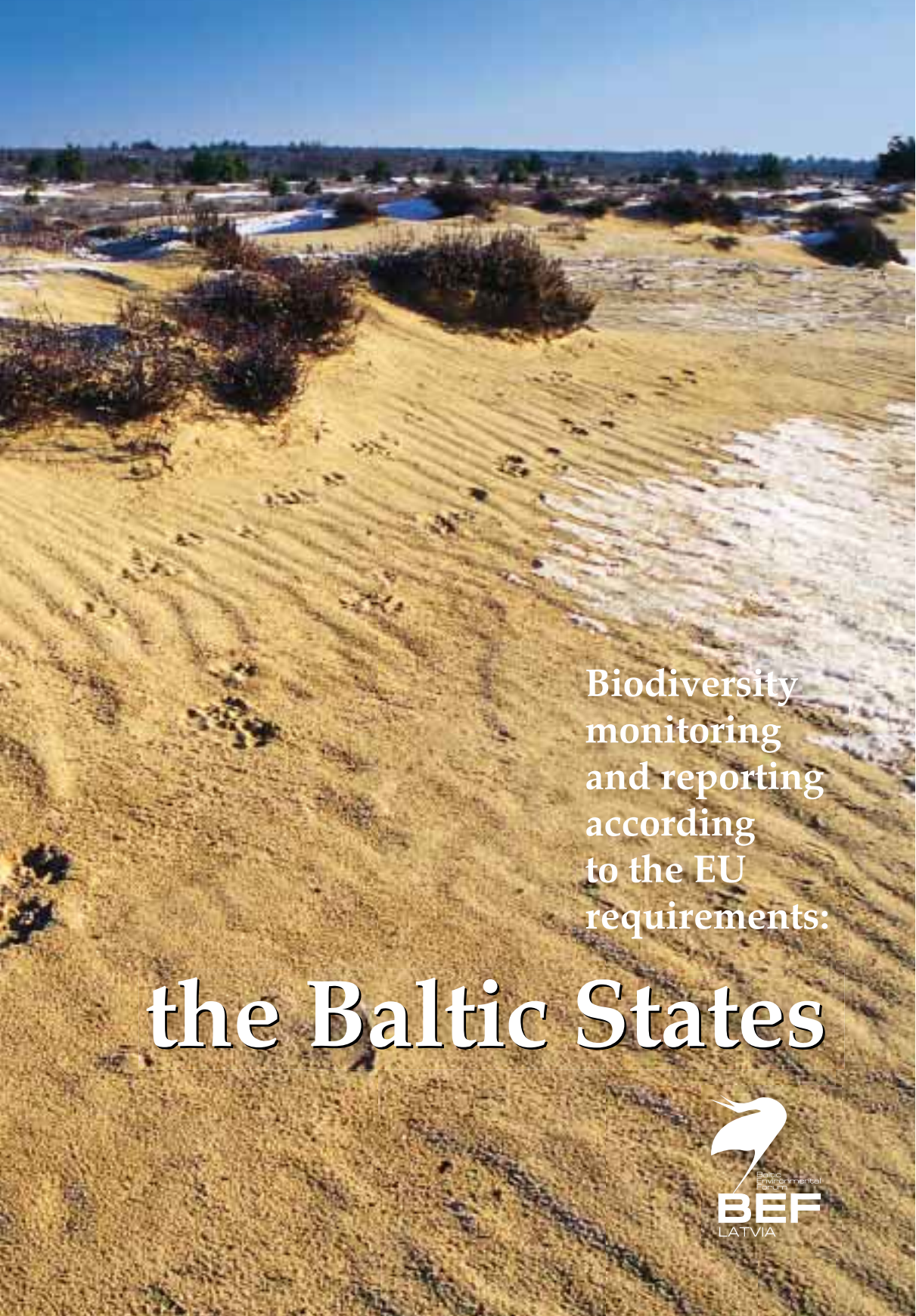

Biodiversity monitoring and reporting according to the EU requirements:

the Baltic States

Baltic Environmental Forum
BEF
LATVIA

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Introduction

Biodiversity monitoring has been among the issues repeatedly noted by the Baltic nature conservation stakeholders as challenging and unclear. Participants of several seminars organized by the Baltic Environmental Forum (BEF) have argued in support of a long-term, structured biodiversity monitoring with aims well-understood by the scientific community as well as sustained commitment and financial backing of the decision-makers.

In order to offer the many parties involved in biodiversity monitoring a forum to openly discuss the issues (from political commitment and EU reporting requirements to monitoring methodology and indicators), the BEF took the initiative to find financial support for such an endeavor. As a result, a project on "Implementation of the biodiversity monitoring requirements in accordance with the EU Birds and Habitats directives through facilitated cooperation and stakeholder networking in the Baltic States" was prepared and subsequently accepted by the Phare Cross Border Co-operation Programme in the Baltic Sea Region for Latvia 2002.

This publication, along with several larger and smaller workshops, is among the outputs of this year-long (2005) project. Information used in this document has been compiled from presentations, discussions and informal debates taking place at the seminars and expert meetings held in the frame of the project. Additional data was gathered through reviewing relevant literature and internet sources. This document is designed to contain two key blocks of information. Firstly, **review of the existing biodiversity monitoring systems** in a number of **old EU member states** as well as those of **the Baltic States**. In general, biodiversity monitoring ought to serve as a tool for shaping national nature conservation policy, and developing a road map for overall sustainable development in a given country. However, today the biodiversity monitoring debate is largely affected by the looming EU Habitats Directive reporting requirements. Hence, the publication will also take a brief look at the **biodiversity trends on a global scale**, and will **outline the EU reporting obligations** that are likely to affect the future structure of biodiversity monitoring systems in the Baltics and beyond. Secondly, having looked at the existing biodiversity monitoring systems, the publication will offer **recommendations for changes** necessary to meet the targets set in the EU nature conservation policy. Among other issues, the publication will look at prospects for **transboundary biodiversity monitoring**.

Conservation of biological diversity today has climbed toward the top of global, regional and national political agendas. Changes resulting from anthropogenic activities that in the past decades have taken place at unprecedented speeds have triggered development and ratification of many international conventions, and setting targets for global nature conservation. The initial chapter of this publication will take a look at documents forming international biodiversity conservation policy and requirements for individual countries deriving from committing to the established targets. As already noted, timing of this project corresponded with active EU-wide debate on future reporting required by the Habitats Directive. These obligations have prompted multi-level (decision makers, scientists, officers responsible for filling the reports, etc.) discussions on readiness of member states to fulfill them. Thus, we will also take a look at what is so particular about this reporting format, how it is likely to develop in the future, and what it means for the existing monitoring systems. We will introduce experience from the **old EU member states** Austria, Sweden, the United Kingdom, Denmark as well as the new ones – the Czech Republic and the Baltic States.

With the common past shaped by the Soviet rule, **the Baltic States** share a number of similarities in their existing biodiversity monitoring systems. Among

the prevalent tendencies are the following: research is very detailed and rather narrowly focused, monitoring sites not sufficiently representative to assess conservation status of habitats and species in entire countries, a lack of continuous financing affects availability and consistency of data, and there are too many stakeholders involved in shaping and executing monitoring programs, among others. On the one hand, the upcoming reporting needs have incited the countries to quickly review their approaches and make the necessary adjustments, which might, given the relatively short time, end up being too rushed and not thoroughly thought through. On the other hand, the responsible authorities do not appear too anxious about their ability to fill the reporting formats; for them this is one among many similar responsibilities that need to be met prior to 2007.

While certain aspects of biodiversity monitoring are shared by the three Baltic States, there are also differences in their approaches. The **Latvian** system has been overwhelmed with a diversity of responsibilities and bureaucratic weaknesses as well as a lack of consistency in financing. Currently, the most awaited are the results of a national project for assessment of monitoring (including biodiversity), which is expected to pinpoint the existing limitations and propose a whole new model. The most suited to deliver data on meeting the 2010 target of halting biodiversity loss is the "paper version" of the new **Lithuanian** biodiversity monitoring system. It was set up in 2005 to replace the former vegetation and wildlife monitoring. Yet, in real life only some parts of it have been tested, which does not fully prove viability of the entire system quite yet. The **Estonian** system was restructured in 1995 and further shaped based on the outcomes of a number of Phare financed projects. It is believed that a sufficient amount of data is produced as a result of different monitoring sub-programs, but challenges arise with its interpretation and compatibility.

Even though **transboundary cooperation** has been repeatedly discussed at the BEF nature conservation seminars and some activities even take place, in practice there is little cooperation between the three Baltic States. Most often it is only on expert level and based on long-term professional collaboration. However, there is a cross-border project between Latvia and Estonia, which also covers certain monitoring aspects. We will briefly look at this initiative.

Finally, **recommendations** that could alleviate implementation of the EU monitoring requirements in the Baltic States will be drawn. This will be based on conclusions made when analyzing the existing biodiversity monitoring systems and combining this information with requirements set forth by the 2010 target, and the EU reporting requirements.

Overview of biodiversity monitoring

Currently, 2010 is about the most significant milestone in the biodiversity conservation realm. It is the year by which the global community has committed to "achieve a significant reduction of the current rate of biodiversity loss at the global, regional and national level as a contribution to poverty alleviation and to the benefit of all life on earth"[1]. On the European Union (EU) and pan-European level, commitment to the target is even more ambitious - to "protect and restore habitats and natural systems and halt the loss of biodiversity by 2010[2]". In the EU, the Habitats Directive (1992) is one of the most significant contributions to this aim. According to the spirit and the general requirements set in this document, the member states are responsible to protect and maintain species and habitats, which are deemed important on the European scale. The Birds Directive (1979) is another important document guiding the European community to protection of all wild bird species in their territories.

