INTERNATIONAL MIRE CONSERVATION GROUP

NEWSLETTER

issue 2003/3, October 2003

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 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 (Jan Sliva), a Secretary General (Hans Joosten), a Treasurer (Philippe Julve), and 2 additional members (Tatiana Minaeva, Stuart Brooks).

Viktor Masing (†), Hugo Sjörs, and Richard Lindsay have been awarded honorary membership of IMCG.

Editorial

A thick IMCG Newsletter with articles on peatlands in various countries worldwide. Again we received a lot of contributions and again we took the liberty to edit most of them severely. Forgive us for being too harsh or for making mistakes. It's all our fault.

Do not forget to contribute YOUR part to the IMCG Network by filling out the Membership Expertise Form, by adopting a concrete task from the Action Plan, or by reacting to the draft agenda of the upcoming week long Mire Meeting Marathon (The M^3).

We will do our best to publish the next Newsletter around the middle of December 2003. Please send all your contributions, news, publications, etc. to us well before December 15th, and with your help we hope to prepare another interesting newsletter.

For information or other things, contact us at the IMCG Secretariat. Address updates should be sent to Jan Sliva (sliva@wzw.tum.de). In the meantime, keep an eye on the IMCG web-site: http://www.imcg.net

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"I conclude with the reminder. Mires in cultural landscapes are peculiar oases of life in the desert of civilisation. With increasing human impact these biocoenoses disappear with accelerated speed. We have to remember, that these resources are non-renewable."

Mieczyslaw Jasnowski 1993 (in his last publication "Torfowiska okolc Szczecina").

Contents:

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Mire Meeting Marathon

31 October – 6 November, Belgium & The Netherlands

At the end of October, beginning of November a whole range of peatland related meetings will take place. On Friday October 31, IMCG and IPS are expected at the European Commission DG XI (Brussels, Belgium) to present the Wise Use book. In the evening of that day the IMCG Executive Committee will assemble in Egmond (near Amsterdam, Netherlands). The IMCG EC will continue this meeting on Saturday November 1. On Sunday November 2, a joint meeting will take place with the IPS in Amsterdam, followed by the GPI Steering Committee convening in Amsterdam on Monday November 3. On Tuesday November 4 people involved and interested in the GEF Peatland Carbon project will come together in Wageningen (Netherlands). Wageningen will also be the place where the first conference will take place of the Coordinating Committee of the Ramsar Guidelines for Global Action for Peatlands on Wednesday November 5 and Thursday November 6.
IMCG members interested in one or more of these meetings are requested to contact the secretariat (joosten@uni-greifswald.de or IMCGsecr@web.de).
A draft agenda of the IMCG meetings is presented below. Contributions, comments, and further proposals are welcome at the secretariat!

Draft agenda for the IMCG-EC meeting October 31 - November 1, 2003 (Egmond, near Amsterdam)

1. *Formal issues*
   - 1.1 Chairmanship of the meeting
   - 1.2 Agenda
2. *Internal Organisation*
   - 2.1 Membership: status and progress (report Jan)
   - 2.2 Secretariat (report Hans)
   - 2.3 IMCG website (report Hans). Threatened peatlands site (report Tanja)
   - 2.4 Newsletter: production and distribution (report Hans)
   - 2.5 Finances (report Philippe)
     - 2.5.1 General overview (report Philippe)
     - 2.5.2 Book sales via IMCG (report Philippe)
     - 2.5.3 Arrangements with IPS about WUMP finances (report Stuart)
   - 2.6 IMCG Annual report 2003 (report Hans)
   - 2.7 Organisation of the discussion on the constitution (report Jan)
   - 2.8 Coming IMCG meetings
     - 2.8.1 2004 South Africa (report Jan)
     - 2.8.2 2005/2006 Tierra del Fuego? (report Hans)
     - 2.8.3 2006 Finland (report Hans)
3. *Contacts with and representation in other organisations*
   - 3.1 Wetlands International
   - 3.2 European Habitat Forum (report Jan)
   - 3.3 IUCN (report Jan)
   - 3.4 SWS
   - 3.5 IPS
     - 3.5.1 Preparation meeting with IPS November 2 (see separate agenda)
     - 3.5.2 IMCG input into IPS 2004 conference
   - 3.6 GPI (report Tanja)
     - 3.6.1 GPI progress and perspectives
     - 3.6.2 GPI website (connected to IMCG website and also managed by Michael Trepel)
     - 3.6.3 Preparation GPI meeting November 3
   - 3.7 Ramsar STRP (report Tanja)
     - 3.7.1 Relation STRP and CoCo/GGAP
     - 3.7.2 Input in of IMCG in STRP activities
     - 3.7.3 Preparation CoCo/GGAP meeting November 5-6
4. *IMCG Action plan*
   General check of progress with respect to the Action Plan. Items of special concern:
   - Peat(land) certification
   - Peat as a slowly renewable and developments within the EU
   - IMCG input in the global component of GEF project
5. *Any other business*

Draft agenda items for joint meeting IPS / IMCG November 2, 2003 (Amsterdam)

1. *International conventions and initiatives: the need for common or joint approaches*
   - Ramsar, GGAP and CoCo (Rieley/Minaeva)
   - GPI
   - Wise use DVD (Clarke)
   - Faizal Parish’s GEF project
2. *Joint publications*
   - Wise Use book
   - Progress on distribution and additional initiatives
   - Financial aspects
   - International Journal of Peat and Peatlands (Rieley/Joosten)
   - The status of mires and peatlands of the World.
3. *Peat(land) certification*
4. *Vision on mid- to long-term peatland developments (10, 20, 50 years): ideas*
5. *Information exchange*
   - On site exchange on issues like Terminology, Mire Classification, Global database, Trends and changes in mires and peatlands, Criteria for conservation
   - Information Exchange Mechanism
6. *“Trouble shooting”*

14th IMCG Congress – South African Mires and Peatlands
10-27 September 2004
2nd Circular and Call for Papers

Invitation
The International Mire Conservation Group (IMCG) invite you to participate in the 14th IMCG Congress, held in Southern Africa from 10 – 27 September 2004.

Congress Objective
The objective of the IMCG Congress is to internationally enhance the exchange of information and experience relating to conservation and wise use of mires, peatlands, and peatland-related ecosystems. In the year 2004 the presentation of the current stage of knowledge will focus (i) upon African wetlands and peatlands as well as on mires and peatlands in the tropical and sub-tropical environment (ii) on the general global issues related to peatland and mire ecology and conservation.

Event structure
According to the IMCG tradition the congress consists of three main parts:
(i) A field excursion where the local and regional issues concerned with the conservation and wise use of peatlands in southern Africa will be addressed
(ii) The IMCG Symposium, two-days event as the platform for the exchange of the scientific current stage of knowledge
(iii) The IMCG General Assembly

Additionally, a one-day workshop on "The management and restoration of southern African wetlands and mires" is included in the Programme to strengthen the position of the regional objectives and to allow a discussion on regional challenges within a group of local, regional, and international experts.

Congress Programme
(1) Field excursion: 10 – 23 September 2004
Theme: "Southern African Mires and peatlands"
Venue: South Africa and Lesotho – schedule attached
(2) Workshop (for SADC wetlanders, all welcome): 19 September 2004, theme: Management and Restoration of southern African wetlands and mires.
Venue: Maseru, Lesotho
(3) Symposium (scientific presentations): 24 – 25 September 2004, theme: Management challenges for wetlands, mires, and peatlands in the 21st Century.
Venue: Paarl, South Africa – schedule attached
(4) IMCG General Assembly: 26 September 2004
Venue: Paarl

Congress Schedule
10 September 2004:
- Arrival at Johannesburg International Airport, South Africa.
- Welcoming Dinner at Rietvlei Nature Reserve, Pretoria at 17H00
- Accommodation: Rietfontein Guest Lodge, Pretoria
  (Gauteng Province, South Africa)

11 September 2004:
- Excursion: Highveld karst fens, old peat mining and peatland restoration sites in Rietvlei Nature Reserve.
- Travel to the Eastern Escarpment Plateau
- Excursion: selected reed/segde fens in Grassveld biome: Lakenvlei Peatland and Verloren Vallei Mire Ramsar Site
- Accommodation: Dullstroom
  (Mpumalanga Province, South Africa)

12 September 2004:
- Travel to the Eastern Seabord: Kosi Bay
- Excursion: subtropical swampforest and the Kosi Bay Ramsar Site
- Accommodation: Kosi Bay
  (KwaZulu-Natal Province, South Africa)

13 September 2004:
- Excursion: pristine mires and sites with subsistence farming in subtropical reed/sedge and swampforest interdune fens; depending on time available: estuarine and fringe communities of the Kosibay lake system
- Accommodation: Kosi Bay
  (KwaZulu-Natal Province, South Africa)

14 September 2004:
- Travel across the Greater St Lucia Wetland Park (World Heritage and Ramsar sites).
- Excursion: Vasi Pan peatland (recovery of a mire devastated by afforestation)
- Excursion: mangroves and other estuary ecosystems on at St. Lucia lake (boat trip)
- Accommodation: Cape Vidal, St Lucia
  (KwaZulu-Natal Province, South Africa)

15 September 2004:
- Excursion and field work: Mfabeni fen and swamp forests
- Accommodation: Cape Vidal, St Lucia
  (KwaZulu-Natal Province, South Africa)

16 September 2004:
- Travel towards the Kingdom of Lesotho and
- Excursion: Waterval Vley mire (parts of this unique percolation mire on the Great Escarpment along the Drakensberg is destined to become a dam for a pump storage scheme)
- Accommodation: Harrysmith
  (Free State Province, South Africa)

17 September 2004:
- Travel into Lesotho via the Golden Gate in the Maloti Transfrontier Park
- Excursion: a mosaic of mire, wetland and streams in an ancient oxbow in the Mountain Kingdom of Lesotho
- Accommodation: Oxbow Lodge (Lesotho)

18 September 2004:
- Excursion and field work: unique interbedded gravel/peat alluvial fan mires of Lesotho (at 3000 m a.m.s.l.)
- Excursion and field work: impacted peatlands as a result of Lesotho Highland Development Water Transfer Scheme to South Africa
- Accommodation: Oxbow Lodge (Lesotho)

19 September 2004:
- Travel to Maseru, the capital of Lesotho
- Optionally:
  (i) Participation in the Worksop on southern African wetlands, mires and peatlands, or
  (ii) own discovery of and excursion to the wetlands in the foothills of the Maloti mountains
- Accommodation: Maseru (Lesotho)

20 September 2004:
- Whole day travel to the southern seaboard via the Karoo.
- Visiting some palustrine wetland systems on the way
- Accommodation: Cradock (Eastern Cape Province, South Africa)

21 September 2004:
- Travel through the Karoo and enter the Fynbos Floral Kingdom
- Excursion: the palmiet (*Pronium serratum*) fens in the Cape Fold Mountains
- Accommodation: Tsitsikamma (Eastern Cape Province, South Africa)

22 September 2004:
- Travel along the Garden Route through a landscape of coast, forests, and lakes
- Excursion: the Groenvlei Lake and mire and the Vankersvelvlei (*Sphagnum* dominated floating mire)
- Accommodation: De Hoop (Western Cape Province, South Africa)

23 September 2004:
- Excursion: the De Hoop Nature Reserve and Ramsar site
- Travel to the symposium venue at Paarl via L'Agulhas (the southern most point of the continent of Africa, close to the De Mond Ramsar Site)
- Accommodation: Paarl (symposium venue) (Western Cape Province, South Africa)

24 & 25 September 2004:
- Symposium (scientific presentations)
- Venue: Paarl
- Accommodation: Paarl (Western Cape Province, South Africa)

26 September 2004:
- IMCG General Assembly
- Accommodation: Paarl (Western Cape Province, South Africa)

27 September 2004:
- Departure from South Africa
- International Flights are available from Cape Town
- Tour Bus will travel back to Johannesburg International Airport from Cape Town (Please Note: 16 hour route!)

Field conditions
Normal wetland field conditions and normal footwear for mire/wetlands: Gum boots (= wellingtons or wellies for U.K. participants)
Dangerous animals (elephant, buffalo, hippo, crocodile etc) might be present in mires and wetlands
Anti-malaria precautions are strongly recommended for Kosi Bay

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Symposium Programme and call for papers
The 14th IMCG Symposium "Management challenges for wetlands, mires, and peatlands in the 21st Century" Paarl, South Africa, 24 – 25 September 2004

Preliminary Programme outline
There will be a opening session in the morning of 24 September 2004 and three scientific sessions during two days of the Symposium (one afternoon session on September 24 and two sessions on September 25). There are no specific themes of the scientific sessions, however, the content of presentation should follow the main objective of the Symposium.
Besides the oral presentations (with 20-30 minutes length depending on the number of accepted abstracts), there will be a possibility of poster presentations during the Symposium event.

Call for papers
All contributions should be in English. Abstracts of oral presentation and posters (max 1 page) should be submitted to the organisers by 15 January 2004 in an electronic form (as a MSWord-format or Rich Text Format only). The abstracts are subject to review by the Symposium Committee and acceptances will be announced by 15 February so that everybody can enjoy the advantage of the early registration payment.

Symposium committee
Piet-Louis Grundling, IMCG (MB member), South Africa; Jan Sliva, IMCG (EC, Chairman), Germany
Hans Joosten, IMCG (EC, Secretary General), Germany; Jennie Whinam, IMCG (MB Member), Tasmania; Rodolpho Itturaspe, IMCG (MB Member), Argentina; Lenka Thamae, South African

Development Community (SADC) Wetland Project; John Dini, Department of Environmental Affairs and Tourism (Biodiversity Planning), South Africa;

Registration
All participants must complete the registration form (attached at the end of this Newsletter) and send it by mail, fax or email to the organizers.

Registration fees
Reduced registration fees are offered for early registration before 29 February 2004. Early registration is only available to professional participants whom are able to actively contribute to the congress objectives. Accompanying persons are welcome to register after 29 February depending on the availability. The number of participants for the Field excursion is limited to 50. Professional participants will thus receive first preference.

Apart from the submission of abstracts, there is a no deadline for late registration for the Symposium. However, the organizer has rights to disclaim the registration if the offered services cannot be fulfilled because of the delayed application. **Please note that the registration deadline for the Field excursion is 31 April 2004.**

	Early Registration before 29 February 2004; for professional participants only	Regular registration after 29 February 2004; for professional participants and accompanying persons
Field excursion	EUR 900	EUR 950
Workshop	--	--
Symposium	EUR 150	EUR 200
General Assembly	--	--
Total package	EUR 1000	EUR 1100

Total Package
The total package includes the IMCG field excursion, workshop in Lesotho (optional participation), IMCG Symposium in Paarl and the IMCG General Assembly. Please note that transport to and from South Africa is not included.

Field excursion
The registration fee for delegates of the excursion includes all transport from Johannesburg (10 Sept.) to Paarl (23 Sept.) and optionally the return to Johannesburg by bus on September 27, accommodation and meals during the excursion, and the entrance fees during the field excursion.

NOTE: A special rate applies for participants from African counties who wish to join the group for any part of the field trip at ZAR 50 a day (accommodation and transport to site excluded). Please contact the South African organizers for more details.
Participants from other developing countries can contact the IMCG Secretariat for assistance – contact details below.

Workshop (for SADC wetlanders, other delegates also welcome)
There are no participation fees. African countries' delegates not attending the Field excursion must register for this event by 31 March 2004 if they want to qualify for a transport and accommodation allowance.

Symposium (scientific presentations)
The registration fees include the admission to the sessions, accommodation, meals, and Symposium abstracts, but not transport to Paarl (except Total package holders)

NOTE: There is a special rate offered with R250 per day for participants from African countries. Please contact the South African organizers for more details. Participants from other developing countries can contact the IMCG secretariat for assistance – contact details below.

IMCG General Assembly
There is no cost, but participants must arrange own accommodation and transport if they are not attending the Field Excursion and the Symposium.

Payment
Only bank transfer payments are possible. Payment has to be made to:

Account Name: IMPESA
Bank: ABSA
SWIFT code: ABSAZAJJCPT
Branch: Silverton, RSA
Branch Code/ Bank Clearance No: 33 444 5
Account No: 405 727 1173

Write "IMCG 2004" and your full name as the subject of payment.

The registration fee is calculated as a netto amount. Please note that bank transfer costs are not included in congress costs. Please ensure that any (international) bank transfer fees will be covered by your bank account.

Confirmation
After receipt of registration and payment a personal confirmation letter (by e-mail) will be send to the participants by the organiser.

Cancellation policy
Cancellations should be made in writing form (by mail, fax or email) to the organiser. The organiser is not responsible for any loss caused by changes of exchange rates.

Cancellation fees:
<u>Before April 1, 2004</u>
A fee of ZAR 400 (ca. EUR 50) will be retained to cover administration expenses should you cancel your registration (both total package or any part of the event) for any reason
<u>Between April 1 and 1 August 2004</u>
The cancellation fee is 50% of total payment. Only reimbursement in ZAR is possible.
<u>After August 1, 2004</u>
No refund of any fees can be made after this date

Travel arrangements
Valid passports and visas are required for entering the Kingdom of Lesotho. The organizers cannot be held responsible for any problems caused by the disrespect of the visa or custom regulations.

Insurance
Every delegate should check the validity of his/her own insurance. The organisers cannot accept liability for personal injuries sustained or for loss of, or damage to, property belonging to Congress delegates or accompanying persons, either during or as a result of the Congress.

All delegates of the Field excursion have to sign the RELEASE AND WAIVER OF LIABILITY before starting the field trip.
The third circular with all final information will be sent to registered delegates only.
We are looking forward to welcome you in southern Africa in September 2004!!

A registration form can be found on page 47

REGISTER

Please fill out the IMCG membership registration form.

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

Wise Use of African peatlands

by Jan Sliva

(presented at the Conference "The Restoration of Scottish Raised Bogs" 22nd-23rd October 2003, Dumfries, reprinted with the permission of the Conference organizer)

Since peat formation processes are strongly influenced by climatic conditions, mires and peatlands represent predominantly ecosystems of the northern hemisphere, occurring especially in boreal and sub-arctic latitudes. The exploration of peatlands has a long tradition here. In the last centuries the discovery of peatland charcteristics went hand in hand with research progress in biology, geology, pedology, and other peatland-related sciences. In mire-rich regions as Fenno-Scandia, British Islands, Siberia, or in the northern part of the North America peatlands became an integral part of utilisation systems, followed by improvements in their scientific terminology, classification, and inventory, and later of conservation and restoration efforts. In retrospect one can see the long way from the defeat of the fearsome "muds", their utilisation and exploitation, the recognition of their substantial functions and values, up to the endeavour of their wise use.

Due to the preconceived idea of peatlands being restricted to cool temperate climatic zones, the occurrence of peatlands in subtropics and tropics was neglected for a long time. However, the continuously increasing discovery of peat deposits in a great number of tropical and subtropical locations gradually altered this opinion. This applies to the African continent as well, where recently peatlands of different types have been evidenced in almost all countries.

Because of the relatively young history of peatland research in Africa, there is still a general lack of comprehensive data on the extent and location of peatlands, as well as of the information on their various functions and values. How vague and incomplete our knowledge is, is shown already by the simple comparison of two important data sources (Lappalainen & Zurek 1996 and Joosten & Clarke 2002) dealing with the extent of African peatlands. For numerous countries the information on peatland extent differs considerably, e.g.:

mire area in km^2	Lappalainen (1996)	Joosten & Clarke (2002)
Algeria	220	10
Botswana	0	3,000
Egypt	461	10
Congo	2,900	4,000
Mozambique	100	1,000
Nigeria	7,000	120
South Africa	9,500	300

The reason for the huge discrepancies is the lack of modern standardised inventories. Almost all overviews until now have relied upon old data based on different criteria used for peatland and/or mire definition from different disciplines (cf Joosten & Clarke 2002). Thus, it is important to recognise that the current peatland estimates for the continent are still very tentative (Pajunen 1996). Based on the old traditional terminology of the colonial sovereigns, in most of the African countries the division between peatlands and other (non-peatland) wetlands is not established yet. In the majority of cases the peatlands are classified as swamps and the peatland forests are called generally swamp forests, hence there is no differentiation whether the system is peat accumulating or not. Without better knowledge of the local conditions, this makes the general assessment of the extent and location of peatlands extremely inaccurate. Recent estimates of the extent of African peatlands vary between 38,000 and 58,000 km^2 (Pajunen 1996, Joosten & Clarke 2002) but the real number will be likely considerably higher (c.f. Hughes & Hughes 1992).

The call for improved inventory, classification, monitoring, and functional understanding of tropical peatlands, as stated in the Res. VII/17 Ramsar COP8 (Guidelines for Global Action on Peatlands or GAP; see www.ramsar.org/key_guide_peatlands_e.htm) is not an end in itself. The African peatlands are endangered by destruction and damage due to increasing human pressure. Their extent and quality are continuously decreasing without awareness and acknowledgement of their functions and values for humankind, without knowing how indigenous people depend on, or benefit from the peatlands. The first world countries have an indispensable commitment to aid developing countries in the African continent (and elsewhere). They must self-critically point out their own management mistakes on wetlands and peatlands from the past as examples and work together with the local people to gain awareness of the peatlands and wise use for human wealth and prosperity in the future. The recent initiatives of IMCG (International Mire Conservation Group), IPS (International Peat Society), and GPI (Global Peatland Initiative) contribute to this to a significant extent.

