Expert meeting on

"Monitoring of mire habitat types according to EU Habitats Directive in the Baltic States"

October 6-7, 2005, Jūrmala, Latvia

REPORT

Goals of the meeting:

- To inform about European developments regarding monitoring and reporting for Natura 2000 mire habitats;
- To discuss experience on filling in the EC reporting format (examples 7110*, 7120 raised bog habitats[1]);
- To discuss the methodology for monitoring of mire habitats;
- To provide recommendations for authorities on further steps to fulfil the reporting obligations and to ensure effective monitoring and implementation of the Habitats Directive goals;
- To discuss other main problems/ important issues related to mire monitoring and to find solutions together.

Opening and introduction *By Ms. Daina Indriksone, BEF*
Ms. Indriksone introduced the goals and activities of the Phare CBC project "Implementation of the biodiversity monitoring requirements in accordance with the EU Birds and Habitats Directives through facilitating cooperation and stakeholders networking in the Baltic States", in the frame of which the current meeting was carried out. She reviewed the outcomes of the previous events as well as introduced the goals, discussion topics and agenda of the current meeting.

SESSION I Conservation status assessment and filling in reporting format for bog and fen habitats

Monitoring and reporting for Natura 2000 mire habitats
By Mr. Doug Evans, European Topic Centre on Biological Diversity
Mr. Evans gave a brief overview on mire habitats of Annex I of the Habitats Directive and their distribution in the Baltic States and in the whole Europe. He also explained the reporting

[1] Active raised bogs (7110*) ;
Degraded raised bogs still capable of natural regeneration (7120)

format of the European Commission (EC) and related terms and concepts as well as informed shortly about the next steps.

He informed that there are 12 mire habitat types in Annex I of the Habitats Directive, including 6 acidic, 4 alkaline and 2 extreme boreal mire types. There are also 6 associated habitats (3160, 4010, 6410, 6450, 9080, 91D0) and some species of Annexes II, IV and V that should be monitored together with mire habitats.

Mr. Evans characterized mires as unique habitats that are relatively poor in species but the species living there are mostly "specialists". It is also not so easy to delimitate mire habitats as they form often mosaics with other habitat types (e.g. 7110 with 3160). Mires are habitats with complex structure and function (depth of the peat, hydrology etc. are very important), not just plant communities. All these aspects make mire monitoring and also reporting to the EC problematic.

Mr. Evans also presented the distribution of mire habitats in the Baltic States but added that some of this information still needs to be checked and specified.

Mr. Evans introduced briefly five sections of the reporting format and emphasized that this document was worked out not only by the EC but together with Member States. More precisely he focused on Annex D of the reporting format, which requires information about habitats. Using practical examples he explained the problematic concepts like range, area, trends, typical species and favourable reference values that are still under discussion in the Scientific Working Group developing guidelines for reporting. For **range** probably the IUCN definition[2] will be used but still defining range can be sometimes problematic and the decision is made case by case (for example if there is one big (covering the whole country) or several smaller "ranges" in the country).

The problems with estimating **trends** are more relevant with regard to species and mostly related to difficulties to distinguish a trend from a fluctuation. Mr. Evans pointed out that the time scale for trends was left undefined in the reporting format to allow best use of existing data.

The concept of **typical species** is still under discussion. A separate assessment for each typical species will be not required but it is included within the assessment of 'Structure and Function'. Member States should list the typical species considered and this should be preferably a short list (5-10 species for each habitat type) of species indicating the undisturbed habitat type. Typical species can be plant as well as animal species.

Favourable reference values should be set for range, area of habitat and for population of species. It should be the values where habitat/species can be considered to be at a 'Favourable Conservation Status'. Favourable Reference Range (FRR) and Area (FRA) should not be

[2] "Extent of occurrence is defined as the area contained within the shortest continuous imaginary boundary which can be drawn to encompass all the known, inferred or projected sites of present occurrence of a taxon, excluding cases of vagrancy. This measure may exclude discontinuities or disjunctions within the overall distributions of taxa (e.g. large areas of obviously unsuitable habitat) (but see 'area of occupancy', point 10 below). Extent of occurrence can often be measured by a minimum convex polygon (the smallest polygon in which no internal angle exceeds 180 degrees and which contains all the sites of occurrence)."

smaller than the current values! For some habitats the FRR could be modelled from climate data (e.g. for 7130, which needs certain amount of rainfall). For active raised bogs (7110) FRA could be actual area of active raised bogs and degraded raised bogs still capable of natural regeneration (7120). Mr. Evans pointed out 7120 as an exceptional habitat type for which the favourable range and area should be actually 0 km² (although in reality this will be probably never achieved).