The 2010 target is indeed highly ambitious, regardless of whether we aspire to halt or to reduce biodiversity loss. The recent 4th report of the Millennium

[1] 6th Conference of the Parties to the Convention on Biological Diversity (The Hague 7 - 19 April 2002); Decision VI/26

[2] The EU Strategy for Sustainable development adopted in Gothenburg Summit (2001)

Ecosystem Assessment commissioned by the United Nations, Ecosystems and Human Well-being, clearly states that "over the past 50 years, humans have changed ecosystems more rapidly and extensively than in any comparable period of time in human history, largely to meet rapidly growing demands for food, fresh water, timber, fibre, and fuel. This has resulted in a substantial and largely irreversible loss in the diversity of life on Earth."[3]

In the light of these notions and the targets set to foster positive changes, the European Environment Agency is "currently developing and implementing a set of biodiversity indicators in order to form a picture of overall biodiversity trends at EU level."[4] Monitoring of biodiversity in each of the member states, as required by the Birds and Habitats Directives, is expected to yield the necessary information to support the Europe-wide efforts of halting loss of biodiversity.

On the one hand, monitoring of biological diversity is an important activity for any country to be able to define goals of their nature conservation policy. As such, monitoring is equally important for policy makers and the scientific community. Essentially, biodiversity monitoring should be teamwork of the both parties. On the other hand, however, any commitments made on a political level are heavily impacted by economic interests and lobbying powers as well as varying perceptions of goals and means for achieving them. For instance, Dr. James Williams from the Joint Nature Conservation Committee United Kingdom emphasized[5] that both the political and scientific communities have different perspectives on what is to be achieved with monitoring and how much data is needed to make a valid, scientifically sound judgment. This sentiment was further elaborated by a member of the Lithuanian delegation to the seminar by saying that politicians expect monitoring data to yield positive results, while the scientific community maintains a more skeptical stance and sees the more disturbing aspects that data or a lack of it indicates. It is important to acknowledge that these notions bear no scientific weight; they are rather sentiments that

[3] Millennium Ecosystem Assessment, 2005. Ecosystems and Human Well-being: Biodiversity Synthesis. World Resources Institute, Washington, DC.

[4] Note to the Habitats Committee (DocHab-04-03/03 rev.3) Brussels, 15 March 2005

[5] Presentation at the BEF seminar on Implementation of biodiversity monitoring requirements according to the EU Habitats Directive in the EU Member States (3-4 March 2005, Sigulda, Latvia)

surround the biodiversity monitoring realm (as well as the 2010 target in a way). This activity depends heavily on collaboration between policy-makers and scientific actors, which are often motivated by different ambitions and goals.

However, international conventions and agreements aimed at conservation of the natural environment have started as a collaborative effort of politicians and scientists. The Baltic States are among the countries that are signatories to a number of international documents, such as the Ramsar, Bern, Bonn, and Rio Conventions. Each of these documents targets specific issues and sets specific tasks for their signatories to fulfill. Reporting on the achieved is the key instrument for compiling information from all the involved countries, and for being able to estimate trends taking place. As previously noted, in the EU the key document that sets such reporting requirement is the Habitats Directive (which largely comprises the requirements set forth by the Bern Convention (1979) on the Conservation of European Wildlife and Natural Habitats). Periodical reports (every 6 years) from each of the EU member states are not only seen as means of enforcing implementation of the requirements set in the directive. Data submitted by the countries is expected to fulfill a crucial role in overall assessment of biodiversity trends in Europe. The following chapter will take a closer look at the reporting procedure currently being established in the European Union.

Overview of reporting needs for EU Directives

Reporting is like passing a standardized test for school. One can always assume that students are learning the things they ought to learn, yet there is no other way to compare pupils' aptitude and progress than with obtaining comparative evidence and subsequently analyzing it. Well, biological diversity reporting results would not get anyone into a university or give a country an honors degree for saving its nature. Unified reporting that is gradually being introduced to EU member states serves less competitive yet vital purposes. Information obtained through the routine reporting would serve three key objectives: evaluate Europe-wide biodiversity trends, assess progress with meeting the 2010 target, and set long-term policies for biodiversity conservation.

While monitoring itself is not standardized across Europe, there should be some system that delivers comparable data and offers solid grounds for drawing conclusions beyond just national borders. Since reporting on assessment of conservation status is a new exercise[6] and data processing has not been done yet, Dr. Doug Evans of the European Topic Centre on Biological Diversity

[6] Old EU member states had to submit a national report in 2001 demonstrating progress in legal transposition and implementation of the Habitats Directive and progress with establishing Natura 2000

acknowledged that this will be challenging[7].

The essence of biodiversity conservation is to achieve and maintain a **favorable conservation status** of species and habitats. Namely, the goal is not to allow situations when species or habitats decline or go extinct due to unfavorable conditions caused by human activity. Hence, monitoring is to yield information that assists in determining the favorable conservation status and to offer a picture on the overall state of biodiversity.

However, biodiversity monitoring programs cannot be perceived as a uniform set of universally applicable methods, which are easy to determine and to introduce in practice. The Irish example of monitoring raised bogs clearly demonstrates that the different elements of biological diversity also require different monitoring approaches. More on the particular issue can be found in the Practical Information section – CASE A.

The European Union has adopted the ambitious policy of halting the biodiversity loss by 2010, and information obtained through reporting will form grounds for the initial assessment of success in meeting this target. Yet, "short-term goals and targets are not sufficient for the conservation and sustainable use of biodiversity and ecosystems. Given the characteristic response times for political, socioeconomic, and ecological systems, longer-term goals and targets are needed to guide policy and actions," according to the Millennium Assessment report. Once again, information on the state of biodiversity in the member states obtained from national reports ought to serve as a basis for adjusting set targets, shaping conservation policy in the EU and individual member states, as well as help setting priorities for further monitoring.

As the illustrated objectives show, there are ambitious plans set for the national biodiversity reports. Thus, the countries are under certain pressure to supply as comprehensive and scientifically reliable data as possible, yet in most member states their existing monitoring systems are not quite ready to yield the necessary data. The European Commission is aware of this situation and ready to allow time for restructuring. During the 2001-2006 reporting period (report due in 2007) countries can provide information that is derived from the best available

[7] Discussions at the BEF seminar on Implementation of biodiversity monitoring requirements according to the EU Habitats Directive in the EU Member States (3-4 March 2005, Sigulda, Latvia)

data as well as based on the best expert judgment. Biodiversity trends need to be demonstrated, and those would then be used as criteria for evaluating the subsequent report (2007-2013 reporting period). The standard format for assessment of conservation status of species and habitats can be found in Annex I of this publication.

The 2014 report will have to rely on information yielded by the established monitoring systems. It will not only demonstrate conservation status of species and habitats, it also needs to incorporate assessment of effectiveness of measures taken under the directive.

Countries are somewhat hesitant by 2007 to establish such important baselines about the state of their biodiversity based largely on the best expert judgment. If that turns out to be faulty, a country could be penalized for not meeting the biodiversity conservation targets. However, any baseline situation established earlier will be regarded as flexible, and could be changed if new scientifically sound evidence is found. The Baltic experts assume that the best expert judgment will turn out to be the key means of generating information for the 2007 report. This is largely due to the fact that no appropriate data is available. As it is going to be discussed later in the publication, monitoring efforts so far have been too detailed and not sufficiently representative of entire territories. Furthermore, reports on assessment of conservation status should reflect not just the Natura 2000 areas but the entire country as a whole. Data from countries of one biogeographical region will be further compiled to form a picture of favorable conservation status of species and habitats on this level.

The quality and amount of data on biodiversity available across Europe is one of the key concerns throughout member states. As the later chapters will show, there are diverse experiences with monitoring of biodiversity elements, yet no country can say that they have enough scientific evidence to assess conservation status of species and habitats in entire territory. Every member state is planning to introduce certain measures to make their monitoring systems meet the needs of such a biodiversity assessment.

However, data availability would only partially alleviate the challenging task. References as to what needs to be achieved and maintained in the frame of the EU nature conservation policy are equally challenging. Concepts such as “favorable conservation status”, “typical species”, “trends and fluctuations”, “natural range”, etc. were highlighted by Dr. Doug Evans of the European Topic Centre as the

more unclear and confusing to the scientific community. The Habitats Directive indeed alludes to what some of these concepts mean, yet those cannot be used as formulas to carry out the assessment.

