Management of coastal habitats and grasslands

Background paper

for the LIFE-Nature Co-op project
“Experience exchange on habitat management among Baltic LIFE-Nature projects”

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Content

Introduction

This background paper has been prepared in the frame of the LIFE-Nature Co-op project “Experience exchange on habitat management among Baltic LIFE-Nature projects” for the seminar on “Management of coastal habitats and grasslands - experience exchange for improved know-how”. The project is being implemented by the Baltic Environmental Forum.

The aim of the paper is to give an overview of management methods used in conservation and restoration of coastal and grassland habitats included in Annex 1 of the Habitat directive, and to offer examples of their application in various projects, including those by LIFE-Nature. According to the main body of EU nature conservation legislation – the Habitat directive – a coherent network of special areas for conservation shall be set under the title of Natura 2000 for protection of the habitat types listed in Annex 1 and habitats of species listed in Annex 2 of the directive. The network also includes the special protection areas classified according to the Bird directive. In these sites deterioration of the habitats is to be avoided.

This paper will introduce the types of coastal and grassland habitats included in Annex 1 and relevant for the Baltic countries. Historical land use and other factors determining the extent and distribution of these habitats will be briefly reviewed. Management methods will be presented and projects using these will be reviewed. Impacts of Common Agricultural Policy will be described. Finally, recommendations for the near future will be presented.

The coastal and grassland habitats are under threat due to agricultural intensification, abandonment and building development. The first two, acting locally in opposite directions can both lead to severe deterioration of the habitats’ conservation status while the third can totally destroy the habitats. While being locally opposite these factors form one complex at larger scale, since intensification of agriculture leads to abandonment of agriculturally less favourable sites that in turn tends to open these for building development. It must be stressed that due to big decline in agricultural production the problems resulting directly from agricultural intensification are minor in the Baltics while those related to abandonment and building development are severe. The wet grassland habitats are also threatened by drainage but this issue will be only briefly touched upon as it has been dealt with by a separate BEF seminar dedicated to wetlands. It should also be added that at a more global scale the coastal and grassland habitats are under threat from long-range air pollution, climate change and deterioration of water quality. However, in the Baltic States these threats are currently significantly smaller than those of abandonment and development are.

In the frame of management both regulatory tools and active management in the form of grazing and mowing, as well as bush cutting for restoration will be reviewed.

This background paper is intended to serve as a practical aid for the people involved in management of coastal and grassland habitats, among others those who are involved in both the existing or future LIFE-Nature projects dealing with these habitats.

1. Relevant habitats, their description and ecological character

Habitats can be named and classified in many ways. In this paper, nomenclature of Annex 1 of the Habitat directive will be used - that is neither better nor worse than many others. This choice is due to the fact that the Habitat directive is the central piece of nature conservation on EU level and this is how habitats are described in Natura 2000 site databases and LIFE-Nature projects. In all nomenclatures and classifications of habitats there is always room for discussions and interpretation. Hence, some subjectivity in judgements whether a given habitat type is present in a country is always present.

Interpretation Manual of European Union Habitats (2003) provides some framework guidance on the subject, while most of the countries have also developed their own interpretation manuals. Still, expert judgements are often necessary in individual cases. The relevant habitats and their ecological character are described below while a summary table of these habitats in the three Baltic States is presented in Annex 1.

1140 Mudflats and sandflats not covered by seawater at low tide

Relevance of this habitat to the Baltic States has caused some argument. Strictly speaking there are practically no tides in the Baltic Sea. Therefore Finland has decided that this habitat is not relevant for the country. By contrast Sweden has considered the habitat to be relevant, since though tides are not present, wind direction changes can cause similar fluctuations of the sea level and hence expose large areas of sand and mud otherwise covered by seawater. Estonia has followed the Swedish example and considers the habitat to be very characteristic to many coastal Natura 2000 sites. This decision reflects the understanding that these wind-driven fluctuations are producing the habitat with basically same ecology. Latvia and Lithuania have apparently followed the Finnish reasoning and do not consider this habitat to be relevant. The habitat type is very important for waterfowl and waders both migrating and nesting, who feed here during the episodes of low water.

1150 Coastal lagoons

This is a broad habitat category and significant geographic variation is present. The coastal lagoons are shallow water bodies separated from the sea either temporarily or permanently. Some of the lagoons may dry out during droughts. Salinity varies depending both on the salinity of the adjacent sea and how much the water is exchanged between the lagoon and the sea. This in turn results in different vegetation patterns. The latter are also dependent on the soil types, coastal dynamics and lack or presence of grazing. For example, reed tends to dominate ungrazed lagoons with shallow stagnant brackish water characteristic to the Baltic States.

