Peninsula meant that it was subject to high pressure from the development of 25 windfarm projects. The proposals that were made in order to preserve the integrity of peatland ecosystems contributed to a small reduction in the number of windfarms and their dimensions and, more importantly, to the prevention of windfarm development on the blanket bog core of the Serra do Xistral. In addition, the recommendations and corrective actions proposed served to reduce, to a greater or lesser extent, the impacts arising from the installation of windfarms on peatland.

On the other hand, apart from the social and environmental benefits of wind energy, the installation of windfarms provided economic returns to the owners of land that was otherwise virtually unproductive. In addition, the realization of the studies described here much improved our knowledge and understanding of the peatland ecosystems in the area.

However, many peatland areas of great ecological, scenic and scientific value have been directly or indirectly affected by the construction of windfarms. The situation is aggravated by the potential negative impacts associated with the improved access to these relatively remote ecosystems, in that they have already become subject to anthropogenic pressure (attempts at reforestation, transformation into grassland and pastures through burning, fertilization or liming, overgrazing, etc.).

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Fighting windmills on peatlands: a reconnaissance in the swamp of conflicts, values, and uncertainties

by Hans Joosten

Energy is a key issue in the fight against climate change. Besides a reduction in energy consumption a shift is needed towards other, renewable sources of energy. Wind energy is such a renewable energy and like biofuels, wind energy in principle is well received by environmentalists, including mire conservationists. But similar to biofuels (see IMCG newsletter 2007-3), support for wind energy cannot be unconditional as it may interfere with important mire and peatland values. With its conflicting effects, the issue of windfarms on peatlands thus requires a wise use approach of integrated decision-making. To make sound decisions, incompatible values have to be identified, conflicting claims have to be balanced, and norms have to be established for assigning priority to one over the other.

In this paper I try to analyse some of the issues raised in relation to windfarms on peatlands; I will address different types of conflicts and discuss a general but central issue in the debate: how to deal with uncertainty and risks?

Types of conflicts

Proponents of windfarms on peatlands have their arguments to support their case; of course the opponents also have their arguments. The two sets of arguments will be conflicting or at least seem to be conflicting. It is helpful to look at the conflicts involved, because some types of conflicts can easily be solved whereas others can not be solved at all, but only be mitigated (Joosten & Clarke 2002).

Firstly it should be clear whether a particular conflict deals with “**facts**” (that are “true” or “not true”) or with “**choices**” (that you “support” or “oppose”) (Table 1).

Table 1: Types of conflicts in the “windfarm on peatland” debate

	Conflict type	Examples
Conflicts dealing with facts	**Different understanding** of terms and concepts	* disagreement on what is a "blanket bog" or what is an "acrotelm" * disagreement on what is "sustainable" or "long-term"
	Different judgements as to "means – ends" and "cause – effect" relationships	* disagreement on whether a site type is peat forming or degrading * disagreement on how far the hydrologic influence of a ditch will reach * disagreement on how much peat will oxidize in the next 25 years
Conflicts dealing with choices	**Different preferences** as between different instrumental values	* different aesthetic opinions on whether windmills are beautiful or ugly * preference for a "wild nature" experience versus preference for ample available energy
	Attaching **different precedences** to present-day instrumental or intrinsic values	* favouring wind energy for climate change mitigation , "but not in my backyard" * favouring national biodiversity conservation over global climate change mitigation
	Different priorities with respect to instrumental or intrinsic values	* favouring smaller emission reductions now over larger reductions in 25 years
	Different positions with respect to which entities have intrinsic moral value	* not accepting the death of any bird specimen (animal protection) versus not accepting that of only a threatened species (nature conservation) * not accepting infringement of the life of plants and animals (biocentrism) versus accepting it for the benefit of humankind (anthropocentrism)

Conflicts arising from **different understanding** deal with miscommunication; persons use the same term, for example “sustainable”, but with a different meaning – one understanding it in the sense of “strong sustainability”, the other in the sense of “weak sustainability”, a third just in the sense of “something good”. Such conflicts are simple to solve by effective communication, i.e. by clearly explaining what you mean when you use a word. What do you mean when you say “blanket bog”, what are the characteristics, the features that distinguish it from other types of bogs and peatlands? This does not imply that you have to agree on whether the use of a particular word is “correct” or not; people do not have to *agree* on the definition to understand the concept the other is using. The “blanket bog” concept of – say – Richard Lindsay may be completely different from that of – say – Tom Dargie. But when I know what is meant with a “blanket bog sensu Lindsay”, I can sensibly discuss it. It might then

become apparent that a specific feature or process or impact is relevant for a "blanket bog sensu Lindsay" but not for a "blanket bog sensu Dargie". Lindsay's "acrotelm" concept may, for example, apply to his "blanket bog" but not to Dargie's "blanket bog" (leaving aside the realistic possibility that also their "acrotelm" concepts are fundamentally different…).
Effective communication is reliant on both "sender" and "receiver": both sides must *want to understand* what the other is saying. Then it often becomes clear that there is no real conflict, but merely misunderstanding and talking at cross-purposes. "Oh, if you consider it *that* way, I can agree…".

Of course *understanding* what somebody means does not imply that you *agree* with what he is saying.

The second conflict type arises from **different judgements**. One person may judge a plant community rare and threatened; another person may deem it abundant and safe. One person may think that a ditch will lower the water level in a bog over an extent of at most 10 m; the other may think that the impact will be at least 250 m. Also such conflicts can be solved factually. First you have to ensure that you are dealing with the same situation: are you talking about the same plant community and are you talking about the same mire type, the same slope, the same ditch characteristics, etc. Then you can test what is "rue" by simply mapping occurrence of the plant community and trends in its occurrence over several years. And you can simply dig the ditch and watch what happens.
In practice, however, we want to know beforehand what is going to happen, because if the effects will be too severe, we would oppose the intervention. So in case of the ditch we need a prognosis. A consensus (including levels of uncertainty) can be reached on "technical" questions like
– how rare is a specific species or community
– under which vegetation type is peat being formed
– how far will the hydrologic influence of a drain extent
– how much peat will oxidize
– how many birds will be killed

when
– all parties really want to know the best possible (= "most true" = least untrue) answer,
– terms are clearly defined,
– the boundaries of the system under consideration are clearly defined, in space (local, regional, national, global), in time (during construction, during operation of the plant, 100 years after the plant has been abandoned, infinitely) and in functionality (do the sheep on the bog belong to the system under consideration, is the coal powered back-up plant included in the windfarm concept?); different system boundaries will generally lead to different statements,
– the level of generalisation is clearly defined (does it apply to all blanket bogs, to the whole peatland in average, to every single spot within a concrete peatland…), and
– all information on the subject is exchanged.

In such open discourse a common base of knowledge is created that enables to formulate the "state-of-the-art" answer to the question including all its uncertainties. That answer may later turn out to have been wrong, because "state-of-the-art" knowledge is never complete, but that is inherent to every decision. It necessitates, however, rules on how to deal with uncertainties (see below).

Besides these conflicts dealing with facts, there is a second group of conflicts that deals with "choices". These conflicts are much less easy to solve.
Conflicts between preferences relate to balancing what one party gains against what the other loses. *Preferences* pertain to things that can be replaced by something else, in other words things that can be exchanged for a set of alternatives, which can often be expressed in terms of money.
In the absence of other premises, no preference can be considered better or worse than other preferences. Somebody who thinks that windmills are aesthetically ugly is morally no better person than somebody who thinks they are beautiful. In weighing preferences, premises like distributional justice and the distinction between needs (essentials) and wants (luxuries) give rise to the following considerations:

1. All means of meeting *wants* should be distributed equally unless an unequal distribution is to the advantage of the least favoured. This implies that the desires of poor people may be weighted heavier than those of the rich.
2. Preferences more related to *needs* (i.e. things that are more essential) prevail over those more related to *wants*. This implies that the provision of more basic commodities (comfortable warmth, good employment) might be weighted heavier than the provision of luxuries (a solarium, high income). It makes a difference whether you provide the first watt of electricity to a person or you provide the 1001st watt.

With respect to windfarms on peatlands, arguments in favour as well as those against are usually far from based on needs and more related to wants. Yet in some areas wind generated electricity may play an important role in poverty alleviation and in the provision of employment with all social benefits it entails.

In contrast to conflicts between preferences, conflicts dealing with different precedences can not be solved by balancing pros and cons. **Conflicts dealing with precedences** involve conflicts between "me" and "you", "those here" and "them there", and "some few" and "those many" with respect to the fundamental individual rights on subsistence, liberty, and autonomy. The Not In My Back-Yard (NIMBY) phenomenon is a clear example of such conflict. It involves, for example, people who advocate wind energy, but do not want their own view disturbed by windmills. Usually people will conceal NIMBY motives behind “objective facts” or “values” that “incidently” would prohibit erecting wind mills in “their” peatland. Such problems cannot really be solved, because people have an innate drive to give more weight to their own interests than to those of others. Yet in doing so, they should still respect the rights of others. In the Wise Use Guidelines (Joosten & Clarke 2002) we have presented a set of principles and priority rules that may help in resolving conflicts between the rights of different persons or different groups.