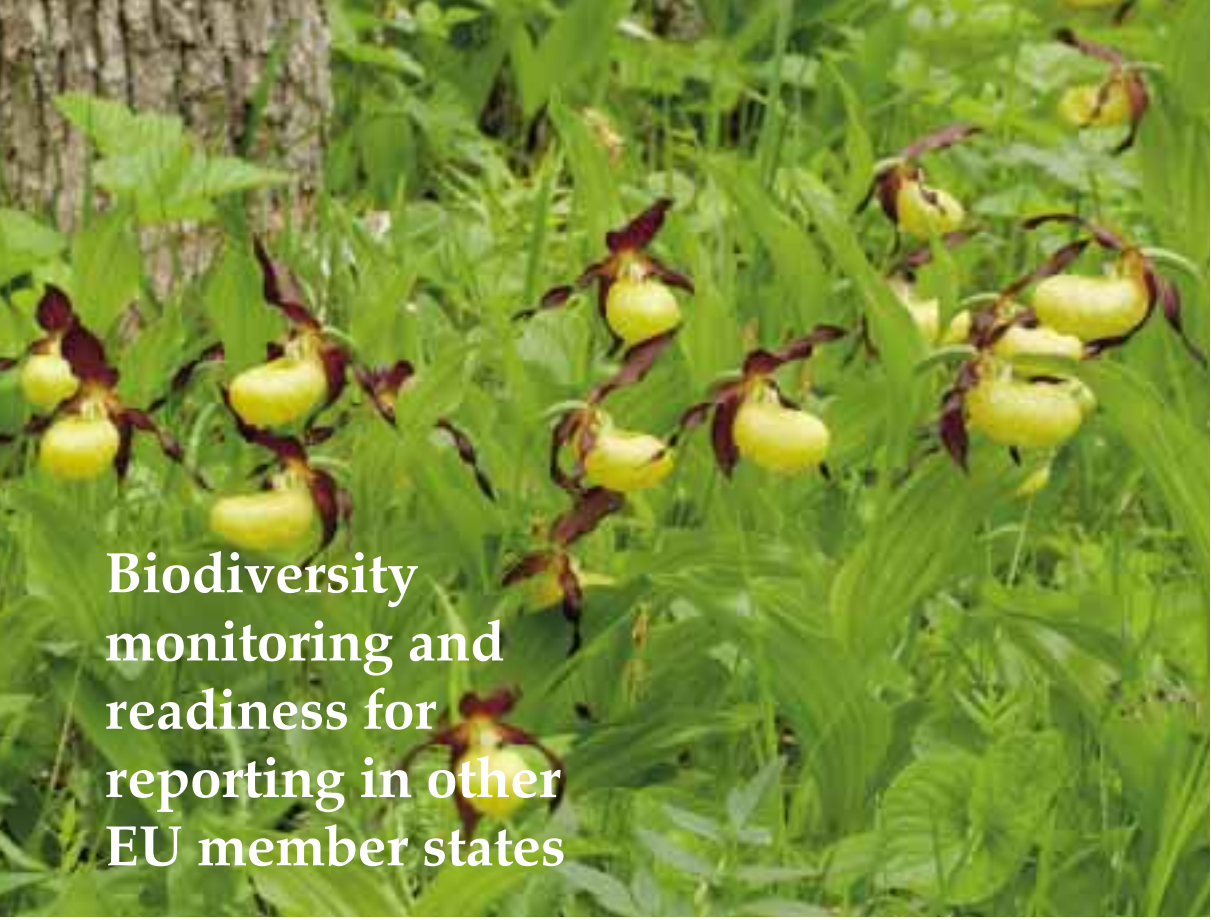
The Scientific Working Group under the Habitats Committee that has been working with the issue of monitoring and reporting all along is set to play the role of a support mechanism until the national reports are due. Among other issues the group is to give guidance on filling the matrices and the reporting format, to develop and offer further clarification on the unclear concepts, and to develop a common understanding on how a "favorable reference value" is established. The European Topic Centre along with the DG Environment is to establish an electronic reporting format for conservation status, among others.

One of the reasons why national authorities in charge of filling the report formats are not too anxious about the 2007 reporting is the number of various reports they will have to submit before this one. Indeed, every convention that has been ratified in a given country is followed by certain reporting obligations. The European Topic Centre and the Scientific Working Group are to investigate further synergies with reporting obligations for, e.g., the Birds Directive and the Water Framework Directive. This might not only reduce the amount of work that is required for filling the reports but would also further encourage cross-sectoral collaboration in member states.

Generally, in this publication we review biodiversity monitoring requirements that derive from both the Habitats and Birds Directives. However, in the early stages of the Phare-CBC project it was repeatedly noted that reporting requirements for the latter directive are not yet known, and it is impossible to start analyzing suitability of available data to fulfill them. Hence, review of reporting requirements that to an extent help shape national monitoring strategies is restricted to the Habitats Directive only.

REMEMBER:

- Biodiversity monitoring is not just to fulfill the reporting needs, it serves a much broader set of objectives.
- The Natura 2000 monitoring is just a fraction of all monitoring needed – the overall goal is to ensure and to demonstrate the conservation status of species/habitats in the entire country.



Biodiversity monitoring and readiness for reporting in other EU member states

Some countries might have extensive data on birds or butterflies; some have monitored their brown bear populations, while some might have in-depth knowledge of their grasslands. However, today none of the European countries can say that they know enough about their biological diversity to be able to assess the conservation status of species and habitats found in their territory. The old EU member states just as the new ones are currently undergoing the questioning and restructuring process in the light of the EU reporting requirements.

The old member states have already experienced the first reporting period in 1994 – 2000 with a report submitted in 2001. Yet, it has to be noted that this report had to simply demonstrate progress in legal transposition and implementation of the Habitats Directive, and establishing the Natura 2000 network. Filling this document did not require support of any monitoring data as it did not have to provide information of conservation status. Hence, biodiversity monitoring systems in all EU member states (the old and the new alike) are undergoing certain metamorphoses. The extent of these changes depends on the prior composition of systems. In this chapter we take a look at biodiversity monitoring

issues in Great Britain, Austria, Sweden, Denmark as well as the Czech Republic.

Reporting standards manager, Dr. James Williams, of the Joint Nature Conservation Committee in the **UK** emphasized that measuring and assessing conservation status requires certain pragmatism as it is not a very straight forward endeavor. For monitoring biodiversity in protected areas in the UK, a Common Standards Monitoring System (CSM) has been in place for almost 6 years now. Data gathered as part of this system is used for judgment-based assessment of biodiversity elements; it also serves as an early warning system for detecting negative trends as well as basis for establishing more detailed monitoring if needed. Even though this approach allows to make assessment of the biodiversity status and to interpret the identified trends, it would not be sufficient to meet the EU reporting requirements for two main reasons. Firstly, CSM assesses favorable condition differently than it would be necessary to determine the conservation status defined in the Habitats Directive. Secondly, the CSM is applied only within protected areas and not in a wider countryside, which means that there is no sufficient data for assessing species and habitats conservation status across the country. Nevertheless, there is a significant amount of information available in the UK to be able to create a picture of the overall state of biodiversity elements, yet the biggest challenge remains to make the best use of this information.

One of the key messages of the seminars held in this project has been that monitoring has to be tied to management, i.e., monitoring is done to be able to know what management methods to apply, and to see how management is working. Dr. Thomas Ellmauer of the Federal Environmental Agency of Austria believes that the higher the need for habitat management, the higher the need for more data. According to this ratio, the UK and Austria needs much more precise data than, for instance, Sweden and Finland. Those countries have extensive natural areas that do not require management at all.

Austria is currently working on a concept of Biodiversity Monitoring System, which will be based on the existing individual monitoring systems, e.g., forest, water quality, and agri-environmental measures. The new system is being designed to yield data for

the assessment of conservation status of species and habitats in the country. Appropriate and effective indicators are seen as one of the key aspects for successful biodiversity monitoring. Indicators have been created for all 66 habitat types found in Austria as well as for all Annex 2 (HD) species.

The monitoring system has to include an effective sampling design, be based on a reliable baseline situation, and to identify indicators to be recorded (e.g., favorable conservation status indicators, early warning indicators). More on assessment of conservation status in Austria can be found in the Practical Information section - CASE B

The indicators for area, structure, function, and characteristic species are one of the steps in defining habitat monitoring program in **Denmark** as well. The Danish terrestrial habitat monitoring system NOVANA was started in 2004, thus validity of the chosen indicators cannot be judged quite yet. The currently ongoing mapping of habitat types will assist in establishing monitoring stations that will be the backbone of the monitoring data gathering; this process should be finished by 2006. Information obtained through the monitoring stations is expected to be sufficiently representative, objective, and easy to understand, among others. Analysis of this data should not only offer a diagnosis but also produce a prognosis which helps to react accordingly.

In the case of biological diversity preservation, reaction essentially means applying appropriate management methods. It is crucial to understand that monitoring has to be linked with management. This link is one of the guiding principles for establishing the **Swedish** biodiversity monitoring system in the Natura 2000 areas. For instance, if a minimal management intervention is required, the site will also have a low frequency monitoring system. In sites of reoccurring or restoration management, a high frequency monitoring will be integrated into the management system. In order to create a focused and effective system that does not gather excessive data, it is crucial to set objectives for a given site. While the new system is still being developed, reviewing reporting responsibilities to the European Commission has helped to assess the existing databases. Today, the Swedish Species Information Centre believes that there is

quite a lot of data available on species but there is less on structure and function of habitats. Furthermore, setting appropriate reference values is among the current challenges in determining the conservation status of species and habitats in Sweden.

Just as the old EU member states, the new countries also are in the process of revising their biodiversity monitoring systems. In the following sections we will look at the Baltic experience, but for now we will take a glimpse at the Czech experience. The **Czech Republic** took a very proactive approach to implementation of the EU nature conservation requirements, i.e., identifying and designating the Natura 2000 sites. However, the national biodiversity monitoring system is still to be fine-tuned. Similar to the Baltic States, there are plenty of individual monitoring efforts carried out by the state, universities, NGOs and other nature conservation actors, yet these do not make for a coherent, uniform, and a long-term system. Fragmented efforts as well as competition and lobbying to obtain financing are the key weaknesses, and such a system cannot produce the comprehensive monitoring data needed to assess the conservation status of species and habitats. Nevertheless, the proposed EC reporting format was tested on a number of wildlife species. This exercise allowed to conclude that terms such as distribution range, thresholds for changes in populations, typical species, etc. are still to be defined. Currently, a proposal has been submitted to the Czech Ministry of Environment to establish a national biodiversity monitoring scheme that is able to fulfill the new obligations.