Lagoons are created by different types of coastal processes. For example in the northern and middle part of the Baltic coast (Sweden, Finland, Estonia) post-glacial land lift is the most important factor in separating shallow bays from the sea and creating lagoons but other processes like sand movements can play a role, too. Along German, Polish, Lithuanian and Latvian coast the sand movements are mostly the main cause of separation of the lagoons from the sea.

In spite of all variations this habitat has an important common feature - big importance for biodiversity. Lagoons are important habitats for some amphibian species, spawning sites of the fish, they are important to many invertebrate species and support waterfowl and waders both on migration and during nesting time.

1210 Annual vegetation on drift lines
Annual vegetation on drift lines is present in all coastal countries. This habitat is very dynamic and cannot be mapped and managed separately as it is always part of a larger coastal habitat complex. Its ecological significance is also that of an element of such a complex of coastal habitats. Drift lines are often important feeding sites of migrating waders and other birds.

1220 Perennial vegetation on stony banks
This habitat is often present together with the previous one, being next zone landwards from it. Sea impact is somewhat weaker and the habitat is less dynamic, allowing development of perennial vegetation. The complex including this and the previous habitat can be an important nesting site for tern and gull colonies as well as for some waders like Ringed Plovers (*Charadrius hiaticula*) and Oystercatchers (*Haematopus ostralegus*). The latter use also the mudflats and sandflats open at low tide (1140) as feeding grounds. These habitats form one complex also from the management point of view.

1230 Vegetated sea cliffs
This habitat can be present together with the previous ones but has its unique flora and fauna, especially birds. It differs from similar inland habitats (8210, 8220) by direct sea impact (being much more dynamic due to that) and also characteristic biota. The habitat tends to be present together with other habitats located on the top, like grasslands (6210, 6270, 6280), heaths (4030), scrub (5130) or limestone pavements (8240).

1310 *Salicornia* and other annuals colonising mud and sand
This habitat is present on the sites where saltwater impacts favour species of *Salicornia*, *Suaeda*, *Salsola* and other salt-loving plants. Due to low salinity of the Eastern part of the Baltic Sea such conditions are more often present where trampling thickens the soil and thus favours evaporation of the water. Therefore in the Baltic states this habitat tends to be present as a mosaic within the coastal meadows (1630).

1630 Boreal Baltic coastal meadows
The habitat is characterised by short vegetation under influence of brackish seawater. Patches of the previous habitat are often present. Habitat is important for many endangered species, including Annex 1 bird species. It is critically important for the nesting Baltic Dunlin (*Calidris alpina shinzii*), and also important for Avocet (*Recurvirostra avosetta*). On migration this is a key habitat for Barnacle Geese (*Branta leucopsis*) and Lesser White-fronted Geese (*Anser erythropus*). The habitat is also important for the Natterjack Toad (*Bufo calamita*). This is a 'Boreal' habitat added to the Annex 1 by Sweden and Finland. However there is a similar habitat 1330 characteristic to more saline environments of the coastal areas of older member states.

1640 Boreal Baltic sandy beaches with perennial vegetation
This habitat is often present together with other coastal habitats (e.g. 1140, 1210) and also with various dune habitats (e. g. 2110, 2120, 2130, 2140, 2180, 2190). This is also a Boreal habitat.

2110 Embryonic shifting dunes
This is the first stage of dune formation. This habitat is present in most of the European coastal regions. In the Baltics it usually borders the previous habitat being next zone landwards. The sand is still under influence of the sea during the storms but is also moved by the wind.

2120 Shifting dunes along the shoreline with *Ammophila arenaria*
This is the next stage of dune formation and is usually located landwards from the previous within the same dune complex. Direct sea influence is limited to stronger storms but winds move the sand.

2130 Fixed coastal dunes with herbaceous vegetation
This is the next stage of dune formation and is usually located further landwards from the previous within the same dune complex. Direct sea influences are weaker than for the previous habitat, sand movements are to large extent arrested by vegetation.

2140 Decalcified fixed dunes with *Empetrum nigrum*
Dunes with *Empetrum nigrum* develop vegetation that is somewhat similar to heaths. This habitat is also mostly located within larger dune complexes.

2180 Wooded dunes of Atlantic, Continental and Boreal region
These dune woodlands are also usually part of larger dune complexes. They represent still older successional stages. Mostly this habitat includes the naturally wooded dunes but old plantations with biodiversity interest can also be included. Wood composition varies from broad-leaved in more southern regions to mostly pine but also alder in Boreal region.