There is a clear pathway for the understanding and learning process of African peatlands, consistent with the main actions of GAP guidelines:

- Improving and developing standardised classification, inventories, mapping, and evaluation of African peatlands
- Understanding their functions and values on a local, regional and international scale
- Detecting trends in quantity and quality and actual threats of peatland resources
- Developing wise use guidelines based on traditional use and customs, and on the current state of the art of science
- Developing and implementing environmental education, training, and public awareness programmes focusing on peatlands
- Developing legislative and policy instruments to promote the wise use of peatlands and to secure the wise use of peatland resources for the future generations
- Building local and regional institutional capacities, expertise, and networks to secure the self-containedness for the future

Classification and inventories

There is no unified terminology and classification system for African peatlands (see overview in Pajunen 1996). In existing attempts, the “first world” authors try to adopt systems of their own home countries and the work of local researchers is mostly subjected to the colonial (mostly European) traditions. The confusion is aggravated by the fact that the European terms are often conceptually associated with the European “standards” but hardly meet the specific and widely different conditions of subtropic and tropic African peatlands. The extensive Bangweulu swamps in Zambia or Okavango swamps in Botswana, for example, were rarely recognised as peatlands although they include thousands of square kilometres of pristine percolation or terrestrialization mires with significant peat deposits. Or the notification of the bog (boggy) vegetation in Okavango Delta in Botswana (e.g. Ellery & Ellery 1997) surely does not fit in the concept of the term bog (= ombrothropic) vegetation as used in Europe. Also the principal term and definition of peat (= sedentary organic material) and peatlands (sites with peat sedentate) sensu Succow & Joosten (2001) and Joosten & Clarke (2002) should be revised taking into consideration the extensive areas of eroded, transported and/or sedimented peats along natural African watercourses.

An extremely high variety of peatland types exists in Africa depending on the latitude, altitude, edaphic conditions, and geo-morphological settings. Similar to the northern hemisphere, peatlands can be classified according to their main water source. Geogenous peatlands (that are mainly fed by minerotrophic ground water and surface water) occur in all elevations across the continent, whereas ombrogenous and ombro-soligenous (sensu Steiner 1992) peatlands (fed mainly by rain water) can be found in higher altitudes in areas with a positive water budget; for example the moss-rich sloping mires in Ruvenzori/Uganda or the ombro-soligenous mires in the mountains of Lesotho. Depending on the characteristic position in the landscape – and thus on the character of water feeding and water movement through the peatland body – several geo-morphological settings of African peatlands can be distinguished: (i) stream source settings (ii) basin settings, (iii) plain settings, (iv) streambank settings, and (v) estuarine settings. Every type of setting supports the development of different hydrological types of peatlands (all hydrological types sensu Joosten & Succow 2002 are evidenced) and requires different management and wise use practices. Whereas some of peatland types support vegetation which is physiognomically (and sometimes also floristically) quite similar to European ones (like Phragmites reed beds or tall sedge fens), the structure and floristic composition of numerous peatlands differs considerably. Typical African subtropical and tropical mire types include, for example: (i) Cyperus papyrus percolation and terrestrialization mires (“Papyrus swamps”, Fig. 1), (ii) high productive mountain sloping mires in the tropics, (iii) peat swamp forests in the interdunal depressions of the coastal plains or

Fig. 1: Endless and hardly accessible Cyperus papyrus and Phragmites stands of so-called permanent swamps in the Okavango Delta, Botswana accumulated up to 4-5 m of peat

(iv) peat accumulating mangroves in the estuaries. Reflecting the globalisation tendencies in peatland conservation and in line with the claims of the latest Ramsar documents, all specific types of (African) peatlands must be considered in fair-balanced global classification schemes.

Thanks to the Global Peatland Initiative of the main peatland-interested stakeholders (see www.wetlands.org/projects/GPI/default.htm) the first projects on mapping and inventory of Southern African peatlands (IMPESA project, see www.impesa.net could be initialised.

Functions and values

Although the African peatlands dispose almost the same variety of different functions as their European counterparts, their value can be different because of the different socio-economic conditions of society and the needs and demands of the local people. Despite being extremely important, the functions and values of specific peatlands often remain undefined and unconsidered in everyday handling, management, and decision making (Stuip et al. 2002). Indeed it has only been in recent decades that peatlands (and generally wetlands) have been recognised as valuable natural resources that in their natural state provide important economic benefits to people and their environment (Wyatt 1977). That applies in particular for indigenous populations in harsh living conditions. Whereas in Europe several functions are nowadays "less worthy" because of the improved standard of living, they still have very high values in the African environment – e.g. providing opportunity for fishing, hunting, viewing, plant material, harvesting of wild fruits and plant production, domestic stock grazing and water cleaning as the most important examples.

Because of the very narrow dependency of the indigenous population on peatlands in their immediate surroundings, the assessment of their importance has to be performed very carefully and sensibly. Lots of mistakes were made in the last decades because of one-sided evaluation (e.g. conservation of unique bio-diversity by total protection of areas), often supported by foreign parties, in which the demands, needs, and traditions of the local community were ignored. These practices are hardly target-oriented.

Actual threats

The danger of irreversible damage to huge wetland and peatland areas within a short time period is high. The peatlands are extensively damaged by increasing crop production, enhancement of stock density, urbanisation, energy projects, afforestration and plantations, road constructions or peat extraction (Kotze et al. 1995). The yearning for a better future forces people to make fast decisions and actions with positive but one-sided and short-term success. Although the ecological impact assessment procedure has already been established in several African countries, very often the weight of economical arguments overrules the ecological criteria. The unique and pristine Watervalvlei mire situated on the Drakensberg escarpment, some 23 km north east of Van Reenen, South Africa (Fig. 2), is a prime example, as it falls victim to the Braamhoek pumped storage scheme (PSS) of the ESCOM (an influential energy concern in South Africa, see www.africanenergy.co.za/braamhoek.htm) despite numerous national and international protest campaigns. Besides the official projects the peatlands are increasingly endangered by uncontrolled activities of local people. They are drained and cultivated for manioc, yam, batatas, and sorghum cultivation, and especially the swamp forests are affected by uncontrolled burning following drainage and by banana plantations (Fig. 3). Whereas the traditional small-scale crop cultivation and water extraction along the peatland margins hardly influenced the water regime of the peatland and its flora and fauna in the core areas, the current large-scale peatland inversions into horticultural farmland and the following semi-commercial and commercial plantations destroy irretrievably more than the peatland itself. In many cases the sites become unsuitable for horticulture after a few years after drainage so that the damage steadily affects new areas. "The peat swamp forest damage diffuses across the landscape like cancer. If you spend too much time

Fig. 2: The unique and pristine large mire Watervalvlei in South Africa will be irretrievably lost by the dam construction and flooding for the Braamhoek pumped storage scheme.

for investigation of reasons and planning of best solutions, there will be nothing left to protect or to restore in a few years. ...” (Scotty Kyle, KZN Wildlife, pers. comm.).
Therefore the “hot spots” of significant peatland threats have to be identified in joint co-operation between all interested and involved national and international stakeholders. Together with local governmental and tribal authorities all efforts must be undertaken for peatland protection and finding solutions quickly.

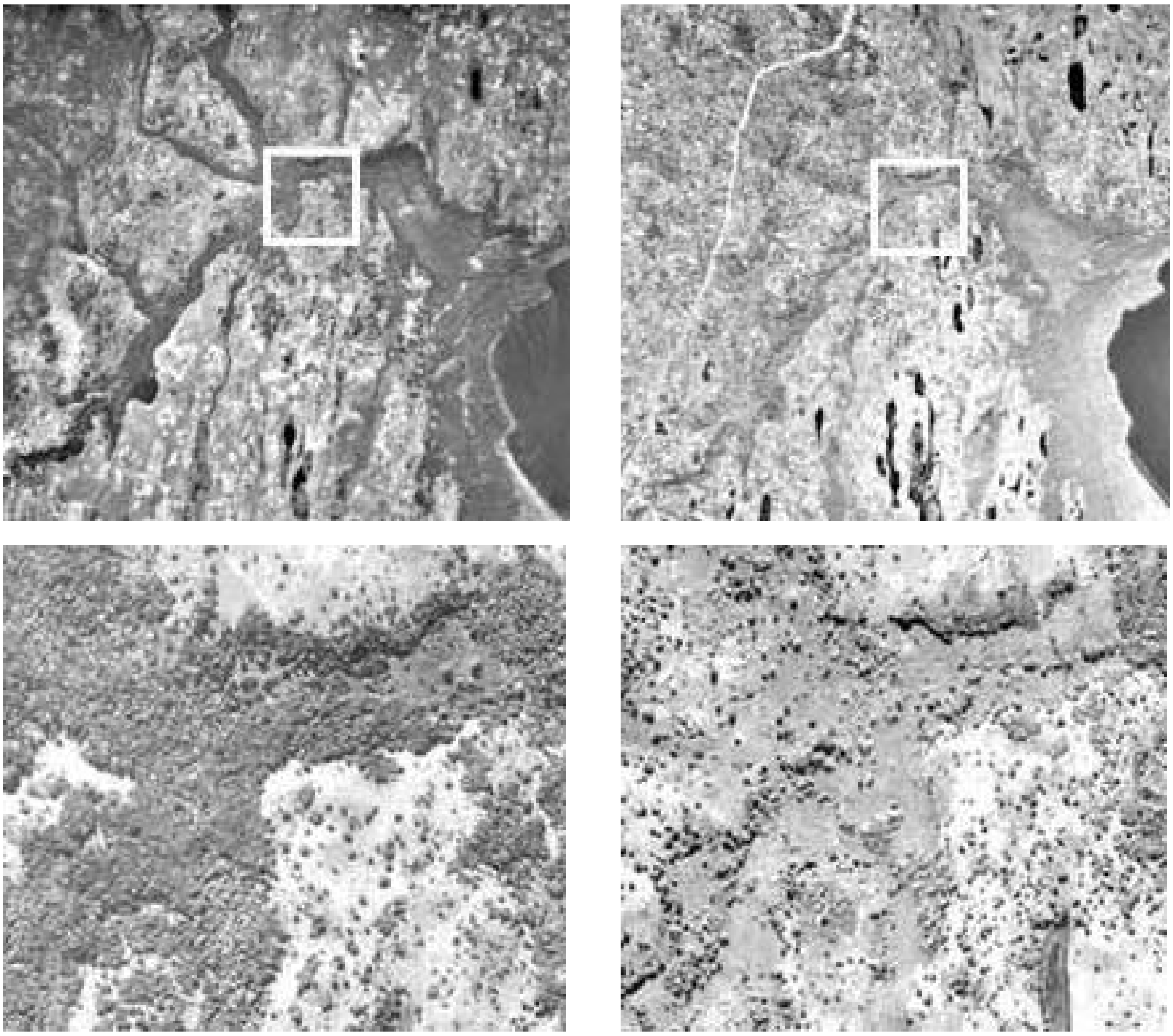

Fig. 3: The damage of coastal peat swamp forests in KwaZulu-Natal, South Africa: Kosi-Bay area, Swamanzi valley north-east of Manguzi .Comparison of aerial photographs from 1959 (left) and 2000 (right). The bottom pictures focused in detail the framed area above. Clearly visible is the destruction of the forest canopy and the inversion in open areas. (Aerial photographs: Chief Directorate Survey and Mapping, Mowbray, SA)

Wise use guidelines development

The conservation of nature resources in the form of total preservation often miss the targets desired. Only in remote areas without traditional requirements and needs can human activities be excluded without major problems. In the face of old traditional tribal rights and respecting the equality of interests, solutions should always be based on “Community based sustainable development” and “Environmental entitlements analysis” (Kepe 1997), where the local communities (mostly in form of community-based organisations CBO’s and/or tribal authorities representatives) are directly involved in the planning and decision making (e.g. Wynne & Lyne 1995). The development of the wise use practices should build up on the analysis of the traditional needs and utilisation of the area and keep in mind the actual socio-economic situation of the local community. The implementation of new wise use principles should always contribute to poverty reduction and direct involvement of the locals.
As an example of an international project on the development of wise use guidelines for critically endangered peatlands the GPI project Maputaland (Wise Use of Peat Swamp Forests in Maputaland, South Africa & Mozambique) may be mentioned. The Tembe tribal community is involved in the project, together with local and regional NGO’s, state

authorities, and academic institutions. Based on the actual threat analysis as well as the analysis of values and functions of the unique swamp forests, wise use management practices of the peatlands and alternative use of adjacent areas are suggested.

Environmental education, training, and public awareness

Not only the high poverty of the people and their every-day concern how to manage the essential minimum needs for the family are responsible for the predacious use of natural resources. It is also the lack of appropriate environmental education and training capacities. In the last century, the indigenous population was often held back from adequate education sources – so today we harvest, also in this respect, more fruits of the discreditable chapter of African colonial history.

The need for suitable environmental education is enormous. The appropriate methods are to be developed for all population classes and easy, understandable educational tools must be achievable for a broad stratum of people. Numerous education tools concerning the wise use of wetlands and peatlands were elaborated already, but in my own opinion, they reach only a negligible portion of the addressees. ommunity training has proved to be a very effective method. Using model sites and case examples with direct involvement of the local community, showing suitable management methods and wise use options of alternative use that brings benefits both for natural resources and humankind, often leads to fast acceptance and broad implementation. Such methods generally meet the goals more efficiently than pure policy directives.

Legislative and policy instruments

It is the important role of the international community, both as governmental and non-governmental co-operation, to help the development of the modern legislative and policy instruments for the efficient conservation and wise use of national wetland and peatland resources. The membership of African countries of relevant international conventions (RAMSAR, CBD, UNFCCC) is a good opportunity to utilise the available international capacity, but also to attract attention of the international floor to important and urgent national problems.

At the end of my short analysis and in retrospect of my own experience gained in the south of this continent during the past few years, here is a concluding remark:

Recognising the importance of peatland and wetland restoration efforts in European countries, we should keep clearly in mind that there are enormous problems and needs outside the borders of the prosperous and affluent industrialised countries. If we moan about our troubles, we should not forget that there are far greater problems elsewhere. The success of our professional work should be measured not only by the good results in our home environment but also by the extent of help for indigent humankind. The better our knowledge of the wise use of peatlands and of peatland restoration acquired, the more efficient the assistance to those who require our help can be. This is our human commitment.

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A new worldwide overview of mires and peatlands.

by Hans Joosten

Guicciardini[1] says, that it is not known whether Asia, Africa, or America, contain any mosses, as no search has been made. Degner[2] and Dr. Anderson[3] deny that there are any in these regions. The latter says that he has been assured, from very good authority, that there is not to be found on the whole continent of America a single particle of real and genuine peat moss. The former argues upon this as a fact: "If," says he, "forests are converted into moss[4], the greatest part of Moscovy, Tartary, America, and other woody uncultivated regions would have, ere now, undergone this change, which is not the case."

To this I reply, 1st, That in woody regions, moss is of little value; it is never in request as a fuel, as the abundance of wood supplies its place. No efforts are made to search for it as a soil or a manure. The former can be produced in abundance; the latter is less requisite. Mosses, therefore, may exist in these regions, though no notice be taken of them.

2. Accordingly, in Russia they abound; many marshes and valleys in that empire are filled with it. This I am assured of from unquestionable authority.

Tooke[5], in his View of the Russian Empire[6], says, that in Siberia, there are abundance of morasses of different magnitudes. Towards the shores of the Frozen Ocean, for several hundreds versts in width, is one prodigious watery morass, grown over with moss, and destitute of wood.

In the interior of the country are many smaller: he specifies four different kinds: 1. Low watery land; 2. Swamps which yield turf; 3. Bottomless morasses, which appear to be lakes overgrown; 4. Moss morasses, the deep and useless moss of which will permit neither grass nor shrub to grow.

3. In South America, at least on the Peruvian mountains, it has been discovered. I have also been informed by a gentleman who lived thirty years on the banks of the Mississippi, and had occasionally visited all the United States, that moss is frequently found in the vallies. He mentioned, that it is generally covered with a green surface which conceals it from view; but below this many feet of moss is often found. He said that the skeleton of the bergamot in the possession of Mr Peel[7], was dug out of moss.

Till it be ascertained beyond a doubt that there is not to be found a particle of genuine peat in these regions, it would be superfluous to offer any reply to this objection, or to attempt to obviate this difficulty.

Rev. R. Rennie 1807. Essays on the natural history and origin of peat moss.
Archibald Constable & Co,. Edinburgh, pp. 218 – 220.

[1] Lodovico Guicciardini (1521-1589)
[2] Johann Hartmann Degner (1687 - 1756)
[3] James Anderson (1739-1808) in his 1794 book: Practical treatise on peat moss.
[4] A general opinion in those days was, that peat originated from wood.
[5] William Tooke (1744-1820)
[6] Tooke, W. 1799. View of the Russian Empire during the Reign of Catherine the Second. 3 vols., London, 1799.
[7] Sir Robert Peel (1750-1830), Member of Parliament and father of the later prime Minister of the same name.

IMCG is currently preparing a worldwide overview of the status of the mires and peatlands of the World. For every country a description is given of the natural conditions (as far as relevant for peatland occurrences), the mires and peatlands present, their condition, their uses, and the expected trends.

We want to present a first complete draft of this detailed global overview at the end of 2003. IMCG members – and other interested people – who can contribute data on specific countries are requested to contact Hans Joosten (joosten@uni-greifswald.de).

During the development of the background report on the Wise Use of Mires and Peatlands (Joosten & Clarke 2002), one issue has - time and again - been a matter of dispute: the extent and condition of peatlands in every country. Therefore it was decided to compile a new and critical international overview, with - per country – detailed background information and references. Next to these countrywise overviews, also global compilations will be presented. A first overview of this IMCG project that is partly funded by the Global Peatland Initiative is presented here.

Consistency

The new overview has to be as consistent as possible. This means that the variety of data in existing publications have to be adjusted to uniform standards. In our case, we use the concepts and terms (wetland, peat, peatland – with minimally 30 cm of peat- , suo, mire) as defined by Joosten & Clarke (2002).

> "It remains only to point out that without a precise definition of the concept of peatland any useful peatland statistics cannot be collected and that all cartographic exercises and statistical studies of the area and distribution of peatland carried out without such definition (as well as all concludions based on these) must be handled with appropriate care."
> C.A. Weber 1902/2002.

We "translate" the terms used in the references into these standard terms if it is sufficiently clear what is meant. When this is not completely clear, we use the original terms (or a close English equivalent) in "quotes" to illustrate the ambiguity in terms

Reliability

We test the reliability of the data by considering typological differences (where possible, we recalculate all data to the 30 cm criterium), scale differences, time differences, changing national borders and names, calculation or printing errors and quotation mistakes, pseudo-exactness introduced through recalculation of figures in the metric system, and repetition of source error. We try to reconstruct the quotation pathway of figures in order to arrive at the original source of the data presented. In a quotation sequence the data may be expected to become "less unreliable" as with every consecutive citation more people (should) have given consideration to their probability. Special attent is paid in this respect to key publications that are often cited for peatland distribution data.

The 30 cm criterion

The calculation of the 30 cm criterion area for regions for which these data are not available is done by developing "translation tools" by correlating and extrapolating data on various peat depths that are available for some countries. In this way we have already discovered that many "primary data" are not primary data at all but are themselves already extrapolations. For example: the correlation between the values for "suos" (> 0 cm of peat) and "peatlands" (> 30 cm of peat) of Tjuremnov (1949) are simply to good to be true (see Figures 1 and 2).

Original occurrence

For the 'original occurrence', the maximum mire extent in every region during the Holocene has been used (cf. Fig. 3). Applying a fixed time slice would have been complicated, as mires were already being destroyed in some regions, very early and extensively, while still expanding in other places. There are no indications that a substantial area of mires disappeared naturally since the Holocene climate maximum. Changes in the areal extent of mires and peatlands are therefore largely attributable to human activities, both on site as outside the peatland area (e.g. hydrological changes outside the mire area).

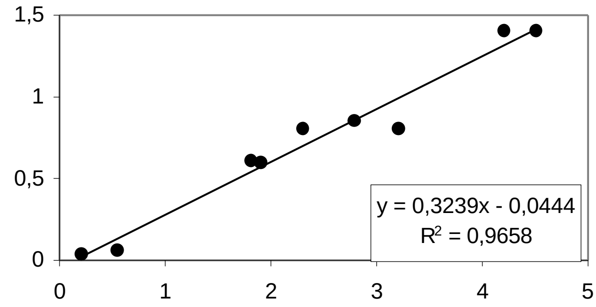

Fig. 1 Relation between suos (peat thickness > 0 cm, x-axis) and peatlands (peat thickness > 30 cm, y-axis) for the European part of the former USSR excluding Northern Territory, Leningrad Province and Karelian ASSR (after data from Tjuremnov 1949)

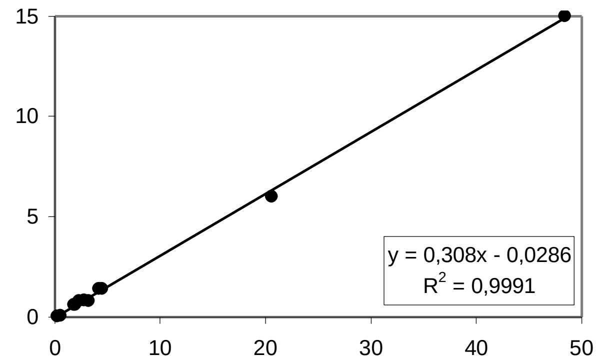

Fig. 2 Relation between suos (peat thickness > 0 cm, x-axis) and peatlands (peat thickness > 30 cm, y-axis) for the European part of the former USSR (after data from Tjuremnov 1949)

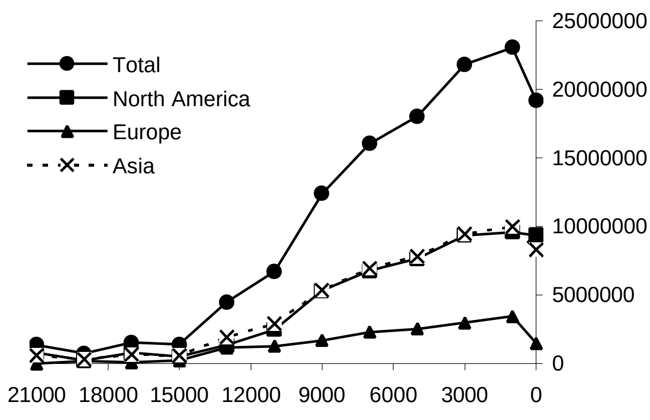

Fig. 3: The area of Sphagnum peatlands in North America, Europe, and Asia in the last 21,000 years. X- axis: years BP, y-axis: area in km^2. After Gajewski et al. 2001.