Annex E of the reporting format is matrix for assessing the conservation status of habitats. If the preparatory work is done and data gathered then Annex E can be quickly filled in.

Mr. Evans informed that the reporting format is now agreed and will most probably not be changed anymore; only the guidance document is still under development. The first draft of the guidance document was discussed in September 2005 and the next meeting of the Scientific Working Group will be on 21-22 November 2005. The main focus of this meeting will be on reference values. Mr. Evans emphasized that work examples from countries on conservation status assessment and filling reporting format are still very needed, especially on habitats (as the current examples are mostly about species). He also encouraged countries to participate in the process if they want their concerns to be addressed in the guidelines.

Reports from the Baltic States on filling in the reporting format for active raised bogs (*7110) and degraded raised bogs still capable of natural regeneration (7120). *Please see the seminar handouts for filled in reporting formats.*

Estonia *by Mr. Hanno Zingel, Estonian Environment Information Centre*

Mr. Zingel informed that the assessment was done together with the nature conservation department of the Ministry of the Environment who is responsible for Natura 2000 network and has relevant databases. From published sources two books have been used for the assessment: Eesti NSV taimkate (Plant cover of Estonia) (Laasimer, L. 1965) and Eesti taimkatte kasvukohatüüpide klassifikatsioon (Classification of habitat types of Estonian plant cover) (Paal, J. 1997).

For both habitats the range can be considered the whole Estonia, which of course has not changed since 1965. The area trend has been estimated since the accession date (01.05.2004) and for such a short period the trend is stable. However, if to take a longer period (since 1965), the area of raised bogs has decreased as result of direct human influence and also natural processes. Mr. Zingel mentioned peat extraction, mechanical removal of peat, mines, underground mining and drainage as pressures/threats for raised bogs. As typical species mainly Sphagnum species and some higher plant species were selected, additionally also some bird and butterfly species. The Favourable Reference Area for active raised bogs would be the current strictly protected area, which is 10 000 ha less than the total present area of active raised bogs. Future prospects as well as the total conservation status of active raised bogs was assessed as favourable in Estonia because 90 % of this habitat is protected and consequently out of extraction management.

For degraded raised bogs (7120) the pressures and threats as well as typical species are the same as for active raised bogs (7110*). Mr. Zingel admitted that estimating favourable range

and area as well as the conservation status was a little bit difficult for this habitat type as actually the less we have degraded raised bogs the better it is.

Questions and discussion

- It was discussed that the opinion of the European Commission is that FRA should not be smaller than the present area. In most cases some restoration is needed to achieve FCS.
- However, there is already some discussion that in some cases also less than present could be viable (especially concerning species like wolf, lynx, brown bear). In the biogeographical process after reporting all these problems will be discussed.
- Scientific research on minimum requirements of habitat types would be needed.
- European Topic Centre will make one report per each bio-geographical region based on reports of Member States. All reports will be publicly available, NGOs will be invited to the bio-geographical process, countries will be compared and questions asked if there are some very big differences.
- It was mentioned that air pollution should be also added to pressures/threats.
- The participants suggested that the Estonian list of typical species for both discussed habitat types needs some adjustment. At the moment there were listed mostly characteristic bog species but not all of them have indicating value (indicating good status of a concrete habitat type).
- Interpretation of 7110 and 7120 was also considered as not an easy question. There have been discussions at least between bog specialists of Estonia, Latvia and Lithuania.

Latvia *by Ms. Māra Pakalne, Latvian Fund for Nature*

Ms. Pakalne explained that in Latvia the main criterion for active raised bogs is that peat accumulation is still going on. If not then it is already degraded raised bog where also the typical species are different (species characteristic for degraded raised bog like *Calluna vulgaris, Pinus sylvestris, Betula pubescens, Cladina sp*.).