2190 Humid dune slacks
This habitat can be present only within larger dune complexes, as it is located between the dunes. The habitat can also be important for the breeding of Natterjack Toad (*Bufo calamita*).

4030 European dry heaths
The heaths can be located both together with dunes and totally apart. They can also be present together with peat-bogs on the higher grounds from the latter. The vegetation is usually more varied but tends to include *Empetrum* and *Calluna*. In the Baltic region the heaths are mostly semi-natural and without grazing tend to get overgrown (usually with pine or juniper).

5130 *Juniperus communis* formations on heaths or calcareous grasslands
This habitat can be present together with the previous and with insufficient grazing the succession can lead from the former to the latter. However it can also be present in complexes with calcareous grasslands (habitats 6210 and 6280). Without grazing this habitat is only a successional stage from heaths or calcareous grasslands to the forest. Depending on site conditions the succession can be either quick or slow but the direction is mostly the same. Grazing tends to significantly slow down the succession process and can even lead to a relatively stable state.

6210 Semi-natural dry grassland and scrubland facies on calcareous substrates
This habitat can in turn be present together with the previous one (when juniper formations are located on calcareous grasslands). With grazing or mowing these habitats can form relatively stable patterns while lack of management leads to succession towards shrubbery.

6270 Fennoscandian lowland species-rich dry to mesic grasslands
This habitat can be similar to the previous one but the main difference is the soil chemistry. This habitat is characterised by acidic soils while the previous one by neutral or alkaline.

6280 Nordic alvars
This habitat is located on limestone or limestone gravel. It can have some similarities with habitat type 6210 ‘Semi-natural dry grassland and scrubland facies on calcareous substrates’ but is characterised by very thin topsoil that makes the conditions much more extreme. These habitats can sometimes be present within the same sites and alvars can also form complexes with various other habitats like 5130 ‘*Juniperus communis* formations on heaths or calcareous grasslands’, 8240 'limestone pavements' or 1230 ‘Vegetated sea cliffs’. The habitat has very limited distribution being present on Estonian coast and islands as well as Swedish islands of Gotland and Öland.

6410 *Molinia* meadows
These meadows can develop on clay laden, calcareous or peaty soils. They can be present together with coastal meadows (1630) - as part of suprasaline zone, alluvial meadows (6450) or other wet grasslands and even in moist hollows within dry grasslands.

6430 Hydrophilous tall herb fringe communities
This habitat is connected to water or forest edges and can be present together with other wet grasslands.

6450 Alluvial meadows
This habitat is located in the floodplains being flooded in spring and often also in autumn and winter - summer floods can occasionally also occur. It can be present in combination with the previous habitats (6410 and 6430) and also with mesic grasslands (6510 and in some cases also 6530 or 9070) or even fens (7230); it can also be combined with alluvial woodlands (91E0 and 91F0). Habitat is important for many endangered species, including Annex 1 bird species. It is critically important for the Great Snipe (*Gallinago media*) and Corncrake (*Crex crex*). Original definition of the habitat located it to the floodplains of big rivers in Northern Sweden and Northern Finland. However in Estonia and Latvia the local alluvial meadows are interpreted as representing this habitat.

6510 Lowland hay meadows
This habitat is usually moist and can be present on the edges of alluvial meadows or other wet grasslands or together with more dry meadows.

6530 Wooded meadows
This habitat can be dry, mesic or wet - the important characteristic is its ‘‘wooded’’ character. It is characterised by the well developed and usually species rich (sometimes extremely species-rich) grass layer and a canopy of varying thickness. The key character of this habitat, differentiating it from the wooded pastures is regular mowing. This is a 'Fennoscandian' habitat that has been added to the Annex 1 by Sweden and Finland. Estonia and Latvia also have this habitat.

9070 Wooded pastures
This is a very variable habitat that is characterised by wood cover and grazing (but no mowing - if grazing is carried out after mowing the habitat is considered 6530). Some wooded pastures are quite similar to the previous habitat while others can be more like grazed forests. Biota is in general similar to the previous habitat but grass layer is usually less species-rich (especially when comparison is made on small scale like one sq. metre) while insects and fungi can be more diverse due to presence of dung and dead wood. Hermit beetle (*Osmoderma eremita*) is a species living mostly in old oaks of this and the previous habitat. This is also a 'boreal' habitat that has been added to the Annex 1 by Sweden and Finland, and considered to be present in Estonia and Lithuania. Somewhat similar habitat in a different biogeographical region is dehesa (6310) but for example wooded pastures of England like New Forest are not present in the Annex 1.