Drainage of peatlands leads to peat subsidence and oxidation/mineralization of the peat (Kuntze 1992) and a decrease of the peat depth in time. When the peat layer become less than 30 cm thick, the area is not called a peatland anymore according to our

inventory definition. The peat may eventually disappear completely (Borger 1975, Leenders 1989) and former peatlands change into humus rich mineral soils. Consequently these former peatlands are excluded from recent geological or pedological inventories that use a minimum peat thickness for classifying peat soils/deposits.
The rate of peat mineralization is a function of land use intensity (incl. drainage depth, intensity and type of land use), climatic conditions, and peat type. As the climatic conditions largely determine peat type and land use, these parameters are to some extent correlated. The rate of "peatland" disappearance is furthermore determined by the depth distribution of the peatlands, deep peatlands taking more time to disappear (becoming less thick than 30 cm) than shallow ones.
On the basis of the literature we have developed rules of thumb to correct for former peatland losses that are not covered by recent inventories.

Underrepresented types
The overview concentrates on freshwater peatlands. Some peat accumulating ecosystem types are generally overlooked in inventories because they are - erroneously - not considered to be peatlands or mires. These will inevitably also be underrepresented in our inventory. Such ecosystems include mangroves, salt marshes, paludified forests, cloud forests and elfin woodlands, paramos, dambos, and cryosols.

Presentation
The data are mostly presented for national states, as this is the basis of most inventories, maps, and publications. They are pragmatically ordered according to "continents" based on the availability of data. Irian Jaya is, for example, scheduled under Indonesia in the "Asia" continent, whereas Papua New Guinea is allotted to Australasia. Next to national states, other distinct and disjunct areas (isolated areas like Greenland, Spitsbergen/Svalbard, Tasmania) or contested regions (e.g. Falklands/Malvinas, Jammu and Kashmir) are presented separately.
Within the continent chapters, the countries and other areas are arranged alphabetically. For every country/region a short introduction is provided comprising the location and extent of the country and the major physiogeographic characteristics of the area, as far as relevant for peatland distribution. We have uptil now collected information for 255 countries/regions.

In the following we present some "under construction" examples (references excluded) of the new global peatland overview, i.e. the first country/region of each "continent".

Africa: Algeria (People's Democratic Republic of) (Algérie)

Algeria is a republic in western North Africa. It is bordered to the north by the Mediterranean Sea, to the east by Tunisia and Libya, to the south by Niger, Mali, and Mauritania, and to the west by Morocco. Its total area is 2,381,741 km^2.

From north to south, four main physical regions extend across the country:

– The Tell along the Mediterranean coast consists of a narrow (80 to 190 km) coastal plain backed by the mountainous area of the Tell Atlas Mountains. The numerous valleys contain most of Algeria's arable land, that is, however, poor in humus and has suffered from overcultivation
– The High Plateau, a highland region of level terrain
– The mountains and massifs of the Saharan Atlas
– The Algerian Sahara, comprising more than 90 per cent of the country's total area. Much of the terrain is covered by gravel, although the Great Eastern Erg and the Great Western Erg are vast regions of sand dunes. In the south are the Ahaggar Mountains, which culminate in Mount Tahat (3,003 m), the highest peak in Algeria.

The country's principal river, the Chelif (725 km), rises in the Tell Atlas and flows to the Mediterranean Sea. No permanent streams are found south of the Tell. Several basins in the High Plateau collect water during rainy periods, forming large, shallow lakes; as these dry they become salt flats, called chotts, or shotts.
The Tell region has a typical Mediterranean climate, with warm, dry summers and mild, rainy winters. This is the most humid area of Algeria, with an annual precipitation ranging from 400 to 1,000 mm. The mean summer and winter temperatures are 25° C and 11° C, respectively. During the summer an exceedingly hot, dry wind, the sirocco (known locally as the chehili), blows north from the Sahara. To the south the climate becomes increasingly dry. Annual precipitation in the High Plateau and Saharan Atlas ranges from about 200 to 400 mm. The Sahara region experiences daily temperature extremes, wind, and great aridity; annual rainfall is less than 130 mm in all places.
The northern sections of Algeria have suffered from centuries of deforestation and overgrazing. Remnants of forests exist in a few areas of the higher Tell and Saharan Atlas.
Lower slopes are bare or covered with scrub vegetation. Much of the High Plateau is barren, but tracts of steppe vegetation are present. Plant life in the Sahara is widely scattered.
Forests, which contain much brushwood, cover 0.9 per cent of Algeria's land area (Microsoft Encarta Encyclopedia 2002).

According to Britton & Crivelli (1993), Algeria has 290 km^2 of freshwater marshes.
Schneider & Schneider (1990), basing on oral communications of Adam Palcynski, mention the occurrence of peatland near the coasts and on coastal mountain slopes in Algeria. The peat deposits that partly consist of halophilous plants are stated to be up to 5 m thick.
Lappalainen & Zurek (1996c) only mention the Mekhada Marsh (220 km²) as a peatland area, but the peatland character of this area is questionable. Many wetlands in Algeria have been destroyed, including the majority of Lake Fetzara.

References still to be checked:

Renault-Miskovsky, J. 1985. L´environnenment végétal des sites préhistoriques algeriens données actuelles de la paléobotanique. L´Anthropologie, 89,3, 307-318
Salamani, M. 1991. Premières donnés palynologiques sur l'histoire Holocène du massif de l'Akfadou (Grande-Kabylie, Algérie). Ecologia mediterranea 17: 145-159. Grande Kabylie (36°48´N, 40°35´E) 1230 m, Algeria. Pollen.

America and Antarctica: Argentina (Argentine Republic)

(As far as we know now Anguilla and Antigua and Barbuda had/have no peatlands, therefore we present Argentina as an example for America).

Argentina is a federal republic in southern South America, bordered on the north by Bolivia and Paraguay; on the east by Brazil, Uruguay, and the Atlantic Ocean; on the south by the Atlantic Ocean and Chile; and on the west by Chile. The country occupies most of the southern portion of South America.
The length of Argentina from north to south is about 3,330 km; its maximum width is about 1,384 km. The country includes the Tierra del Fuego territory, which comprises the eastern half of the Isla Grande de Tierra del Fuego and a number of adjacent islands to the east, including Isla de los Estados. The area of Argentina is 2,780,400 km^2; it is the second-largest South American country, after Brazil. Argentina claims the Falkland Islands / Malvinas, and other sparsely settled southern Atlantic islands as well as part of Antarctica.
The western boundaries of the country fall entirely within the Andes, the great mountain system of the South American continent. The Patagonian Andes, which form a natural boundary between Argentina and Chile, are one of the lesser ranges, seldom exceeding about 3,660 m in elevation. From the northern extremity of this range to the Bolivian frontier, the main Andean cordillera occupies the western part of Argentina, with a number of peaks above about 6,400 m. Several parallel ranges and spurs of the Andes project deeply into northwestern Argentina. The only other important highland in Argentina is the Sierra de Córdoba in the central part of the country. Its highest peak is Champaquí (2,850 m).
Eastwards, from the base of the Andean system, Argentina consists almost entirely of a flat or gently undulating plain that gradually slopes from an elevation of about 600 m to sea level. In the north, the Argentine plains consist of the southern portion of the South American Chaco. The Pampas, treeless plains that include the most productive agricultural sections of the country, extend nearly 1,600 km south from the Chaco. In Patagonia, south of the Pampas, the terrain consists largely of arid, desolate steppes.
The chief rivers of Argentina are the Paraná, which traverses the north-central portion of the country; the Uruguay, which forms part of the boundary with Uruguay; the Paraguay, which is the main affluent of the Paraná; and the River Plate, the great estuary formed by the confluence of the Paraná and the Uruguay rivers. Other important rivers of Argentina are the Colorado, the Salado, and the Negro. In the area between the Salado and the Colorado and in the Chaco region, some large rivers empty into swamps and marshes or disappear underground. There are also many lakes, particularly among the foothills of the Patagonian Andes. Extreme pollution of the rivers in Buenos Aires is one of the main environmental concerns.
Temperate climatic conditions prevail throughout most of Argentina, except for a small tropical area in the northeast and the subtropical Chaco in the north. In the vicinity of Buenos Aires the average annual temperature is 16° C. The January and July averages for this area are, respectively, 23° C and 10° C. In San Miguel de Tucumán the average January temperature is 26° C and the average July temperature is 13° C. Considerably higher temperatures prevail near the tropic of Capricorn in the north, where extremes as high as 45° C are occasionally recorded. Climatic conditions are generally cold in the higher Andes, Patagonia, and Tierra del Fuego. In the western section of Patagonia winter temperatures average about 0° C. In most coastal areas, however, the ocean exerts a moderating influence on temperatures.
Precipitation in Argentina is marked by wide regional variations. More than 1500 mm falls annually in the extreme north, but conditions gradually become semi-arid to the south and west. In the vicinity of Buenos Aires annual rainfall is about 950 mm. In the vicinity of San Miguel de Tucumán annual rainfall is about 970 mm.
The soils of Argentina vary greatly in fertility and suitability for agriculture, and water is scarce in many areas outside the northeast and the humid Pampas. About 9 % of the country's land area is arable. The Pampas, which are largely made up of a fine sand,

clay, and silt are ideal for the cultivation of cereal. In contrast, the natural grasslands on the gravelly soil of most of Patagonia, in southern Argentina, are used primarily as pasture for sheep. About 52 % of the total land area of Argentina is used for pasturing cattle and sheep herds.
Most of the northern Andean foothill region is unsuitable for farming. Around 22 % is forest and wasteland. Situated mainly in mountain areas distant from centres of population, the woodland is relatively unused. (Microsoft Encarta Encyclopedia 2002).
Lappalainen & Zurek /1996d) mention a wetland area for Argentina of 40,500 km², including among others the Laguna Mar Chiquita's wetland (2,000 km²) and the wetland of Esteres del Ibera (11,000 km²) (Scott 1991). According to Ferrati et al. (2000) the Iberia system comprises a vast flooding depression of some 13,000 km², 90% of its surface being covered by aquatic or flooding plants.
4-8% of Patagonia is covered by „mallines" (wet meadows) (Horne et al. 2000). The flooded savanna of the Parana covers 38,900 km² (www.worldwildlife.org/wildworld/profiles/terrestrial/nt/nt0908_full.html).
Already Darwin (18xx, cited in Lesquereux 1844, probably Journal of Researches into the Natural History and Geology of the Countries Visited During the Voyage of H.M.S. Beagle 1839, Henry Colburn Publishers of London.) described peatlands from Tierra del Fuego and pointed at the existence of peatlands dominated by the cushion plants *Astelia* and *Donatia* (p. 349)
According to Bonarelli (1917), 500 km² of "peatlands" (with an estimated 125 Mt of peat reserves) are found in Tierra del Fuego, covering 2.51% of the island. Also Von Bülow (1929) uses this figure for the area of Tierra del Fuego "peatlands". Guinazú (1934) presents an areal figure of 400 km^2 only of Sphagnum "peatlands" on the Argentine part of Tierra del Fuego, with a mean peat thickness of 1.5 m. According to Schneider (1958) a detailed inventory of peatlands in Argentina was made "during the times of Peron" (1946-1955).
Schneider (1976, 1980) mentions a "peatland" area for Argentina of 450 km^2, a figure quoted by Kivinen & Pakarinen (1980) for the peatland area (> 30 cm peat), by Bord na Mona (1984) and Andriesse (1988) for the extent of organic soils, by Markov et al. (1988) for the area of „peat resources" (peat thickness not mentioned), and by Markov et al. (1988) and Pfadenhauer et al. (1993) for the peatland area (> 30 cm peat).
Shrier (1985), basing on Kivinen & Pakarinen (1981), presents a figure of the "mire area" and "peat deposits" of 450 km^2. These are said to include acidic "mire formations" in wet depressions in the Patagonian prairie and deposits associated with Fluvisols in the basin and delta of the Colorado River. According to Markov et al. (1988) most of the peatland area is found in the south and the east of the country in the floodplains of the Rio Negro, Rio Salado, and Parana rivers. Furthermore they mention mangroves at the Atlantic Ocean and some forested peatlands along the rivers.
Some peat deposits have been reported from the Laguna de los Pozuelos (Ramsar 1996).
Pfadenhauer (1990) refers to "cushions bogs" in the high mountain areas of Argentina. Peatlands are reported from the Anconquija mountains (www.nmnh.si.edu/botany/projects/cpd/sa/sa35-img.htm).
According to Rabassa et al. (1996) the majority (95%) of the Argentinian peatlands is found in the Isla Grande de Tierra del Fuego. Other peatlands are found in the highland valleys of the Andean Cordelliera (lat. 23°-53° S), more precisely in the Puna (northernmost Argentina), and the Andean provinces of Mendoza, San Juan, Neuquén, and Santa Cruz. Deep peatlands are also present on the Falkland/Malvinas Islands (see there). In the mountain valleys of the Province of San Luis, peaty materials are locally known as "turbas terrrosa" ("earthy peat") and "tierra negra turbosa" ("peaty black soil") and are widely used for soil-improvement. Wetlands and "swampy bogs" are also reported from the fluvial valleys of the Paraná-Río de la Plata basins in Eastern under subtropical conditions Argentina.
Rodolfo Itturaspe (Ushuaia, pers. comm. 2001) estimates the total area of peatlands in Argentina on 2,300 - 2,800 km2, with at least 2,400 km2 as a good approximation. These estimates are based on a preliminary map of peatlands of Isla Grande of Tierra del Fuego (GS elaborated satellite images). Tierra del Fuego is estimated to contain 90% of the peatlands of total Argentina.
The former estimations for Tierra del Fuego probably did not include the largely inaccessible Peninsula Mitre (East part of Tierra del Fuego, mountain area and Staten Island) with its 1,800 – 1,900 km^2 of peatlands. North of Lagoa Fagnano (TdF) 200 – 700 km^2 of peatlands can be found, the exact area being unclear because of the difficulty to separate mires from "vegas" (wet grasslands).
Schwaar (1989) describes terrestrialization and spring mires from Lago Argentino in South-Patagonia.
The use of peatlands in Argentina is limited. Some extraction of peat for agricultural and horticultural use takes place in San Luis and in Tierra del Fuego (Rabassa et al. 1996). In Tierra del Fuego peat extraction is rapidly increasing since the completion of the Transamerican Highway. Rodolfo Itturaspe (Ushuaia, pers. comm. 2001) estimates the total area drained for peat extraction as not larger than 10 km^2.
In Ushuaia, peatlands are frequently disturbed by urbanization by overloading or by total/partial removal of peat (Rabassa et al. 1996).
Pictures from peatlands in the Anconquija mountains can be found under http://www.nmnh.si.edu/ botany/projects/cpd/sa/sa35-img.htm, whereas pictures from Tierra del Fuego peatlands are available under www.geocities.com/riturraspe/turberas/turba_fotos and www.wetlands.org/projects/GPI/gpi0.htm

Asia: Afghanistan

Afghanistan is a republic in southwestern Asia, bordered on the north by Turkmenistan, Uzbekistan, and Tajikistan, on the east by China, Jammu and Kashmir, and Pakistan, on the south by Pakistan, and on the west by Iran. Afghanistan has a maximum length, from northeast to southwest, of about 1,450 km and a width of about 725 km. It has an area of 652,225 km^2.

Afghanistan consists for about three quarters of its surface of uplands. The principal mountain system is the Hindu Kush with an average altitude of about 4,300 m with some peaks over 7,500 m high. The main lowlands are a series of river valleys in the north and various desert regions in the south and southwest. The chief rivers are the Amu Darya on the border of Tajikistan; the Kabul, which flows into the River Indus; the Helmand in the south; and the Harirud in the west. All these rivers except the Kabul empty into lakes or other wetlands.

Temperatures in Afghanistan exhibit great daily and seasonal variations, the annual rainfall averaging about 300 mm. Most of the rainfall occurs between October and April. Sandstorms occur frequently in the deserts and arid plains (Microsoft Encarta Encyclopedia 2002)

As a consequence of its mountainous and extremely arid character, Afghanistan possesses few wetlands other than the major river systems (Scott 1995, Spiers 1999).

Bortenschlager & Patzeldt (1978) describe a shallow peatland with 1 m of Cyperaceae peat intertwinned with some sand and loam layers from the lakeside of Ptukh Lake in the Wakhan-Pamir (3272 m a.s.l.). Markov et al. (1988) estimate the area of „peat resources“ in Afghanistan as being 120 km^2, elsewhere they mention 100 – 120 km^2 of peatlands with a peat thickness of 1 – 1.5 m. Also Lappalainen & Zurek (1996b) use this figure of 120 km^2.

An overview of possible peatland occurrences in recent wetlands is presented in Table 1.

Wetlands in Afghanistan have been seriously affected by drainage for agriculture and urban development, and by diversion of water supplies for irrigation purposes (Scott 1995, Spiers 1999)

Table 1: Possible peatland occurrences in recent wetlands in Afghanistan, derived from Scott 1995.

Name	character	former area	present area
Amu Darya	Braided river channels with vast tracts of Phragmites	> 400 km^2	Much of the area probably already drained and under cultivation
Kole Hashmat Khan	Brackish lake and marshes, half covered with Phragmites	2 km^2	largely drained and converted into agricultural land
Lake Duronta	Reed beds along western shore	20 km^2	
Hamun-I-Puzak	Freshwater lake largely covered by Phragmites	350 km^2	

Australasia and the Pacific Islands: Cook Islands

(As far as we know now, Clipperton had/has no peatlands, therefore we present the Cook Islands as an example for Australasia and the Pacific Islands)

The Cook Islands comprise 15 small oceanic islands in the central South Pacific, defined by statute as all the islands between latitudes 8° and 23° South and longitudes 156° and 167° West, to the west of American Samoa and the east of French Polynesia. The islands are situated about 3,200 km northeast of New Zealand, and are a self-governing country in free association with New Zealand.

A mixture of coral atolls and volcanic peaks, the total area of the island group is 237 km^2.

Five of the islands in the northern Group (Suwarrow, Tongareva/Penrhyn, Manihiki, Rakahanga and Pukapuka) are low-lying coral atolls with central lagoons, while the sixth (Nassau) is a tiny sand cay. Of the 15 islands only 2 are uninhabited: Manuae and Takutea. The highest point is Te Manga (652 m) on the island of Rarotonga.

Of the nine islands of the Southern Group, Averau/Palmerston and Manuae are typical atolls, Aitutaki is an "almost atoll" with a central volcanic cone rising to 119 m, and Takutea is a tiny sand cay on a coral foundation. The other five islands, Rarotonga, Mangaia, Mauke, Mitiaro and Atiu, are volcanic "high" islands with fringing barrier reefs. Rarotonga, the largest island in the group and much the highest island with a peak at 650 m, is now deeply dissected by erosion. The others have much lower volcanic cores surrounded by raised coral limestone platforms (makatea). Almost 90% of the land area is in the Southern Group, with the island of Rarotonga (67 km2) accounting for over a quarter.

The climate is tropical oceanic, influenced by winds from the northeast and southeast. The average annual rainfall on Rarotonga is about 2,100 mm, while that for the other islands ranges between 1,500 mm and 2,800 mm. The mean annual temperature on Rarotonga is 23.9°C. There is a pronounced wet season from November to April, when about two-thirds of the annual rainfall occurs, and a relatively cool dry season from May to October (Scott 1993b, Microsoft Encarta Encyclopedia 2002).

There are four main types of wetlands in the Cook Islands:

– Freshwater marshes and swamps: on Rarotonga, Mangaia, Atiu, Mitiaro and Mauke.
– Permanent freshwater lakes: Lake Tiriara on Mangaia, Lake Tiroto on Atiu, and Lake Rotonui and Lake Rotoiti on Mitiaro.
– Tidal salt marsh: at Ngatangiia Harbour on Rarotonga.
– Mountain streams: on Rarotonga.

There are no mangroves in the islands.

On Rarotonga, freshwater marshes and swamps occur widely in flat-bottomed depressions between the coastal ridge and the base of the alluvial fans of streams rising in the interior. These depressions, which may be several hundred metres wide but are generally less than one metre deep, contain finer sediments than the adjacent ridges, and are widely used for taro cultivation.

On Atiu, Mangaia and Mauke, extensive freshwater swamps are present in a broad zone around the central volcanic cores of the islands. These wetlands have formed in depressions between the volcanic interiors and the surrounding raised limestone terraces (makatea).