Conflicts dealing with priorities relate to sustainability and deal with intergenerational justice, i.e. a balance between the wellbeing of present-day and future generations. Because of their future implications they involve discounting – translating future values into present-day values. Any solution of these conflicts must consider that the importance attached to some things may change with time.

If we damage a peatland today by building a windfarm, how do we approach restoration of the peatland after the lifetime of the windfarm? Do we have to make our decisions on our current knowledge, or can we be confident that in 25 years peatland restoration techniques have developed so that restoration will be much easier? Will an area of blanket bog be much more valuable in 50 years than it is today because there will be so much less blanket bog 50 years from now?

It is essential for any sensible resource planning to develop sound expectations as to what will become easier in the future and what will not, what will become more valuable and what will not, what will become more important and what will not.

In the Wise Use Guidelines we have identified those peatland related resources and services that are *essential* to human life and reproduction, and that are prudently expected to be *non-substitutable* within any reasonable human timeframe;.these resources and services include:

– the maintenance of general problem-solving capacities (incl. conservation of global biodiversity),
– global climate regulation (e.g. carbon storage),
– food production capacity (e.g. preventing soil erosion),
– drinking water availability (e.g. filtration/preventing pollution),
– habitable land (e.g. providing buffer to floods),
– good health conditions (e.g. preventing spread of diseases),
– autonomy to live according to one’s own moral position (e.g. respect for nature).

Conflicts arising from different moral positions concern which entities (other than human beings) have intrinsic moral value and to which moral obligations exist. Some people may think that blanket bogs and the organisms that depend on them have an indefeasible right to autonomic existence, whereas others may think that they are only there for the benefit of people. The acknowledgement of a right to subsistence, freedom, and autonomy of non-human entities – independent of their contribution to the fulfilment of human needs and wants – leads to competing moral claims when the interests of human beings and non-human entities clash.

Conflicts with respect to intrinsic value cannot be solved through compromise, as they deal with the fundamentals of people’s value systems. They can only be mitigated by acknowledging and respecting the other’s position - so long as the positions do not fundamentally clash.

Dealing with uncertainties and risks

> *“If you knew everything beforehand, becoming rich would be no fun.”*
>
> My mother

Scientific uncertainty lies at the heart of much of the controversy in the windfarm debate. Richard Lindsay has repeatedly requested more fundamental research. The uncertainties he has cited concern different aspects related to the “precautionary principle” (cf. Rio Principle 15):

– What level of scientific certainty is needed to make a decision?
– What are the risks of serious or irreversible damage associated with windfarm construction and operation?
– What is the proper balance between the risks of the intervention and the cost of maintaining the status quo?

> *“Principle 15: In order to protect the environment, the precautionary approach shall be widely applied by States according to their capabilities. Where there are threats of serious or irreversible damage, lack of full scientific certainty shall not be used as a reason for postponing cost-effective measures to prevent environmental damage.”*
>
> *The Rio Declaration on Environment and Development (Rio de Janeiro, 13 June 1992)*

With respect to the third point, there are costs associated with every decision we take. When we preserve a peatland and forbid its use as a windfarm, the decision is generally made on the basis of values other than market prices, yet the decision *will* result in a different price of energy that people have to pay.

Our society has to limit the emission of carbon dioxide to the atmosphere. This means that, next to energy saving, the best (in terms of practicability) and cleanest ‘energy source’ has to be produced. If equally good and clean but cheaper alternatives are available, the establishment of a windfarm on peatland should be forbidden, just for being economically stupid. No further assessments of risk and damage would be necessary in such a case. To be able to judge this, a proposal for windfarm establishment should always make the absence of

reasonable alternatives evident: the best way to apply precaution is to consider multiple alternatives early in the planning of a project. Of course there are differences in interests and options between individual companies and society at large, but 'society' has to give permission, so it is 'societal interests' that ultimately have to decide.
Let us assume that building a windfarm on peatland is the cheapest option, then if this is forbidden – say for conservation reasons – this would mean that energy production will be more expensive. We do not have to know the implied price difference in advance, but it is still interesting to know what prices are implied by our choices: what monetary sacrifice do we attach to our conservation? Or, the other way around, for how much monetary gain are we willing to sacrifice a conservation area? The prices we pay may be higher or lower than we would have guessed, and can serve as a cross-check on the reasonableness and consistency of political and societal decisions.
An important element of the precautionary principle is that its most meaningful applications pertain to those impacts that are potentially irreversible. Some peatland values (including the carbon store of the peat, the palaeoecological and cultural archive value, natural phenomena that need a long development time like macro- and micropatterns and several rare species, human valuation) definitely belong to that category.
Reduced to its essentials, precaution is an attitude toward risk: an inclination to accept costs today in order to avoid or mitigate future dangers in situations in which the scientific evidence for these dangers is uncertain.
In any particular situation, proponents and opponents of a precautionary approach may actually agree on the type and magnitude of the possible danger (e.g. a major landslide), but disagree on the uncertainty with which it may happen. Alternatively, they may agree on both the danger and the uncertainty, but have different attitudes towards risk and hence disagree on what should be done to avoid or mitigate that danger. The debate should thus clearly distinguish among:

1) uncertainty with respect to our knowledge about the danger – do we know enough about the processes involved?,
2) the degree of certainty that the danger will come to pass: if we know enough about the processes we can determine the chance that it will happen (this type of uncertainty is completely different from the first one)
3) the risks that we are prepared to take (or its complement: the costs that want to accept) to avert or mitigate this (un)certain danger (*cf.* Weiss 2006).

In the discussion, advocates and opponents of precautionary action should make these different uncertainties as precise as possible. They may then discover that substantial agreement exists on both the science and its associated uncertainty, which enables then to focus the discussion on differing attitudes to acceptance of costs and risks.
In the case of windfarms on blanket bogs it seems there are still major uncertainties about the effect the building and drainage may have on the stability of the peat. The probability of a peat slide may be substantial and its effects may be far reaching.

One last remark with respect to risks: conservation sites are declared because real threats from the 'normal' world exists. If such threats would not exist, a protection regime would be senseless. This means that conservation areas have the character of 'sanctuaries', areas that are sacred and should be protected from normal economic development. Normal economic considerations do not apply and you have to have an extremely good reason to desecrate such areas. If not, you will ultimately loose everything you have…

References

Joosten, H. & Clarke, D. 2002. Wise use of mires and peatlands – Background and principles including a framework for decision-making. International Mire Conservation Group / International Peat Society, 304 p.
Weiss, C. 2006. Can there be science-based precaution? Environ. Res. Lett. **1** doi:10.1088/1748-9326/1/1/014003

Windfarms on Peatland: A Symposium

27–30 April 2008 Santiago de Compostela, Galicia, Spain

Block I of IMCG's 2007–2010 Action Plan focuses on the implications for peatlands of energy-related issues. These include fuel peat policy, cultivation of biomass energy crops on peatlands and infrastructure affecting peatlands in relation to wind- and hydropower and the exploitation of oil and gas reserves.
This Windfarms on Peatland symposium will focus on the intersection of European policy for windfarm development with peatland interests. In line with the UNFCC/Kyoto agenda, it looks as though the European Union will require its members collectively to derive 20% of energy requirements from renewable sources by 2020. Onshore wind power generation is currently regarded as the most viable technology, and already windfarms seem to be appearing everywhere. In oceanic countries, many of the preferred sites are on peatland. It has even been suggested that windfarms compete with peatland for gently sloping upland locations, where the wind resource is most favourable.
The environmental impact studies that are carried out for these windfarm proposals usually predict rather small effects on the peatland habitat. Nevertheless, the engineering work (peat removal, drainage, road construction, blasting) required to install a windfarm

resembles operations that have in the past been associated with the degradation of peatlands, reduction of their biodiversity and loss of their ability to deliver other goods and services. On the other hand, some of the peatlands targeted already are substantially degraded, and opportunities for their restoration are flagged as potential secondary benefits from windfarm development. This symposium will provide a forum for scientists, policy-makers and practitioners dealing with these matters to exchange insights and experience; and to begin working towards a common understanding of the issues, the formulation of principles for "wise/best practice" and the identification of research needs and priorities.