7230 Alkaline fens
This and other mire habitats can be open due to hydrological conditions but old history of grazing or mowing can also contribute. In such cases the succession (in addition to peat development) can go towards woodlands (e.g. 9080) after cessation of those traditional uses.

2. Historic use and formation of the coastal and grassland habitat patterns

History of land use alongside with natural factors has created the distribution patterns of the coastal and grassland habitats.

The natural factors include sediment accumulation, coastal abrasion, erosion, land-lift, fires, floods and wild herbivores.

Land use history includes grazing, mowing, cutting or pollarding trees, reed-cutting etc.

In the present days, it is hard to imagine how much **grazing** influenced the landscape and all habitats before large-scale use of barbed wire started to change the pastoral activities. Grazing was widespread with shepherds or small children looking after the animals, most of the pastures were not fenced. Grazing was almost everywhere, only growing crops or hay was spared, and so where sites planted recently with trees. Large areas were also managed as hay-meadows and grazed after mowing. Together with land-lift this has created the coastal pastures that were used 'from the start', and hence where reed and bush could not take hold - this habitat is therefore often not secondary in spite of being semi-natural. The floodplains were probably also pastures in the beginning but later they have mostly been used as hay-meadows. Thus the alluvial meadows were formed. Forests were also used for hay making and grazing, resulting in formation of wooded meadows and pastures. Grazing has also been instrumental in formation of alvar, heath and scrub, and to some extent in creation of open dunes with moving sand. Especially this latter has lead to concern about over-grazing quite long ago. In some places grazing was banned and dunes were planted with tress to arrest the sand movements.

Traditional agricultural activities influenced landscapes in many ways. As a result of clearing the fields from the stones, **stonewalls** were erected along the field margins. Meadows and pastures were cleared from stones to much lesser extent. Thus the traditional coastal landscape was created with relatively densely ditched small fields and sparsely ditched or totally unaltered large hay-meadows and pastures, and also thin woodlands used for haymaking or grazing. The historical border between fields and meadows/pastures is often marked by a stone wall. The historic land-use has varied a lot but still on several old maps a landscape pattern similar to the present can be recognised.

In the Baltics, winter fodder is more important than in more southern countries. Hence use of grasslands for **haymaking** has been very widespread.

History of the land use in the Baltic States has some important common features, yet there are also individual traits particular to each country. As glaciers retreated to the north, the humans advanced. Therefore, among the present Baltic States what is now Lithuania was settled first and what is now Estonia - last. The same happened with Neolithic shift to pastoralism and agriculture that advanced

from the south with the so called culture of the battle axes. Hence, Lithuania has the longest history of human imprint on the landscape and Estonia the shortest. These differences, however, are minor.

There are also differences in **medieval history** since what is now Latvia and Estonia was conquered by the mostly German crusaders while Lithuania maintained independence and became a great power. However the feudal land-use systems developed in all of those countries. As the landlords hold title to most of the land and their estates used most productive parts the farmers were forced to use also very marginal lands.

Decline of the feudal land-use systems in the nineteenth century Russian empire that then included all the three countries in question lead to purchase of farms by more well-off farmers. However, big parts of land remained in the ownership of the landlords.

Considerable changes happened after the independence and subsequent land reform in the nineteen twenties. Farmers got access to the fields that had belonged to the large estates. This reduced demand for hay from the distant woods, resulting in over-growth of more remote wooded meadows. Some of the wooded meadows were converted to wooded pastures (mowing plus grazing was replaced by grazing only). Barbed wire introduced gradual shift to less 'total' grazing than before. This change however was not as dramatic as the rapidly increased drainage activity that was also supported by the state.

The impact of soviet collectivisation in 1949 and subsequent concentration of agriculture was even more dramatic. Most of the wooded meadows were abandoned during the sixties. Large-scale drainage resulted in replacing former open ditches with underground pipes on 4/5 of drained fields. To some extent such large fields were also created by draining former wetlands. Use of open alluvial meadows continued, but tractors replaced the hand mowing and horse-driven machines. Large kolkhoz (collective farms) herds of cattle differed significantly from the pre-war farm herds but not so much from the herds owned by estates in older days. More distant wet grasslands however gradually fell out of use. Grazing and mowing ceased also on most of the islets. Intensification, concentration, mechanisation and chemisation of agriculture resulted in growing run-off of pollutants that peaked in the eighties.

Regaining of independence/collapse of communist system - followed by radical de-regulation of agriculture (including unregulated import) resulted in dramatic drop of agricultural production. Use of agro-chemicals and pollution also dropped. Many fields fell out of use, area under cereals decreased. Number of domestic animals dropped quickly. Economic importance of semi-natural grasslands significantly decreased and their use became mostly not profitable. Therefore all seminatural grasslands started quickly to fall out of use.