The Mangaia Swamps and Lake Tiriara (21°55'S, 157°56'W) on the island of Mangaia in the Southern Group are five main areas of freshwater swamp, each of about 20-30 ha in extent, and a 20 ha freshwater lake around the edge of the volcanic hills in the centre of Mangaia Island, where water collects between the volcanic hills and the limestone plain. Large portions of the swamp have been modified for the cultivation of taro (*Colocasia esculenta*). An endemic subspecies of the Cook Islands Reed Warbler (*Acrocephalus kerearako kerearako*) frequents a wide variety of habitats including reed-beds.

The Atiu Swamps and Lake Tiroto (20°00'S, 158°07'W) on the island of Atiu (27 km^2) in the Southern Group consist of freshwater marshes around the inner edge of the makatea where water runs off the volcanic plateau, the permanent freshwater lake Tiroto. Large portions of the swamps have been modified for the cultivation of taro (Colocasia esculenta).

The Mitiaro Lakes and Swamps (19°49'S, 157°43'W, 400 ha) on the island of Mitiaro comprise a large area of freshwater swamps and peatlands with two permanent freshwater lakes in the volcanic interior of Mitiaro Island.The island is unusual in that much of the volcanic plateau in the centre of the island is only about one metre above sea level, and is considerably lower than the surrounding makatea, which rises to about 9 m above sea level. Large areas in the volcanic interior are permanently swampy, and there are extensive peat deposits. In the lower, eastern portion of the interior, there are two lakes, Lake Rotonui (about 50 ha) in the south and Lake Rotoiti (a few ha) in the north. Large portions of the swamps and peatlands have been modified for the cultivation of taro (Colocasia esculenta). A subspecies of the Cook Islands Reed Warbler (*Acrocephalus kerearako kaoko*) is endemic to the island. (Scott 1993b)

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Europe: Albania (Republic of) (Shqipëri)

Albania is a republic in south-eastern Europe, located in the western part of the Balkan Peninsula. It is bounded on the northwest and north by Serbia and Montenegro, on the east by the Former Yugoslav Republic of Macedonia (FYROM), on the southeast and south by Greece, and on the west by the Adriatic Sea. Albania has a maximum length from north to south of about 345 km and a maximum width of about 145 km. Its total area is 28,748 km^2.

Albania is predominantly mountainous with peaks averaging between 2,100 and 2,400 m. Lowlands, which comprise less than one quarter of the land area, are limited to a belt along the Adriatic coast north of Vlorë and to several river valleys extending inland from the coast. The rugged North Albanian Alps form the southern end of the Dinaric Alps and include Albania's highest peak, Mount Korab (2,751 m). In the central and southern parts of the country high plateaux and basins interrupt the mountains. The coastal lowlands possess rich soils, but in many places the land is marshy or poorly drained.

Most of Albania's rivers rise in the mountainous east and flow west to the Adriatic Sea. The largest of these - the Drin, Shkumbi, and Mat - have broad valleys. Albania's three large lakes straddle its borders: in the north-west, Lake Scutari, and in the east, Lake Ohrid and Lake Prespa.

The Adriatic coastal region has a typical Mediterranean climate, with mild, wet winters and hot, dry summers. Inland, a more severe continental climate prevails, with marked seasonal temperature extremes. Average annual precipitation ranges from about 1,000 mm on the coast to nearly 2,500 mm in sections of the northern mountains. Summer precipitation is scant in all parts of the country.

About one fifth of the country's land is arable. Major drainage and reclamation projects since the 1950s have added greatly to the total farmland (Microsoft Encarta Encyclopedia 2002).

According to Britton & Crivelli (1993) Albania had 2,000 km² of "marshes" in the 1940s. 600 km² had been drained by 1980.

Shumka (2002 in prep.), quoting Klosi (1965), gives a "peatland" area for around 1946 of 500 km2. He substantiates this with detailed descriptions of individual peatlands (with often substantial peat thicknesses) of some 200 km2. The soil map of Albania of 1958 (available under www.nhq.nrcs.usda.gov/WSR/albania/albania2.html) indicates for 1958 an area of approximately 40 km^2 of histosols (livadhore torfike). Lappalainen & Zurek (1996a) estimate the recent "peatland" area to be < 100 km². Shumka (2002 in prep.) mentions a current peatland area of over 179 km^2 of which 3 – 4 km^2 may currently still be peat accumulating.

The mires of the Kolkheti lowlands (Georgia)

by Hans Joosten, Andreas Kaffke & Izolda Matchutadze

Because of its climatic and geographic situation the Kolkheti (Colchis) region (Georgia) represents a centre of biodiversity and human activity on the transition of Europe and Asia.
Its unique climate combines a high annual temperature of 14,1^o C with very high levels of annual precipitation ranging between 2,531 mm in the south and 1,458 mm in the north. 29% of the precipitation falls in summer. Consequently air humidity is high throughout the year with values between 70% and 83% (station Poti). Frost hardly occurs. These climatic conditions are extremely favourable for the growth of mires. The total area of mires and peatlands in Georgia („tchaobi" in Georgian) is ca. 450 km² (Markow et al. 1988) with the majority in the 2,000 km² large Kolkheti Lowlands (Kobulina 1974, table 1).
The mires of subtropical Kolkheti with their luxurious *Sphagnum* vegetation - situated between citrus groves and tea plantations - form a structural and functional transition between the mires of the boreal and those of the tropical zones. The special character of the area and its mires brought Botch & Masing (1983) and Succow & Joosten (2001) to the distinction of a specific Kolkheti mire region within Eurasia.

Flora and vegetation

The Kolkheti mires display a diverse vegetation with many endemic species and relicts from the glacial period. Ispani II and I (partly) are dominated by *Sphagnum papillosum*, *S. imbricatum*, and *S. palustre*. The vegetation further comprises amazingly few species, including *Molinia litoralis*, *Rhynchospora alba*, *R. caucasica*, *Rhododendron ponticum*, *R. luteum*, *Vaccinium arctostaphyllos*, and *Drosera rotundifolia*. This monotony makes Ispani II to a paradigm example of low internal (a-) diversity that contributes substantially to global ecosystem (ß- and ?-) biodiversity (Joosten 2001).
In Imnati *Sphagnum palustre*, *S. papillosum*, and *S. magellanicum* are interestingly accompanied by *Carex lasiocarpa*, *C. rostrata*, and *Cladium mariscus*. The minerotrophic parts of Nabada are characterized by *Cladium mariscus*, *Sphagnum palustre*, *Carex gracilis*, *C. lasiocarpa*, *C. riparia*, *Potentilla erecta*, *Lysimachia vulgaris*, *Hydrocotyle vulgaris*, *Molinia litoralis*, and *Eupatorium cannabium*.
Most data on the vegetation of the Kolkheti mires go back to Dokturowski (1931, 1933) and Flerow (1936). In the 1960s some studies were published by Kolakowski (1961), Tumadjanow (1962) and Kimeridse (1962, 1963, 1966), but since then the subject has drawn little scientific attention (cf. Kimeridse 1992 unpublished, Potskhishvili et al. 1997, Matchutadze 1999). All studies have been confined to the floristic composition of the vegetation. A compatibility with a modern vegetation typology is absent.

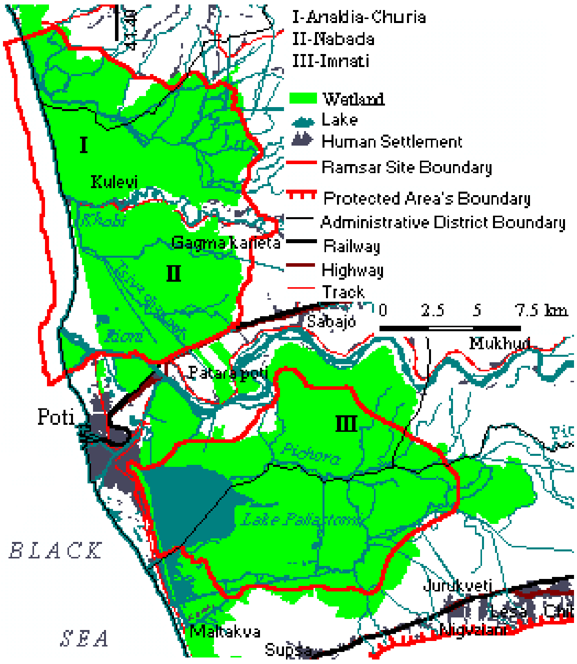
Table 1: Large peatlands in the Kolkheti Lowlands (area data after Dokturowski 1931, Potskhishvili et al.1997, Matchutadze 1999).

Name	Area (ha)	Main vegetation type
Imnati	8,000	Sphagnetum; Alnetum
Anaklia-Churia	2,500	Sphagnetum; Caricetum, Alnetum;
Nabada	3,300	Sphagnetum
Maltakva peat bog*	980	originally Sphagnetum; now secondary vegetation types
Grigoleti*	420	partly Sphagnetum; secondary vegetation types
Shavtskala*	500	Caricetum; Juncetum; secondary vegetation types
Ispani II	250	Sphagnetum
Ispani I*	500	dispersed Sphagnetum; secondary vegetation types

* currently strongly degraded

Sphagnum

Among the major peat accumulating species, *Sphagnum* deserves special attention. Kolkheti is the only subtropical area in the world with *Sphagnum* dominated ombrotrophic mires. *Sphagnum palustre* grows here under ombrotrophic conditions, whereas the species elsewhere is restricted to mesotrophic, i.e. minerotrophic sites (Daniels & Eddy 1985). *Sphagnum imbricatum* is a main peat forming species in Ispani and Imnati (Dokturowski 1931, 1933, Potskhishvili et al. 1997, Kaffke et al. 2000). From 800 years BC on, its massive occurrence in the bogs of Central and Western Europe (Overbeck 1975) led to the accumulation of slightly decomposed *Sphagnum* peat ("white peat"), which is now of high economic value. In recent centuries, the species has become extremely rare in Europe (Green 1968), its massive decline being ascribed to climate change, fires, and eutrophication (cf. Mauquoy & Barber 1999). In Kolkheti the widespread dominance of *Sphagnum imbricatum* (Kaffke unpubl.) enables the study of vegetational characteristics and peat accumulation processes of this species. This will provide important information for advancing commercial *Sphagnum* cultivation that is currently being developed as a sustainable substitute for the exhausting fossil "white peat" (Joosten 1998, 2000, Gaudig & Joosten 2002).



The Central Kolkheti peatlands (changed after Geoinformation Center Tbilisi).

Relict species

During the last Glacial Maximum, Kolkheti constituted an important refugium for the flora of Europe (Tarasov et al. 2000). Because of this, the Kolkheti mires currently harbour - next to Tertiary relict species like *Rhododendron ponticum* - many (sub)mediterranean, temperate, and boreal relict species (Denk et al. 2001). Of special interest is the widespread occurrence of boreal mire flora elements in Kolkheti like *Drosera rotundifolia*, *Menyanthes trifoliata*, *Rhynchospora alba*, and *Carex lasiocarpa*. Many mire species, including Georgian and Caucasian endemics, are included in the Red Data Book of the Georgian SSR (1982). Examples include *Molinia litoralis*, *Nymphaea colchica*, *Ramphicarpa medwedewii*, *Drosera rotundifolia*, *Cicuta virosa*, *Hibiscus ponticus*, and *Osmunda regalis*.

Peat stratigraphy

The Kolkheti Lowlands are subject to regional subsidence (Dshanelidse 1989), which influences mire development decisively. Furthermore peat formation is affected by the absolute rise of the Black Sea water level. Some 10-11,000 years ago, that level was ca. 30 m lower than at present. Around 5,000 BP the Black Sea reached its present height (Chepalyga 1984). Since then water level fluctuations of 0,5 - 1,5 m have taken place (Potskhishvili et al. 1997).

In most peatlands (e.g. Nabada, Churia-Anaklia, Imnati/Paliastomi) peat accumulation started between 5,230 and 6,930 BP (Timofejew & Bogolyubowa 1998), in Ispani 2 clearly later (4,600 BP, Kaffke et al. 2000). The largest peat depths are found in Nabada (13 m), Imnati (12 m), Ispani II (8 m), and Anaklia-Churia (7 m). The peat depth in the *Sphagnum* mires may reach up to 12 meter (Dokturowski 1931), which makes them to the thickest *Sphagnum* mires of the World (cf. Nejschtadt et al. 1965).

The stratigraphy of the mires of the Kolkheti Lowlands has been studied by Dokturowski (1931, 1936), Nejschtadt et al. (1965) , Sluka (1973), Serebrjannyi et al. (1984), Dshanelidse (1989), and Timofejew & Bogolyubowa (1998). These studies focussed on the lithogenesis of the lowlands as the complex result of Black Sea trans- and regression, subsidence, and sedimentation. These processes also influenced land use considerably, e.g. by inundation of human settlements (Potskhishvili et al. 1997).

The deepest peat layers often lie considerably below the present sea level (e.g. Imnati up to 7 m, Nabada up to 11 m, Churia up to 6 m, Timofejew & Bogolyubowa (1998). The surface of the coastal mires is generally positioned at 0 - 4 m asl. The *Sphagnum* mires Ispani II and Imnati clearly have a higher surface with domed centres 4-5 m higher than their margins (Dokturowski 1931, Timofejew & Bogolyubowa 1998, own field observations). The peats in Imnati and Ispani II predominantly consist of *Sphagnum* and *Sphagnum*-sedge peats, in Anaklia-Churia of sedge and reed peats, partly of alder and *Sphagnum* peats, and in Nabada especially of reed peats, partly *Sphagnum* peats (Dokturowski 1931, Timofejew & Bogolyubowa 1998, own field observations). Many profiles show substantial stratigraphic changes.

Peat accumulation rates

The stratigraphical information and the 60 available ^{14}C-dates allow a general assessment of peat accumulation rates. 4 m of *Sphagnum* peat was formed within 1000 years in Ispani II, i.e. 4 mm y^{-1} (Kaffke et al. unpubl.). In Imnati the uppermost 6 m of *Sphagnum* and *Sphagnum* mixed peat accumulated with a rate of 3 mm y^{-1} (Nejschtadt 1965), in Anaklia and Nabada with 1.2 mm y^{-1} (Dshanelidse 1989). These values are (extremely) high compared with boreal and temperate peatlands (Göttlich 1990, Couwenberg et al. 2001). The associated accumulation rates of dry organic weight and Carbon (carbon sequestration rates) have not yet been assessed, information on the vegetation types and site conditions involved is virtually absent.

Detailed macrofossil analyses, that enable a good insight in the origin and development of the peatlands, are only available for Ispani I and II. The botanical composition of the uppermost 3 m of peat in Ispani II is largely identical with that of the recent plant cover, indicating that the vegetation has not changed substantially for 1000 year. (Dokturowski 1931, 1936, Kaffke et al. 2000).

Palynology

Pollen diagrams are available for almost all larger mires of Kolkheti. Their temporal and taxonomic resolution is very low, the diagrams of Nabada, Churia, Ispani 1 and 2 having a resolution of merely 400 year (Dokturowski 1931, 1936, Sluka 1973), the most detailed ^{14}C dated diagrams reaching only 150 (Anaklia) and 300 years (Imnati) (Serebrjannyi et al. 1984, Nejschtadt et al. 1965). The existing diagrams therefore offer only limited information on regional climatic, hydrological, vegetational, and cultural developments, especially with respect to short term fluctuations and rapid developments. Highly developed cultures have been present in the Kolkheti area since the 6th - 7th millenium BC (cf. Lordkipanidze 1991). Their history has until now hardly been subject of palynological research. The extremely high peat accumulation rates in the Kolkheti mires and the prevalence of slightly humified peats provide excellent conditions for temporally and taxonomically detailed palynological reconstructions of vegetation, climate, and settlement history.

Human impact

Because of the synchronous presence of man and mires over many millennia, and the fact that archaeological settlements have been found adjoining large mire complexes (e.g. Churia), an important role of human cultures in the development of Kolkheti mires can be assumed (cf. Joosten 2002). Especially anthropogenic grazing and fire may have been decisive in determining the development of mire vegetation and mire types (Krebs & Resagk 2002). Whereas such relations are evident from other areas of the world, also for prehistoric times (cf. Moore 1987, 1993, Törnqvist & Joosten 1988), little is known about this relation in Kolkheti.

Large-scale destructive human impact on the Kolkheti mires started at the end of the 19th century. Reclamation for agriculture had low priority because of the abundant availability of other suitable areas; the majority of the mires was reserved for future peat extraction (Kobulina 1974).

Around 1900 the surroundings of Lake Paliastomi were still untouched (Shavrov 1909).

The pretentious socialist agricultural development in Kolkheti was accompanied by massive deforestation. The virgin forests were replaced by plantations of tea, citrus, and tung tree. Canals were dug to drain the wetlands. In Imnati and Ispani I peat was extracted to be used as a soil improver in the plantations. Ispani I was largely destroyed by peat extraction during the 1920s/30s. Also Maltakva, Grigoleti, and Schavtskala are strongly affected by peat extraction and reclamation and have largely disappeared as peatlands. During the 1960s and 1970s dredge peat (hydrotorf) extraction led to an extensive system of canals and pits in the Imnati complex (Petrenko 1963). Most ditches were soon neglected and are currently overgrown (Potskhishvili et al. 1997, Matchutadze 1999). The peatlands Imnati, Churia, and Nabada are partly impacted by drainage and melioration. The degraded peatland ecosystems have been invaded by alien plant species.

The central part of Imnati, the largest peatland of the Kolkheti Lowlands, is still largely untouched (Potskhishvili et al. 1997). Also Ispani 2 is only affected marginally by drainage ditches.

Nature protection

The first state nature reserve in Kolkheti was established in 1935. In 1991 Georgia launched the Protected Areas Management Programme with support of WWF. On 7 July 1996, the Kolkheti mires Imnati, Nabada, Anaklia-Churia, and Ispani were designated as Ramsar wetlands of international importance because of their significance as habitats for wintering, nesting, and migratory birds. In 1999 the Georgian Parliament passed the law “On the establishment and management of the Kolkheti protected areas”. In the same year the Integrated Coastal Zone Management project (ICZM) became effective which includes the Kolkheti National Park and the Kobuleti Nature Reserve) aiming at

– establishment of a Kolkheti National Park (including Imnati, Nabada, Anaklia-Churia, and Lake Paliastomi) and a Kobuleti Nature Reserve (encompassing Ispani II and Ispani I),
– enhancement of sustainable use of regional goods and services,
– monitoring environmental quality, and
– development of an oil spill contingency plan and oil pollution management capability (www.worldbank.org, Shanshiashvili 1998).

Recent developments

In spite of these protective measures, the pressure on the Kolkheti lowlands has rapidly increased since the collapse of the Soviet Union. Protection in praxis is very poor. The present-day socio-economic hardship with its high population pressure and the increasing demand for timber causes much damage to the forest. The preserved fragments of the Kolkheti forests with species such as *Quercus hartwissiana*, *Quercus imeretina*, *Buxus colchica*, and *Pterocarya pterocarpa* are being severely cut and only survive in places that are difficulty accessible. Deforested places are used for agriculture. The fast-growing Alder (*Alnus barbata*) has become dominant under human shelter.

Other harmful activities include pouching (of such species as deer, nutria, pheasant and others), cattle grazing (Krebs & Resagk 2002), burning, and trade with (IUCN) Red Book and CITES plant species.

Large scaled, centrally planned recent threats and damages include

* the establishment and construction of oil terminals, harbors, railways, and other oil transportation infrastructure in the wetlands. In the Anaklia-Churia outskirts the virgin Kolkheti forest is being felled and drainage canals are dug for the construction of the large Kulevi oil terminal. Consequently groundwater is no longer replenished and the community does not have drinking water. These mires and the adjacent Kolkheti forests are the only favorite nesting place for the Kolkheti pheasant (*Phasianus colchicus*). Now the local population has seen how the beautiful landscape is destroyed and lost, they worry about it very much.

* the planning of peat extraction for export purposes. One of the proposals concerns the extraction of 16.2 million tons of peat in the Imnati mire, at an annual rate of 150,000 tons. The second proposal concerns the Anaklia mire where a total of 4.4 million tons would be extracted at an annual rate of 200,000 tons (communication with Georgian Ministry of Environment officials). The total number of full time jobs created would be 140 per year (pers. comm. Tijen Arin, World Bank). Such peat extraction would, however, also lead to loss of carbon storage and sequestration capacity and to environmental damage (cf. UNFCCC - Kyoto Protocols).

Perspectives

The public awareness among the local population about the global importance of Kolkheti *Sphagnum* mires is still very low, but increasing thanks to educational projects.

The Kolkheti mires and forests are excellent places for eco-education, where environmental awareness can be raised by field lessons, lectures, and meetings for the community. People are able to see rare and endangered species with their own eyes. The canals and rivers can be used for recreation, e.g. for sailing with motor and rowing boats. Horse riding is a traditional sport in Kolkheti for which the secondary meadows are used. Nature conservation and (eco-) tourism will furthermore be enhanced by the rehabilitation of ancient traditional trades such as weaving, timbering, bee-keeping, metal casting, and tinware work.

The development of eco-tourism will have a great importance in future. Just two hundred meters from the resorts of Kobuleti, holiday-makers have the opportunity to enjoy the pristine monuments of Mother Nature in the Ispani mires.

See the regional news section for recent developments concerning the Ispani peatland complex.