Sesion 1. Peatland windfarms: how much, how many?
- The drivers: policy and economics
- Present and projected extent of windfarm development on peatland

Sesion 2. Effects on peatland structure and function
- Effects of turbine bases, borrow pits and miscellaneous infrastructure
- Road construction methods, effects of roads
- Hydrological effects
- Peat stability and erosion
- Secondary effects (Collateral and induced activities)
- Carbon issues

Sesion 3. Effects on biodiversity, landscape, heritage and people,
- Biodiversity issues
- Effects on landscape
- Archaeological considerations
- Social aspects

Sesion 4. From EIA/ES to peatland wise use
- What is special about peatlands in this context?
- EIA/ES requirements for peatland windfarms
- How should industrial development on peatland be monitored?
- What can we learn from mistakes?
- How do the principles of peatland wise use apply?
- Case studies demonstrating positive and negative outcomes for peatlands
- What are the 'win-win' scenarios?

We await your further suggestions!

Call for papers and posters
The deadline for submission of abstracts for oral presentations and posters is 20 December 2007. Abstracts should be sent electronically to the Organizing Committee (edcone@usc.es). Please provide title and summary (guideline 500 words) as a MS Word document in 11 pt. type; you may include Figures and Tables but your whole submission must fit on one A4 page with 2.5 cm margins. The Committee reserves the right to select oral presentations from the titles submitted; see the Symposium web site for more details. It is the intention that full versions of all presentations will be made available to participants for use during the Symposium, and subsequently considered for publication in the peer-reviewed journal Mires and Peat. Therefore, full versions of all oral and poster contributions should be prepared in journal format before the Symposium (deadline February 29, 2008). There will be an opportunity for authors to amend their manuscripts in the light of the experiences of the Symposium before the peer review process begins. For further information about the journal and instructions for authors see www.mires-and-peat.net

Participation fees

	Registration		
	before 15/02/08	after 15/02/08	On-site
IMCG Member	€ 350	€ 400	€ 430
Non Member	€ 400	€ 450	€ 480
Student*	€ 250	€ 300	€ 330
Accompanying person	€ 200	€ 220	€ 230

*Student status must be confirmed by a letter from the academic supervisor

Symposium venue
Scientific Sessions will take place at the Istituto de Cerámica of the University of Santiago de Compostela (USC), located at the south campus, close to the faculty of Biology

Registration
Register on: http://wfps.environmentalchange.net/

Accomodation and travel information
There is a wide range of accomodation options in the centre of Santiago. Delegates must choose and book their own accommodation (visit the web site for more information).
Santiago de Compostela International Airport, 12 km from the town centre, is served by several airlines including low-cost companies (e.g. Ryanair, Vueling, Easyjet, Air Berlin) and by connections to the main international airports at Madrid and Barcelona. Other nearby airports are at A Coruña (60 km) and Vigo (75 km), and Porto (Portugal) is within ca. 2.5 hours by car.

Preliminary Programme
Sunday 27 April
16:00-20:00 hrs – Registration
21:00 hrs – Reception and and dinner

Monday 28 April
08:00 hrs – Full-day excursion to windfarms on blanket bogs in O Xistral and Buio mountains.

Tuesday 29 April
09:00 hrs – Opening session, scientific and poster sessions.

Wednesday 30 April
09:00 hrs – Scientific sessions, synthesis and conclusion,
21:00 h – Closing dinner

Post-symposium excursion
Thursday 01 May
08:00 hrs: departure from Santiago towards O Xistral, Cuadramón and Buio mountains; full-day excursion visiting mires, dinner and overnight stay at Lugo.

Friday 02 May
08:00 hrs: departure from Lugo towards Os Ancares mountains; full-day excursion visiting mires, returning to Santiago in the evening.
The post-symposium excursion can be booked using the registration form at € 150 per person. The price includes travel, meals (lunches 01 and 02 May, dinner 01 May, breakfast 02 May) and overnight accommodation in Lugo.

Additional Information
The official language of the symposium will be English. All abstracts and presentations must be submitted in English.
The registration fee for delegates includes the field excursion (28 April), admission to sessions, symposium documentation, receptions and all meals (except breakfast) from dinner on Sunday 27 April up to and including the symposium dinner on 30 April, and refreshments (coffee/tea) on Congress days. Please note that places on the field excursion cannot be guaranteed for registrations received after 15/03/08.
Registration fee for accompanying persons includes the field excursion (April 28), receptions and all meals (except breakfast) from dinner on Sunday 27 April up to and including dinner on 30 April (Symposium dinner), plus a programme of guided visits to Santiago de Compostela and the University.

Organizing Committee
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Rhynchosporion

In the framework of a contract with the Nature unit of European Commission, we are currently working on management guidelines at European level for habitat 7150 of Habitat Directive: Depressions on peat substrate of the Rhynchosporion. Consequently we are looking for experiences of management practices and restoration projects on the pioneer communities of the Rhynchosporion coming from different European Union member states.
This work is part of a bigger one named “Management Models for Nature 2000 sites”. Management Models for Natura 2000 sites is a project launched by the European Commission in January 2007. It aims to elaborate management models for habitat types included in annex I of the Habitat Directive (92/43/EEC) that need active recurring management. These models will be published in the EUROPA website by March 2008.
Management models represent a useful tool for the conservation management of the Natura 2000 sites. These models shall contain detailed descriptions of the techniques and means to apply, in order to help site managers prepare site-specific management plans with reference to targeted habitat types and species, as well as in the practical realization "in the field", taking local constraints into account in a variety of similar Natura 2000 areas.
The best available information will be used for the elaboration of the management models, taking into account previous experience and best practice developed in different countries, results of management activities implemented in conservation projects and management guidelines produced at national and regional level.
This project looks at the habitat type across its natural range, i.e. across many different countries and in the context of a biogeographical region to highlight the similarities and differences in management options.
To conclude, if you have information about active management of Rhynchosporion communities or documents in English, French, German, Spanish or Italian, please contact us
mathilde.stallegger@ecosphere.fr .

Mathilde Stallegger

Sneaky peat: Finland's deceptive peat policies.

by Hans Joosten

It must have been in the late 1960s when the Dutch State Forestry Service decided to close parts of the present day National Park Groote Peel to safeguard the sensitive bird population against too much public attention. The new rule was published widely and prohibition signs explaining the new policy were erected on all entrances to the bog.

On all entrances?

The Groote Peel was a large and wild area with a complex system of paths, dating from medieval times. Of course some of these obscure paths had been overlooked.

And of course, we found fun in entering the Groote Peel to naughtily explain the guard that we were no trespassers, because there had been no sign on the route we had taken. A ‘sport’ indeed, similar to young ‘hackers’ who uncover vulnerable spots in computer systems.

It lasted some weeks until all backdoor trails were known and the Groote Peel could become what we all thought it had to be: quiet and protective. A useful action thus, not to be equalled to looking for loopholes for terrorist action or for unjust and irresponsible financial gain.

The latter is exactly what the Finnish peat industry is trying to do. Deliberately out of desperation or out of sheer stupidity she tries to convince the world that burning peat is less harmful to our climate than burning coal, lignite, oil or gas.

It is an established fact that per unit of produced energy the CO_2 emission of peat combustion is higher than that of other fossil fuels. This is largely determined by its chemical properties that – without substantial energy losses – cannot be altered.

The solution that our Finnish friends have found is to ‘widen the scope’: to take the so-called ‘pre-use’ and ‘after-use’ of peat extraction fields into consideration. They present this as a ‘life-cycle-analysis’.

Life-cycle-analysis (LCA) is the assessment of the environmental impact of a product or service throughout its lifespan. The goal of LCA is to compare the environmental performance of products and services, to be able to choose the least burdensome one. A LCA implies the assessment of the whole life cycle of the product including raw material production, processing, distribution, use and disposal as well as all intervening transportation steps. The big question is: where does ‘life’ begin and where does it end?

Let’s take a look at the so-called ‘pre-use’ of peat extraction fields. Some peatlands emit much greenhouse gases, some less. Worst of all are peatlands that are drained and used as arable land. Some smart persons, let’s call them ‘scientists’, looked at what happens with the greenhouse gas balance when you burn peat that is extracted from such areas that anyhow continuously loose peat. They calculated that this combination leads to a smaller emission of greenhouse gases than when you leave the heavily emitting agricultural peatland alone and burn peat that is extracted from pristine peatland. Flawless mathematics, indeed, but there is a fundamental mistake in the assumptions.

The flaw starts with the name: ‘pre-use’. The offsetting of greenhouse gas emissions (the ‘swap’ from cropland peat oxidation to peat combustion) has – of course – nothing to do with the ‘pre-use’ of the peatland in question. What the peatland emitted before peat extraction is not relevant for the peat combustion emission values, because emissions from pre-combustion times have already happened and adding or subtracting these emissions to or from the peat that is burned afterwards is nonsense.

Although the claimed offset refers to the ‘pre-use’, actually it draws on an assumed ‘future use’ of the peatland. And here the real trick lies.