Ms. Pakalne informed that she did not put the total territory of Latvia as range of raised bogs because in some parts of Latvia there are less bogs. There is no GIS-based map available in Latvia for raised bog habitats, only for peatlands that includes also other habitat types (swamp forests etc.). Ms. Pakalne considered the quality of data moderate because the data are quite old and not updated. The range of raised bogs has not changed but the area covered by this habitat has decreased 53 % since 1970-ies because of direct human influence (although the present area 1500-1800 km² is very approximate at the moment, based on data of Latvian Environmental Agency). Ms. Pakalne divided past and present impacts for raised bogs into direct (drainage, peat extraction, building, forest plantations, fires, use for agriculture, road construction) and indirect influence (eutrophication, pollution, cumulative impacts). The favourable reference area for active raised bogs could be ca 100 km² more than present area.

Ms. Pakalne explained that she had chosen as typical species the characteristic species occurring in many mires and having also an indicator value. Sometimes also very small species can be good typical species, like *Mylia anomala* and *Kurzia pauciflora* for 7110. *Betula nana* cannot be typical species in Latvia because it is very rare.

Ms. Pakalne concluded that the conservation status of active raised bogs can be considered as favourable in protected areas but not outside because the peat extraction is still going on. The raised bogs cannot expand because they are surrounded by drainage ditches.

About degraded raised bogs (7120) she concluded that it would be better to have more active raised bogs and the degraded ones as less as possible. Therefore it is unclear how to assess the conservation status for 7120. Currently the degraded bogs have been left out from protected areas.

Discussion:

- Opinion was expressed that probably prospects on national level are unfavourable until the peat extraction is still going on. If drainage ditches are also in protected areas then consequently the status is unfavourable.
- The range of raised bogs should be the whole Latvia.
  Selected typical species should be easily identifiable, not very small because they should be also monitored by protected areas' staff that will probably not recognize tiny *Bryophytes*. A good example is Common Standards of Monitoring in UK (http://www.jncc.gov.uk/page-2217).
- Countries are interpreting 7120 differently: for example Scotland's approach is that a single site can be both, e.g. 80 % is active and 20 % affected by drains. One drain does not always mean that the bog is degraded; the relevant specialists should make the decision.

Explanation of coming EC guidelines on reporting *by Mr. Doug Evans*

Mr. Evans gave a brief overview on what kind of guidance countries can expect and how they can participate in the development of this document.
He emphasized that the guidelines will not be a fixed paper but a dynamic document available on Internet and will be updated and improved all the time.
The biggest part of the guidance (33 pages at the moment) is simple explanatory notes for e.g. codes for country, region etc., i.e. trivial recommendations to get data in the same format. However, there will be also ca. 10 pages explanation of problematic concepts and terms (e.g. typical species) and mainly this part is still under discussion.

Mr. Evans emphasized that the guidance document is not an EU law but recommendations and that countries should participate in its development, take part in the meetings of the Scientific Working Group, send examples and comments if they want their problems to be addressed.

Discussion:

- The Baltic Ministries of Environment/competent authorities have got the draft guideline documents but have not commented very actively.

Raised bog monitoring and conservation status assessment in Ireland
By Ms. Deirdre Lynn, National Parks & Wildlife Service, Ireland

Ms. Lynn gave an overview on raised bog habitats and their monitoring as well as introduced first attempts to assess the conservation status of raised bogs in Ireland.

She informed that Irish experts consider as raised bog habitats active raised bogs, degraded raised bogs, bog woodland and *Rhynchosporion* depressions.

The original resource of high bog in Ireland (active and degraded) has been ca. 310 000 ha. Currently remained are 18 000 ha (according to data collected 10 years ago), from which less than 3000 ha are active. That means that only 1 % of original resource has remained active and 5 % still capable of regeneration. The main reasons for this huge decline are industrial peat cutting (mainly in 1970-80ies) and drainage, but also forestry, burning and invasive species. Now the peat extraction is stopped but drainage is still functioning. Drains have been blocked in very few sites because this is very expensive. 97 % of remaining resource of raised bogs is now protected and all commercial turf cutting is stopped at the moment (domestic turf cutting is stopped within 10 years of designation).

Ms. Lynn informed that a survey of raised bogs was carried out in 1994/95 (distribution of community complexes was mapped, length and functioning of drains was quantified). She pointed out that repeatable quadrates or transects are not suitable for Irish raised bogs because the distribution of communities changes continuously. During survey the community types were mapped, physical characteristics (firmness, cracking, slope, bare peat etc.) recorded and only in small number of quadrates more detailed information was recorded. In 2003 also extent of peat cutting was assessed.