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Peatlands of Mongolia: a short report on the GPI project

by T. Minaeva, V. Smagin & A. Sirin

Mongolia until now has been considered a white spot in our knowledge on the peatlands and mires of the world. Detailed studies of geology and relief, hydrology, vegetation and soils, ecosystem productivity, flora, fauna, and palaeo-ecology have been carried out in Mongolia during the previous century by Mongolian and foreign scientists. Recently a large project on ecosystem mapping was realized by a joint Russian-Mongolian Biological Expedition (RMBE) having already 35 years expertise in complex biological and ecological studies of Mongolian nature. But all these studies contain little information on mires and peatlands of the country.

We know of only few descriptions of Mongolian peatlands in literature, like the overview on Central Asian mountain sedge mires by E. Lavrenko (1956) or in the vegetation studies of Mongolia by A.Yunatov (1950). There are also some modern floristic publications on mire species mainly of vascular plants. A few palaeo-ecological studies were done based on peat material. No special concern was given to Mongolian peatlands in relation to their functions, threats, perspectives of their conservation, and wise use.

To cover these gaps, the Global Peatland Initiative in the framework of its DGIS programme granted a project submitted by the Botanical Institute of the Mongolian Academy of Sciences (BI MAS). The project, lead by Prof. Dugardjav Chultemin director of BI MAS and head of the Mongolian part of RMBE, aimed on the inventory of Mongolian peatlands with following main objectives:

– to estimate peatland distribution on the scale of the country;
– to make detailed field mapping of peatlands of key regions;
– to define main threats for peatlands on the national regional and local levels.

The field study was undertaken in July-August 2003 by two joint groups. The first group of 10 people made a field trip on 2 cross-country vehicles in the highland and mountain regions of the central and northern parts of Mongolia covering more than 4000 km in total. The group was leaded by Prof. Petr Gunin (head of the Russian part of RMBE) and Dr. Bayasgalan Davagdorj (chief of the geobotanical department of BI MAS). The second group focused on the detailed study of the mires of the Khentey Mountains and was lead by Dr. Tsedendash Gonchigjav (head of the forestry department of BI MAS). The authors of this short report were invited to the field teams as mire specialists.

The diversity and amount of peatlands that we saw in different regions of Mongolia are truly amazing. In river valleys and intermountain depressions, there are sedge fens with brown mosses; on permafrost there are sedge-cotton grass fens; river valleys feature blanket bogs with shrubs; mountain heights (2500-3200 m) have blanket bogs with sphagnum and/or brown mosses and arctic sedges, pillows, and dwarf shrubs. In the taiga zone of the Khentey Mountains we found oligotrophic raised bogs with peat layers up to 4-5 meters and paludified coniferous forests with shallow peat on long gentle slopes, furthermore we found paludified mesotrophic birch forests with sedges, with dwarf shrubs, with brown mosses (in flat river valleys), and with sphagnum (higher in the mountains). In the forest-steppe zone of the Khentey Mountains fens with birch and dwarf willows, tall sedges, and brown mosses, as well as spring mires with a very high floristic diversity could be found.

The peatlands of Mongolia are very fragile and variable ecosystems influenced by a number of factors. Although their long-term dynamics can not yet be described, it is obvious that these peatlands were significantly threatened and their area and diversity significantly decreased during the last 10-15 years. The wetlands and peatlands of Mongolia are not just unique ecosystems, presenting islands of boreal diversity in arid and semiarid zones. They are key ecosystems that provide living conditions for the population of the country. The role of peatlands in the hydrology on a continental scale (Yenisej River, Lake Baikal), and in the maintenance of water resources and productivity of pastures is underestimated in Mongolia. At the same time peatlands are considerably affected by day to day land use activities.

The main direct threats for Mongolian peatlands are grazing and gold mining (in piedmont regions of the northern Khentay Mountains). Climate change constitutes a further, indirect threat. Lack of information and awareness adds to the threats. These threats are discussed in more detail below.

Peatlands are among the most productive pastures in Mongolia and none of the sedge fens in the river valleys has remained without use. To a large extent the economic development of Mongolia during the last 10 years was based on stimulating private cattle husbandry. A herd of 1000 contingent sheep is tax-free. A number of publications illustrate the loss of productivity in Mongolian pastures, which are mainly wetlands and peatlands. The mechanism of degeneration of wetlands by overgrazing is well known from other countries –plant species develop less productive dwarf forms, mosses disappear, a tussock microrelief establishes itself, peat decomposes, and wetlands dry out. Currently the attempts to introduce the wise use principles to wetland/peatland pastures are undertaken within the framework of the WWF Altay-Sayan project in the Har Us Nuur National Park, Hovd province (Western Mongolia), which is designated as Ramsar site (1999).

The other significant threat is gold mining in the northern parts of Mongolia, especially in the Khentey Mountains. The majority of the small rivers under gold mining have their origin in raised bogs (2000 m a.s.l. and higher) passing through paludified valleys covered by coniferous forests with willows, tall sedges, grasses, and sphagnum mosses. These communities with their very high natural biodiversity and attractive landscapes are mostly destroyed now. To save them an adequate method for ecological impact assessment is needed that takes the particularities of peatlands ecosystems into account. The project aims to reach this task on a model administrative unit, Huder district, hoping that this experience will be useful for further spatial planning of gold mining activities.

Modern climate change has had a significant negative impact on the peatlands of Mongolia. The last 10 dry years, especially the years of 2000-2002, combined with overgrazing and man induced fires have lead to the loss of vast peatland areas. Strongly affected by droughts they change to meadows and steppe ecotypes. As a consequence of the climate of the last years, thousands of hectares of former fens in the Orchon River valley, the Ider valley and the Darchat intermontane basin have degraded. Though the typical hummock hollow relief is still there, with up to 50-60 cm of sedge fen peat in hollows, at the same time, hummocks are covered with steppe vegetation or completely bare. Large flat areas show bare dry peat without vegetation except for some fungi. During rainstorms peat material is washed downhill from such places, leading to a rapid disappearance of peatland ecotopes from the landscape. Old maps, local population, and existing literature describe these areas as covered with vast mires, very wet and impassable. Lavrenko (1956) described very wet rich fens with peat and tall sedges covering the Orchon River valley, whereas we could easily pass over these places finding only remains of these once impassable peatlands.

One of the largest indirect threats is the lack of information on peatlands on all levels. Peatlands are an unknown type of landscape even among “specialists.” They are not considered as ecosystems demanding special management or presenting benefits through their natural functions. There is no awareness about the decrease of peatland area among the population, specialists, or decision-makers. Wetland and peatland conservation is not seen in connection with the problem of climate change. There is little knowledge on what the Ramsar convention and a Ramsar site represent. Conservation activities in the Ramsar sites that we visited – Ogii Nuur (1998) and Terhiyn Tsagaan Nuur (1998), are not visible – both sites are under active use of grazing and fishing.

Within the project framework, together with Prof. Dugardjav, Dr. Tsedendash and other Mongolian colleagues, we had a number of meetings with decision-makers on land use from different administrative levels. In general we met with understanding of the problems described above on all levels from National Ministry of Nature Resources to the district (somon) administration. Discussions with stakeholders, specialists from different institutes of MAS, and representatives of Mongolian and International NGOs lead to the recommendation of following activities to promote conservation of peatlands of Mongolia:

– to fill gaps in the knowledge of peatlands of Mongolia, such as: long term dynamics in relation to climate; short term dynamics; the effect of these dynamics on biological diversity, the hydrological regime, and other natural functions etc.;
– to more actively use the mechanisms of the Ramsar convention: to extend existing sites to include peatland areas surrounding lakes; to develop Ramsar site management plans following a wise use approach; to include degraded sites in the Montreux record of sites where changes in ecological character have occurred; to initiate a resolution on the influence of aridisation on wetlands on a global scale;
– to raise awareness of different parts of society on the natural functions and benefits of peatlands and on existing threats;
– to introduce a wise use approach in peatland management on the local, regional, and national level.

We would like to mention the warmness, hospitality, and patience with which Mongolian friends meet guests and especially stress their delicate understanding of nature.

The peatlands of Mongolia are one of the most beautiful nature phenomena and it is worth to join forces to keep them alive.

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Atmospheric implications of Indonesian peat fires

by Angelika Heil & Baerbel Langmann

Introduction

Smoke-haze from vegetation fires has a long history in Indonesia. Traditionally, fire is used as a tool to clear forests for agricultural purposes. It has also been used to convert swallow peatlands into paddy rice fields (Andriesse 1988, Sorensen 1993). Indonesia possesses the largest reservoir of tropical peatlands worldwide (up to 27 million hectare Mha), most of them in Eastern Sumatra, Southern Kalimantan, and Irian Jaya. The peat layer may be 10 m in depth and more and is generally densely forested (Rieley et al. 1997).

Along with the dramatically increasing deforestation and forest degradation rates in the last decades (Archard et al. 2002, FWI/GFW 2002), vegetation fires in Indonesia increased in intensity and frequency (Siegert et al. 2001), including also fires in peatlands (Diemont et al. 2002). Vast peatland areas in Indonesia have been drained for land conversion purposes in the last decades (Sorensen 1993). A popular example is the 1-Million ha Mega-Rice Project in Central-Kalimantan initiated by the Indonesian government in 1995 (Boehm and Siegert 2001). Drainage, in turn, increases the ignitability of peatlands, particularly during extreme drought events such as those triggered by the El Nino Southern Oscillation (Siegert et al. 2001). In contrast to surface vegetation fires, fires in peat areas may burn underground, are more long-lasting, and are difficult to extinguish (Bowen et al. 2000).

Fires in peatlands are also more critical to cause smoke-haze pollution: Their biomass load and thus the potentially available fuel that can turn into emissions is much higher than that of other vegetation types. For instance, a peat layer of 2 m depth would result in a biomass load of 2000 kg dry matter (dm) per m^2 (when bulk density is ~ 0.1 g/cm^3 (Sorensen 1993)). In contrast, the above-ground biomass load of tropical forest ranges from 13 –36 kg dm/m^2 (Ogawa et al. 1965, Brown and Gaston 1996) and ~ 0.4 –1.2 kg dm/m^2 for *Imperata* grassland (Ariyadasa 1999). Moreover, while peat is mainly consumed by smouldering combustion, combustion emits larger amounts of incompletely oxidised compounds (e.g. CO, NH_3, CH_4 and other hydrocarbons) per unit amount biomass consumed (Lobert and Warnatz 1993, Ward et al. 1996, Einfield et al. 1991). This applies also to fine particles (with high OC and low EC content), which are largely responsible for causing strongly impaired visibility during smoke-haze episodes. The fine particle emissions are also by far the most important emissions from a public health standpoint (Sharkey 1997).

Vegetation fires in Indonesia have caused several transboundary smoke-haze episodes in the last decades. The largest reported before 1997 were in 1982/83 and 1994, in which an estimated area of 3.5 and 5.1 Mha was affected by the fires, respectively (Lennertz and Panzer 1984, Qadri 2001). However, the pre-1997 fire events remain largely anecdotal: Missing documentation hinders the reconstruction of the atmospheric impacts of these events and the estimate of the relative importance of peat fire emissions (Nichol 1997). The situation changed with the 1997 fire and smoke-haze event in South-East Asia that excited unprecedented levels of international concern. Since then, various research activities have been initiated to improve the understanding of the origin and characteristics of the smoke-haze and its impact on atmosphere, climate, air quality, and health (e.g. Duncan et al. 2003, Heil and Goldammer 2001, see also WHO Health Guidelines for Vegetation Fire Events (Goh et al. (1999)).

Recently, Langmann and Graf (2003) published the hypothesis that the increased sulfur content observed in the Indonesian fire aerosols could be due to volcanic sulfur deposited in Indonesian peat areas. The island arc volcanoes in and around Indonesia have been permanently degassing for thousands of years, releasing heavy metals and sulfur into the atmosphere. These volcanic compounds may accumulate in the Indonesian peat areas by wet deposition and be re-released with fire. Volcanic compounds may enforce the atmospheric

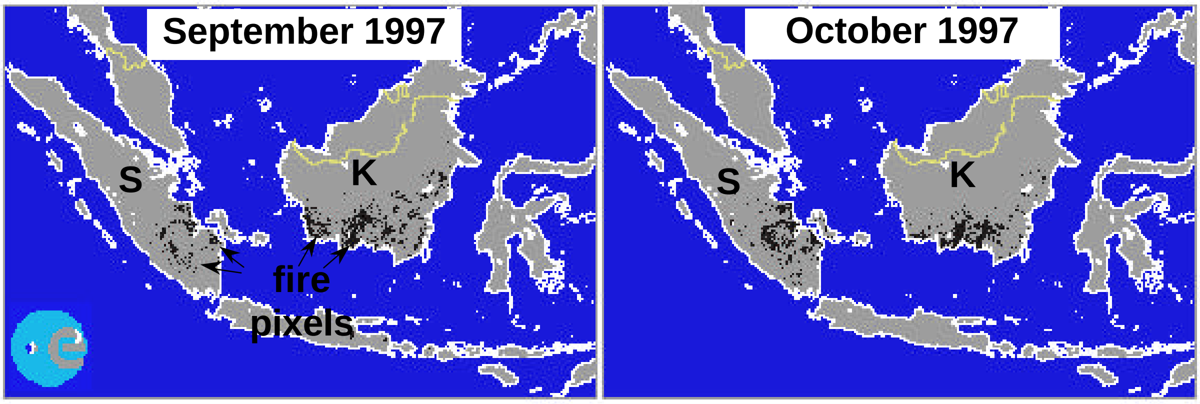

Figure 1a (left) and 1b (right): Monthly night time fire activity map of Kalimantan (K) and Sumatra (S) for September and October 1997 as depicted by the ATSR satellite instrument (adapted from Arino and Rosaz (1999)).

implications of peat fire aerosols. For instance, an increased heavy metal content would imply a higher toxicity and thus increased health impacts.

Emission estimates

The 1997 fire episode in Indonesia began in July and ended in November with the onset of the monsoonal rain. A second fire episode occurred in 1998. The temporal and spatial development of the fires was registered by several satellite systems as 'hotspot', i.e. pixels where temperature exceeded a certain threshold (e.g. Fig. 1a). However, a detected fire pixel does not provide direct evidence how much of the pixel burned hampering an estimate of the area burned. In addition, low-intensity, subsurface fires such as those occurring in peatlands, commonly elude satellite retrievals. Depending on the approach used, area burned estimates for the 1997/98 fires in Indonesia vary significantly (c.f. Levine et al. 1999). Furthermore, the attribution of a fire pixel to a specific vegetation type depends on the quality of vegetation maps. Both factors strongly determine the estimated emission production.

Levine (1999) estimated the emission production resulting from the 1997 fires in Kalimantan and Sumatra. For his calculation, he used both the estimate of the area burned and the estimate of the ecosystem burned of Liew et al. (1998), which suggests that 20% of the area burned consisted of peat swamp forests and the remainder of agricultural and plantation areas, forests and bushes (Table 1). Levine assumed that a 1.5 m peat layer was burned with a burning efficiency of 50% (i.e. effectively 0.75 m entirely burned). As a result of this and other assumptions, fires in peat swamp forests accounted for the largest part of the total emission production, with 91% (223 Tg C) for total C and 94% (15.6 Tg C) for particulate matter (TPM), respectively (Table 1). The same applies to the emission of trace gases.

Table 1: Estimated emissions produced from the 1997 vegetation fires in Indonesia based on Levine (1999) and the intermediate estimate by Page et al. (2002). Page et al. (2002) estimated the emissions from fires in peatlands solely.

Source	Land cover type affected by 1997 fires	Area burned [Mha]	% total area burned	Biomass Carbon [MgC/ha]	depth burned m	Carbon released [MgC/ha]	Total C released [TgC]	% of total C released	Total TPM [Tg C]	% of total TPM released
Levine (1999)	Agriculture&Plantations	2.3	50%	22.5	(a)	4.5	10.3	4%	0.5	3%
	Forests& bushes	1.4	30%	45.0	(a)	9.0	12.3	5%	0.5	3%
	Peat forest (1.5m deep) incl. aboveground vegetation	0.9	20%	487.5	0.75	243.8	222.3	91%	15.6	94%
	Total	4.6	100%				244.9	100%	16.6	100%
Intermediate estimate Pageetal.(2002)	Peat mean depth 2.3 m	2.4		1,311.0	0.51	290.7	709.6	81%	49.7 (d)	87%
	surface vegetation on peat (forest)	~ 1.4 (b)		250.0	(c)	125.0	170.0	19%	7.6 (d)	13%
	Total	2.4		1,561.0		415.7	879.6	100%	57.2	100%

(a) Burning efficiency 20% TPM= Total Particulate Matter

(b) Area of peat surface vegetation burned not explicitly given by Page et al. (2002)

(c) Burning efficiency of above-ground vegetation (pristine forest assumed) is 50%.

(d) Applying same emission ratios related to total C released as Levine (1999) for peat forest and forests&bushes, respectively

Page et al. (2002) estimated the amount of carbon released from fires in peatlands only. The inventory is based on satellite images of a 2.5 Mha study area in Central Kalimantan. From the 2.15 Mha of peatlands, 29.3 % were fire-damaged. Based on ground measurements, they assumed that a 0.51 m peat layer entirely burned on average. In addition, they took into account that the forest cover on the peat layer was also affected by the fire (Table 1). Compared to Levine (1999), the assumption of Page et al. (2002) for biomass load and depth burned resulted in much higher carbon emissions per ha (416 Mg C/ha versus 244 Mg C/ha). However, when comparing with the carbon emissions resulting from the peat layer solely (291 Mg C/ha), the numbers are relatively close. Levine (1999) did not explicitly consider the emissions from the aboveground vegetation burned, while Page et al. (2002) assumed a relatively high biomass density as typical for pristine peat swamp forests. When extrapolating the results on Indonesia as a whole, Page et al. (2002) set up 3 different scenarios for the total area of fire-damaged peatland: a) a lower estimate resulting in 0.52 (± 0.04) Gt C released from 1.45 Mha of fire-damaged peatland, b) an intermediate estimate with 0.88 (± 0.07) Gt C from 2.44 Mha of peatland burned (Table 1) and c) an upper estimate with 2.34 (± 0.19) Gt C from 6.8 Mha peatland released. The latter would mean that 34% of Indonesia's peatland area (20 Mha) was fire damaged. Each of these scenarios result in higher

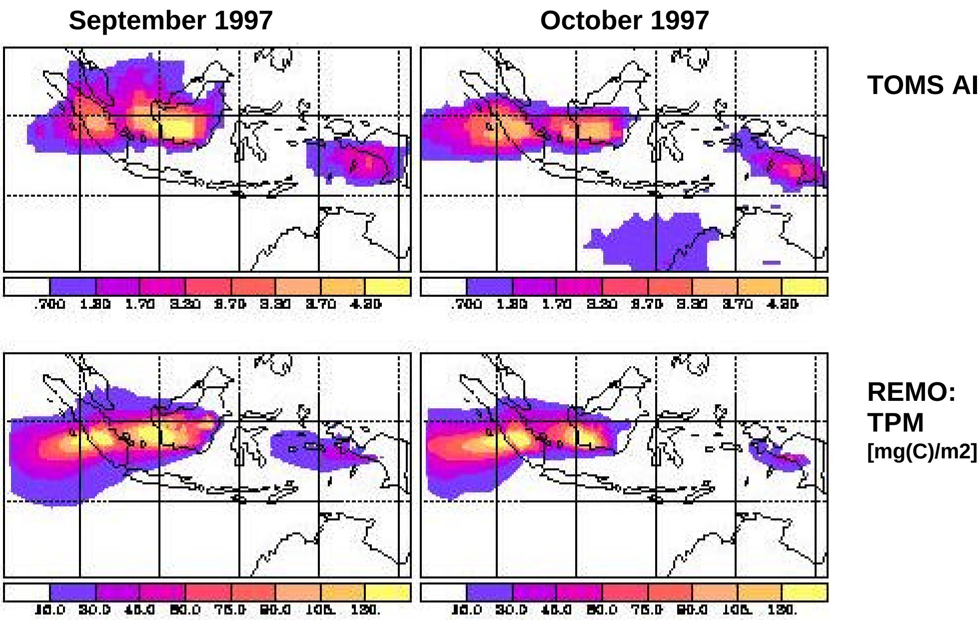

Figure 2: TOMS Aerosol Index (AI) versus REMO simulation of TPM column burden above 1.5 km height for September 1997 on the left and for October 1997 on the right.

total emissions than the one calculated by Levine (1999) for all land cover types affected by the fires. The range of these figures demonstrates clearly the uncertainties involved in emission estimates. Only very recently, pyrogenic emissions from combusting peat samples from Sumatra have been characterised within the framework of the EFEU-Project (Impact of Vegetation Fires on the Composition and Circulation of the Atmosphere, c.f. Wurzler et al. 2001). In the absence of specific emission characteristics for Indonesian peat fires, Levine (1999) used emission factors obtained from burning boreal peat. Despite all these uncertainties, the particular importance of peat fire emissions remains unquestioned. The estimated emissions of particulate matter (TPM) from the Indonesian fires by Levine (1999) and Page et al. (2002, intermediate estimate), respectively, are by about a factor of 25 and 89 larger than the estimated annual emissions of particulate matter from anthropogenic sources in Europe 1990 (0.65 TgC TPM/a, from Amman et al. 2001, C-content of 0.15 assumed).