If you arithmetically reduce the greenhouse gas emissions from peat combustion with the emissions that the agricultural peatland would emit if you would not extract peat there, you make an illegitimate claim with respect to the future of that agricultural peatland site. You suppose that that agricultural peatland would continue to be what it is now: a heavily greenhouse gas emitting area…

Our world suffers from too much CO_2 entering the atmosphere. The global and European communities have already intervened, starting with the easiest objects – centralized power plants fuelled by fossils fuels – and the most obvious options: making CO_2 emissions from fossil fuels more expensive. It is exactly to evade these costs that the peat fuel lobby tries to find loopholes in the climate regulations.

The loophole found is that the European Union and the Kyoto Protocol have not yet efficiently nailed down emissions from drained peatland soils. Farmers on drained peatland do not have to pay a fine of – say – € 800 per hectare per year for the up to 40 tonnes of CO_2(eq) their land use emits from oxidizing peat. This crooked situation will not persist, because it is common knowledge by now, that – in the words of UN Under-Secretary General Achim Steiner this week in Bali – “protecting and restoring peatlands is … among the most cost-effective options for climate change mitigation.” The assumed continuation of the present situation, implied by the Finnish ‘pre-use’ concept, can and will not persist. It may still take a few years, but the world will not continue to accept uncontrolled emissions from drained peatlands that amount to 10 % of global anthropogenic greenhouse gas emissions.

Other countries already have acknowledged this fact for years and have implemented ambitious rewetting projects to decrease greenhouse gas emissions from drained peatland.

Not so Finland: instead of acting against these hitherto unsettled emissions, Finland plans to abuse an obvious loophole in climate policy to arithmetically (and only arithmetically!) extenuate the emissions from one of the most CO_2 dirty fuels: peat.

And what about the ‘after-use’, the other component of LCA, the plans and promises to use the cut-over peatlands for forestry or for reed cultivation?

Indeed such biomass may help to reduce the use of fossil resources and could – under the right conditions, see our previous IMCG-newsletter – be beneficial for the climate. But what has 300 years of reed cultivation on a cutover peatland (if you could ever guarantee that) to do with the emission value of burning peat today? Why not compensate your present-day emissions with present-day biofuel production? Or even better: why not stop peat combustion completely and solely rely on the ‘after-use’ option of renewable energy?

Every day I see the ruins of the old Greifswald beer brewery next to our Botanical Institute. It was still in operation when I came to Greifswald, but was soon closed as a result of shady business in the first years after the reunification of Germany. Meanwhile a nice pioneer forest has developed on the place where 10 or 15 years ago beer crates were stored.

Ever heard of a Life Cycle Analysis of beer that includes the forest that grows on the premises 100 years after closure of the brewery? No? …Exactly!

For peat’s sake, Finland, stop swindling and cheating and just treat peat for what it is: a fuel with a somewhat higher emission than other fossil fuels.

http://en.wikipedia.org/wiki/Sneaky_Pete_Kleinow

Assessment on Peatlands, Biodiversity and Climate Change

Results from the first comprehensive global assessment on the links between peatland degradation and climate change were presented at the UNFCCC Conference in Bali on 11 December. The Assessment on Peatlands, Biodiversity and Climate Change was initiated by the UNEP-GEF supported project on Integrated Management of Peatlands for Biodiversity and Climate Change in which IMCG was represented in the steering committee.

The global Assessment on Peatlands, Biodiversity and Climate Change was prepared through a review of scientific information on the nature and value of peatlands in relation to biodiversity and climate change, the impact of human activities and potential sustainable management options. The assessment addresses issues raised at multiple international conventions (CBD, Ramsar, UNFCCC, UNCCD). The Executive Summary was officially launched at the UNFCCC CoP in Bali on December 11, 2007. In July CBD SBSTTA had already decided to endorse the Assessment.

Besides a chapter on the character of peatlands, there are chapters on peatlands and people, peatlands and past climate change, peatlands and biodiversity, peatlands and carbon, peatlands and greenhouse gases, impacts of future climate change on peatlands and finally a chapter on management of peatlands for biodiversity and climate change.

The assessment shows that clearance, drainage and fires in peatlands emit more than 3 billion tones of carbon dioxide every year, equivalent to 10% of global emissions from fossil fuels. Protection and restoration of peatlands are among the most cost-effective options for climate change mitigation.

The United Nations Environment Programme (UNEP) and the Convention on Biological Diversity (CBD) together with the Global Environment Centre (GEC) and Wetlands International called for the international community to take urgent action on to protect and restore peatlands.

The assessment was presented by Achim Steiner, UN Under-Secretary General and Executive Director UN Environment Programme (UNEP), Ahmed Djoghlaf, Executive Secretary of the Convention on Biodiversity (CBD), Marcel Silvius, Programme Manager of Wetlands International and our Main Board member Faizal Parish - Director of the Global Environment Centre.

PDF versions of the assessment chapters are available from the GEC website www.gecnet.info. The Executive Summary Summary and the chapters can also be found on the IMCG website www.imcg.net

“Just like a global phase out of old, energy guzzling light bulbs or a switch to hybrid cars, protecting and restoring peatlands is perhaps another key ‘low hanging fruit’ and among the most cost- effective options for climate change mitigation.”

Achim Steiner, UN Under-Secretary General and Executive Director UN Environment Programme (UNEP), Bali, December 11, 2007.

Georgia 2008

by Hans Joosten

As agreed during our General Assembly meeting in Finland last year, in September 2007 a try-out excursion was made by a group of students from Greifswald University as a preparation for the IMCG events in Georgia in 2008 (27August – 11 September, see the preliminary route and schedule in IMCG Newsletter 2006/4).

The trip fell exactly in a time of rapid changes in governmental structures, which complicated the organisation considerably. But the proverbial hospitality and creativity of the Georgians and the immense network and organisational talents of Izo and her team effectively solved all practical problems. The try-out gave us a better idea what to expect and the organisational team a better insight what can be improved for the 2008 IMCG excursion.

Because of the large economic problems and the suboptimal infrastructure, the excursion in Georgia may be somewhat more adventurous than most IMCG field symposia. It are bad roads that lead to the beautiful mires of the Lesser Caucasus and the most scenic places to stay may not have abundant facilities. But these small nuisances are more than compensated by the impressive landscapes of mires, forests, and mountains with their enormous biodiversity and beauty (including valleys with their own endemic plant species!).

And most importantly: Georgia is looking forward to IMCG! As we experienced on many places the visit of our international network is eagerly awaited. Managers hope for guidance and support to optimally deal with peatland associated problems. Scientists look forward to international cooperation and exchange. Conservationists need our international support in preventing that more of the unique nature is sacrificed for short-sighted economic gain. IMCG may really make a difference and, if the beautiful nature was not sufficient, only this is reason enough to go.

My most impressive experience this trip was meeting the old white-haired woman – when Izo and I one evening returned from inspecting experimental *Sphagnum* cultivation plots around Ispani 2. Since cow grazing was excluded last year, the margins of Ispani 2, the first percolation bog in the world, have recovered spectacularly and luxurious *Sphagnum* is driving back the dominance of *Juncus effuses* and the invasive *Polygonum thunbergii*. Cow exclusion is still disputed, because local people rely on cow milk for subsistence. I recognized the woman from a meeting we had had in Kobuleti some years ago, where we had discussed the damage cows were doing to this unique mire. Now the woman took our hands, called Izo "princess", and thanked us for helping conserving mires in that area. "Because", so she said "without nature we cannot survive…".

The congress programme:

1. Pre-congress Field trip: 27 Aug. - 8 Sept. 2008. Themes: Vegetation zonation and high altitude mires of the Lesser Caucasus, mires and relict forests of the Kolkheti lowlands (including the huge Imnati percolation bog), vegetation zonation and high altitude mires of the Javakheti-Plateau. Mire conservation, utilization, restoration and *Sphagnum* paludiculture; mire development history, vegetation, flora and ecohydrology; percolation bogs, Caucasus biogeography, endemic plant species, Georgian culture. Assessment of the mire conservation status in Georgia. 8 September: visit to Ispani 2: the type locality of the unique Kolkheti *Sphagnum* percolation bogs.
2. Symposium (scientific presentations): 9 - 10 Sept. Theme: Conservation, biodiversity, and restoration of mires; Venue: Kobuleti, Adjara, SW Georgia
3. IMCG General Assembly: 11 September 2008; Venue Kobuleti, Adjara, SW Georgia

Sedge percolation mire on the Javakheti-Plateau

Cost:

Costs of the Total Package: Euro 800 (includes all transport within Georgia, meals and accommodation, programme and excursion and symposium materials)

Costs of single parts:

Only Field trip: Euro 700.

Only Symposium: Euro 200 (excursion to Ispani 2 on 8 September and IMCG General Assembly 11 September included in the price)

Only IMCG General Assembly: No cost, but you must arrange own accommodation, meals, and transport

A special rate applies for participants from countries with currency problems. Please contact the organisers for more details.