Raised bogs are community complexes that include different structural elements like pools, hollows, lawns, flats, hummocks, disturbed areas, facebank. Each of those elements has different diagnostic species (this list will be adapted for the EC reporting format). Community complexes are amalgamated into ecotopes: marginal and sub-marginal ecotope (degraded raised bog) and sub-central and central ecotope (active raised bog, bog woodland and active flush). The assessment is done on the ecotope level. Ms. Lynn described the physical characteristics and characteristic species for each ecotope (see the presentation).

During raised bog monitoring in 2004/05 all sites surveyed before were revisited, ecotopes were remapped, impacts quantified, changes assessed and conservation assessment was derived. For assessment of impacts and activities Natura activity codes were used, influence and intensity of activity as well as area affected was estimated. Ms. Lynn demonstrated the monitoring results on maps.

The results of 1995 and 2005 were compared. The ecotopes were added together to get habitat types. If degraded raised bog had got better (less degraded raised bog) then this was not considered as habitat loss. To assess the structure and function of degraded raised bogs the variation of extent of the marginal ecotope was considered: increase of marginal ecotope indicates the situation getting worse. If the extent of degraded raised bog had increased as result of deterioration of active raised bog then this was not considered as part of the changes in extent of degraded raised bog. Future prospects were assessed using the impacts recorded (including positive management). Usually there was auto-correlation between future prospects and changes in extent and structure and function.

For all 48 sites the conservation assessment matrices were filled in.

The results of the overall assessment showed that overall range of active and degraded raised bogs has been maintained in recent decades but the area of active raised bogs has declined more than 25 % in the last 10 years and therefore assessed as unfavourable-bad. The area of degraded raised bog has only declined for 1 % and therefore assessed as favourable. These losses would be bigger if a longer time period is considered. The overall assessment of structure & function and future prospects was done based on summarizing assessments of individual sites. As the result it can be concluded that the overall conservation status of Irish active raised bogs is unfavourable/bad and the conservation status of degraded raised bogs is unfavourable/inadequate.

Finally Ms. Lynn highlighted some problems appeared during this assessment. It is unclear how to estimate habitat extent or determine structure and functions without surveying/assessing all the sites as well as how far to go back for assessment of trends and what to do with mixed quality data.

Discussion:

- In Slovakia and Czech Republic similar approach is used in raised bog monitoring as in Ireland.
- In Ireland the described assessment was done by four employed ecologists and it took about a year.
- In Ireland it is cheaper to use fieldwork than remote sensing because usually it is very cloudy for making aero photos.
- For assessing the intensity of impact the length of drains and their functioning is taken into account, also burned areas, invasive species.
- 48 sites for raised bogs should be representative. For assessing blanket bogs in Ireland the agri-environmental monitoring system is used and 50 % of national resources are monitored.
- Summary of this assessment report will be dealt on political level in Ireland (NGO Irish Peatland Trust has been drawing attention to the big loss of mires already 20 years but now the assessment was done by a state authority and this will be hopefully taken more seriously).

SESSION II Monitoring methodology for bog and fen habitats

Monitoring of mires within EU Habitats Directive in Sweden

By Mr. Sebastian Sundberg, Uppsala University, Sweden

Mr. Sundberg introduced the system and methodology for monitoring of Natura 2000 mire habitats in Sweden.

He informed that wetlands inventory was carried out in 1981-2004 in Sweden and since 2004 a complementary baseline survey is going on that should be finished by 2007. There are different monitoring systems developed for rich and poor mires, which were tested in 2004-2005. Regular plots of National Environmental Landscape Monitoring programme (NILS - going on since 2003 with 5-year cycles) are used and additional plots are added in Natura 2000 sites to ensure statistically robust data. Mr. Sundberg also pointed out the fact that as the situation in North- and South-Sweden is different (in south there is more human disturbance, atmospheric deposition etc. while in north there are huge areas without human influence), also

different monitoring approaches are used. In the southern part of Swedish boreal region at least 10 raised bog sites will be monitored, in the rest of boreal region a sample of 10 sites will be monitored. In the continental region all sites will be monitored as well as all sites with drainage ditches.