Modelling atmospheric impacts

Due to the scarcity of air quality data and other observational information in Indonesia, it is particularly important to model transport and dispersion of fire emissions over Indonesia for impact assessments. For this purpose, the regional model REMO has recently been applied for simulations of particulate matter emissions from vegetation fire in Indonesia during 1997/98 (Langmann and Heil, in preparation). REMO (Langmann 2000) is an on-line atmospheric-chemistry model with a standard horizontal resolution of 0.5 degree. Vertically, 20 layers are used. For the model run, the area burned estimate for the 1997 fire episode given by ADB/BAPPENAS (1999) (similar to the lower estimate used by Page et al. 1999) has been redistributed spatiotemporally (1/2°, weekly intervals) using ATSR1 hot spots information (Along Track Scanning Radiometer, Arino and Rosaz 1999). The vegetation data by Loveland et al. (2000) were complemented with information on peat areas based on Rieley et al. (1995) and other sources. The emissions were calculated following the approach of Levine (1999). For a detailed methodology, we refer to Langmann and Heil (in preparation).

Figure 2 shows preliminary results from a qualitative comparison of REMO calculated Total Particulate Matter (TPM) (column burden above 1.5 km height in mg(C)/m2) with TOMS Aerosol Index (AI) (Herman et al. 1997) as monthly mean for September and October 1997. The space borne sensor TOMS measures the presence of aerosols in the whole atmospheric column with a height-dependent sensitivity. From the qualitative comparison (note that the absolute numbers differ) we conclude that REMO is able to reproduce the spatial and temporal distribution of the fire particles. Figure 2 also demonstrates the impressive extend of the smoke-haze layer that covered large parts of Indonesia, Malaysia, and Singapore. A preliminary comparison with ground-based measurements suggests that REMO may approximately predict the TPM concentration ranges observed, but requires further adaptations to reproduce the temporal TPM patterns. Further research will focus on the influence of the Indonesian fire aerosols on local and regional climate via modifications of clouds and precipitation and incoming solar radiation. In addition, health aspects will be considered. Dependent on the availability of corresponding satellite data and vegetation maps, the atmospheric impacts of the different fire episodes over the last decade (e.g. 1994, 2001) will be studied, too.

Conclusions

Modelling the atmospheric impacts of emissions from vegetation fires in Indonesia largely depends on the data base available to establish the emission inventory, i.e. spatio-temporal information on the area burned and the corresponding vegetation data. Due to the high potential emission rate, the inclusion of fires in peatlands is of particular importance. Improved data bases on peat areas and characteristics are urgently required. Given this apparent particular relevance of peat swamp fires to the development of transboundary smoke-haze, emission reduction and control strategies will have to focus on the prevention of fires in this type of vegetation as a matter of priority.

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Integrated river basin management in Air Hitam Laut River Basin, Sumatra

by Dua Klaas

Introduction

This paper focuses on the sustainable management especially of the peat swamp forests of Air Hitam Laut river basin, Sumatra – Indonesia. It presents findings from a literature review, discussions, interviews, and a one-day workshop conducted in Jambi – Indonesia with representatives from the Dutch partners, the local community, NGOs, government officials, and academic sectors.

A four month research (April – August 2002) was carried out at the International Agriculture Centre (IAC, Wageningen - the Netherlands) and by a fact-finding trip in the study area as part of the development of an inception report for the Water and Ecosystem Programme released by the Dutch government in accordance with the declaration of The Hague 2000 on Water Security in the 21st Century. The research aims to support the Water and Ecosystem programme through the compilation of data, identification of main Indonesian stakeholders, and support to the workshop in Indonesia, and by providing recommendations concerning the Air Hitam Laut river basin.

Study area

Air Hitam Laut River and Berbak National Park

The Air Hitam Laut River and Berbak National Park are located in Jambi Province, Sumatra – Indonesia. This river flows adjacent to South Sumatra province, through the centre of Berbak National Park and ends in the South China Sea. Upstream, freshwater swamps dominate the river basin. Downstream, the river is affected by tidal flow and saltwater swamps are found. Rich brackish and mangrove vegetation cover the coastline and estuarine area. Large areas of this river basin consist of peat soils. According to Diemont and van Reuler (1984), the formation of up to 10 metres thick peat layers of this 175,000 ha peat area started between 4,780 and 3,015 BP.

There are approximately 17,000,000 ha of lowland peatland in Indonesia (Andriesse 1988; Soil Research Institute 1976), of which 9.7 million ha lie in Sumatra (Soil Research Institute 1976). Most of the areas have shallow peat (0,5 – 1,5 m deep), and extensive parts are flooded during the wet season. Peatlands in this river basin are classified as ombrotrophic peatlands (Silvius et al. 1984; AWB 1992). They play an important hydrological role, absorbing and storing water from Air Hitam Laut River, and providing it to the whole Berbak ecosystem.

The river is of significant importance to the Berbak National Park, which has a total area of 162,300 hectares (AWB, 1992) and includes saltwater swamp, freshwater swamp, and coastline ecosystems. The Berbak National Park is the largest remaining undisturbed peat and freshwater swamp forest area in Sumatra, and comprises two-thirds of all visibly undisturbed peat-swamp forest of Sumatra (Asian Wetland Bureau, 1992). Thus, this national park might be considered as the best peat swamp reserve for flora and fauna in Asia. The National Park and the adjacent areas have an exceptionally high biodiversity and have been assigned Ramsar status. The vegetation species list currently contains over 260 species (Giesen, 1991), including 150 tree species and 23 palms (Arecaceae). This makes it the most palm-rich swamp forest yet known (Dransfield 1974).

The avifauna of Berbak is very rich. Vagrant species from Siberia heading for Australia use the park as a transit place before finishing their long trip. More than 224 species (49 families) have been observed, including all of the kingfisher (Alcedinidae) species known from Sumatra and nine of the ten hornbill (Bucerotidae) species (Silvius et al. 1984). The White-winged wood Duck (*Cairina scutulata*), which is one of the world's rarest waterfowl species (Lambert 1988), has also been found in Berbak National Park.

Other species that can be found are crocodile, several primate species and other mammals like tiger and bear. Several species are protected under the Indonesian law, like the Sumatran tiger (*Panthera tigris sumatrensis*), the large Mouse Deer (*Tragulus napu*), and the Malayan Sun Bear (*Helarctos malayanus*).

Population and socio-economy

A total population of 31,037 (BAPPEDA 2000) are settled in 16 villages surrounding Berbak National Park. Most of the inhabitants work in agriculture (rice, coconut, and mixed farming) and sea and river fisheries. Cropping activities are intended only to fulfil local needs. The farmers mainly use traditional methods to manage the land and fertilise the soil. Mangrove forests along the Berbak coast are also used by inhabitants to catch shrimps and to cut wood for construction and fuel.

Present area management

The Berbak National Park authority is responsible for the management of the National Park and BAPPEDA is responsible for spatial planning of the area surrounding the National Park.

Human activities and environmental impact

Certain activities like agriculture and related activities, forest logging, animal hunting, and river fishing pose a threat to the peatland ecosystem. Agriculture-related activities include conversion, shifting cultivation, drainage, and fertilisation and are often related to each other. Data of land use distribution in four coastal villages in 1990 and in 1996 show that land use for agriculture activities – both rice field and dry land agriculture – has greatly increased between 1990 – 1996 (Asian Wetland Bureau 1992 and BAPPEDA 2000). Fire burning is intentionally used to clear the land for agriculture. This low-cost method is preferred by the farmers since opening new land for planting takes a lot of manpower and high investment.

Due to their high water content peat soils make the cultivation of many crops hardly sustainable. Rice, as the main crop of preferencem requires the land to remain humid without the water inundating the area. After clearing activities most of the new lands are inundated with water, however. To get suitable land for planting, farmers build parits (ditches) to drain the water from the soil. This can, however, rapidly drain all the water from the land causing it to dry out. This method is still being used as it has been for generations because it is a cheap and easy method.

Besides cutting trees for non-commercial purposes, inhabitants sometimes fell trees illegally inside the National Park to sell the wood to timber companies and illegal sawmills located nearby. People build canals to transport the logs. The number of trees taken from the Park is not exactly known but certainly reaches several thousands per year. Ramin (*Gonystylus bancanus*), a highly valued commercial timber that can easily be found near Air Hitam Laut river basin, is preferred. A local NGO (EIA 2001) has reported widespread illegal logging of Ramin in Berbak National Park, with over 130 tonnes being shipped to Malaysia between March and June 2000 (Kompas 2001).

According to WARSI (1999), based on landsat images of 1997 – 1998 3,406.3 ha land has been cleared in the north part of Berbak National Park. The images that were taken on 1 May 1998 reveal open areas of 16,802 ha in the centre of the Park along Air Hitam Laut River's bank and upstream that were caused by forest fire in July and August 1997. Although lightning can also trigger the fire inside of the National Park, it is believed that most fires inside the forests are associated with illegal activities, like cooking at camp sites or carelessly thrown away cigarettes. Fire is a significant threat as it can easily expand into large areas of valuable forest.

Environmental problems in this area are complex and related to each other. One problem creates another. Drainage creates dry soils, which may lead to unintentionally widespread peat soil burning and destruction of the forest. When forest and peat soil burned, the hydrological function of the peatlands is disturbed. The complexity of environmental problems and the relationships among all elements, such as the soil, the (sea- and river) water, the forest, the plants and animals, and the people who rely on natural resources provided by the peat swamp forest, requires a holistic approach involving not only economic and social, but certainly also ecological aspects.

Bottlenecks in implementing policy and measure

There are 6 main issues hindering the protection and preservation of peatlands and their hydrology: 1) lack of a hydrological peatland concept in management, 2) problems of integration of conservation activities and management in this river basin, 3) the lack of community-based measures, 4) remoteness of the area, 5) unawareness of the local community, 6) lack of enforcement.

These issues can be classified into two main groups: management by policy makers and condition of the local community. Low education and poverty influence the perspective of the local people on the forest and cause a low awareness for preservation issues. This condition is worsened by lack of co-ordination among the authorities in policy formulation, which relates to insufficient baseline data available to support decision-making, such as apprehension about the hydrological concept of peatland and limited hydrological data. Consequently, there are separated activities and different management plans in this river basin.

Integrated river basin approach

The above painted complexity indicates the need for an integrated river basin approach.

To address environmental problems associated with hydrological functions in this area, it is appropriate to focus on the entire river basin as the most understandable natural system that links all decisive water-related factors, such as forest, soil, river, and coast. The river basin as a functional area includes the key interrelationships and interdependencies for water and land management from upstream to downstream. The management plan is therefore formulated with regard to all elements in this river basin. Such “integrated river basin management” is defined as (Easter et al., 1986):

“The process of formulating and implementing a course of action involving water and related land resources of a watershed, taking into account related social, economic, environmental, and institutional factors, with special emphasis on the linkages between upstream and downstream parts of a watershed and their respective human and physical endowments.”

This approach aims to prevent fragmented and inconsistent measures. With an integrated river basin management the river basin is used as a planning unit, formulating a management plan, co-operation, and interaction among stakeholders (national, provincial, and regional level). There are ecological, economic, and social reasons for applying such an integrated river basin management. Ecologically, there are significant interrelations and interdependences among elements of the peat swamp forest ecosystem on the scale of the river basin. Economically, the local community depends on forest resources. On a social level, the indifference among stakeholders with respect to each others interest is the main reason in choosing an integrated river basin approach in Air Hitam Laut river basin.

Proposed measures

Several measures are needed in order to implement integrated river basin management, including integration of policy formulation by decision-makers in the entire river basin, co-ordination of data access, and training for decision-makers. A body consisting of a range of stakeholders will help the integration of policy formulation. This body can encompass a high level steering committee of two provincial governments (Jambi Province and South Sumatra Province) and inter-agency task forces (for specific purposes like forest conservation or land rehabilitation). Its integrated action plans can improve co-ordination of separated government functions and between different organisations involved in river basin management. It will also be responsible for communication as the co-ordinator of data access. Another important function is to provide training, which helps decision-makers to better understanding of the concept of integrated river basin management. Training decision-makers in a) the hydrological concept of peatlands, b) sustainable use of peatlands, c) ecosystem approach in river basin management, and d) integrated plan for sustainable management of peat swamp forest is desirable.

The local population is the key player in achieving sustainable development because they are the main actors responsible for utilisation of the area. Community measures include local economic development by encouraging present commercial efforts such as traditional Rotan (*Clamus* spp.) and Nipa (*Nypa fruticans*) products based on sustainable use of the natural resource. The peat swamp ecosystem furthermore has a high commercial value for tourism.

Another measure is awareness raising by teams of (young) locals in every village who will function as illuminator and local educator among their people. They will teach how to identify and solve problems and present sustainable agriculture practices, selecting suitable crops for peat soils, as well as good practices on selective forest logging. They can discuss possible solutions among themselves and feed the outcomes of the discussion to the decision-making process. Through such a bottom-up approach communities are encouraged to be involved in the decision-making.

Other supporting measures include research to provide adequate data in for and good communication among the stakeholders.

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Symposium in honour of Prof. Jasnowski: the future of Polish Mires

by Ab Grootjans & Leslaw Wolejko

A small symposium in honour of Prof. Mieczyslaw Jasnowski, who died 10 years ago, was organised by the Botanical Institute of the Agricultural University of Szczecin on Saturday 13th September. Some 80 persons, of which several were IMCG members attended the symposium and enjoyed a nice excursion in and around the Odra valley on Sunday 14th. During the symposium, which was opened by his wife Prof. Janina Jasnowska, several mire scientists explained how Prof. Jasnowski had influenced their work and more general how he had laid the fundaments for an integration of vegetation science and palynology in mire science. Prof. Stefan Friedrich, the head of the Botanical Department of Szczecin Agricultural gave a very nice overview of the personal and scientific life of Prof. Jasnowski. Polish speakers contributed to the symposium with the overviews of main problems of the temporary peatland science in the country. Kazimierz Tobolski (Poznan University) addressed the problems of palaeoecological research. Prof. Maria Herbichowa (Gdansk University) discussed the present status and biodiversity of rised mires in Poland, Dr. Dembek and his co-authors presented an overview of present and future threats for Polish mires. This work of IMUZ was based on famous mire inventories in Poland by the team of Prof. Jasnowski. Prof. Piotr Ilnicki (Poznan Agricultural University) presented a concept of wise use of peatlands in Poland. Prof. Slawomir Zurek (Kielce University) compared the present tundra vegetation and the palaecological records from Poland.

Invited guests from Germany were Michael Succow and Lebrecht Jeschke, who were both instrumental in the establishment of the Polish/German National Park Odra valley and who closely cooperated with the Jasnowski's during that period. Experiences in mire restoration in Austria were communicated by Michael Steiner, one of the founders of the IMCG, who knew Prof. Jasnowski from many pre-IMCG activities. Other partners in Polish mire research were Ab Grootjans from the Netherlands and Leslaw Wolejko from the Botanical Department of Szczecin, who gave a joint presentation on ecohydrological research in spring mires in Western Poland during the last 10 years and outlined the commencing Dutch-Polish peatland project financed by Dutch government (PIN-MATRA).

Conservation and Wise Use of Wetlands and Wetland Biodiversity in the European Newly Independent States

Seminar 15-19 September, Armenia

The International Seminar "Current Issues of Conservation and Wise Use of Wetlands and Wetland Biodiversity in the European New Independent States" was held on the shore of Lake Sevan, Armenia, from 15 to 19 September, 2003. The Seminar provides an opportunity for wetland managers and scientists of the region to re-establish lost contacts and to exchange experiences in different aspects of wetlands and wetland biodiversity conservation and wise use.

Delegates from Armenia, Belarus, Czech Republic, Denmark, Georgia, Iran, Kyrgyz, Lithuania, Moldova, The Netherlands, Russian Federation, Turkmenistan, Ukraine, United Kingdom, USA, and representatives of the Ramsar Convention Bureau, BirdLife International, LakeNet, International Council for Game and Wildlife, Wetlands International Russian Programme, and WWF Caucasus; in total 64 persons participated in this event.

H. E. Vardan Ayvazyan, the Minister of Nature Protection of the Republic of Armenia, welcomed the participants during the opening session, followed by short welcome speeches of Tobias Salathe (on behalf of Ramsar Convention Bureau), Ashot Mnatsakanyan (on behalf of the Sevan National Park), Dave Pritchard (on behalf of BirdLife International), Irina Kamennova (on behalf of the Wetlands International Russian Programme), Nukzar Zazanashvili (on behalf of WWF Caucasus Office), David Reed Barker (on behalf of the LakeNet), and Amalia Hambartsumyan (on behalf of the Armenian NGOs).

A main focus was on the "Caucasus eco-region," with its typical peatland and alpine ecosystems that represent important wetland resources, including several endemic species of flora and fauna.

The programme was composed of 43 presentations, 7 of these focussed on the implementation of the Ramsar Convention by national governments, but also on other international instruments and the synergy between these, 4 presentations covered international cooperation, 8 national wetland policies, 5 wetland management and conservation, 3 wetland restoration, 10 threats to wetlands, 2 legislation, 2 invasive species, and 2 inventory.

Resolutions were drafted on the following three themes:

– Conventions and International Cooperation;
– Ramsar Site and Wetland Conservation; and
– Wise Use of Wetland Resources.

Two members of the IMCG family played an active role during the event, Tatyana Minaeva from the Russian Federation and Karen Jenderedjian from the host country Armenia. Tanya introduced the Global Peatland Initiative in context of the implementation of the Ramsar Convention in the region, while Karen was the Executive Secretary of the Seminar's Organizing Committee.

For more information please, visit
http://www.peatlands.ru/?file=cont.php&page=other&subpage=sevan_report.html&lang=ru
and
http://www.worldlakes.org/initiative/armenia_seminar.htm

Reported by Karen Jenderedjian

The "Story of the Peatland Biodiversity Programme"

by Olivia Bragg

The Darwin Initiative Peatland Biodiversity Programme (PBP) was a capacity-building peatland conservation initiative for central and eastern Europe (CEE) – the whole of the FSU "bigger half" of the continent. Its timing (1998-2002) was critical. As the countries that are now on the verge of accession to the European Union made their preparations to meet EU standards for environment and biodiversity, the PBP was there to raise the profile of peatlands - the "invisible" Priority Habitat - in their proper biogeographical (rather than their human-limited political) context. The Programme aimed to share our experience of the problems arising from neglect of peatland-wise-use principles during economic development in the UK; of the whole mechanism that we have now been obliged to devise to try to salvage what is left; and why. It worked by bringing 58 CEE personnel to Scotland for a three-week training course; and sending them home with knowledge, skills, and money to begin to tackle the most urgent peatland conservation problems in their own countries. It drew almost 750 people in 13 CEE countries into the network of "peatland people", at least for a day or two and in many cases for much longer. And although it's only a start, it seems to have made a difference.

The experience of the Programme has been drawn together in a limited-edition book. There are only 73 copies in central and eastern Europe and less than 50 in the west, but it will now be made freely available worldwide through the IMCG website.

The book has four purposes:

- it is a record of the Darwin Initiative Peatland Biodiversity Programme;
- it outlines CEE peatland biodiversity resources and conservation situations at this developmentally critical time;
- it offers a template that might be considered for use in other parts of the world where biodiversity is threatened; and
- it covers principles and organisational details that may be helpful to other groups interested in participating in the global Darwin Initiative programme.

Its main contents are:

- Materials (including a bibliography) from the PBP Scottish course; which covered ecosystem function, conservation management, survey and inventory, the roles of statutory agencies and NGOs, and developing and funding projects. Some emphasis is given to methods of presentation, and especially to workshop techniques.
- "Year 2000" accounts of the peatlands and conservation situations in Belarus, Bulgaria, the Czech Republic, Estonia, Hungary, Latvia, Lithuania, Poland, Romania, Russia, Slovakia, Slovenia and Ukraine.
- Summary reports of the Programme's 23 CEE workshops; which focused on wide-ranging aspects of network-building, national policy, education, site management, and neglected peatlands including trans-boundary areas.
- The results of the final plenary workshop (Estonia 2001), which identified the principal barriers to CEE peatland conservation and generated 150 potential solutions which are presented in a format that can be used to extract "custom-designed" action plans for individual situations.
- The PBP network: names and contact details of "peatland people."

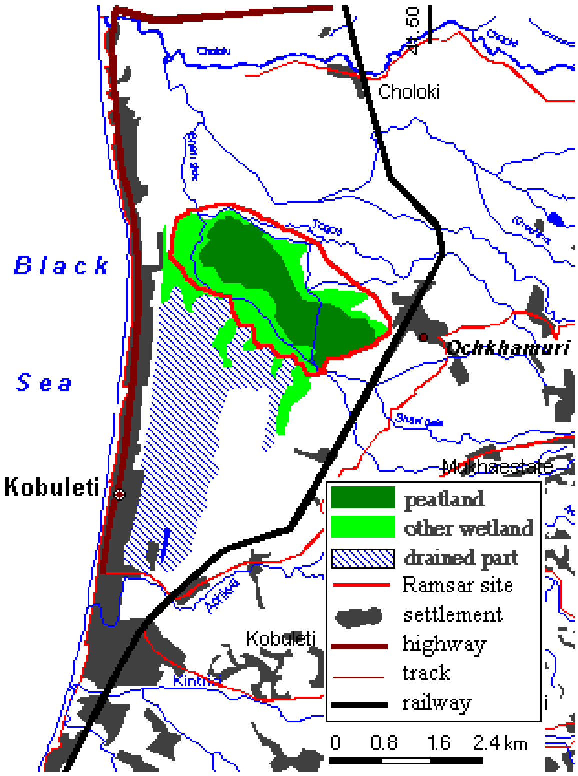
Bibliographic details are: Bragg, O. (ed.) (2003) Sharing expertise for the conservation of peatlands in central and eastern Europe. Department of Geography, University of Dundee on behalf of the Peatland Biodiversity Consortium, Dundee, 200pp, ISBN 0903674386. Now available at: http://www.imcg.net/docum/darwin.htm

The Darwin Initiative is a small grants scheme financed by the UK government. It was launched at the Rio "Earth Summit" in 1992, and its main aim is to channel UK expertise into providing assistance in implementing the Biodiversity Convention to countries that are rich in biodiversity but poor in financial resources. The Peatland Biodiversity Programme was run within this scheme by a consortium of six Scottish organisations with expertise in peatland science and conservation; namely Scottish Natural Heritage, the Scottish Wildlife Trust, the Macaulay Land Use Research Institute and the Universities of Aberdeen, Dundee, and Stirling.