Please pre-register as soon as possible
joosten@uni-greifswald.de and tchaobi@yahoo.com
Additional information and registration form in near future on http://www.imcg.net

Peat and peatlands conference Lamoura 2007

by Greta Gaudig

From 8 to 11 October 2007, the Fédération des Conservatoires d' Espaces Naturels and the French Mire Resource Centre organised – in collaboration with the university of Franche-Comté, the Groupe d'Étude des Tourbières, the Comité Français des Tourbières, the French section of the International Peat Society and the International Mire Conservation Group – a conference about the future of peat use in horticulture, its alternatives and the rehabilitation of mires after peat extraction. About 100 people of different interest groups participated in the bilingual conference in Lamoura (French Jura). More than 2/3 of the 37 presentations illustrated experiences of worldwide peatland rehabilitation projects after extraction. Some examples were discussed on site during the mid-conference excursion in the Swiss and French Jura.

The second focus was on future peat use in horticulture: the advantages of peat, the characteristics and possibilities of alternatives such as bark, coir fibre, compost, perlite, mineral wood, or *Sphagnum* biomass, as well as the progress in UK's target of 90% peat replacement by 2010 were presented as basis for discussions in various workshops. Peat has the best quality for professional growing media. Its replacement by alternatives is at the moment only possible to a limited extent. There are different opinions if, to what extent and when *Sphagnum* biomass – produced by *Sphagnum* farming – could be the solution: future will show…

More than half of the growing media are consumed by hobby gardeners. Better awareness and promotion of alternatives to peat substrates could save peat resources in this branch. The UK's partnership demonstrates the practicability.

Autumn peatland in the Regional Natural Park of Upper Jura (France)

Mutual understanding is necessary for solving problems. The conference has certainly contributed to the dialogue between different "peat interest groups". And it has illustrated that a focus on one specific topic (or actually two related ones: what to do with cutover bogs and what are the alternatives to peat?) can be more effective than to discuss all peatland related problems at once.

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Many interesting abstracts, presentations and papers can be found here:
http://www.pole-tourbieres.org/Actes_Colloque.htm

Second International Field Symposium Khanty – Mansiysk (Russia)

by Pascal DeMazière

Between 24 August and 2 September 2007 the Second International Field Symposium "West Siberian peatlands and Carbon Cycle: past and present" took place in Khanty – Mansiysk (West Siberia). The topics were the biodiversity and carbon cycle of peatlands in West Siberia.

There were two field excursions; one before and one after the Symposium. The first excursion lasted three days and started with a cruise on the river Irtych and then on the river Ob. Both rivers are splendid and particularly the Ob is very impressive with its 5440 km length and width that reaches 2 km in places. At the end of the first day we reached the nature reserve "Elizarovskiy zakaznik", where, in the best Russian tradition, we had a very good diner... On the following day we visited many different wetlands and peatlands in the 25 km wide floodplain of the river Ob. The highest water level is reached in June and this year it was very high like it happens every ten years on average. The river is surrounded by thousands of ponds, lakes, former river-beds, wetlands and mires. Elena Lapshina gave a lot of scientific explanations about the different types of peatlands. Many upland island bogs are pine – dwarf shrubs – *Sphagnum* bogs, which are called "ryam". The vascular plants we saw are the same we saw last year in Finland during the IMCG field symposium, but in addition we also saw a few Siberian plants such as the Siberian Pine (*Pinus sibirica*). The birdwatchers among us spotted some couples of whitetail eagle. On the third day we went back to Khanty – Mansiysk visiting a few more wetlands and peatlands and a small museum with a big collection of stuffed birds and mammals on the way. The trees along the river had their trunks partially submerged in water, giving the impression of a Russian mangrove.

The second excursion lasted four days including two travel days to the Natural Park "Kondinskie lakes". During the trip we had plenty of time to look at the huge forests on both sides of the road. For hundreds of kilometres we could admire the Russian taiga that is covered with pines (*Pinus sylvestris*, *Pinus sibirica*), larches (*Larix sibirica*), birches (B*etula pendula*, *Betula pubescens*) and, around the lakes, willows (*Salix alba, Salix pentandra, Salix triandra, Salix viminalis* etc.) and poplars (*Populus tremula*). When we reached the Natural Park the staff welcomed us warmly with an excellent diner. We were put in wooden houses with a banya (Russian sauna) nearby. The park features the beautiful lakes “Arantur”, “Pontur” and “Rangetur”. They reminded me of the Finnish lakes we saw last year, but they were much bigger and surrounded by fantastic peatlands. No wooden paths in these huge mires and we obviously had to wear waders. Walking for hours with water reaching up to your knees was not that easy. We felt a little bit like the first explorers of a new world, we saw some quite rare plants such as *Hammarbya paludosa*, a small orchid and *Juncus stygius*, a tiny rush.

Yugra is an autonomous district of 500.000 sqkm and a population of 1.5 mln, mainly concentrated in the cities (90%). The district has been producing oil since the 1950s and is currently responsible for 58% of Russian oil production. We visited an oil refinery that belongs to Lukoil, which is the largest private Oil Company in Russia. There was no visible degradation of the landscape around this very modern plant, but of course there are pipelines and roads crossing the wetlands and mires. We also visited a drilling platform, where pollution was more visible. Oil had not been reached yet and the extracted mud and sand is left on the site, although it is regularly cleared. The Natural Park “Kondinskie lakes” counts 49 000 hectares and 14 drilling platforms like the one we visited with 112 functioning boreholes.

Between the two main excursions there of course was the symposium in Khanty – Mansiysk with 80 participants from 12 different countries. There were more than 80 presentations and posters within the 2 days of the symposium. The main topics were palaeoecology, biodiversity, carbon accumulation, carbon gas fluxes and restoration techniques in peatlands polluted by oil. This symposium was a great success; the presentations, the discussions and the excursions were very interesting and everything was very well organized by Elena Lapshina and her team.

The proceedings of the meeting are available from Elena Lapshina (e_lapshina@ugrasu.ru).

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New IMCG flyer

We have produced a new version of the IMCG flyer. You can download a PDF version from the IMCG webpage: http://www.imcg.net/docum/flyer.pdf. Printed copies can be obtained from the Secretariat. Please send us a note if you want flyers for distribution.

Regional News

News from the EU
LIFE +

LIFE+ is a small but important fund in Europe. LIFE+ does not replace the LIFE programme, but it brings together all former funding lines from the European Commission Directorate for the Environment (e.g. Forest Focus, NGO core grant etc). It will be implemented from 2007 – 2013. There are three pillars in LIFE+:

1. LIFE+ Nature and Biodiversity
2. LIFE+ Environment and Governance
3. LIFE+ Information and Communication

LIFE+ Nature and Biodiversity

As in the former LIFE-Nature programme, funds will be available for implementing the Birds and Habitats Directives objectives – and especially for work on Natura 2000 sites (Note that the extension of the Natura 2000 network to marine areas is specifically mentioned). In addition, however, money will be available under the 'biodiversity' part of this pillar for wider actions to help halting the biodiversity loss outside the Natura network. The definition of 'wider actions' is more or less summarized in the Biodiversity Action Plan[1]. Under the pillar LIFE+ Nature and Biodiversity the European Commission would like to see 'concrete conservation actions' in the field. The 'demonstration of best-practice' (LIFE+ nature) and the 'demonstration of innovative projects' (LIFE+ biodiversity) is crucial to ensure success. There are special measures (LIFE+ Annex 1) and principal objectives (LIFE+ Annex 2) defined for the Nature and Biodiversity component of LIFE+ in the Regulation.

LIFE+ Environment Policy and Governance

This includes funding for 'priority actions' such as climate change, water, air, soil, urban environment, noise, chemicals, environment and health, waste and natural resources, forests, innovation and strategic approaches. The wording is quite general and allows a lot of flexibility. However, projects should for example 'contribute to the development of innovative policy approaches, technologies, methods and instruments' or the 'implementation of Community environmental policy'. There are special measures (LIFE+ Annex 1) and principal objectives (LIFE+ Annex 2) defined for every priority action.

LIFE+ Information and Communication

This aims at implementing communication and awareness raising campaigns on environmental, nature protection or biodiversity conservation issues. Forest fire prevention is mentioned specifically under LIFE+ Information and Communication. This differs from the other two LIFE+ components in that there is not only a focus on communication but that it is the condition sine qua non in order to obtain funding from it. Communication campaigns always fall under this component even if the main target is biodiversity. There are again special measures (LIFE+ Annex 1) and principal objectives (LIFE+ Annex 2) defined for LIFE+ Information and Communication.