For baseline survey the data from wetlands inventory and aero photos will be used, field surveys of some mire habitat types and of all sites with drainage ditches will be done.
In total there are 2274 km² active raised bogs in Sweden of which 13 % are in Natura 2000 sites. The favourable reference area has been set 2286 km².

For assessing structure and function the following parameters are monitored in raised bogs:

- Tree cover, extent of hollows **and area** (using remote sensing, every 18th year)
- Drainage ditches (until satisfactorily restored)
- Negative indicator species, *Molinia, Betula pubescens* (qualitative search in the bog)
- Tree density (> 0.5 m, number within the main plot; every 6th year)
- *Sphagnum* cover, vegetation height (small plots; every 6th year) – did not work very well in field because of high nitrogen deposition in some sites
- *Addition: cover bare peat and dominant vascular plants*
- Typical plant species (small plots; quadrant frequency; every 6th year)
- Typical bird species (sampling: in sites larger than 3 km² – line transect survey, in smaller sites – territory mapping; also will be monitored in all SPAs).

Mr. Sundberg added that some parameters might be still deleted in case there are not enough resources but actually, the main costs are related to travel not to the number of parameters monitored.

He described the field sampling scheme for raised bogs: a minimum of three circular plots containing at least 10 smaller plots each of 0,25 m² will be selected randomly at each site. He listed the typical vascular plant (*Carex limosa, Drosera anglica, D. rotundifolia, Rhynchospora alba, Scheuchzeria palustris, Trichophorum cespitosum*), *Sphagnum* (*S. austinii, S. balticum, S. cuspidatum, S. fuscum, S. magellanicum, S. majus, S. rubellum, S. tenellum*) and bird species (*Circus cyaneus, Motacilla flava, Numenius arquata, N. phaeopus, Pluvialis apricaria*) that are monitored in active raised bogs and presented an example of criteria for favourable conservation status for a raised bog site.

Alcaline fens (7230) in total cover 860 km² in Sweden and 16 % of them are in Natura 2000 sites. Mr. Sundberg stated that as the total coverage is probably underestimated, the favourable reference area has been set at 1200 km². Monitoring of alkaline fens has been separated into four subtypes (southern and all managed – all sites monitored; northern unmanaged – sample of habitat will be monitored; open and treed (sample of sites/habitat will be monitored throughout the boreal region) alkaline fens).

The area will be monitored by remote sensing and field measurements (GPS). For assessing structure and function, the following parameters will be measured for alkaline fens:

- Tree cover, hydromorphological structure (using remote sensing, every 18th year) – in open fens
- Management (grazing, mowing)
- Drainage ditches (until satisfactorily restored)

- Negative indicator species, *Molinia*, *Phragmites*, *Filipendula ulmaria, Cladium*, *Sphagnum*, *Calliergonella cuspidata* (qualitative search + plots; every 6th year)
- Tree density (> 0.5 m, distance between nearest neighbours; every 12-18th year)
- Vegetation height (plots; every 6th year) – evaluated as not a good parameter
- Addition: cover of bare peat, litter and dominant species
- Typical plant species (plots; quadrant frequency; every 12-18th year) – quite a long list containing vascular plants and *Bryophytes*, will be probably shortened still.

Mr. Sundberg admitted that probably some dragonflies and butterflies could be added to the list of typical species but not birds because there are only few birds in this habitat type.

The sampling scheme in alkaline fens (semi-permanent 0,25 m² plots in permanent transects are monitored) as well as an example of site-specific conservation status objectives was presented.

Mr. Sundberg pointed out that *Cladium* fens (7210) are EU priority habitat type but in alkaline fens *Cladium* is actually a negative indicator species (alkaline fens are overgrowing with *Cladium*).

Discussion:

- In the area with largest impact all sites are monitored but in undisturbed areas only a sample of sites is monitored. In case of negative indication in the sample sites, all sites will be monitored.
- Participants expressed the opinion that 6-years monitoring cycle in raised bogs is probably too frequent; it should be 10 years to avoid the impact of monitoring (disturbance).
- The 6-years reporting cycle for EC is a compromise across all habitats and species but monitoring cycles can be also longer or shorter depending on habitat/species.
- It was pointed out that as some Annex species are anyway in the lists of typical species of habitats, those species could be monitored in the frame of habitat monitoring – cost efficiency!