Biodiversity monitoring systems in the Baltics

With the common past shaped by the Soviet rule, the Baltic States share a number of similarities in their existing biodiversity monitoring systems. Among the prevalent tendencies are the following: research is very detailed and rather narrowly focused, chosen monitoring sites are not sufficiently representative to assess conservation status of habitats and species in entire countries, a lack of continuous financing affects availability and consistency of data, and there are too many stakeholders involved in shaping and executing the monitoring programs. The new output requirements that biodiversity monitoring across Europe has to meet have prompted countries to reassess their monitoring programs and practices. The first test for determining the overall state of biodiversity in Europe will be filling the report in 2007. The upcoming task has also created an interesting discourse in the realm.

Neither the involved authorities responsible for filling the report nor the scientific community are particularly anxious about the reporting. Yet, the latter group acknowledges the fact that monitoring is a long-term process, and the need for

certain data cannot be met immediately. So far the report is not perceived as an integral part of biodiversity monitoring systems and as a data tool that allows shaping biodiversity policy in the long term. It is rather seen as a bureaucratic activity that does not feed into the overall system of biodiversity conservation in a country.

Nevertheless, experts are not very optimistic and sense a potentially serious risk of not being able to provide the necessary data that demonstrates conservation status of protected habitats and species in the three Baltic States. At the project events, members of the scientific community have acknowledged that the 2007 report is manageable as there is a possibility to apply the best expert judgment where real data is not available. Yet, just 7 years later, in 2014 the next report requires assessment based on data provided by the established monitoring systems. For monitoring activities to yield sufficient information in a decade requires starting them rather soon. While some habitats and species respond to impacts or management activities sooner than others, in general, trends in the state of habitats and species can only be seen in the long term. The next three sections will look at each of the Baltic States and their biodiversity monitoring systems individually – what they are now and what the plans are for the future.

Even though each of the countries has taken a different approach to organizing and carrying out biodiversity monitoring, there is a share of elements that are similar in all three. For instance, monitoring tends to be too scientific and too local. Namely, previously data was gathered to improve understanding of specific species or habitats, i.e., to understand impacts on the subjects, to demonstrate development patterns, among others. Yet, this data is not sufficiently representative of the whole country, and thus not useful in determining conservation status or systemic trends.

Furthermore, financial support of monitoring programs has often been the matter of lobbying ability and even political connectivity. Experts from all three countries have noted that some years certain programs received sufficient funds, yet the following year those could be cut. Depending on the local or international political context, certain monitoring activities are started (e.g., monitoring accidentally killed animals in Latvia) but not continued on a regular basis. Their introduction is often not harmonized with other ongoing activities, which leads to the overlap of data gathered and makes the system inefficient. Hence, fluctuations in financial support to the monitoring programs, and a sporadic introduction of new activities affect stability and reliability of outputs.

However, there is a certain benefit to this kind of in-depth monitoring – the Baltic States do have an impressive amount of data, especially on species, demonstrating trends over a long period of time. Experts from old EU member states have acknowledged the wealth of information that their countries do not have. Yet, there is a risk of data incompatibility, which has to be taken into account. Even though it does not allow drawing comprehensive conclusions needed to meet the monitoring and biodiversity conservation goals set in the EU, from the scientific perspective this kind of data is very valuable. Hence, while restructuring the biodiversity monitoring systems to support conservation status assessment across countries, one should not just abandon efforts of the past but rather wisely balance scientific interests and political needs.

Estonia

The debate about a scientifically narrow yet valuable monitoring, and the potential changes toward a more extensive and potentially more representative monitoring at this time is most prominent in Estonia.

In 1998, the EU Phare funding supported establishment of monitoring schemes that are still followed today. Namely, cooperation of over 100 experts from various fields yielded a GIS-based monitoring scheme as well as a biodiversity monitoring master plan. The overall monitoring program consists of 41 subprograms that each target different mediums, either species or habitats. Ten of those subprograms deal with monitoring of habitats and monitoring activities take place in 120 designated sites. Semi-natural communities are among the most frequently monitored habitat types, and activities here adhere to the following principle – the more intense the management of habitats or species, the more concentrated the monitoring.

The Environment Information Centre is the key institution coordinating monitoring activities in Estonia and the focal point for storing, analyzing, and publicizing the obtained data. The Centre subcontracts scientific institutions to design and carry out specific monitoring programs. Currently, there are 41 biodiversity monitoring subprograms, and the majority of species, habitats or habitats for species monitored today are those of the Natura 2000 classification.

Government officials presenting the Estonian monitoring program at the project events have noted that the system yields a sufficient amount of data; it is comparatively representative, and could assist in estimating the necessary conservation status. Yet, there have been concerns expressed that the abundance of available data that makes the officials so confident in their ability to assess the state of biodiversity in Estonia might turn out to be incompatible and not serve the purpose so well.

In the light of the new type of conclusions that have to be drawn based on monitoring results, Estonia just as its neighbors is planning to introduce changes to the system. 2005 marked a turn in the biodiversity monitoring methodology applied in Estonia. In the future there will be more sites and less monitoring parameters (e.g., simplified system, more descriptive, and less accounts on plant communities found in transects).

The grassland monitoring is a good example for showcasing the system-wide changes in Estonia. Monitoring of plant communities in Estonia was started in 1994 and in 1998 the program underwent changes in methodology, which became more detailed. Having abundant data of 10 years from the same monitoring plots indeed allows scientists to draw informed conclusions about trends in these grassland habitat sites. However, the specificity of knowledge produced through intensive monitoring does not offer understanding of the overall conservation status of grassland communities in Estonia. In the light of the EU biodiversity preservation requirements, a new approach to monitoring grasslands was started in 2005. The new methodology is still to be fine-tuned, and it needs to be proven adequate and suitable for the purposes it serves. For now the proposed system revisions are surrounded by a lot of opposition, and many a scientist believes biodiversity monitoring is weakening.

In summer 2005, researchers were using a new type of questionnaire for their field work. In comparison with the previous monitoring activities, this time around the methodology was simplified but the number of monitoring sites has been tripled.

One questionnaire is usually filled for one habitat type (some exceptions are permitted); monitoring area is covered in transects containing 5-10 fixed points recorded in GPS and photographed. A list of species is added to the questionnaire, but for species of I and II protection category a species data form is filled (can be done for species of III protection category as well). The coordinates of the location are recorded and borders of the distribution area are marked on a map.

The authorities believe that it is important to record an expert's opinion on a given site and the potential management activities that might be necessary there. In the future, there is a plan to combine monitoring of habitats (vegetation) and species found in these habitats. That would allow for better use of resources as well as yield more information. Today the main challenge is definition of habitat type borders (as different vegetation type could still be the same habitat type).

The issue to be seriously considered is the potential subjectivity of this kind of monitoring. It can only be avoided if training and clear guidelines for the estimation of structure and function as well as recording facts are given. Estonians, however, plan for the same people to monitor the same habitats, which would eliminate possibilities for skewed data.

For the next season the questionnaire will be adjusted based on comments and recommendations received from the field researchers as well as scientists processing the data. It might turn out to be a serious task for the authorities: currently experts are skeptical about the new approach. The past field season has showed that the new approach has increased travel costs and the amount of office-based work. Indeed, less time was spent in the field, yet more hours than initially thought were needed to fill the forms, to enter the data into the system, and to process the photos taken.

To conclude, the Estonian competent authorities are positive about their ability to make the new biodiversity monitoring system compatible with the EU requirements while not reducing its scientific value. Echoing the stance of their colleagues from other EU member states, Estonia also accepts the principle that the intensity of monitoring depends on the intensity of management applied to

a site, i.e., management activities have to be followed by monitoring in order to make the right decisions for nature conservation.

Changes in the Estonian biodiversity monitoring system are very new; ability to appraise the conservation status of Estonian species and habitats (and the reports where that has to be demonstrated) will be the first real test for the system.

Latvia

In the course of 2005, a full revision and reassessment of the existing environmental monitoring system took place in Latvia. An independent consultancy was contracted to analyze the system and to evaluate its ability to deliver information, and to support the relevant policy developments required by a variety of national and international environmental commitments. The biodiversity monitoring is one of the core subjects of this study, and the outcomes should serve as a roadmap to the authorities and decision makers for restructuring the system wisely.

The current Latvian biodiversity program was established in 2001, and it is comprised of 16

sub-programs that cover a broad range of habitats and species. Each of those subprograms has a separate action plan in place. According to the statements made at one of the project seminars[8], only 9 of those are presently financed and running. The Latvian Environment, Geology and Meteorology Agency is the focal institution in this system, i.e., it not only draws annual monitoring plans based on the individual action plans, but it also controls the monitoring process as well as analyses the obtained information. The actual monitoring field work is carried out by relevant scientific institutions and NGOs, e.g., scientific institutes under the University of Latvia, the Latvian Fund for Nature. This makes for a very complex system with a large number of actors involved and an abundance of data obtained.