National annual priorities

Wide-ranging 'multiannual strategic programmes' (set out in Annex II of the Regulation) will determine priority areas for grants. From 2008, Member States 'may' set out national annual priorities from within this multiannual programme. One prediction is that smaller Member States may be more likely to draw up these national programmes as they will have less of a problem spending their budget allocation. 2007 will not include these national priorities as there was not enough time to develop national annual priorities due to the late adoption of the Regulation.

Exclusion of 'recurring activities'

The European Commission does not want the EU budget to subsidise 'recurring' activities, as LIFE+ is intended to fund 'innovative', 'demonstration' or 'best practice' projects. However, this could exclude necessary management actions in a demonstration project – e.g. regular grass mowing, or regular monitoring and survey work. The advice is not to make such activities the main part of a project, but to incorporate them in a wider project. And last, but not least, every activity can be 'demonstrative' and/or 'innovative' – it depends on how it is presented. Also, do not forget to include communication activities in every project. The European Commission would like to see it.

Applying for grants

Organisations will have to apply for grants by sending applications to their national authorities, which will then forward to the European Commission. Applications will first be assessed for eligibility and will then be scored in several categories – e.g technical coherence, conservation benefit, socio-economic benefit and financial coherence. National authorities may make comments on the applications they submit. The Commission will give a 'bonus score' derived from those comments and how well the project fits with possible national priorities (after 2007). Transnational projects are encouraged.

Timetable

The European Commission has put the 'application guidelines' on their homepage: http://ec.europa.eu/environment/life/funding/lifeplus.htm. Deadline for the submission of the 2007-projects is 30 November 2007. First opinion of the European Commission on projects is expected by 1 May 2008. The official confirmation could be received in September 2008. Projects therefore which fall under the 2007 call can start as of January 2009.

[1] http://eur-lex.europa.eu/LexUriServ/site/en/com/2006/com2006_0216en01.pdf

Countries eligible

LIFE+ funds will not be available for non-EU countries. However, exceptions will be made for the following countries if they provide ‘supplementary funds’: Iceland, Liechtenstein, Norway, Switzerland, Croatia, Turkey, Macedonia, Albania, Montenegro, Bosnia and Herzegovina (probably) and Serbia (probably).

Keep in mind

There are provisions (in Article 10 of the Regulation) to ensure that funds are not given where other EU instruments can cover them. Please check other possibilities before submitting a LIFE+ proposal. The bigger the proposal, the more support you will get from the European Commission – simply because they cannot administrate thousands of small proposals. Therefore proposals of € 1-3 million are welcome. However, the size of the project is not part of the selection criteria and smaller proposals can be submitted.

Andreas Baumueller, EHF

News from the UK: Carbon stores, sources and sinks

According to research presented at the annual conference of the Royal Geographical Society with the Institute of British Geographers, bogs and peatlands in northern Britain store over 1.5 billion tonnes of carbon. Severe erosion and climate change may result in the release of this carbon into the atmosphere contributing to global warming,

Predicted hotter summers and rougher winter storms could ruin peatlands, according to Martin Evans of the University of Manchester. A vicious cycle would ensue where climate change damages peatlands so that they in turn contribute to climate change by releasing more carbon to the atmosphere.

Peatlands in the uplands and moors of Britain are already among the most severely eroded in the world. If the erosion becomes more widespread around 30% of the carbon stored in the UK’s blanket peatlands could be released into the atmosphere further enhancing global warming.

Through pollution, burning and grazing, Britons have pushed bog environments across the country to the brink. UK blanket peatlands in northern latitudes are a major store of carbon containing around 10 times UK annual emissions. By making sure water levels in Britain’s bogs are optimised and by growing the right plants on peatlands, the UK could significantly reduce its carbon emissions.

Restoration of degraded peatlands creates a new carbon sink and prevents the loss of carbon stored over thousands of years. Peatlands are an important part of Britain’s upland landscape. Careful management of Britain’s upland peatlands can preserve them for the future and play a part in tackling climate change”

Shetland windfarm postponed

Viking Energy, the company behind plans to build a massive windfarm in Shetland intends to wait until next summer before submitting a planning application to allow a second study of the islands’ peatlands. The company had initially hoped to have already submitted its planning documents, but was faced with a huge number of responses to a public consultation.

The plans are to build 600MW windfarm in Shetland’s central mainland. During the initial consultation in spring this year, many local residents were concerned about the amount of peat which would have to be cleared to erect up to 192 turbines, each measuring up to 145 metres in height. There were also worries that disturbing the sensitive peat habitat could pollute rivers and other inshore waters. Environmental consultants have now been asked to help refine the details of the proposed layout for the windfarm.

News from The Netherlands: opposition to windmills

Several Dutch nature conservation groups have addressed the local government of Steenwijkerland (Overijssel) to abstain from placing windmills near Scheerwolde and Blokzijl. The windmills would be placed in between the fenland nature conservation areas De Weerribben and De Wieden. Nature conservationists see placement of the small scale windfarm as bad for the open landscape, bad for nature and bad for the local economy which depends much on the landscape attracting tourists and house owners.

The conservation groups are not opposed to windfarms but would like to see them large and concentrated in areas where they would do less harm. Should the government not comply, the organisations will eventually file a complaint with the EU court.

The future national park Weeribben/Wieden is a Natura 2000 site. The windmills are projected on the foraging routes of purple herons (*Ardea purpurea*), an endangered species with a still healthy population in the area.

News from France: EU Ecolabel for peat free growing media

You will remember the efforts of IMCG with respect to the revision of the EU Ecolabel for growing media that threatened to allow the inclusion of peat. The argument of the industry was that an ecolabel that nobody can carry has no value. Now the EU Ecolabel has been awarded to the French company Aquiland, which offers high quality peat free growing media.

Aquiland sells a whole range of peat-free growing media for vegetable and flower cultures called “Orgapin”. There are two main products, one made with pure bark compost, the other a mixture of bark compost (80%) and wood fibre (20%). Different particle sizes and fertilizations define numerous variants.

Current uses of Orgapin are strawberry culture (25% of the French market), raspberry culture (50% of the French market), seed potatoes (85% of the French market), but also geranium slips, herbs, cut flowers and market gardening. After use, Orgapin is ploughed in to improve organic fertility of soils.

The EU Ecolabel is a guarantee for products whose use safety, results reliability and environment protection features are regularly checked. EU Ecolabelling of Orgapin proves that there are worthy alternatives to peat. marc.miquel@aquiland.fr

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News from Germany: New Ramsar site

The German Bundesministerium für Umwelt, Naturschutz, und Reaktorsicherheit has designated the "Bayerische Wildalm" (7 hectares, 47°35'N 011°47'E), as Germany's 33rd Wetland of International Importance. The small site is an area of remarkable peatland concentration in the southern state of Bavaria which extends across the border to the Austrian Ramsar site of the same name. The site is a karst depression, or polje, with a natural brook that vanishes into one big and several small ponors (swallow hole). The bottom of the polje is covered completely by a fen which is hydrologically controlled both by water coming from the sloping fens along the polje slopes and by periodic floods of the brook. The mires show typical features for the Limestone Alps, with many endangered plant species, which form the chief basis for the site's nomination to the List.

At the occasion of the designation, the German minister for Environment commended the decision as contribution to nature conservation as well as climate protection: "Climate protection means nature conservation – nature conservation means climate protection."

News from Finland Reed Canary Grass on cutover peatlands

The Finnish energy industry has discovered the potential of Reed canary grass in energy generation – albeit in form of co-combustion with peat (and wood), negating all positive effects this biomass fuel might have on greenhouse gas balances.

The cultivation areas of reed canary grass (*Phalaris arundinacea*) increase rapidly in Finland. The ministry of Agriculture and Forestry has set an objective of having 100.000 ha cultivated for this fast-growing perennial grass. Now the total cultivation area is about 20.000 ha. Reed canary grass is well suited also for cultivation on former peat extraction sites. Apparently multiple tons of fossil carbon need to be cut away and combusted, before this "green" energy can be grown.

The peat energy lobby points out the importance of Reed canary grass in the after-use of cutover peatlands in Finland. The carbon balance of Reed canary grass production can be very negative, however, if drainage levels are too deep and high amounts of carbon are emitted from oxidation of the remaining peat.

Source: IPS

News from Poland: No road through Rospuda

The Regional Administrative Court in Warsaw has cancelled the environmental consent for the entire Augustow bypass road in north east Poland. This section of the "Via Baltica" expressway had been routed by the Polish Road Agency through the Natura 2000 site "Augustow Forest" which includes the mires of the Rospuda Valley. The environmental consent had been given earlier by the Minister of the Environment of the previous government.

The February decision by the then Minister, Jan Szyszko, upheld the one by the governor of the Podlasie concerning the environmental aspects of the construction of the bypass. The decision was opposed by the Polish ombudsman and numerous environmental organizations, including IMCG. Their main objection was that alternative plans for the bypass construction had not been considered.