The end of grazing and mowing triggers overgrowth of the sites leading to disappearance of characteristic flora, including most of the orchids. Overgrowth of the short-grass communities leads to vanishing of typical nesting birds, especially the waders. Value of the area for migrating geese also decreases. Overgrowth of coastal meadows and dunes (including dune slacks and shallow lagoons) leads to vanishing of Natterjack Toad populations. Effects on biodiversity of invertebrates are also negative.
To sum up - loss of grassland habitats and overgrowth of coastal habitats with tall vegetation can lead to severe loss of biodiversity and even to species extinctions.

The question thus rises - **how can man-made effects on vegetation be of critical importance for so many species?** Even though extensive agriculture - including pastoralism - has a history of several thousand years, and in some of the coastal regions of the Baltic sea has indeed influenced nature ever since these coastal sites appeared from the sea, this time-scale is mostly far too short from the evolutionary point of view. The species that are at present critically dependent on pastoral activities are mostly far older than the agriculture.

The most feasible hypothesis to explain this apparent paradox has been independently developed by several authors, most clearly by Leif Andersson of Sweden and Franz Vera of Netherlands. And the answer is indeed quite obvious: the large herbivores have grazed the land long before humans have domesticated them. The keystone species in big parts of Europe were the wild horse and wild cattle - species that are now extinct in the wild but who have been extensively grazed throughout Europe from the beginning of pastoralism. Extensive grazing by horse and cattle gradually thus replaced the grazing by wild horse and cattle. Hence the same species that had benefited from the wild horse and cattle continued to benefit the from free-roaming domestic animals of the same species.

Shift to intensive and enclosed animal husbandry has left large areas without the grazing that has been here ever since the ice retreated and indeed had been also been here before along glacial edges and in the interglacial periods. It is important to note that other herbivorous mammals still present is European wild fauna like elk (moose), red deer, roe deer, beaver and even bison can not provide sufficient grazing without presence of horse and cattle. Any management of grassland habitats and indeed mostly also of the coastal ones must take this into account.

3. Management necessary to secure favourable conservation status

3.1 Habitat management in Natura 2000 sites – general principles

Recognition of the fact that habitat loss and deterioration are the major cause of the decline in European biodiversity is a cornerstone of nature conservation in EU. According to the Habitat directive a coherent network of special areas for conservation shall be set under the title of Natura 2000 for protection of the habitat types listed in Annex 1 of the directive and habitats of species listed in Annex 2. The network also includes the special protection areas classified according to the Bird directive. In these sites deterioration of the habitats is to be avoided.

Management of Natura 2000 sites has therefore to secure that conservation status of the habitats relevant to the given site will not decline. Quite naturally this means setting limits to human activities detrimental to the habitats. However many of the Annex 1 habitats are seminatural, meaning that natural successional processes can also lead to their deterioration. Furthermore these habitats are also important for some Habitat directive Annex 2 species and even more often for Bird directive Annex 1 species. Securing their favourable status will quite often mean active management as contrasted to passive 'let the natural processes do their job' approach.

The directive does not, however, prescribe that the present spatial habitat pattern of every site must be kept static. This means that natural dynamics of the habitat distribution patterns may be acceptable as long as all relevant habitats will not deteriorate.

Some habitats are very dynamic and any attempt to 'freeze' them will in fact lead to deterioration while other can be conserved only if properly managed on the spot. It is also clear that more dynamic approach demands larger sites. How active must the management be is thus both habitat type and site specific. Therefore the general recommendations presented in this paper will have to be creatively adapted to every site.

The Habitat directive also stipulates that European Commission has co-responsibility to secure financing of the Natura 2000 site management. LIFE-Nature programme is the key instrument to secure this co-financing and aid in creation of the coherent Natura 2000 network. EU contribution to the financing of the Natura 2000 site management however is not limited to LIFE-Nature programme. Current interpretation of the situation by the Commission is that other financial instruments also form part of this contribution as long as they are helping to manage the sites.

3.2 Management of coastal and grassland habitats

3.2.1 General issues

In natural sites the habitats are usually present as mosaic patterns that are often also quite dynamic.

Depending on habitat types and other circumstances the management might either be aimed at **conserving the existing habitat patterns** or at managing the habitat complex and **leaving room for internal dynamics due to natural processes.**

As it should be clear from the previous chapter, more or less all grasslands and to some extent also other habitats in question require grazing and/or mowing in order to secure their favourable conservation status. Understanding that cessation of traditional use of these habitats is a major problem has driven many projects and initiatives – both national and international – aimed at reversing these negative trends.
Management planning can be an important first step in this as shown by the following example.