The study carried out by the Estonian, Latvian and Lithuanian Environment, Ltd. (ELLE) [9] focused on two sides of the biodiversity monitoring – the content (themes) and the technical composition. The findings are somewhat alarming and they show that about 35% of current monitoring activities do not support meeting requirements of any international documents. In the mean time, even if the monitoring program received a full amount of financing necessary, it could only produce data to be able to report 26% of what is required by the Birds and Habitats Directives. In the absence of full financing, for instance, in 2004 the rate of meeting the needs would have been only at 15%. The consultant has expressed even more dismay over the technical validity of the monitoring data available. A review of a number of recent country reports shows that only 1 in 4 has used the state monitoring data. Besides, it was just a mention of the fact that such a data exists, and not the actual results. This leads to believe that monitoring might be

[8] Expert meeting "Biodiversity monitoring and reporting according to EU Habitats Directive in the Baltic States – methodological aspects", May 25-26, 2005, Estonia.

[9] Project "Review of the Latvian National Monitoring Programme", ELLE, May-November 2005

performed just for narrow scientific interests in a specific field of studies. It does not, however, serve the broader state interests as it ought to, and does not offer a full spectrum of information about the entire territory.

The ELLE report and a number of individual experts have noted that currently the monitoring is not sufficiently representative of the biodiversity situation in the entire country. The report acknowledges that the number of activities performed could be satisfactory, yet the number and location of monitoring stations is not. The issue of representative monitoring approach has also been one of the goals behind the Latvian Ornithological Society establishing a new independent breeding bird monitoring program. Opposite to the existing state programs, which are geographically limited and as such considered not representative, this program is based on internationally established methods and would give a reliable overview of the monitored bird species. Birds are monitored in their flyway, and most of the work is done by experienced and previously trained amateur ornithologists.

As it has been noted earlier, there is no clear patterns as to what subprograms received money, how frequently, and how much. One can speculate that it is often driven by the ability to effectively lobby the appropriate decision makers. At one of this project's expert meetings[10], it was noted that only a very small part of grassland monitoring, for instance, is currently supported by the state. Most of such activities take place in the frame of the LIFE-Nature projects, but these activities are short-lived and their outcomes would not be valid for reporting to the EU.

There is a clear need for restructuring of the biodiversity monitoring system in Latvia. The findings and recommendations of the ELLE study offer a good baseline for such a step, and currently it is the initiative of decision-makers to introduce the needed changes.

In the meanwhile, the message from the scientific community is impossible to misinterpret. Namely, a long-term and sustained monitoring is the only significant tool that can ensure that nature is protected and managed in the right way. If we cannot trace changes over time and attribute causes to them, then we cannot make educated decisions on how to proceed. Director of the Teiči and Krustkalni Nature Reserves, Juris Jātnieks, is one of the more active supporters of sustained monitoring activities.

[10] See note 8.

Monitoring data in the Teiči and Krustkalni Nature Reserves has already been compiled for about 20 years. Of course, the state support for these activities has not always been uninterrupted, and continuation of the monitoring efforts has often required proactive and determined work by the staff and administration of the protected area. Aside from the state financing, the Reserve has also attracted foreign funding in the form of various projects that either commenced some new monitoring initiatives or continued the old ones that did not receive a continued financial support. Some of the most praised data in the protected area covers butterfly populations (good indicators of the state of their habitats), birds, vegetation, and water quality analysis of the water bodies of the Teiči and Krustkalni Nature Reserves.

The Teiči and Krustkalni Nature Reserves showcase the importance of reliable, long-term monitoring data. All decisions pertaining to habitat management are made based on the information obtained through monitoring. For instance, the grassland monitoring program there was started in 2000, and the obtained data allowed drawing the most appropriate management plan. Currently, the grassland management and restoration activities are in place for 4 years; the results and effects of these activities are continuously monitored in order to be able to make the necessary adjustments in habitat management.

Despite the success of Teiči and Krustkalni, it is believed that biodiversity monitoring should not be left up to individual projects but rather be continuously supported by the state. For the future, Juris Jātnieks believes that more attention should be paid to monitoring impacts on habitats of agricultural activities, such as pesticide and fertilizer use, and drainage.

Lithuania

With its current state of play in the field of the biodiversity monitoring, Lithuania can be positioned right in-between Estonia and Latvia. Namely, Lithuania has the new biodiversity monitoring program for 2005-2010 recently approved by the government, and first observations of bird species in designated SPAs according to the new requirements were started in

2005. However, for most of the activities appropriate methodologies are still to be developed. The new monitoring program is designed to fulfill a variety of international requirements (i.e., conventions and directives) and to meet the lofty goals of halting the loss of biodiversity by 2010, to support sustainable use of natural resources, and to produce data for effective management.

In Lithuania just as in the other two Baltic States the biodiversity monitoring is a part of a broader National Environmental Monitoring Program. Aside from monitoring species and habitats of EU importance, the Lithuanian biodiversity sub-program will also include such aspects as forest status, limited game species, fishing quotas. and invasive species. In order to allow for assessment of species and habitats conservation across the entire country, additional 25 % of all monitoring activities for species and habitats of EU importance will be done outside protected areas. This is to effectively meet the requirements set in the Birds and Habitats Directives for providing compatible data on conservation status of species and habitats on a national level.

The new biodiversity monitoring system in Lithuania was started with a pilot initiative of monitoring bird species that require establishment of the Natura 2000 sites. The monitoring results would allow Lithuania meeting the requirements set in the Birds Directive.

In 2005, a number of breeding birds as well as concentrations of migratory water and wetland birds were monitored. To perform the work in a coordinated fashion, and to ensure compatibility of data acquired, each of the species was developed a separate methodology. The action was financed through the EU Structural Funds in Lithuania.

For instance, the methodology for monitoring breeding birds prescribes looking at single males, pairs, and hatch; the unit of focus could be the number of pairs (nests), the number of territories for singing males, and the number of chicks hatched. The main methods include mapping, transects and spot counting; the frequency, depending on the species, is 1-3 times per year.

The first experience from the field season is compiled by a working group established specifically for this purpose. Some issue have already emerged: the species-specific methodology is rather complicated, hence the observers would require more training in the future; for data gathering to be highly effective, the field workers have to be equipped with the necessary tools (e.g., binoculars, GPS).

The institutional setup behind the new system is rather elaborate. A number of scientific institutions and governmental bodies play the key role in data gathering and analysis, e.g., administrations of the state protected areas would be responsible for data gathering inside the Natura 2000 areas, scientific institutes would monitor outside the protected areas, the State Protected Areas Service would do the analysis while the Nature Protection Department at the Ministry of Environment would be in charge of reporting to the European Commission.

Lithuanian nature conservation experts and relevant governmental officials have highlighted a number of issues that they find challenging for the new biodiversity monitoring system. Currently, there is a lack of skilled experts in protected areas administrations that would be able to fulfill the extensive monitoring requirements. Furthermore, the monitoring methodology for animal and plant species, and habitats is still to be developed and approved by the Ministry of Environment. The year 2006 is the set deadline for approval, yet 2007 was deemed a more realistic timeframe. And finally, a substantial coordination is foreseen between various monitoring efforts, yet acquiring data from other institutions might turn out to be challenging. It has been acknowledged that, for instance, data on forests is not easily available to nature conservation experts, and forestry interest groups are known to use this data to draw a situation that is more favorable to the interests of forestry industry.

As of today, appropriate and high quality monitoring as required by the Habitats Directive in Lithuania should start by 2008. A year prior to that the first report to the European Commission will have to be submitted; experts and authorities alike hope to rely heavily on the best expert judgment, and fractions of the past data that can be applied in assessing the conservation status of species and habitats. Since the first testing of the new monitoring system took place only in 2005, not much assessment of its viability can be carried out at this time.

Transboundary cooperation

The collaboration of the Baltic States in the field of nature conservation is guided by a number of agreements. The first trilateral agreement on environmental cooperation was signed already in 1995. However, most of the transboundary cooperation for nature protection takes place in the framework of individual projects or even as private initiatives of individual scientists. One of the more prominent transboundary projects has been the "Integrated Wetland and Forest Management in the Transborder Area of North-Livonia" (2003) financed by

the Dutch PIN-Matra program. The project aims to improve the co-operation between Latvia and Estonia in the protection and management of transboundary wetlands, wet forests and semi natural grasslands.

While certain aspects of transboundary cooperation have been facilitated by this project (e.g., seminars for know-how exchange, generating ideas for future collaboration, and the necessary improvements), mutual biodiversity monitoring once again has proven to be rather difficult. The range of challenges includes different methodologies, border crossing issues, as well as state policies and financial support for monitoring activities. Nevertheless, there has been a transboundary monitoring of mire birds – it was started in 1997, and a repeat count financed by PIN-Matra was carried out in 2005. Even though the experts agree that certain uniformity in monitoring (especially in transboundary nature areas) would be beneficial, most of the monitoring activities are carried out in each country separately.

The issue of collaborative monitoring efforts is also relevant for meeting the EU biodiversity preservation goals. For instance, there should be some mutual data gathering and sharing in order to assess the conservation status of vagrant species. During a number of seminars held within this project, the Baltic experts were encouraged to attempt coordination of data on transboundary nature values; this is despite the fact that reporting is done by each country individually. Political, financial as well as methodological constraints significantly limit effective cooperation. However, the experts admitted that regular meetings and information/experience exchange is very useful and needed to meet the common obligations set by the EU.