Regional News

News from Georgia
Ispani threatened by road construction

The Ispani peatland complex (Ispani I ca. 400 ha, Ispani II ca. 250 ha), east of Kobuleti in the Kolkheti lowlands of Georgia (Transcaucasia) is currently under threat by road construction.



The Ispani peatlands (changed after Geoinformation Center Tbilisi).

At the moment the main transit route from Turkey into Georgia leads through the city of Kobuleti. Its economic importance and bad state necessitate the reconstruction of the road. It was chosen not to repair the existing road through the city, but to build a new road east of the city of Kobuleti.
Two options exist for the planned new road. It can either be build along the railway track that runs several kilometres east of the town, or over the narrow stripe of land that separates the settlement from the peatland system. This would not only damage the peatland system and its hydrological integrity itself, but would also nullify all the recent efforts of establishing a general awareness among the population of the natural value of these unique ecosystems.

The Ispani peatland complex consists of two parts. Drainage and peat extraction have damaged the southern Ispani I mire. The northern Ispani II is still intact and is globally unique because it is worldwide the only known representative of a so-called percolation bog. In this bog the water flows through the whole peat body, in contrast to other bogs, where water predominantly flows via the surface or via the uppermost peat layers (acrotelm). During excavations in the Ispani mires, settlements from the eneolithic – early Bronze Age dating back to the 4th -3th millenium BC were found under the peat layers.
Ispani II is one of the last largely undisturbed mires in the Kolkheti lowlands. It provides a habitat for many plant species that are extremely rare and endangered in Georgia. Due to its importance to migrating birds, Ispani II was put on the Ramsar list of wetlands of international importance on 7 July 1996. In 1999, Ispani II was given the national protection status of Strict Nature Reserve.
Since 1998 the peatland complex is under investigation by a team of Georgian and German mire scientists. Through a series of regional and national campaigns, partly funded by the Global Peatland Initiative and the Integrated Coastal Zone Management project, awareness on the peatlands of the Kolkheti lowland, most notably also the Ispani complex, has increased considerably. Various 'wise use' projects involving local stakeholders have been realised. A visitor's centre and an educational path through Ispani I are currently under construction and are intended to be finished next year.

We strongly urge those involved in the planning of this road to take these factors into account and not to build this nonetheless essential road so close to this worldwide unique piece of Georgian nature.

Izolda Matchutadze and Matthias Krebs

News from China:
the cost of saving wetlands

China is paying a heavy environmental and social price for its spectacular economic growth. Water is running short, with some areas experiencing a fall of several metres in groundwater levels. The government has now banned the draining of wetlands and the logging of forested watersheds. And up to a million people may be moved from their homes as the wetland restoration programme gathers pace.
At the eastern edge of the Tibetan plateau, in Sichuan province, lies Ruoergai, the world's largest high-altitude wetland. Its 600,000 hectares are home to 50,000 people, mostly Tibetans. Ruoergai stores Himalayan meltwater and releases it slowly to the streams that feed the Yangtze and the Yellow river, both of them vital to the lives of 500 million Chinese. Groundwater levels here have dropped sharply, and patches of sand are replacing the retreating mires. It is the result of a deliberate policy, according to Rob Paterson, of the United Nations Development Programme. In the '60s official government policy in

China was to drain marshes all over the country with the idea of increasing the area available either for crop production or for grazing.– for very good reason at the time: feeding the hungry.
Now, though, Ruoergai cannot cope with exceptional snowmelt: there is not enough peatland area to store it, and catastrophic flooding downstream is the inevitable consequence. In dry spells, it has less water to release. The government is trying to restore Ruoergai, by filling in old drainage ditches and also by settling the nomads, in an attempt to reduce grazing pressure.
But more probably, the answer lies in leaving the nomads alone and enforcing a strict ban on the most sensitive parts of Ruoergai.
Far downstream, the choices confronting China's policymakers are even more stark. Dongting, part of the Yangtze river system, was once China's largest lake. In less than half a century, 40% has disappeared, partly through reclamation to resettle 10 million people, and partly because upstream logging has silted up the Yangtze. Logging is now banned, though the shallow river still floods. As the government reverses the reclamation and allows Dongting to fill up again, more than one million people face removal. Already 360,000 people have been moved from the land that was originally reclaimed from the lake.
The problem of a coastal nature reserve at Dafeng mirrors those upriver. A wetland species, Pere David's deer, reintroduced there, is now breeding so successfully it is destroying the flora and faces culling. In China's water crisis, neither humans nor wildlife can expect to continue unchanged.
Source: BBC News.
http://news.bbc.co.uk/1/hi/sci/tech/3123575.stm

News from Ireland: Bog bursts

In the past weeks various bog bursts have struck Ireland. In the night of Friday 19 September 2003 some 20 landslides in Co. Mayo have laid bare huge strips of rock, buried farmland under thick layers of peat and mud, and smothered entire flocks of sheep. New river valleys were sculpted and bridges washed away. More than 40 families were forced out of their homes in the village of Pollathomas. After heavy rains the crown of two hills had broken and water and peat surged down the hill in four directions. At least four graves on the Pollathomas graveyards had been stripped of remains by the moving earth, The Independent reports. The damage to roads, bridges, homes, and farmland is estimated at more than € 10 million. Environmentalists ascribe the bogbursts to severe overgrazing of the steep bog slopes by sheep.

Ireland's second landslide in a month happened on 16 October 2003 near Loughrea, Co Galway, when a substantial section of bogland shifted down a mountainside. Damage was limited to an unoccupied house and farm buildings in the area. A number of trees were destroyed and a minor road was closed. Fine Gael Senator Ulick Burke, who lives in the area, said: "There was no warning. This has not happened in this part of the world before and there had been no inclement weather conditions that might have triggered it off. This was an isolated case and is unlikely to occur again. But I am sure the local authority will take whatever steps are necessary to prevent a repeat."…

Let's look back in time on behalf of Mr. Burke:

Bog-Bursts with special reference to the Recent Disaster in Co. Kerry, Ireland
R. Lloyd Praeger 1897

A dry summer had been followed by a wet autumn, and about nightfall on December 27th (1896), a heavy downpour of rain set in, accompanied by a south-easterly gale. Somewhere between two and three o'clock the following morning the edge of the bog, which overlooks the Ownacree valley, gave way and liberated a vast flood of peat and water. There was no immediate warning of the catastrophe, and no one witnessed the actual rupture.
Although the outburst was clearly not instantaneous, it evidently proceeded with great rapidity: as is witnessed by the circumstances of a lamentable loss of life. The bog gave way along the line of a turf-cutting from 4 to 10 feet deep, parallel to which, and about 300 yards below it, runs the Kingwilliamstown road. A small stream, coming from the bog, passes under this road. Close by this stream, on the lower side of the road, was situated the house of Cornelius Donelly, Lord Kenmare's quarry steward; it was of the ordinary type, of one storey, with walls of rubble masonry and a thatched roof; it stood about 12 feet below the level of the road, and at a short distance from it, the intervening space being occupied by a garden. The house was entirely swept away; Cornelius Donelly, his wife, and family of six children all perished; the bodies of some of them, and those: of their live-stock, together with articles of furniture, were carried down the valley, and were found at various points along the course of the flood, a portion of one of the beds being picked up; a few days later, in the Lake of Killarney - fourteen miles away. From the fact that the whole family perished, and that those bodies which were recovered were without clothing, it would appear that the rapidity with which the flood rose was so great as to afford them no chance of escape. […]
The flood attained its maximum height during its first great outburst in the dark hours of Monday morning. At daybreak, the roaring flood of black fluid, bearing on its surface huge masses of the lighter crust of the bog, had already become confined to the central portions of the valley, but still ran cross the road and over the site of Donnelly's house. The flow, which continued .with constantly diminishing violence for the whole of Monday, was not regular; but

intermittent, swelling and diminishing as fresh portions of the bog gave way, and slid down walls into the torrent. Every fresh outburst was accompanied by, loud noises, likened by bystanders to the booming of big guns or the rumbling of thunder. Over the sides of the valley the settlement of the peaty part of the fluid had already taken place, and, as drainage continued, it ceased somewhat in consistency. The disruption of masses of bog continued at intervals down to Friday; January 1st. When we visited the scene on Saturday, January 2nd the flow had lost its torrential character, but a turbid stream, many times increased beyond its usual volume, occupied the river bed. […]
The flood has left behind it, in the upper portion of the valley, a deposit of peat averaging 3 feet in thickness, here as everywhere contrasted by its black colour with the grass land or other surface on which it rests. Its compact convex margin, like that of outpoured oatmeal porridge, often 2 feet in height, serves equally well to define it; so it was an easy task to determine and map the high-water level of the flood. The surface of the deposit was everywhere broken by great roots and trunks of Scotch Firs, which in their enormous numbers, bore convincing testimony to the evisceration which the bog had undergone. The appearance of this extensive sea of black peat, with its protruding stumps of blackened trees, overlying fertile fields, was a sight melancholy in the extreme. […]
Read before the Dublin Natualists Field Club, 9th February, 1897
(www.from-ireland.net/history/bogbursts.htm)

News from the UK: Moors for the future

Moors for the Future is a new £5.1m corporate partnership project to restore large parts of the Peak District moors and to enhance peoples experience, understanding, and care of this special landscape through an integrated programme of new initiatives. This project has come out of the work of many partners over many years, understanding the problems of the moorlands, and from a specific programme of assessment and consultation in order to prepare a management plan for the project. This work has been led by the National Park Authority in partnership with a group of the key representatives of land-use and statutory conservation management organisations for the area.
The three principle objectives of the Moors for the Future project are as follows:
1. To restore and conserve moorland sites most damaged from access and recreational pressures.
The project aims to restore 3 km^2 of the worst degraded areas of the Dark Peak area which have been caused by accidental fires and which now are extensive bare peat landscapes at risk from severe erosion. It further aims to restore 19 km of trampled moorland along paths which have become widening scars (up to 11m width in places) and to trial ways of reducing the risk of disturbance to bird populations where paths cross specific sensitive sites. A major restoration plan over 5 years has been drawn up to achieve this.
2. To enhance visitors' and local peoples' experience of moorland heritage and encourage greater care of it. The project aims to develop a range of new initiatives, such as: a new 'moor care' campaign; new interpretation provision, new moorland visitor and research centre and more generally at important moorland heritage sites; and to make access to moors easier for people with disabilities and for communities in surrounding cities and towns using public transport.
3. To establish a learning centre to develop expertise about how to protect moorlands for the future and to meet the education and research needs of specific groups and the wider pubic.
Rather than one actual centre, the moorland learning centre will be a number of new facilities and programmes seeking to: extend access to important heritage research and records; provide a range of environmental educational opportunities to schools; and develop a sustainability monitoring and research programme by which to monitor the future health of the moorlands. A range of new facilities and initiatives have been identified in the management plan to achieve this objective.

In order to set up a sustainability baseline, patterns and processes on moorlands are investigated to identify efficient conservation management planning, and we invite interdisciplinary research from universities and other research institutions.

Project Manager Chris Dean,
cd.moors@peakdistrict-npa.gov.uk
Research Assistant Cass Worman
cw.moors@peakdistrict-npa.gov.uk
Tel 01433 621 656 or 07717 577 679

We will consider assistance to (student) research projects and facilitate access issues.
Please let us know of your initiatives, contact:
Dr Aletta Bonn
ab.moors@peakdistrict-npa.gov.uk

News from Vietnam Decree on wetlands conservation adopted

On 23 September 2003 the Prime Minister of Vietnam, Phan Van Khai, has signed a decree on the conservation and development of wetlands, the first ever legal document on the management of wetlands. The decree provides an important legal basis for promoting sustainable management of wetlands in Vietnam.
The decree stipulates that wetland conservation areas need to be managed and restrictedly exploited. Constructions in the buffer zones that impact or

potentially threaten wetland conservation areas are strictly prohibited. In special cases, when the constructions in the wetland conservation areas and their buffer zones are needed, prior approvals by the Prime Minister are required.
The decree also lays down that organisations and individuals who exploit resources on wetland areas take responsibility for protecting the uniqueness of the ecosystems and for conserving biodiversity. The state encourages wise uses of wetlands.
In the next two years, Vietnam will make strong efforts to nominate three more Ramsar sites among 65 already identified nationally important wetland areas. See further:
www.ramsar.org/w.n.vietnam_decree.htm

News from Moldavia
Lower Dniester new Ramsar Site

The Republic of Moldova has designated its second Wetland of International Importance, effective 20 August 2003. The Lower Dniester (Nistru de Jos) lies on both sides of the Dniester River in the Tighina and Slodozia districts and covers an area of 60,000 hectares. The area encompasses a large variety of wetland types, including river ecosystems, permanent and intermittent lakes and pools, old river meanders, channels, brook ecosystems, and artificial wetlands. Peatlands are extremely rare in Moldova, but in the Dniester area some fen ecosystems can be found.
See further:
www.ramsar.org/ris_moldova_lower_dniester.htm

Still available: IMCG publications

The Wise Use of Mires and Peatlands - Background and Principles including a Framework for Decision-making

This groundbreaking book attempts to highlight the global nature and importance of peatlands and the problems that result from their use. The authors representing the IMCG and IPS provide suggestions on how these problems may be resolved through the application of the ‘wise use’ approach.
The book is essential reading to all those who influence mire and peatland management; public sector officials, land-use planning officers, environmental licensing bodies, heritage agencies, grant authorities, environmental protection groups and commercial companies.

"It is difficult to do justice to this wonderful book in a short review. It is inspiring and hopeful. We can only hope that it comes into the hands of everybody with a responsibility in any area of peatland management, be that industrial, conservation oriented, or in the maintenance of environmental integrity. ...This is a book that deserves to be read over and over ...".
John Feehan in Scéal na Móna April 2003

"This fundamental clash of values, basic to many conflicts over peatland, is here teased out in a crash course on ethics and moral philosophy that is quite as surprising and welcome as the initial coming together of developers and conservationists. "
Michael Viney, The Irish Times, (03-02-03)

Joosten, Hans & Clarke, Donal (2002): The Wise Use of Mires and Peatlands - Background and Principles including a Framework for Decision-making. 304 pp..

C.A. Weber and the Raised Bog of Augstumal

One hundred years after the original work was published in German, the work of Weber on the Augstumal Peatland has been re-issued in an English translation. The book marks the beginning of modern peatland science and has had a vast impact on mire science of the previous century. Because of its limited availability many knew of it only from scholarly reviews. The book is surprisingly modern in its content and reading it one hundred years later, one may wonder what might have been achieved in the meantime had the book been more widely distributed.

“Reading this superb new translation may […] be both an exhilarating and humbling experience for many ecologists.”
Paul Glaser

“I should have said I am finding it pretty interesting. W(eber) was way ahead of his time. I have myself rediscovered several of his wheels.”
Richard S. (Dicky) Clymo, London

Couwenberg, John & Joosten, Hans (eds.) (2002): C.A. Weber and the Raised Bog of Augstumal - with a translation of the 1902 monograph by Weber on the "Vegetation and Development of Raised Bog of Augstumal in the Memel delta". 278 pp., Tula.

IMCG members can order these books for EUR 20 plus P&P each via Philippe Julve: philippe.julve@wanadoo.fr
For members from countries with currency problems special arrangements are made. Please contact Tatiana Minaeva: tminaeva@wwf.ru

New and recent Journals/Newsletters/Books/Reports

SUO. Mires and peat. Vol. 54, no. 1. (in English and Finnish)

The most recent issue of SUO includes a paper on the effect of peat nitrogen concentration and fertilization on the foliar nitrogen concentration of *Pinus sylvestris* on drained peatlands in areas with different temperature sums. In the coldest regions tree growth is clearly hampered by nitrogen deficiency, independent of total nitrogen concentration in the peat, in warmer areas PK fertilization can stimulate tree growth. Another interesting paper is a new review of past en present carbon accumulation in undisturbed boreal and subarctic mires (from Jukka Turunen). LORCA for undrained mires in the boreal and subarctic is estimated at 13 – 20 g C m^{-2} a^{-1} for the whole Holocene, which is clearly lower than previous estimates. The recent apparent rate of C accumulation (RERCA) in these areas ranges from 30 – 120 g C m^{-2} a^{-1}. A discussion of the future C balance resulting from climate change reviews many relevant processes and difficulties in estimating effects. A 9 p review of the Joosten & Clarke (2002) Wise Use book and a 3 p. review of Charman's "Peatlands and Environmental Change" (both in Finnish) conclude the issue.

Böckmann, R., Dasenbrock, A. & Kraimer, A. (eds.) (2002): Goldenstedt – Ein Fenster zur Diepholzer Moorniederung. 30 Jahre Moorschutz. Förderverein Goldenstedter Moor e.V., Goldenstedt, 104 pp. (in German)

Review on the origin and development of peatland conservation in a part of the Diepholzer Moorniederung, one of the most valuable bog complexes of Northwestern Germany. Describes the conception of bog conservation thoughts since the 1950s and especially the implementation of the Lower Saxonian Peatland Conservation programme.

Society for conservation of wild nature "Chaobi" 2003. Save for future generations. 22 pp. (in Georgian and English).

Booklet on the floristic diversity and conservation importance of the Kolkheti wetlands and mires (Georgia), including Ispani II (see elsewhere in this Newsletter). With many colour pictures and descriptions of important plant species. For more information: Izolda Matchutadze: izo.muho@gmx.net

Rauber, C. 2002. Stability of raised bogs to climatic changes – a case study. Shaker, Aachen, 127 pp. + app.

PhD thesis from München Technical University based on research on bogs in the Zapadnaya Dvina region in the Southern Taiga belt of European Russia. Dating was with conventional ^{14}C dating and palynology, climate reconstruction was done with Klimanov's "Information Statistical Method" (based on 12 pollen diagrams from the surroundings), historical sources, and dendrochronological data. The study showed for the Subatlantic period no correlation between climate change and the changes in bog vegetation and surface wetness (as revealed by macrofossil analysis and rate of decomposition). The smallest of the tree bogs showed a correlation of the rate of C-accumulation with climate, a correlation that could only be found in the other two bogs in some phases. For more information: Christina Rauber: weissma@weihenstephan.de

Zwaag, J.A. 2002. De Glaspioniers in het veen. Boon, Groningen, 204 pp. (in Dutch). Euro 20,90.

Book about the history of the glass industry, that established itself – because of the abundance of fuel - in the bogs of the northeastern Netherlands in the 19^{th} century.

Bakker, J. (ed.) 2003. PeatPolis.nl. International Peat Society Nederland. 96 p. (in Dutch and English).

Full-colour book on peat art and peat culture, published on the occasion of the PeatPolis peat art exhibition in Barger-Compascuum (the Netherlands) this summer. With a chapter on the artists inspired by peatlands since 1650 (including Vincent van Gogh and the German Worpswede School) and descriptions of all artists involved and all art projects exhibited or performed at PeatPolis. For more information: www.PeatPolis.nl, or Adri de Fluiter: fluitera@tref.nl

Blauw, M. 2003. An investigation of Holocene sun-climate relationships using numerical C-14 wiggle-match dating of peat deposits. PhD thesis Amsterdam, 106 p.

Collection of 5 papers with introductory text, dealing - in a clearly written way - with the effects of changing solar activity on climate development. Solar activity was assessed by high resolution measuring of the proportion of ^{14}C (? ^{14}C) in bog peat deposits in the Netherlands and Denmark. ^{14}C is well known in palaeoecology because the relation between ^{14}C and ^{12}C is currently the most frequently used dating procedure for the past 10.000 (- 50.000) years. ^{14}C is produced in the atmosphere by cosmic rays (energetic ionised nuclei and electrons of both galactic and solar origin) colliding with the upper atmosphere of the Earth. Solar wind (a low-density proton-electron gas, streaming from the sun), in combination with the Earth's magnetic field, provides a shield against cosmic rays so that only a low amount of cosmic rays can enter the Earth's atmosphere. The strength of the shield depends on the intensity of the solar wind so that short-term fluctuations of ^{14}C in peat layers can be attributed to changes in solar activity.