WWF Sweden got involved in management of coastal and seminatural habitat conservation in Western Estonia since the early nineties. As a result of this co-operation between WWF and local nature conservationists, one of the first plans to significantly influence nature conservation in Eastern Europe after the downfall of the communist system - the **management plan for Matsalu wetland** - was ready in 1993 and endorsed by the minister of environment of Estonia in 1994. The plan gives the overview of the specific values of the area and threats to these. Most valuable feature is the meadow complex that to a large extent determines also the status of the wetland as the bird area. Most important threat is the over-growth of the meadows and the main action against it - mowing and grazing contracts with the farmers. This was then a completely new approach for our region.
Working Group on Management of Coastal Lagoons and Wetlands (MLW) was established within the framework of HELCOM in 1993. WWF acted as the lead party and secretariat to MLW. The main objective was development of **Integrated Coastal Zone Management (ICZM) plans** for selected priority coastal wetland areas. Phase 1 of MLW started in 1995. Within 2 year period ICZM plans were developed for Matsalu and Käina Bay areas in Estonia, as well as for the Oder/Odra Lagoon (Germany and Poland), Vistula lagoon (Poland and Russia), Curonian lagoon (Russia and Lithuania), Engure/Kemeri (Latvia). For each area Area Task Teams (ATT-s) responsible for the development of ICZM Plans were established, with the projects being funded by EU-LIFE and Sweden. In both Estonian plans management of the grasslands as well as coastal habitats was a priority. Analysis of the ICZM plans prepared during Phase 1 resulted in decision to start the so called Phase 1b, in order to make the plans more operational. Denmark (DANCEE) and Sweden (SEPA) agreed to finance this task. By that time plans for Matsalu and Käina bay areas had partly been implemented and significant similarities between the areas had become very clear. Therefore decision was taken in Estonia not simply to improve the existing plans but rather to

create the new updated plan covering both areas. This plan gave significant attention to the management of grasslands and other coastal habitats.

Planning alone, however, does not improve the conservation status of the habitats. **Examples of successful implementation** are luckily also available.

To aid in implementation of this plan, the **Väinameri project** was initiated by WWF Sweden and co-funded by SIDA. The project is aimed at conservation of grasslands in coastal zone (coastal meadows, alvars and others) in close co-operation with local people. The key issue is securing appropriate grazing by model investments in cattle, sheep, fences etc. Investments in cattle have largely focused on beef breeds since large-scale increase in dairy cattle numbers is not possible under current economic situation. Efforts to market the beef as a special product related to nature conservation ('green beef') are an important part of the approach. The project also included development of local handicraft based on products from grassland management and restoration (e.g. wool, juniper wood etc.) and ecotourism development, and public awareness raising.

None of the above-mentioned projects would have achieved practical results without strong action based on **local financing**. Matsalu Nature reserve employees started to look for additional financing necessary for the plan implementation immediately after the management plan was ready. Money for large-scale grazing and mowing has been made available by the Parliament since 1996. Tens of contracts were made and area of seminatural grasslands grazed or mown started to recover. The scheme established in 1996 was replaced by the new national system for all protected areas or potential Natura 2000 sites containing grassland habitats in 2001. Payment levels were adjusted and overall budget increased. By now number of contracts for meadow management in Matsalu wetland has risen to three hundred. The area of the mown alluvial meadows in Matsalu wetland has risen from ca 500 ha in 1995 to more than two thousands. Wooded meadows have returned from brink of extinction and about hundred ha are mown every year. Over thousand hectares are managed by grazing. Though grazing pressure has slightly increased it is in most cases below optimal. In order to achieve optimal grazing the number of animals should further increase. There is also very little mixed grazing, on most of the pastures there are only cattle, on some only sheep or only horses. Due to introduction of the similar measure under the rural development plan (see below) the future of the administrative structure of the meadow management is partly unclear.

As in the present-day EU situation, the purely economic interest to graze or mow the valuable habitats is not sufficient; ear-marked payments for this are necessary – both in the new and old member states. Mostly they are paid as a part of agri-environmental schemes under CAP and these payments shall be made available in the Baltic States starting from the next year.

There are also other possibilities like the ones shown above. Coastal and grassland habitats are furthermore relatively popular among LIFE projects in old member states as well as several newcomers, including Latvia and Estonia. The latter however are more suitable for restoration and resuming of management than

for long-term conservation. It must also be noted that LIFE is a relatively small financial instrument as compared to structural funds. Relevant LIFE projects are listed in Annex 3.