Furthermore, certain issues have also been identified as particularly important and necessary to address despite the potential political and financial obstacles. Experts believe that it would be useful to jointly assess the conservation status of habitats and species, and to define typical species. Baltic experts would also appreciate a joint remote sensing training as well as common guidelines and indicators for biodiversity monitoring in the future.

Identification of typical species and application of remote sensing in biodiversity monitoring were among the topics partially covered in expert meetings of this project. More on these issues could be found in the Practical Information section: CASE C and CASE D.

Practical Information

CASE A: Monitoring raised bogs – the Irish approach.

There are a number of reasons why mire habitats are considered rather difficult to monitor. The European Topic Centre singles out a few: they are relatively poor in species, yet those found there are mostly "specialist species"; delimitation of habitat types is made difficult by the fact that they often form mosaic patterns; mire habitats are complex in structure and function. Hence, not only monitoring but subsequently also reporting to the EU on mire habitats is challenging.

Mire experts in Ireland have created their specific way of tackling this challenge by developing a system for assessment of raised bogs. Decrease of raised bogs in Ireland has been very dramatic, i.e., today only 1 % (ca. 3 000 ha) of the original raised bogs resource remains active, with 5 % still capable of regeneration. The main threats to the habitat have been hand cutting over many centuries, industrial peat cutting over the last 50 years, drainage, and to a lesser extent forestry and burning.

A survey of 48 raised bogs, which represents approximately half of our remaining resource in Ireland was carried out in 1994/1995 where the distribution of community complexes was mapped, and physical characteristics (e.g., firmness, cracking, slope, and bare peat) recorded. The same survey also undertook estimation of the length and functioning of existing drains. It is important to note that using repeated quadrats or transects is not a suitable method for Irish raised bogs because the distribution of communities continuously changes. Hence, during the survey only a small number of quadrats were used to record more detailed information.

Ecotopes

In Ireland, raised bogs are assessed on an ecotope level rather that the entire habitat; characteristic species are identified for each ecotope. This approach is favored due to the fact that raised bogs are made up of community complexes that include different structural elements such as pools, hollows, lawns, flats, hummocks, disturbed areas, and facebank. Each of those elements has different diagnostic species, and the list of those will be adapted for the EC reporting format. The 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). Experts in Ireland have identified physical characteristics and characteristic species for each ecotope.

During the 2004/2005 raised bog monitoring survey all sites previously surveyed were once again revisited. Experts remapped the ecotopes, quantified impacts, assessed changes, and determined the conservation status. Natura 2000 activity codes were used for assessment of impacts and activities; influence and intensity of activity along areas affected were estimated. Comparison of the data obtained in 1994/1995 and ten years later was used to assess the status of raised bogs in Ireland.

Assessment methods

After the necessary data was gathered, the ecotopes were added together to determine the extent of a specific habitat type. To assess the structure and functions of active raised bog, changes in the extent of the central ecotope were quantified with losses indicating a deterioration of quality. The structure and functions of degraded raised bogs were assessed by quantifying changes in the extent of the marginal ecotope, with increases in extent indicating a deterioration of quality. 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 in structure and function.

Outcomes

The results of the assessment showed that the overall range of active and degraded raised bogs has been maintained in the recent decades but the area of active raised bogs has declined by more than 25 % in the last 10 years; hence, it was assessed as unfavorable-bad, however the area of degraded raised bog has only declined by 1 %, and therefore assessed as favorable. The losses would be bigger if a longer period of time were used as a point of reference. The overall assessment of the structure and function and future prospects was done based on summarizing assessments of individual sites. As a result, it was concluded that the overall conservation status of active raised bogs in Ireland is unfavorable/bad, and the conservation status of degraded raised bogs is unfavorable/inadequate.

CASE B: Assessment of conservation status in Austria

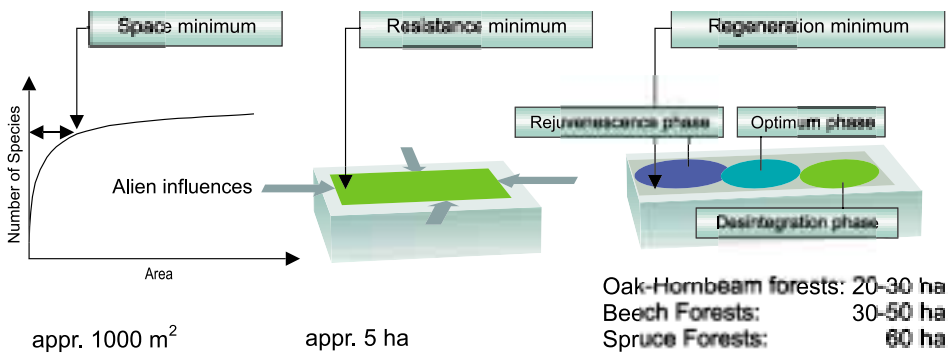
Designing and implementation of biodiversity monitoring efforts in Austria are guided by a set of basic principles. Namely, appropriate monitoring has to cover the whole variability and range of a habitat or species. The intensity of recording has to be in line with the probability of adverse impacts or threats, and the results

have to be aggregated and evaluated on various spatial scales. The monitoring system has to include an effective sampling design, be based on a reliable baseline situation, and to identify indicators to be recorded (e.g., favorable conservation status indicators, early warning indicators).

Appropriate parameters are the first step in assessing the conservation status of species or habitats; they are used as a point of reference for valuation. The parameters can be qualitative (e.g. structure and function, future prospects) or quantitative (range, area). Furthermore, the each of the parameters has to be recorded on the most appropriate level, e.g., structure and function on a locality level, range and area on a state level, while future prospects on both levels.

Measurable indicators are key for being able to assess the status of these parameters and for reducing the complexity of data. The chosen indicators have to be reflective of the conservation status of the respective habitat or species, sensitive to influences or changes, easily recordable, and recorded stably over time. To be able to assess the status of an indicator, each of them is also assigned certain thresholds, i.e., indications of limit values within the variability of habitats and species. Defining thresholds could be based on ecological knowledge, existing guidelines or agreement of experts.

To demonstrate the case, here is an example of indicators and their thresholds. For a beech forest habitat the suitable indicators could be the size of a stand, species composition of tree layer, stock structure, utilization, amount of dead wood, indicative species, and game damage. Thresholds for the size of a stand are demonstrated in the picture below.



Information: Federal Environmental Agency, Austria[11]

[11] Picture from presentation of Thomas Ellmauer for expert meeting „Biodiversity monitoring and reporting according to the EU Habitats Directive in the Baltic States – methodological aspects", 25-26 May 2005.

Thresholds for forest utilization, for instance, could be set by following requirements set in legislation regulating forest felling; tree layer composition threshold is a value that is determined by experts (e.g., what species need to be present and their abundance).

Once the necessary data is available, the assessment procedure can begin. In Austria, experts apply a grading system, which is derived from the Standard Data Forms. Namely, status of each of the indicators is rated with letters A, B, and C. A stands for excellent, B for good (both of them indicate a favorable status), and C is average or reduced (unfavorable).

CASE C: What is a "typical species"?

The concept "typical species" is still in the process of being defined on the European level. Member states, however, should note that a separate assessment for each typical species will be not required; it will rather be incorporated in the assessment of "Structure and Function". The European Topic Centre recommends that typical species should be selected from those traditionally found in a certain habitat type (in good state). The list of typical species should not be long (ca. 5-10 species per habitat), and could be both plant and animal species.

In the discussions that took place in seminars and expert meetings of this Phare CBC project, several ideas were shared by the Baltic experts. For instance, some believe that typical species should be stenotopic species that have some indicator value, and they should be characteristic for a site/habitat. Others acknowledged

that sometimes the abundance of a species (e.g., *Calluna*) has indicative value not the species itself.

The Swedish approach to defining typical species is based on one general condition: the chosen species should be positive indicators of the favorable conservation status of a habitat, and their main indicator value is abundance. In Sweden, a list of typical species is developed for all habitat types; thresholds are set on how many of the typical species should be present in a defined number of plots for the conservation status to be regarded as favorable. In case of grasslands, for instance, the typical species are monitored every six years; in smaller sites it is done on fixed plots while on larger sites sample method is used.

CASE D: Remote sensing – a data gathering method of the future?

Remote sensing is a way of collecting information from a distance, and the most commonly applied techniques are aerial photography and satellite imagery. Remote sensing has been repeatedly noted as one of the up and coming methods of data gathering for biodiversity assessment. As a method, which can rapidly provide information on large areas, it is rightfully deemed less time consuming than fieldwork carried out by experts. However, not everything can become subject of remote sensing; hence, effective biodiversity monitoring would still need to combine modern technologies and the traditional field work.

The Swedish experience shows[12] that satellite imaging works best on some of the forest habitats, heathlands, and certain marine habitants (e.g., lagoons, estuaries),

[12] Key-note presentation by Mora Aronsson of the Species Information Centre, Sweden, during the seminar on Implementation of biodiversity monitoring requirements according to the EU Habitats Directive in the EU Member States (3-4 March 2005, Sigulda, Latvia)

while grasslands and spruce forests are impossible to identify by remote sensing. In Austria, Corine Landcover was used in mapping the Natura 2000 sites, especially for pre-selecting the sites, and for choosing areas for fieldwork. High-resolution ortophoto (aerial photography) can be successfully used for mapping borders of different habitat types. Austrian experts believe that remote sensing is a complementary tool that should be used in a cost-effective manner. It is useful as a monitoring warning system, and it is more suitable for open habitat types.