Furthermore, it was pointed out that after Poland's accession to the EU, a number of new legal regulations had to be applied to the project. The case was referred by the European Commission to the European Court of Justice in March 2007 for infringing the requirements of the EU Habitats Directive. In July this year the European Commission asked the European Court of Justice to issue a ban on construction works in Rospuda valley.

Poland then assured the EC that works will not begin until it is established in a court ruling that the construction complies with EU regulations concerning the environment. The European Court of Justice rejected Poland's motion to give the bypass case the status of a fast-track procedure, which means that a verdict may be passed as late as in two years' time.

The new environment minister, Maciej Nowicki, wants to hold "a roundtable for Rospuda" that would convene in December and be comprised of experts, NGOs and local authorities to discuss possible solutions for the Augustow bypass and for Rospuda, as Nowicki believes that Poland will ultimately lose the case at the European Court of Justice.

News from Belarus: restoration of three peat extraction areas

In Belarus a UNDP-GEF project on restoration of cut-over peatlands has started construction of water regulating facilities at project sites "Dokudovskoe", "Bartenikha" and "Miranka". Construction plans have been elaborated in line with national requirements and international best-practices, which should enable to restore a natural hydrological regime.

The project is entering into a critical phase as successful completion of the construction works will largely determine the effectiveness of peatlands restoration and achievement of the overall project objective. Construction of water regulation facilities, fire prevention channels and ponds will help decrease the risk of peatland fires, reduce CO_2 emissions, restore habitat for globally valuable flora and fauna species and solve significant ecological problems.

The project "Renaturalization and Sustainable Management of Peatlands in Belarus to Combat Land Degradation, Ensure Conservation of Globally Valuable Biodiversity and Mitigate Climate Change" of the United Nations Development Program (UNDP), Global Environment Facility (GEF) and the Ministry of Forestry of Belarus aims to restore wetland ecosystem of 17 drained and degraded peatlands with a total area of over 40 000 ha.

Elena Goloubovskaya: peatlands@tut.by

Raised bogs of Belarus

In the 1960s peatlands occupied 29 390 km^2 or 14,2% of Belarus. At present, mires in nearly natural state cover 6,4% or 13 450 km^2 of the territory. Due to intensive drainage in 1950-1990, more than 46% of mires covering over 100 hectares were damaged. Every year 4-12 thousand hectares of mires are burnt, and adjacent forests suffer from the fires.

In 2004-2007, Earthwatch Institute (Boston, USA) funded inventories and research on Belorussian raised bogs. Annual summer expeditions were organized by Natalia Zeliankevich and Dzmiry Grumo (Institute of experimental botany National Academy of Sciences, Minsk) in collaboration with Oleg Sozinov (Grodno State University), a former delegate of the Peatland Biodiversity Program of the Darwin Initiative.

Earthwatch Institute has provided also another kind of support by sending volunteers to help scientists to do field work. People from more than 25 countries all around the world have participated and contributed into the project "Belarus wetlands".

Project Goals were as follows:

- to obtain modern data from raised bogs in Belarus / do inventories
- to record anthropogenic impact and dynamic processes in vegetation
- to locate new sites with rare or endangered species
- to develop criteria for establishing new nature reserves

So far work has been done in Northern Belarus (Vitebsk, Minsk and Grodno regions).

The "National strategy of stable development of the Republic of Belarus for the period until 2020" cites degradation of soils and natural ecosystems as a result of peat mineralization on drained lands, and degradation of mires due to peat extraction as a serious national problem. According to the Strategy, the existing natural mire ecosystems need state support, which sounds promising.

Olga Galanina & Oleg Sozinov

News from China
14 mln yuan for Qomolangma wetlands

The State Council of China has approved the plan of investing 14 million yuan on the restoration of the wetlands in the Qomolangma National Nature Reserve, and on setting up supportive ecological and zoological monitoring facilities. The project will seal off 5900 ha of natural wetland in the reserve and 4400 ha of degraded wetland will be restored.

The Qomolangma Nature Reserve is located on the Sino-Nepalese border, covering 33000 sq km. With its high species diversity, more than 2300 higher plant species and 270 animal species, it was included in the UNESCO MAB Project in 2004. Mountainous wetlands are very important not only for bio-diversity but also as a buffer of water.

Tibet is known for its rich wetland resources. It has 38 nature reserves, whose total acreage covers 30% of its territory.

Sources: chinanews.cn & http://en.tibet.cn/

For more, see also: A high altitude mire in the Qomolangma National Nature Preserve, Tibet Autonomous Region by Esther Blom in IMCG Newsletter 2003/4.

News from Indonesia:
UNFCCC CoP 13

The 13th Conference of Parties (CoP) of the United Nations Framework Convention on Climate Change (UNFCCC) started in Bali on 3 December 3rd. A crucial issue at the meeting was how the world should try to mitigate climate change when the Kyoto protocol runs out in 2012. Though the recent decision of Australia to ratify the Kyoto protocol may give reason for hope, expectations for the Bali CoP were low.

There were three things that would make the Bali CoP a success or a failure. The first was some sort of long-term commitment by all 192 signatories of the UNFCCC to deal with the problem, involving some sort of goal, such as temperature, emissions reductions or atmospheric carbon concentrations. This has been achieved, albeit only in a footnote and only as a reference to the IPCC report.

The second is further commitments by developed countries to cut their emissions. The EU already committed itself and the USA continues to refuse; at least now Australia has ratified the Kyoto Protocol.

The third concerns developing countries. As it turned out, they still refused to join in setting emission reduction goals, instead demanding clear language on support from the developed nations in combating climate change.

The theme of the Bali meeting was "Forests for carbon" and plans for an international incentive scheme against deforestation figured prominently at the Bali meeting. Mechanisms need to be devised that have real prospects of reducing deforestation and that encourage financial flows from rich countries. Different models are debated, including a global fund

to pay for avoided deforestation or, alternatively, creating tradable offsets for avoided deforestation. Each model has its own difficulties, from how to estimate the amounts of emission saved to how to allocate funding and check it is spent properly.
Deforestation may account for almost 20% of current total global greenhouse gas emissions, with Indonesia and Brazil the largest sources. The majority of emissions from deforestation in Indonesia are caused by peatland degradation. The estimated 2Gt CO_2 emitted from degrading peat in Indonesian peat swamp forests alone amounts to almost 5% of the total global greenhouse gas emissions. This makes peat a key issue in the deforestation talks.

saving trees

Australia will pay Indonesia to plant 100 million trees in Kalimantan in a climate-change deal worth 100 million Australian dollars (82 million US dollars). The deal could cut greenhouse gas emissions by about 700 million tonnes over 30 years – Australia's total annual emissions are about 550 Mtonnes.
Called the Kalimantan Forests and Climate Partnership, it aims to preserve 70,000 hectares of peat forests, flood 200,000 hectares of dried peat land and plant up to 100 million trees on deforested peat land.

Yogyakarta statement

Problems of fire, mitigation, restoration and wise use of tropical peatland were addressed at the International Symposium and Workshop on "Carbon-Climate-Human Interactions on Tropical Peatlands" held in Yogyakarta, Indonesia on 27-29 August 2007. These meetings were attended by over 200 participants from Indonesia, Malaysia and Vietnam and 13 other countries, including scientists, politicians, legislators, land managers, representatives of national and local government, NGOs and community groups, and the private sector. The symposium consisted of seven technical sessions dealing with the following issues concerning tropical peatlands and peat:

- Evolution, extent and natural resource functions;
- Biodiversity and biological, chemical and physical characteristics;
- Restoration and water management;
- Carbon dynamics;
- Socio-economics and land management;
- Fire: detection, impacts, awareness and control;
- Carbon payments, avoided deforestation and cultivation of plantation crops.