New monitoring methodology in Estonia

By Mr. Hanno Zingel, Estonian Environment Information Centre (EEIC), Estonia

Mr. Zingel introduced the new methodology used in habitat monitoring in Estonia in 2005.The data form and species list are attached to the seminar report.

He stated that the previous monitoring methodology did not give the necessary information for overall conservation status assessment of habitats in the country. Therefore this year the number of monitoring sites was tripled and a new field work data form was used.

Mr. Zingel stressed that this form is not final yet but should be improved based on experience of field workers and further work of scientists. Most of this year's filled in forms have been sent to the EEIC already but are not analysed yet.

The methodology is simplified compared to the previous one. The field worker has the map of Natura 2000 habitat types (from the Ministry of the Environment). One questionnaire for each

habitat type is usually filled in (separate questionnaires are filled in only if different subtypes of the habitat with different species lists can be clearly distinguished in the area or the land use and status of different parts of the area is very different). In case of large sites the field worker can select an area that he/she can cover in one day. Area should be covered by transect, with 5-10 fixed points in it (GPS should be used, especially if there are no landmarks). Photographs of each fixed point should be made. The list of species should be added to each questionnaire.

The borders of the site (habitat type) and also borders of different parts (subtypes/vegetation types) of the site have to be drawn onto the map. If the habitat type has changed (e.g. wooded meadow to deciduous forest) then the code of the habitat type can be changed.

For plant species of I and II protection category the species data form should be filled in, the coordinates of the found site should be fixed and/or the distribution area marked on the map, which is added to the species data form (this can be done also for plant species of III category).

Quadrate monitoring is not obligatory anymore (except 4 areas of wooded meadows) but can be done in previous monitoring plots in case an expert wants to do it.

Mr. Zingel emphasized that it is important to get expert's opinion/understanding about the site and what kind of management he/she proposes. The idea is to combine the habitat (plant) monitoring also with other monitoring (insects, birds, butterflies and other species of those habitats).

The main problem is defining borders of habitat types because one habitat type includes different vegetation types.

Mr. Zingel stated that it is planned to use more aero photos and satellite images in habitat monitoring in future. The more detailed fieldwork would be carried out only in case some problems are discovered.

Discussion:

- The opinion of participants was that the presented data form was quite subjective and that analysing of the data would be difficult because of too much text required in answers. The form will be still discussed with experts during this autumn/winter and improved, probably the final version will be shorter and include more quantitative measures.
- It was suggested that in order to avoid subjective estimations there should be exact guidance on how to estimate structure and function and /or clear records are needed how the fieldworker has taken the decision – in Estonia mostly the same persons are monitoring the same habitats at the moment but in future of course some trainings are needed (e.g. for protected areas' staff involved in monitoring).
- It was also pointed out that one should be careful with assessments of impacted area of a habitat in % because the area of a habitat is changing all the time.
- Latvian data form is different, there are fewer questions and monitoring quadrates are used. In Latvia there is a monitoring handbook developed and the form should be

possible to fill in without any special guidelines. The Latvian fieldwork data form is attached to the seminar report.

- In Lithuania there is no form developed yet.
- The BioHab project (www.biohab.alterra.nl) has developed a field work methodology using standardized coding system; the data are directly inserted into computer. It is easy to put data into database and to analyse. For easier analysing it is better to use options (e.g. "yes/no") than free text.
- In the Baltic States mostly paper forms and maps are used so far in field monitoring because there are not enough resources to supply all field workers with laptops.

Semi-natural and climax communities – information received from biological monitoring and methodological restrictions for getting that information
By Mr. Tõnu Ploompuu, Tallinn University, Estonia

Mr. Ploompuu introduced his opinion about the new Estonian habitat monitoring methodology and its relevance to the monitoring requirements for different types of habitats.

He stated that monitoring should give information about the status of habitats as well as enable to prognosticate the trends (changes in habitats). That requires enough punctual measurements but usually resources are limited, therefore the rate of punctuality and costs of monitoring must be optimized – not all the area has to be monitored but it can be done only in a sample sites.

An error in monitoring depends on the natural fluctuation of the community (especially appearing and disappearing of occasional species) as well as on measurement errors (especially subjective fluctuations in measurements). Choosing the right monitoring methodology can diminish errors.