There are a number of examples of using remote sensing for habitat assessment also in the Baltic States. For instance, in the Nigula Nature Reserve in Estonia the relation between mire habitat and abundance of birds was studied by analyzing the structure and dynamics of mire surface and the number of bird species. Among the information used were the aerial photos of Nigula from 1950, and the recent (2000) Landsat images of land cover classification. As a result of superimposing the two maps, a transition areas matrix was created, which demonstrated a decrease in open mire habitats and grasslands, and an increase of wooded mires and forests. The bird species trends also show a decrease of open landscape birds and an increase of dendrophilous bird species.

Agu Leivits of the Nigula Nature Reserve acknowledged that satellite remote sensing is a good tool for habitat mapping and monitoring, but it needs to be used in combination with other tools and information (e.g., aerial photos, cadastral maps, GIS, field work). Remote sensing can also be used for estimating the areas of clear cuts, peat extraction sites, and abandoned agricultural lands.

All in all, the method is developing rather fast, and it is likely to become more important in biodiversity data gathering in the future. Besides, the European Commission has initiated several projects for developing and improving remote sensing techniques, which clearly indicates the potential and acceptability of this method.

Key recommendations: revision of the Baltic biodiversity monitoring systems

Biodiversity monitoring is a set of instruments that allows to partially understand the natural systems, to determine impacts that human activities have on them, and to act accordingly in order to prevent further impacts or to alleviate the existing ones. Due to a continuous development of natural systems, gathering of information has to be sustained and long-term; data gathered over time has to be comparable and trustworthy.

The world has committed to limit biodiversity loss induced by human activity and particularly accelerated in the past 50 years. The European Union has adopted the same goals, and its member states are to facilitate reaching them. One of the key EU nature conservation policy terms today is the conservation status of species and habitats, i.e., knowledge that allows to make appropriate political and scientific decisions to maintain what is good or to improve what is necessary. Biodiversity monitoring systems in the EU member states have to be able to produce just that – data that would allow determining a country-wide conservation status of protected species and habitats.

Prior to accession to the EU, biodiversity monitoring in the Baltic States has served more the scientific interests and certain nationally defined priorities, and produced valuable yet very specific and narrowly focused data. Furthermore, there have

been no coordinated efforts to understand the extent of biodiversity elements; monitoring programs had often been set up through stronger lobbying power of one interest group over another. Hence, one of the more fundamental steps in revising nature conservation efforts is restructuring of the biodiversity monitoring systems in the Baltic States.

Having looked at the on-going processes, requirements set by the EU, as well as experience of other member states, recommendations for the Baltic States can be divided in two main blocks: policy/authorities level and scientific/expert level.

Policy/authorities level

The policy/authorities level is where decisions on composition and longevity of biodiversity monitoring systems are made. It is guided by international obligations, and national aspirations for better natural environment. On the practical side, this level is responsible for being able to meet the various reporting obligations, including the one covered in this publication – the Habitats Directive reporting. In order to have a viable nature conservation that matches the global requirements, the following issues have to be taken into account by the policy/authorities level when designing a biodiversity monitoring system:

- The national biodiversity monitoring system should be designed to meet the **international and national objectives** (e.g., preserving overall biological diversity, conserving certain habitats of species).
- The EU-wide nature conservation policy introduces a biodiversity monitoring concept that is rather new to the Baltic States, hence, establishing and running the **new system requires a substantial political support**, **guidance**, **commitment**, and **financing**.
- Prior to setting up a new system or introducing changes to the existing one, **long-term goals of biodiversity monitoring have to be clearly defined**; this allows to establish a comprehensive understanding of the system in the future, to run it effectively, and to gain maximum benefit.
- The biodiversity monitoring has to be **extensive** and able to produce **comprehensive data** that allows drawing system-wide conclusions; it cannot be lead only by narrow scientific interests of a limited number of peer groups.
- The biodiversity monitoring has to be sustained and long-term, it has to receive a **steady and substantial state financing** and a **continuous mandate** to proceed; project-based monitoring activities are beneficial, but they should not be the primary tool for data acquisition.
- The subjects of biodiversity monitoring (habitats and species) have to be chosen

on **scientifically sound grounds** rather than as a result of lobbying powers.

- While data gathering has to be carried out effectively, the **data analysis and interpretation** that follows **has to be regarded as a priority** and receive a steady financial support.
- Data acquired in the framework of monitoring programs should serve as a **point of reference for measuring national nature conservation policy** and for adjusting it accordingly in order to meet the set objectives.
- Before introducing any new changes to the already existing biodiversity monitoring systems, it has **to be ensured that no prior achievements, efforts and outcomes are lost or their validity is hindered** (e.g., no sub-program should be resized or cancelled without a sound assessment of the potential consequences of such a move).
- Despite the option to use the best expert judgment instead of real data, the responsible authorities should **make the 2007 report a priority**, and initiate the work required for filling it; forming an expert judgment which gives a trustworthy account of the state of biodiversity also requires a fair amount of time.
- Plans should be set in place to **evaluate the process of filling the 2007 report and its outcomes**; monitoring programs and reporting procedures should be subsequently fine-tuned based on the results of analysis.

Scientific/expert level

The scientific/expert level is where the actual data gathering, processing, and analysis are done. Scientists are the ones that develop and propose monitoring methodology and indicators. In the light of the Habitats Directive reporting format, the scientific community should also take an active part in trying to interpret the unclear terms. In the end, experts are those who should raise the red flags in case certain biodiversity trends are alarming and need attention of the policy level. In order to be able to assess the conservation status of species and habitats, the following issues have to be considered by the scientific/expert level:

- In the light of the current need to produce comprehensive assessments, monitoring **methodology** has to be **less detailed** than previously used and **more efficient**; scientific institutes should probably differentiate between biodiversity monitoring needs for state interests and the more specific scientific research interests (financial arrangements with the state in this case would be crucial).
- Data sheets to be filled during field work should be **simple, easily understood** and **include quantitative parameters**, which would eliminate a possibility for subjective estimations, make data analysis simpler, and would allow data gathering to be carried out by a wide range of experts.

- In the 2007 Habitats Directive report that can be based on the best expert judgment, assessment of conservation status has to build the **baseline** for **measuring trends in the future**.
- **Indicators** are crucial for assessing the conservation status of habitats and species; according to the UN Millennium Assessment, an effective indicator should[13]:
  - provide information about changes in important processes
  - be sensitive enough to detect important changes but not so sensitive that signals are masked by natural variability
  - be able to detect changes at the appropriate temporal and spatial scale without being overwhelmed by variability
  - be based on well-understood and generally accepted conceptual models of the system to which it is applied
  - be based on reliable data that are available to assess trends and are collected in a relatively straightforward process
  - be based on data for which monitoring systems are in place
  - be easily understood by policy-makers.

- Determination/definition of values, e.g., favorable reference area, should be based on scientific grounds and **not guided by political biases**.
- **Remote sensing has a noteworthy potential** as a data gathering method; the use of satellite imagery and ortophoto in combination with more traditional methods should be pursued.

Even though the recommendations are given separately for the two levels, the essence of biodiversity conservation is in balanced collaboration between the two. Decisions taken in favor of nature have to rely on both the political will, and the scientific validity. One message repeatedly heard at the events organized in the frame of this project has been encouragement for the Baltic nature conservation experts to take a more active part in European nature conservation working groups and decision-making processes. The Baltic experts have also been encouraged to actively contribute to the development of the EC guidelines by submitting more comments and offering case studies from the region. That would not only strengthen the presence of the boreal region in Brussels, but would also require a certain collaboration (e.g., coordinating positions) between authorities and experts on national levels.

Hence, aside from a well-organized and effective species and habitats monitoring, good data flows, and easy access to databases, certain mechanisms have to be created to also foster the necessary feedback loop.

[13] Millennium Ecosystem Assessment, 2005. Ecosystems and Human Well-being: Biodiversity Synthesis. World Resources Institute, Washington, DC.

Conclusion

Now is the time of changes for biodiversity conservation in each of the member states and the European Union as a whole. The objective is clear – not only to halt biodiversity loss by 2010, but even more importantly, to make the necessary changes in order to preserve the natural world around us for good. Undeniably, that is a difficult target to reach – it is equally clear and blurred, ambitious yet simple. Today European nature conservation stakeholders are in the process of finding the appropriate tools and setting favorable grounds for the biodiversity preservation.

The focal topic of this publication – a biodiversity monitoring system – is just the set of tools that should support taking scientifically sound and politically educated decisions in favor of the natural world. Yet, a perfect monitoring system will not be the answer, it is the knowledge that it provides us with, and what we subsequently do with that knowledge.

The debate on the functionality of national biodiversity monitoring systems was largely triggered by the need to know the conservation status of species and habitats set in the EU nature conservation policy. The first test for the countries' ability to assess this status will be the reporting to the European Commission in 2007 and in 2014, respectively. The key challenge lies in the fact that the assessment has to be done across the entire country, and not just within protected areas; it has to be

done for species that no prior monitoring has been done for; it also has to be done for habitats which are difficult to put a strict boundary on, among other things. Hence, the member states are revising their biodiversity monitoring systems and making the necessary changes in order to create effective systems.