Grazing and/or mowing (and relevant financing) are thus essential part of the management of the habitats in question. However, these same practices are also threats to some of the species in the habitats.

The very same birds that vanish from ungrazed/unmown grasslands because of overgrowth can be **killed by mowing tractors** or their nests can be **trampled by the grazing animals**.
Therefore, conditions to avoid these negative side-effects are usually tied to the payments or can be even included into legal regimes of protected areas.

In Sweden the start date of mowing on meadows where management contracts are made is 15th of July; in Estonia, where areas are often much bigger, the start date is 1st of July as a compromise between the need to secure mowing of large areas and to avoid nestling mortality. It must be noted that when thousands of hectares are managed part of the area is always mown as late as in August even if the mowing starts in the beginning of July. **Late mowing** is also considered to be favourable for most plants and invertebrates.

As for trampling of the nests by grazing animals, the debates of how serious the problem is are still going on and lot of variation due to different factors seems to be present. **Later start of the grazing** on sites with high density of nesting waders has been recommended but this is not always feasible. Apart from practical problems with the farmers it can in some cases (if stocking rates are low) lead to insufficient grazing and hence to deterioration of nesting conditions.
In general late grazing should be recommended only if stocking rates are high.

On the one side, the trampling tends to be more serious problem with high stocking rates, on the other, the high stocking rates can provide sufficient grazing even with late start of the season.

In general, stocking rates of about one animal per hectare are considered to be relatively safe for the birds.

Choice of grazing animals is also of some importance. As noted above the horse and the cattle are basically native to our part of Europe. The sheep and the goat on the other hand have been introduced at the beginning of pastoral age. Given time of the introduction this does not seem to be a big problem.

However as the sheep and the goat are also more selective in feeding than the horse or the cattle they might not be as good for managing sites rich in rare plants, especially during first half of summer.

To some extent even breed matters though at least as important can be the adaptation of local herds based on learning.

Local and older breeds tend to be better suited for the site and to provide better grazing. Beef cattle tend to be slightly (very little) better than dairy herds.

However, heifers of dairy breeds are almost as good while milk cows usually are inferior, mostly simply because they are removed from the pasture for night time and also fed at home. When grazing is used for managing important sites supplementary feeding should be avoided as much as possible.
It also goes without saying that **management of seminatural grasslands must be done without any chemical inputs** and therefore this will not be repeated for individual habitats that will be briefly looked into below.

Grazing nowadays usually requires **fences**. Within the Väinameri project, a model electric fence around the most important demonstration coastal pasture was erected. It is an expensive but reliable type of fence that has lasted already for several years. Several LIFE projects have also included fencing, and in the above mentioned Estonian national financing scheme fencing of the pastures can be supported. Both barbed wire and electric fences are used - and to much lesser extent more traditional ways also. It is clear from the recent experience that investments in good fences are justified. Within agri-environmental schemes only areal payments are allowed meaning that costs of fencing must be included in the areal support for grazing.

Mowing also needs investments - from small machinery like bush-cutters to bigger, like tractors. In the nineties farmers were not able to buy new tractors. Therefore, for example, Matsalu administration has made efforts to provide such equipment. By different projects (financed by Phare, LIFE, WWF and Ramsar SGF) we have been able to buy six new tractors with mowers and other equipment, not to speak of many smaller items. This has significantly contributed to our ability to manage the grasslands in co-operation with the farmers. At present the economic situation of the farmers has improved and they are often making necessary investments themselves.

Apart from possibilities to manage the habitats by co-operation with the farmers who use the sites for grazing or mowing another way has been proposed recently, the so called **'dedomestication' of the horse and cattle**. Most prominent site managed by this approach is Oostvaardersplassen in Holland. In Latvia this approach is implemented at Lake Pape that is also a site of a LIFE project. The main site includes Konik horses and Heck cattle that are grazed on old agricultural landscape – both former arable fields and old overgrowing meadows - close to the lake. The grazing animals have cleared the old fields very well and have started to improve the situation of the wet meadow by the lake. There is also a separate site not included in LIFE project where European Bison is being introduced with a future ambition to combine the sites.

This chapter will now continue by looking into more details at habitat management by classes. The threats and management by habitats is also summarised in a table in Annex 2.

3.2.2 Coastal habitats

Mudflats and sandflats not covered by seawater at low tide (1140) are mostly present together with **annual vegetation on drift lines** (1210) in a habitat complex that would also include **perennial vegetation on stony banks** (1220) or **sandy beaches** (1640).