As raised bogs solely depend on precipitation for their water supply, shifts in moisture conditions at the peat surface may indicate changes in precipitation

surpluss (precipitation minus evapotranspiration). This study shows that shifts towards more wetness in the peat cores (as reconstructed by macro- and microfossil analysis of the peat layers) often correspond with large decreases in solar activitiy (recorded as peaks in ? ^{14}C).
The dating of such events with conventional ^{14}C dating is often not exact enough to prove synchronity between similar events on different locations. This is because rapid changes in the ^{14}C content of the atmosphere in the past prohibit an unequivocal and exact correlation between the measured ^{14}C and ^{12}C relation and real calendar years. One ^{14}C date may give various “solutions” in calendar years. A precise dating of the wet-shift events is in this study done with “wiggle-match dating” in which many consecutive ^{14}C measurements are taken in a peat sequence and the “wiggles” in these measurements are compared with the wiggles in a tree-ring ^{14}C calibration curve. A very nice study, illustrating the enormous potential of mires as archives for all kinds of environmental information from the past.
For more information: Maarten Blauw: blaauwm@tcd.ie

Leito, T. 2003. Endla soostik Looduskaitsela / Nature reserve. Eesti Loodusfoto. 80 pp. (In Estonian and English).
Beautiful book with fotos of Tiit Leitoof the Endla mire complex in Central Estonia (protected since 1981, Ramsar site since 1997) with short texts of Kai Kimmel, Katrin Möllits, and Tiit Leito.
„The sound of winter is the silence and its colours are white and grey. Frost stiffens the rivers but the springs remain free. The hummocks freeze and the bog pools are covered. The animal life and freedom of movement depend on the might of the winter and the depth of the snow. When the mire and its water veins are frozen, you can simply go straight on. However, when the snow hides thawing surface and water, the life of a hiker may be in danger. The busy twitter of titmice in the trees and the cawing of crows far in the open bog quicken the slow rhythm of winter.”
For more information: Kai Kimmel:
tooma_s@merit.merit.ee

Zurek, S. (ed.) 2001. Reserwat torfowiskowy “Biale Lugi”. (Biale Lugi mire reserve). Homini, Bydgoszcz, 268 pp. (In Polish with English figure and table captions and extensive English summary).
Monography about the Biale Lugi mire (520 ha) in the Holy Cross Mountains in Poland. Biale Lugi („white meadow”) is the largest and best preserved mire ecosystem of the Polish uplands and a nature reserve since 1959 with as main conservational aim the protection of raised bogs and „transition mires”. With detailed information on flora and vegetation (also incl. Bryophytes, algae, blue-green algae, fungi, and lichens), fauna , stratigraphy and subfossil plant communities, origin and development of the mire, abiotics (including geological, pedological, climaticological, and hydrological studies, and an overview of the conservational problems of the reserve. Well illustrated, also with coulour pictures.
For more information: Slawomir Zurek: jacekteofil@poczta.onet.pl

Aschemeier, C., Rückriem, C. & Ikemeyer, D. (eds.) 2003. Naturschutz in Moor und Heide. Biologische Station Zwillbrock, Vreden. 172 pp. + app. (in German).
Proceedings of a symposium on nature protection in peatlands and heathlands. Includes chapters on the peatland projects in the framework of the European Union LIFE Programme in Germany and Nordrhein-Westfalia, on the protection and utilisation status of peatlands in Europe, on arthropods in intact bogs and in regenerating cut-over fields, on positive regeneration developments in North-German bogs, on avifaunistic developments in the Diepholzer peatland area, on peatlands along the Dutch-German border, and various contributions on the areas covered by the LIFE project “Peatlands and heathlands of the western Münsterland”. (management, avifauna, biotopes). For more information: Christoph Aschemeier: caschemeier@bszwillbrock.de

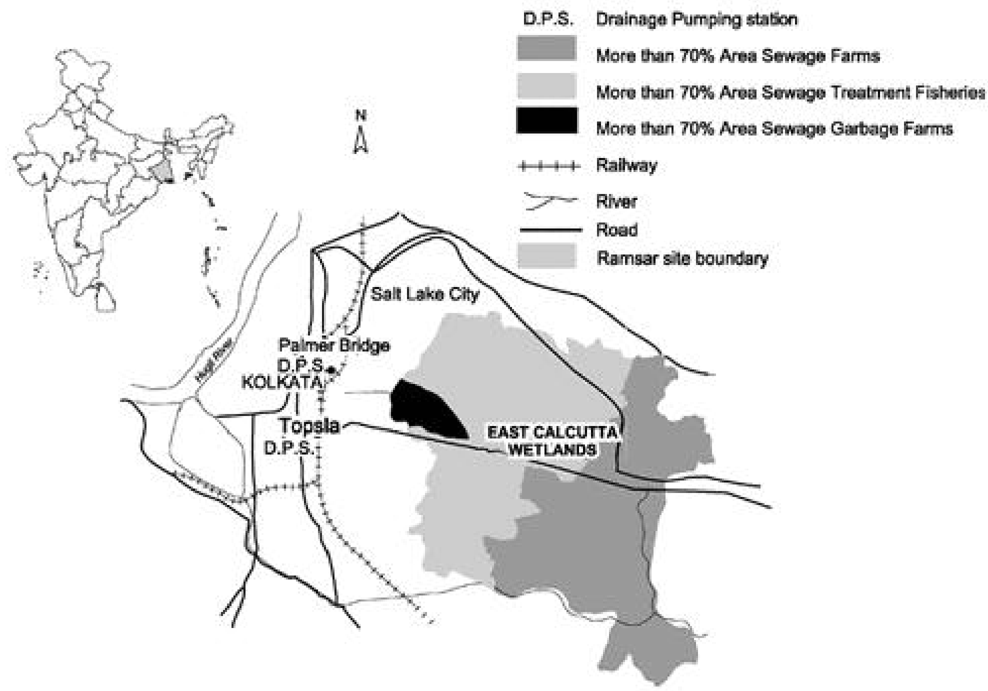
Andreinko, T.L. & Onyschenko, V.A. 2003. Fitoriznomanittja natsionalnich prirodnich parkiv Ukrajni. (Phytodiversity of National Nature Parks in Ukraine. Naukovij Svit, Kijv, 143 pp. (in Ukrainian with English summary).
Describes the location, area, and protection and management status of 11 natural nature parks in Ukraine including some with important peatland areas like Shatsky (48,977 ha, NW Ukraine) and Desniansko-Starohutsky (16,215 ha, NE Ukraine). A floristic and vegetational analysis shows that the Ukranian system of protected areas is not adequate to protect biodiversity. The natural nature parks lodge only 29 % of the Ukrainian species that are included in the IUCN Red List, 20 % of the European Red List, and 27 % of the Ukrainian species included in Appendix 1 of the Bern Convention. Together with the zapovedniki these figures rise up to appr. 60 %. This under-representation is caused by the uneven distribution of protected areas over Ukraine, concentrating mostly in its west part.

Toet, S. 2003. A treatment wetland used for polishing tertiary effluent from a sewage treatment plant: performance and processes. PhD thesis Utrecht, 201 pp.
Whereas many studies have focussed on the performance of treatment wetlands for pollutant removal of municipal wastewater after a primary or secondary treatment, this study focuses on wetland performance for polishing tertiary effluent water from a sewage treatment plant.
These waters have only low remaining COD and BOD levels and moderate P and N concentrations, but additional treatment may still be necessary before

discharging water safely to surface water that are sensitive to eutrophication. A 1.3 ha large constructed surface-flow wetland with a 0.2 m deep front section with Phragmites and Typha and a 0.4 m deep rear section with submerged macrophytes was loaded with 3,400 m3 day-1 of water from a sewage treatment plant. A hydraulic retention time (HRT) of 2.4 days lead to 26% removal of N, 7 % removal of P, 95 – 100 % removal of faecal coliforms in the growing season (against 79 – 91 in the cold part of the year), whereas Oxygen concentration in the water increased. Denitrification was probably the key process for N removal. The annual nutrient removal by the harvest of the emergent macrophyte shoots is significant when the N and P loadings are less than 120 g N and 30 g P m-2 y-1. Denitrification rates in the periphyton were clearly higher than in the sediment or the water. The study indicates that surface-flow wetlands in temperate climates can be very effective in removing total N, ammonium, nitrate, and faecal coliforms from tertiary sewage treatment plants at relatively short hydraulic retention times. P removal is probably only substantial at HRTs of at least 15 days. This would require a proportional increase in the land area needed for treatment wetlands which is in a densely populated area as the Netherlands only feasible when combined with other wetland functions such as nature conservation, recreation, and flood control.
For more information: Sylvia Toet: Sylvia Toet:sylvia.toet@ecology.falw.vu.nl

Bogaerts, J. & Van de Kerkhof, E. 2003. Water in de Peel, naar 32,2m + NAP. Museum de Wieger, Deurne, 88 pp. (in Dutch) Euro 26,50.
Book with fotos of an exhibition of the same name, with six chapters on the current developments in the Dutch Verheven Peel area, where 1200 ha of intensively used agricultural lands are "given back to nature" to merge two major bog complexes. The book pictures the human backgrounds in the central 400 ha, where glasshouse complexes have been dismantled and farms are abandoned to raise the water level. The remaining private houses get clammy and moist and the inhabitants become ill, because the authorities "try to save the cabbage and the goat" by not making the obvious choice to buy and remove the remaining few houses from the centre of this largest (3000 ha) bog complex of the Netherlands. For more information: www.dewieger.nl

Gosh, S.K. & Gosh, D. 2003. Rehabilitating biodiversity. A community based initiative in the East Calcutta Wetlands. WWF India, West Bengal State Office, Kolkata, 41 pp.
In the wetlands to the east of Kolkata local people have through ages been using wastewater from the largest city in the world, especially for growing fish. Retention of wastewater in the ponds, before the initial stocking of fish, allows bacteria to act upon the organic matter in the sewage and decompose the organic waste. The algae that thrived in the shallow ponds under the ample sunshine support the growth of these beneficial bacteria. The algae also provide food for the fish. The ecosystem therefore provides a natural kidney for the city's organic wastewater. This has saved the city of Kolkata from constructing and maintaining a wastewater treatment plant. The wetland (12,500 ha) is largely human made, comprising intertidal marshes including salt marshes and salt meadows with significant waste water treatment areas like sewage farms, settling ponds, and oxidation basins. East Calcutta Wetlands (12,500 ha), that is probably partly underlain by peat, has been designated as a Ramsar Site in November 2002.
The full-coulour booklet deals with the history, flora and fauna, and discusses various programmes to rehabilitate biodiversity and stimulating alternative livelihoods in the area.
For more information: Subir Gosh: ghoshsubir@yahoo.com, and WWF Kolkata: wwfcal@cal2.vsnl.net.in



Bord na Móna 2003. Report on corporate social responsibility 2002-2003. Bord na Móna, 25 pp.

Supplement to the 2002/2003 Annual Report of the Irish Bord na Móna, including its policy in environmental protection, after-use of peatlands, wise use, archaeology, greenhouse gases, catchment hydrology, and community participation. For more information: Donal Clarke: Donal.Clarke@bnm.ie

Ilnicki, P. (ed.) 2002. Torfowiska i torf . Wydawnictwo Akademii Rolniczej, Poznan, 606 pp. (in Polish with English table of contents and English figure and table captions). Zloty 32.

After more than 40 years (Maksimow 1959), a new Polish handbook on "Peatlands and peat", written by a group of 11 peatland experts under the editorship of Piotr Ilnnicki, has been published. The book is divided into 4 parts.

Part 1 deals extensively with peatland values, terminology, genesis, distribution of peatlands in the world (incl. some nice new compilations of literature information), and – very detailed – in Poland, characteristics of Polish peatlands, peatland classification, hydrology, climatology, vegetation, fauna, microflora, with peatland reclamation, agriculture, forestry, protection, and renaturalisation, with construction on peatlands, peat extraction, peatland soils, the role of peatlands in climate change, peatland research methods, and legal and organizational aspects of peatland management.

Part 2 deals with peat, its geobotanical aspects, physical and chemical properties, its use for fuel, horticultural products, balneology, industrial purposes, environmental protection, and its various uses in agriculture, forestry, and medicine.

Part 3 deals with the classification, occurrence, and genesis of gyttjas, the physical, chemical, and mechanical properties of gyttjas, and its utilization values.

The last part deals with the principles of sustainable utilization of peatlands, the threats, the principles of optimal (wise) use, the Global Action Plan for Peatlands, and with organisations dealing with peatlands.

Very valuable are the Polish-English-German-Russian glossaries of peat and peatland in the book, although they should – as always when using dictionaries – be used with critical awareness, as it is often impossible to translate peatland terms one to one into another language.

The book presents the cumulative knowledge of Polish peatland science that has brought forward such classical scientists like Stanislaw Kulczynski, Stanislaw Tolpa, Mieczyslaw Jasnowski, Henryk Okrusko, Adam Palczynski, and many others. It presents a worldwide overview, but obviously strongly focuses on Polish peatlands and peatland experiences.

The book is amply illustrated with figures, tables, and colour pictures, and has an extensive list of references. If you read (and understand) Polish, you get a lot value for money, more than you would get from similar books recently published in other languages. When you do not read Polish, you will understand much of what is being said because of the tables and figures with English captions, and the price for such a nice hardback book remains very low. The Polish Minister for Education awarded the book with a first price this year. The book can be ordered at: Wydawnictwo Akademii Rolniczej, 61-693 Poznañ, ul. Witosa 45. It costs – excl. postage - zloty 32 (ca 7 euro).

Parent, L.-E. & Ilnicki, P. (eds.) 2003. Organic soils and peat materials for sustainable agriculture. CRC Press, Boca Raton, 205 pp. $ 99,95.

This is no value for money. A generally bad book for a much too high price. The book hardly covers the important subject its title suggests: the potential and impossibilities of sustainable agriculture on peatlands soils. It discusses the degradation of peatland soils after drainage and agricultural use (chapters 1 and 2), hydrophysical properties of organic soils (ch. 3), peat substrates for plant growth containers (ch. 4), soil acidity detemination methods and nitrogen and phosphorus balance indicators (ch. 5 and 6, in which the authors apparently had to get rid of a lot of unpublished own research material that is largely irrelevant for a review paper), retention of copper (ch. 7), the fate of pesticides in organic soils (ch. 8, the only clearly written paper in the book), agricultural use of cutover peatlands in Russia (ch. 9), and a last chapter 10 "agricultural production systems for organic soil conservation", an enumeration of largely incoherent statements.

The chapters cannot be read independently from each other, but are insufficiently integrated; the texts are often badly written (possibly because there was no English native speaker involved), have much repetition and an often illogical structure. Some parts cannot be understood by people who are not specialised in peatland soil science. There is no global perspective: the book largely focuses on Quebec and Central Europe, the regions where the editors are coming from. There is no mention of areas where peatland agriculture is currently expanding, such as Indonesia, Sarawak, China, and Southern Africa. No perspectives are offered for agricultural techniques that do not lead to peat soil degradation and peatland subsidence. Various chapters deal with "indicators," but it remains unclear what the relation to sustainability is. Many facts are presented without contributing to the understanding of sustainability, actually the whole concept is not discussed! There is one strong indicator for the failing quality of the book: in the Index the lemma "sustainability" is missing…

Järvet, A. & Lode, E. (eds.) 2003. Ecohydrological processes in Northern wetlands. Tartu University Press, Tartu, 303 pp.

Valuable collection of 52 selected and reviewed papers of the International Conference and Educational Workshop, Tallin, Estonia 30 June – 4 July 2002 (see IMCG Newsletter 2003/2, page 18), dealing with hydrological and thermal processes, plant and animal distribution, hydrochemistry and carbon processes, modelling, both in virgin and damaged peatlands. Includes many papers relevant for peatland conservation and management. For more information and ordering details: Elve Lode: elve@eco.edu.ee

Friedrich, S. (ed.) 2003. Pryzlosc torfowisk Polski. (The Future of Polish peatlands). Akademii Rolniczej, Szczecin, 56 pp. (in Polish and English).

Abstract volume of the international conference (Sczcecin 13-14 September 2003) organised to commemorate the death of the devoted peatland scientists and mire conservationist Prof. Mieczyslaw Jasnowski (1920 – 1993) 10 years ago and to celebrate the 10th anniversary of the the Dolna Odra River Valley Landscape Park (Poland). For more information, contact Leslaw Wolejko: botanika@agro.ar.szczecin.pl

"Peatlands are the last refuges of nature disappearing due to civilisation and utilitary needs of man. Mire degradation and disappearance of peatlands lead to the destruction of nature, being at the same time an economical catastrophy. For that reason inventory of peatlands, evaluation of threats and estimation of real needs for their exploitation become a necessity. This should be a sound, scientifically supported, fair and conscious fight for each cubic meter of peat, which, though continuously forming and accumulating in living mires, belongs to natural resources non-renewable in a realistic time period. These resources are vanishing due to direct exploitation and indirect impact by man."

Mieczyslaw Jasnowski 1993. Torfowiska okolc Szczecina. In: Stan srodowiska miasta i rejonu Szczina-zagrozenia i ochrona. STN Szczecin.

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UPCOMING EVENTS

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

Peatland Conservation and Sustainable Use
22-24 July 2004, Lanzhou City, Gansu, China
Objectives of the workshop and technical visit are:
- Exchange information on peatland values and threats and promote their conservation
- Identify and promote options for sustainable management and community involvement for peatlands conservation and sustainable use.
- Discuss and develop techniques for restoration of degraded peatlands.
- Facilitate international cooperation and exchange on peatland management

for more information contact:
wicp@public3.bta.net.cn
or surf to the IMCG hompage

XII International Peat Congress: Wise Use of Peatlands
6-11 June 2004, Tampere, Finland
more information at http://www.suoseura.com/

The 7th INTECOL international wetlands confernce
25 - 30 July 2004, Utrecht, The Netherlands
for more information visit
http://www.bio.uu.nl/intecol/

32nd International Geological Congress
20 - 28 August 2004, Florence, Italy
The congress hosts a symposium entiteled “Peatlands: basin evolution and depository of records on global environmental and climatic changes”
for more information have a look at http://www.32igc.org/ or contact Peter Martini pmartini@uoguelph.ca

IMCG Field Symposium and General assembly in South Africa
12-26 September 2004
For more information see elsewhere in this and previous IMCG Newsletters

The **IMCG Website** is regularly updated. Recently new links were added to the front-page and others are under reconstruction.
Special attention is asked for the **Mission** section where you may find the IMCG Corporate Strategy and Action Plan 2002-2006. Please check the targets and actions and contact the Secretariat on how YOU can contribute to their delivery.
In the new section on **Threatened Peatlands** information on threatened peatlands will be gathered to inform a wider public and to give expertise in all issues of mire and peatland conservation. Fill out the online form if you want to attract attention to a specific case.
In the **Newsletter** Section you may now also find the IMCG Database of Expertise Form. Please fill out this form as soon as possible to strengthen our network capacity.
The new **Publications** section features information on recent IMCG and other relevant publications.
The **Documents** section is currently under reconstruction.
The **Calendar** still provides the latest on peatland related events worldwide. Please consult the Website when planning your own events and make sure the webmaster is informed on the latest.
Everyone is urged to contribute new and updated links to interesting peatland related websites to the **Links** section.
The section **Projects** is the next to be updated.
Everyone is invited to take a look at and to contribute wherever they can.

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IMCG Congress 2004 – South African Mires And Peatlands
Registration form

Please register preferably before 31 April 2004.
Note deadline for field excursion registration: 31 April 2004.

Please forward registration form to:

Piet-Louis and Althea Grundling
P.O. Box 912924
SILVERTON
0127
South Africa

e-mail: peatland@mweb.co.za
tel/fax: + 27 12 808 5342
cell: + 27 12 83 231 3489

Date:

Last name________________________________First name:_____________________________________

Title:______________________________________Sex:M / F

Company/Organization:____

Position:

Postal Address:

City:____________________________Code:___________________Country:_________________________

Phone (contry code/city code/number):___________________/_______/_________________________

Fax: (contry code/city code/number):___________________/_______/_________________________

Cell phone: (country code /number):___________________/__________________________________

E-Mail:

I want to attend the following (please tick X your choice):

IMCG Field Excursion: 10 – 23 September 2004 - Yes? / No?
Theme: Southern African Mires and peatlands
Venue: South Africa and Lesotho
Price: EUR 950 (early payment before 20 February 2004: EUR 900)
Please note deadline for field excursion registration: 31 April 2004

Workshop (for SADC wetlanders): 19 September 2004 - Yes? / No?
Theme: Management and Restoration of southern African wetlands and mires.
Venue: Maseru, Lesotho
Price: no fees, but register before 31 March 2004 to qualify for travel
and accommodation assistance – Africa countries only.

IMCG Symposium 24 – 25 September 2004 - Yes? / No?
Theme: Management challenges for Wetlands, Mires and Peatlands
in the 21st Century.
Venue: Paarl, South Africa
Price: EUR 250 (early payment before 29 February 2004: EUR 200)

IMCG General Assembly: 26 September 2004 - Yes? / No?
Venue: Paarl
Proce: no fees

Total Package: Yes? / No?
IMCG Field Excursion + Workshop (optionally) + IMCG Symposium
Price: EUR 1100 (early payment before 29 February 2004: EUR 1000)
(Transport to and from South Africa are not included)

NOTE: Participants from African counties
A special rate applies for participants from African counties who wish to present papers or posters at the symposium. Join as for any part of the field trip at ZAR 50 a day (accommodation and transport to site excluded). Please contact Piet-Louis Grundling for more details.

Method of payment

Only bank transfer payments are possible. Payment has to be made to:

Account Name: IMPESA
Bank: ABSA
SWIFT code: ABSAZAJJCPT
Branch: Silverton, RSA
Branch Code/ Bank Clearance No: 33 444 5
Account No: 405 727 1173

Write "IMCG 2004" and your full name as the subject of payment.

The registration fee is calculated as a netto amount. Please note that bank transfer costs are not included in congress costs. Please ensure that any (international) bank transfer fees will be covered by your bank account.

Symposium: Presentations and Posters:

Please indicate if you want to contribute an oral presentation **Yes? / No?**

or poster **Yes? / No?**

If yes, please provide the (preliminary) title:____

____

(see 2nd circular for deadline for abstract submission)

Catering:

Please indicate your dietary constraints/preferences____

How did you learn about the IMCG Congress? (check one):
? E-mail ? IMCG Website ? IMCG Newsletter ? Word of Mouth
? Other (Please specify):____

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