The Baltic States share a number of similarities from nature itself to systems supporting it, but each of them is at a different stage of restructuring their biodiversity monitoring. Estonia is reshaping the system of 1995 – monitoring methodology is being simplified (within the scientifically sound limits), and a number of sites is increased. Lithuania has developed a "paper version" of a system that is able to support reaching the set targets, yet it has just been set in place and the first implemented activities (birds monitoring) does not allow to assess its viability as a whole. Latvia has just reviewed the needs and a proposal for an improved system has been drawn. A political decision to proceed has to be taken at this time. In the Baltic States, the road map to better systems is there; today the essential thing is not to hurry and not to make rushed decisions, triggered by the reporting and meeting the obligations frenzy.

The success of biodiversity monitoring and making the right use of the knowledge it produces can only be achieved through a constructive collaboration between the policy/authorities level and the scientific/expert level. Hence, recommendations drawn as a result of this Phare CBC project have been given for each of the levels separately. Every nature conservation stakeholder plays a particular role in preserving the biological diversity, yet only a collaborative effort will yield the desired results.

Furthermore, the collaboration should take place not only within each individual country but also between them. So far, the transboundary cooperation on biodiversity monitoring has mostly taken place in the framework of projects or as a result of individual scientific efforts. Effective cooperation on coordinated biodiversity monitoring actions is significantly limited by a lack of political will, financing, and methodological constraints. Nevertheless, regular meetings for exchange of experience and information among experts are deemed useful and necessary.

And finally, it is crucial to remember that any report produced or study made should not be the end result, and an objective in itself. Those are only tools and parts of biodiversity monitoring system, which are in place to assist with preserving the natural environment as we know it today.

Annex I

Assessing conservation status of a SPECIES[14]
General evaluation matrix *(per biogeographic region within a MS)*

Parameter	Conservation Status			
	Favourable ('green')	***Unfavourable - Inadequate*** **(‚amber')**	**Unfavourable - Bad ('red')**	***Unknown (insufficient information to make an assessment)***
Range[15]	Stable (loss and expansion in balance) or increasing AND not smaller than the 'favourable reference range'	Any other combination	Large decline: Equivalent to a loss of more than 1% per year within period specified by MS **OR** more than 10% below favourable reference range	*No or insufficient reliable information available*
Population	Population(s) not lower than 'favourable reference population' AND reproduction, mortality and age structure not deviating from normal (if data available)	Any other combination	Large decline: Equivalent to a loss of more than 1% per year (indicative value MS may deviate from if duly justified) within period specified by MS AND below 'favourable reference population' OR More than 25% below favourable reference population OR Reproduction, mortality and age structure strongly deviating from normal (if data available)	*No or insufficient reliable information available*
Habitat for the species	Area of habitat is sufficiently large (and stable or increasing) AND habitat quality is suitable for the long term survival of the species	Any other combination	Area of habitat is clearly not sufficiently large to ensure the long term survival of the species OR Habitat quality is bad, clearly not allowing long term survival of the species	*No or insufficient reliable information available*
Future prospects (as regards to population, range and habitat availability)	Main pressures and threats to the species not significant; species will remain viable on the long-term	Any other combination	Severe influence of pressures and threats to the species; very bad prospects for its future, long-term viability at risk.	*No or insufficient reliable information available*
Overall assessment of CS[16]	All 'green' OR three 'green' and one 'unknown'	One or more 'amber' but no 'red'	One or more 'red'	Two or more 'unknown' combined with green or all "unknown"

[14] Assessment formats obtained from http://forum.europa.eu.int/Public/irc/env/monnat/library
[15] Range within the biogeographical region concerned (for definition, see Annex F, further guidance on how to define range (e.g. scale and method) will be given in a foreseen guidance document to be elaborated by ETC-BD in cooperation with the SWG.
[16] A specific symbol (e.g. arrow) can be used in the unfavourable categories to indicate recovering populations

Assessing conservation status of a HABITAT type
General evaluation matrix *(per biogeographic region within a MS)*

Parameter	Conservation Status			
	Favourable ('green')	***Unfavourable – Inadequate* (‚amber')**	**Unfavourable - Bad ('red')**	***Unknown (insufficient information to make an assessment)***
Range[17]	Stable (loss and expansion in balance) or increasing AND not smaller than the 'favourable reference range'	Any other combination	Large decrease: Equivalent to a loss of more than 1% per year within period specified by MS OR More than 10% below 'favourable reference range'	*No or insufficient reliable information available*
Area covered by habitat type within range[18]	Stable (loss and expansion in balance) or increasing AND not smaller than the 'favourable reference area' AND without significant changes in distribution pattern within range (if data available)	Any other combination	Large decrease in surface area: Equivalent to a loss of more than 1% per year (indicative value MS may deviate from if duly justified) within period specified by MS OR With major losses in distribution pattern within range OR More than 10% below 'favourable reference area'	*No or insufficient reliable information available*
Specific structures and functions (including typical species[19]**)**	Structures and functions (including typical species) in good condition and no significant deteriorations / pressures.	Any other combination	More than 25% of the area is unfavourable as regards its specific structures and functions (including typical species)[20]	*No or insufficient reliable information available*
Future prospects (as regards range, area covered and specific structures and functions)	The habitats prospects for its future are excellent / good, no significant impact from threats expected; long-term viability assured.	Any other combination	The habitats prospects are bad, severe impact from threats expected; long-term viability not assured.	*No or insufficient reliable information available*
Overall assessment of CS [21]	All 'green' OR three 'green' and one 'unknown'	One or more 'amber' but no 'red'	One or more 'red'	Two or more 'unknown' combined with green or all "unknown'

[17] Range within the biogeographical region concerned (for definition, see Annex F, further guidance on how to define range (e.g. scale and method) will be given in a foreseen guidance document to be elaborated by ETC-BD in cooperation with the SWG.

[18] There may be situations where the habitat area, although above the 'Favourable Reference Area', has decreased as a result of management measures to restore another Annex I habitat or habitat of an Annex II species. The habitat could still be considered to be at 'Favourable Conservation Status' but in such cases please give details in the Complementary Information section ("Other relevant information") of Annex D.

[19] A definition of typical species will be elaborated in the frame of the guidance document by ETC-BD in cooperation with the SWG.

[20] E.g. by discontinuation of former management, or is under pressure from significant adverse influences, e.g. critical loads of pollution exceeded.

[21] A specific symbol (e.g. arrow) can be used in the unfavourable categories to indicate recovering habitats

Additional Web Resources

The European Commission

DG Environment/Nature
http://europa.eu.int/comm/environment/nature/home.htm
EC Documents (including 2007 reporting format)
http://forum.europa.eu.int/Public/irc/env/monnat/library

Austria

Expert authority for environmental protection and environmental control in Austria.
http://www.umweltbundesamt.at/en/umweltschutz/naturschutz/natura_2000/gez/

Czech Republic

Agency for Nature Conservation and Landscape Protection
http://www.nature.cz/

Denmark

National Environmental Research Institute /National Monitoring and Assessment Programme for the Aquatic and Terrestrial Environment
http://www.dmu.dk/International/Monitoring/NOVANA/

Estonia

Ministry of the Environment of the Republic of Estonia
http://www.envir.ee/index.aw/set_lang_id=2
Estonian Environment Information Centre
http://www.keskkonnainfo.ee/english/links

Finland

Finland's Environmental Administration
http://www.ymparisto.fi/default.asp?node=4071&lan=en

Germany

Federal Agency for Nature Conservation
http://www.bfn.de/en/03/0303.htm

Great Britain

Common Standards Monitoring
http://www.jncc.gov.uk/page-2217
UK Countryside Survey
http://www.cs2000.org.uk

Latvia

Ministry of the Environment of the Republic of Latvia
http://www.vidm.gov.lv/
The Latvian Environment Agency
http://www.lva.gov.lv/lea

Lithuania

Ministry of the Environment of the Republic of Lithuania
http://www.am.lt/EN/VI/rubric.php3?rubric_id=109

Sweden

Swedish Environmental Protection Agency
http://www.internat.naturvardsverket.se/
The Swedish monitoring approach (in Swedish)
http://smp.naturvardsverket.se:8080/~uppfoljning_natura2000/login (login as 'guest')

Slovakia

http://www.sopsr.sk/natura/index1.php?p=7&lang=en

Mire Monitoring

The Strategy and Action Plan for Mire and Peatland Conservation in Central Europe
http://www.wetlands.org/pubs&/CEPP.htm
Mire restoration techniques from a Scottish LIFE project
http://www.wetwoods.org/
France http://www.pole-tourbieres.org/
Switzerland http://www.wsl.ch/land/inventory/mireprot/

Remote Sensing

http://prinsengineering.com/
Cases in Latvia http://prinsengineering.com/kerimi_bog_habitats.htm
http://prinsengineering.com/LAT_modeling_e.htm
Cases in Lithuania http://prinsengineering.com/n2000.htm
Kite aerial photography http://www.geospectra.net/kite/estonia/color/color.htm

Miscellaneous

Methodology for habitat mapping across Europe
www.biohab.alterra.nl
UN Millennium Ecosystems Assessment
http://www.millenniumassessment.org//en/Products.Synthesis.aspx
ELLE, Assessment of Monitoring Program in Latvia
http://www.environment.lv/eng/default.htm
The Long Term Ecological Research (LTER) Network
http://www.lternet.edu/
Evaluating Effectiveness - A Framework for Assessing the Management of Protected Areas - Best Practice Protected Areas Guidelines Series No. 6.
http://www.iucn.org/themes/wcpa/pubs/pdfs/Evaluating_Effect.pdf
Participatory Biodiversity Monitoring Network (Monitoring matters)
http://www.monitoringmatters.org/

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