Mr. Ploompuu pointed out the difference of semi-natural and climax communities regarding natural fluctuations of species there. Semi-natural habitats depend on human influence while climax communities (e.g. raised bogs) should be free of human influence. Big changes can happen easily in the semi-natural communities in case the human impact changes; consequently also the restoration can be quite quick. This is not possible in climax communities where the reasons of destruction are mostly outside of the habitat, the changes are slower and restoration of already degraded habitat is much more complicated.

Occurrence of some alien species in big climax communities is normal (in points of occasional disturbance, e.g. storm glades) but these alien species are mostly the same as the species appearing in case of degradation of habitat resulting from human impact (e.g. drainage, pollution).

The source of measurement errors can be also species that are difficult to identify or cryptic. Using fixed monitoring plots and performing parallel measurements in statistically significant number can diminish these errors. If to compare the new "status monitoring" method with previous "fixed squares" method then in case of the fixed squares method the measurement errors coming from natural fluctuations, difficult or cryptic species as well as from fluctuations in location of measurement points in different years are much smaller. Difficult

and cryptic species cannot be left out from monitoring because they are important indicators of the "most climax" communities.

Mr. Ploompuu concluded that the same information about climax communities as with the "status monitoring" could be received from landscape monitoring by remote sensing, which is much cheaper than fieldwork. For monitoring of status and changes in climax communities the permanent sample plots should be monitored. The combined analysing of data from landscape monitoring and from biological monitoring of permanent plots should ensure necessary information for assessment of the status of the habitat in the country as well for prognosis of trends and determining indirect human impact. Here the international cooperation could be useful for analysing the changes. The number of permanent plots in one country could be quite small and the monitoring cycle could be minimum 10 years.

However, he admitted that the new "status monitoring" method developed in Estonia could be suitable and give valuable information in semi-natural habitats as well as in seriously degraded and fragmented climax communities.

Discussion:

- The influence of repeated measurements can be reduced by selecting suitable size of plots, by using snowshoes instead of walking in bogs etc. It is good to use remote sensing as complementary method but some of necessary information (e.g. species composition) can be received only from fieldwork.
- English Nature has published the Proceedings of the Peterborough Remote Sensing Workshop (30 Sept. 2004) showing that remote sensing enables to get information not only about horizontal but also about vertical structure of landscapes/habitats. That could be used for monitoring of bogs because it is not possible to monitore large bogs in the field. Remote sensing could be the starting point to define places where to send experts for field monitoring.
- Remote sensing is used widely in habitat mapping.

A glimpse to present and near future of mire habitats monitoring scheme in Lithuania
By Mr. Vytautas Naruševičius, Environmental Protection Agency, Lithuania

Mr. Naruševičius gave an overview about the current situation and future plans regarding monitoring of mire habitats in Lithuania.

He informed that the National Environmental Monitoring Programme for 2005-2010 (NEMP) that includes also nature monitoring part, which includes also monitoring of mire habitats, was recently approved by the government. For mires there are more than 140 monitoring sites inside and 8 monitoring sites outside of Natura 2000 network in Lithuania that will be monitored at least once per three years. The main parameters to be observed are hydrological regime, diversity and abundance of typical plant species, structure and distribution of plant communities, the area of the habitat and the main impacts to the habitat.

The methodology is still under development but it should be approved by the Ministry of the Environment in 2006 (2007) and the high quality monitoring using the new methodology should start latest in 2008.

Mr. Naruševičius explained the roles of different institutions in monitoring of mire habitats. The methodology is being prepared by scientific institutions; the State Service of protected Areas (SSPA) under the Ministry of Environment and Environmental Protection Agency (EPA) have to approve it. Directions of State Protected Areas will do the field work in Natura 2000 sites and preliminary data analysis (organized by SSPA). The fieldwork outside Natura 2000 sites and preliminary data analysis will be done by scientific institutions and coordinated by EPA. Final management oriented analysis of data and preparing input for draft report to the EC will be organized by EPA and performed by the scientific institutions. Finally responsible for the reporting to the European Commission is Nature Protection Department of the Ministry of Environment.

Discussion:

- It was commented that the monitoring cycle is probably too frequent for mire habitats – monitoring is planned more intensive in the beginning (to get as much as possible data ASAP), it might be changed after 2010.

Monitoring in LIFE-Nature project "Implementation of Mire Habitat Management Plan in Latvia"

By Ms. Māra Pakalne, Latvian Fund for Nature

Ms. Pakalne introduced monitoring and management actions in the frame of the LIFE-Nature project "Implementation of Mire Habitat Management Plan for Latvia".