The workshop commenced with a 'Stakeholder Forum' at which views were expressed by representatives of regional governments, agro-industries, researchers, and others on current and pressing issues related to tropical peatland utilization, particularly in the context of climate change and biodiversity conservation. These issues were analysed and discussed in greater depth in four breakout sessions that prepared outline action plans and contributed towards the symposium/workshop statement, which can be downloaded here:
http://www.mns.org.my/article.php?aid=185

News from Canada: Newfoundland and Ontario fuel peat

The province of Newfoundland and Labrador is working with Peat Resources Inc. planning for a new peat fuel industry based upon peat production of 5 million tonnes of peat fuel per year, with revenues of CAD $500 million. Most of this fuel will be exported to the northeastern USA as a clean fuel blend for coal-burning systems, receiving tax credits for renewable energy sources.
Peat Resources estimates that the full cost for peat fuel is $30 to $55 per tonne. In Ontario Peat Resources has identified a preliminary resource of 22 million tonnes. This would allow an annual production of one million tonnes of peat fuel for 22 years. These reserves would be accessible to the Ontario Power Generation plants at Atikokan and Thunder Bay. The Ontario Power Authority will pay double the current price for "clean" electricity.
The Government of Canada's Clean Energy website defines peat as a biofuel. A report by the Ontario Ministry of Energy "An Assessment of the Viability of Exploiting Bio-Energy Resources Accessible to the Atikokan Generating Station in Northwestern Ontario" concludes that peat is the most abundant and viable of the alternative fuels within economical transportation distance of the Atikokan plant. The report can be found here: http://www.energy.gov.on.ca/english/pdf/electricity/Atikokan_report_2006.pdf
See also: http://www.peatresources.com/

News from Tunisia: new Ramsar sites

The government of Tunisia has designated 19 new Wetlands of International Importance, two of which contain peatlands.
Lac et Tourbière de Mejen Ech Chitan. (7 ha; 37º09'N 009°06'E; Nature Reserve). The lake and adjacent peatland of Mejen Ech Chitan are part of the "Chain of Mogods", a forested area extending along the northwest of Tunisia near the sea. The Lake is known as the "Lake of Water Lilies" as it is the only site in Tunisia where this species is found. The site is privately owned and in need of restoration.
Les Tourbières de Dar Fatma (13 ha; 36°48'N 008°46'E). Located in the mountainous region of Kroumirie. The peatlands are among the best examples in North Africa. The site is of primary importance for its rare plant species. Overgrazing and agriculture have had a negative impact on the site.

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

World Energy Council (2007) Survey of Energy Resources 2007

This is the 21st edition of the World Energy Council's Survey of Energy Resources (SER). The World Energy Council consists of authorities, companies, research institutions and more. This report, published in September, reviews the status of the world's major energy resources. It covers not only the fossil fuels but also the major types of traditional and novel sources of energy.

Peat is included as a renewable fuel, which is mainly because the chapter copies verbatim the IPS nonsense we refuted in Newsletter 2007/2. It is interesting that Jaakko Silpola is able to author such a chapter, but is unwilling to discuss its content. The chapter is undersigned by Silpola as representative of IPS. This puts serious doubts on the integrity of IPS (again), which claims to also represent peatland scientists, but seems unable to produce anything remotely objective. Instead the propaganda of energy companies is parroted. IMCG has provided detailed refutation of the argumentation of IPS; this was done by independent scientists, including long-standing members of IPS.

You will remember from our report on the Sweden meeting in the previous Newsletter that IPS promised to provide detailed arguments to support their case with a target date of October. Instead of such a document we find the same unsubstantiated assertions published in an international survey aimed at governments, NGOs, industry, academia and investors.

You will also remember that an agreement was reached in Sweden that neither organisation would lobby international bodies without informing the other. As an imcg member you may infer that the publication of this survey is a breach of that agreement.

IPS needs to consider its objectives and whether it is serious about future collaboration with IMCG.

The survey can be downloaded from:
www.worldenergy.org/publications/survey_of_energy_resources_2007/

Wise Use of Mires and Peatlands: now available as PDF

The book Wise Use of Mires and Peatlands – Backgrounds and principles including a framework for decision-makers (Joosten & Clarke 2002) is now available as a PDF from the IMCG website:
http://www.imcg.net/docum/wise.htm

Nature Reports Climate Change

Nature has launched a new free-access website dedicated to in-depth coverage of climate change at www.nature.com/climate .

Nature Reports Climate Change provides you with free, up-to-date, authoritative information on current climate change research, comprising news, in-depth features, research highlights, commentaries and reviews. As well as highlighting the best peer-reviewed research, it also covers the wider implications of global climate change for policy, society and the economy.

Ramsar Handbooks for the Wise Use of Wetlands, 3rd edition

The guidelines on various matters adopted by the Ramsar Parties have been prepared as a series of handbooks to assist those with an interest in, or directly involved with, implementation of the Convention at the international, regional, national, subnational or local levels.

Each handbook brings together, subject by subject, the various relevant guidances adopted by Parties, supplemented by additional material from COP information papers, case studies and other relevant publications so as to illustrate key aspects of the guidelines. The handbooks are available in the three working languages of the Convention (English, French, and Spanish).

PDF versions can be found here: www.ramsar.org/lib/lib_handbooks2006_e.htm. A CD-ROM with all the PDF files can be ordered free of charge from Montse Riera (riera@ramsar.org).

Ramsar Poster on Wetlands, Biodiversity, and Climate Change.

The Ramsar secretariat has put out a poster summarizing the importance and role of wetlands in climate change mitigation and adaptation. The poster is available in PDF format on the Ramsar Web site: www.ramsar.org/wn/w.n.climate_change_poster.pdf.

Okruszko, T, Maltby, E, Szatylowicz, J, Miroslaw-Swiatek, D, Kotowski, W (eds) (2007) Wetlands - Monitoring, Modelling and Management. Taylor & Francis 347 p. €114

Proceedings of the International Conference W3M "Wetlands: Modelling, Monitoring, Management", held in Wierzba, Poland, 22-25 September 2005.

Wetlands are complex and dynamic ecological systems incorporating two important, inter-linked components: hydrology and vegetation. Modelling wetland components and processes reveals the nature of wetland systems and helps to predict the effects of environmental change. The main goal of much current research is the construction of a vigorous and spatially-explicit model which describes the dynamics of wetland vegetation in relation to environmental variables, including hydrological regimes, sediment type and nutrient availability. Knowledge about ecological functions, environmental services and societal values associated with wetlands has increased rapidly. How to turn this knowledge into practical benefits for sustainable and integrated wetland management is a key question. Individual chapters address the ethics and sociology of wetlands, and the ecology, ecohydrology and conservation practice of a variety of landscapes and countries.

Mitsch, WJ and Gosselink, JG (eds) (2007) Wetlands – 4th edition. Wiley. 582 p. €76.

Mitsch and Gosselink have brought their classic book up to date with substantial new information and a support Web site. This new Fourth Edition offers such revisions as a new chapter on climate change and wetlands and more international coverage, including wetlands of Mexico and Central America, the Congolian Swamp and Sine Saloum Delta of Africa, the Western Siberian Lowlands, the Mesopotamian Marshland restoration in Iraq, and the wetland parks of Asia such as Xixi National Wetland Park in eastern China and Gandau Nature Park in Taipei, Taiwan.

Cook H and Williamson T (eds) (2007) Water Meadows – History, Ecology and Conservation. Windgather Press. 169 p. €29

Water meadows are areas of low-lying grassland in the UK which are regularly artificially irrigated at certain times of the year, to stimulate the early growth of grass in the spring. Only a few remain in operation today, though they played a crucial role in Britain's past farming economy.

In this book archaeologists and scientists - together with one of the last practising 'drowners' - explore the ecology and history of water meadows. They ask when and where the art of 'floating' originated, and explain its hydrology. They also investigate conservation status and future potential.

Koch, C. & G. 2007. Vom Moorgut zum Rohstoffunternehmen. Werner Koch GmbH & Co. KG. 192 p. (in German)

On the occasion of its 100th birthday the German peat company Torfwerk Moorkultur Ramsloh published a pleasantly lay-outed chronicle. Starting with information about the ecosystem "mire" in Lower Saxony, the history of the company is described embedded in the history of the Saterland region and bog use (agriculture, peat extraction) and illustrated with many (sometimes the same) photos and anecdotes. The last chapter is dedicated to restoration after peat extraction and a project for longterm supply of a raw material for high quality horticultural substrates. The family-owned Torfwerk Moorkultur Ramsloh is a pioneer in the implementation of (not peat but) *Sphagnum* farming to provide for future generations.

For more information:
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UPCOMING EVENTS

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

World Sustainable Energy Days 2008
5 - 7 March 2008, Wels, Austria
For more information:
http://www.wsed.at/wsed/index.php?id=217&L=1

IMCG Symposium on Windfarms on peatland
27 April - 02 May 2008, Santiago de Compostela, Spain
More information elsewhere in this Newsletter

13th International Peat Congress After Wise Use - The Future of Peatlands
9. - 15. June 2008, Tullamore, Ireland
for more information, visit ipcireland2008.com

4th International Meeting on the Biology of Sphagnum
2 - 11 August 2008, southern Alaska
This (field) meeting intends to promote collaboration among those interested in the biology of Sphagnum and the ecology of Sphagnum-dominated peatlands.
For more information:
http://www.biology.duke.edu/herbarium/alaska.html

IMCG Field Symposium and Congress
27 August – 11 September 2008, Georgia/Armenia
For more information see elsewhere in this Newsletter and IMCG Newsletter 2006/4

Implementing environmental water allocations
23 – 26 February 2009, Port Elizabeth, South-Africa
Conference on promoting the sustainable use of rivers, wetlands, estuaries and groundwater.
For more information: ewa.innercirclestudios.co.za/

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http://www.imcg.net