She informed that the LIFE project started in 2004 and it is implemented by the Latvian Fund for Nature with help of 16 partners. The four project sites are located in different parts of Latvia but the threats are similar: drainage, peat extraction, fires, degradation and loss of habitat diversity, uncontrolled recreation activities, lack of awareness. In the project even a particular person on public relations has been hired. In frame of the project the management plans for the project sites will be developed, the management actions will be carried out and monitored.

Ms. Pakalne described the project sites in Stikli, Vasenieku, Klani, Veseta and Cena mires and monitoring actions carried out there. She emphasized that habitat and site hydrology monitoring is carried out before and after any management actions. There are monitoring plots in managed as well as in unmanaged areas.

Habitat monitoring is carried out according to the Handbook of Mire Monitoring in Latvia. The main species list is already included in data form, the different layers must be described as well as the management and influences on habitat. 5 1x1 m quadrates in a 10x10 m quadrate are monitored.

Habitat monitoring is combined with hydrological monitoring where the students (and also some landowners) are measuring the groundwater level once in a week.

Ms. Pakalne presented also the models of Cena mire made by computer that show very well where are actually the natural borders of the bog.

Discussion:

- It is not clear yet how the data from hydrological and habitat monitoring will be launched together because the project team is only starting with data analysing now.
- The experience of University of Dundee and from wet woodlands projects in England and Scotland (on blocking ditches) could be useful for Baltic mire projects as well.
- In Kemeri NP (Latvia) also botanical monitoring is carried out using quadrate method. In the frame of Kemeri LIFE-project botanical, ornithological as well as hydrological monitoring is implemented and it is planned to continue it also in future if possible.
- In Kamanos Strict nature Reserve (Lithuania) mainly site management actions are monitored.
- Nigula NR in Estonia has already long monitoring traditions (also combined with remote sensing), monitoring of mire birds has been carried out since 1960-ies and the background data are available already from 1950-ies. In Endla bog the hydrological monitoring has been carried out since 1940-ies. In North-East-Estonia there are good areas for monitoring of pollution. Emajõe Suursoo Nature Reserve uses state monitoring data but this is often not sufficient for management, additional monitoring is needed especially in semi-natural habitats.

Discussion on typical species:

- Estonian proposal was that typical species should be stenotopic species that have some indicator value.
- The opinion of Latvian experts was that typical species should be characteristic for a site/habitat, some of them can be also indicator species. For example *Bryophytes* are good indicators.
- Sometimes the abundance of a species (e.g. *Calluna*) has indicative value not the species itself.
- Mr. Evans suggested that typical species used for reporting to EC should be selected from species that are typically found in a certain habitat type if it is in good status (characteristic species). The list of typical species should not be long (ca. 5-10 species), it should include the species linked to the structure and function of the habitat type, some indicator species.

CONCLUSIONS

- **Filling-in EC reporting formats** – generally not difficult if data are available and definitons are clear, however
    - There are still a lot of uncertainties and confusion – e.g., typical species – indicators?
    - Some learnings:
        - Favourable Reference Area (FRA) has to be at least the same as at present
        - For 7120 FRA should be 0 km^2
- **EC guidelines** on reporting are under preparation
    - It will be a developing document available on Internet that should serve as help and recommendations for countries
    - Next draft will be ready by February 2006
    - BS should take more active role in the discussion process
    - The guidelines contain explanatory notes + definitions for terms

- Worked out examples on filling in reporting formats (particularly for habitats) are still needed

- **Monitoring programmes, methodology:**
  - Estonia: new monitoring methodology elaborated - first experiences gained in implementation -> improvements are needed;
  - Latvia is still elaborating a new monitoring programme/methodology (shall be finalized by the end of November)
  - Lithuania – National Environmental Monitoring Programme for 2005-2010 approved (mire habitats monitoring included), methodology to be worked out by 2006 (07)
- **Methodology, field questionnaires:**
  - Should be simple, easy understandable, quantative parameters (not free text) to avoid subjective evaluation
  - For climax communities also repeated measurements in fixed points would be necessary
  - It is useful (cost efficient) to use remote sensing method to define priorities for field works
  - More intensive management of sites requires more intensive monitoring
  - Species and habitat monitoring should be combined to save resources and obtain more information.

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