The management can only deal with the whole complex as the internal dynamics due to coastal erosion, land lift, sand movements and other processes should be left to nature.

Only thus can favourable conservation status of these inherently dynamic habitats be achieved. Any attempt to 'freeze' the existing patterns - apart from being quite hopeless - would in fact severely deteriorate the conservation status of the habitats.

Indeed coastal defence alongside with other forms of building development is the main threat to these habitats. **Within Natura 2000 sites no building must therefore be allowed on these habitats or in their close vicinity.**
Water pollution is also a threat to these habitats even though pollution from agriculture to the Baltics has somewhat decreased during the last decade. Water pollution contributes to overgrowth of habitats in question with reeds and other tall vegetation that can be detrimental to sensitive species. **Efforts to decrease pollution** both within and in surroundings of Natura 2000 sites are therefore still needed.
Decline in grazing during the last century has also contributed to overgrowth of the coast. **Grazing** can therefore be appropriate part of the management in some sites.
To some extent, intensive visitation by tourists can also pose a threat to these habitats. **Measures to limit access** can be appropriate in such cases though mostly this threat and hence the need to react is not a priority.

Coastal lagoons (1150) can be present together with the habitats dealt in the previous paragraph but also with coastal meadows (1630) and other habitats.

The lagoons must always be managed together with surrounding habitats. Depending on the site character the successional processes of the lagoon might be left to nature or more effort might be put into conserving or restoring favourable status.

Without grazing the shallow lagoons often tend to grow over with rushes, reeds and other tall vegetation. This tendency is usually accelerated by nutrient enrichment from pollution. While it is clear that **efforts to diminish pollution** should be always appropriate wherever source can be identified it can be said that in present situation with agriculture this is often not a priority in the Baltic States. Whether the site including the lagoon should be grazed or not is a decision made on case by case basis. Since many typical species of both invertebrates and birds are dependent on open water, the **grazing** should be in general seen as

beneficial. This is especially so in the Baltic countries were grazing has dramatically decreased from historic levels.
In some cases **mechanical clearing of lagoons** from tall vegetation or mud can be appropriate, but these are usually quite expensive measures that should be clearly planned and carefully evaluated.
In cases where water table of lagoon has been artificially lowered, partial or total **blocking of the outlets** might be appropriate. In some cases this might be appropriate even if a valuable lagoon tends to loose water due to natural processes. In both cases, all possible side effects should be taken into account.
Harvest of reed in winter is a traditional use of lagoons and similar habitats that is often economically viable. This use can be compatible with the habitat management or, depending on objectives, might need regulation. Winter harvest of reed usually does not decrease reed growth as long as risomes are not damaged. Therefore it is compatible with the habitat management if at least some of the reed is considered beneficial. The main ecological effects on reeds are reduced accumulation of litter and less standing dead reed in spring that can be beneficial to some organisms but not all. Therefore the general recommendation can be maintaining mosaic of harvested and unharvested patches.
If the objective of the reed-cutting is to decrease the area covered by reed, the **summer cutting** is more effective than in winter and usually grazing should follow the cutting.
A possible but expensive option is also **mechanical destruction of the reed risomes,** but again - to avoid a more lasting effect, it should be combined with grazing.

Vegetated sea cliffs (1230) can be present together with 1210 and 1220 seawards and with other habitats located on the top, like grasslands (6210, 6270, 6280), heaths (4030), scrub (5130) or limestone pavements (8240). Differently from similar inland habitats (8210, 8220) it is very dynamic due to direct sea impact.

In general, the dynamics of the habitat and its seaward neighbours should be left to nature, and gradual retreat of the cliff face due to abrasion should be taken into account in site management.

Attempts to freeze the current situation would be more or less hopeless and would not benefit the characteristic species. Habitats located on the top should be managed based on their own conservation objectives and shift of the cliff face must be simply taken into account.

In the Baltics, the habitats 1310 **'Salicornia and other annuals colonising mud and sand'** and 1630 **'Boreal Baltic coastal meadows'** are usually present together as a complex mosaic dominated by the latter habitat. This is due to low salinity of the Eastern part of the Baltic Sea were conditions for salt accumulation are usually present where trampling thickens the soil and thus favours evaporation of the water. Therefore, these habitats should be managed together. Favourable conservation status of coastal meadows is characterised by short vegetation under influence of brackish seawater.

At present, overgrowth of the habitat with reeds from the sea and with bush from the land is the main threat. **Grazing (or in some cases mowing)** is absolutely necessary to maintain the favourable conservation status of this habitat complex.

Without grazing or mowing the typical plants, invertebrates and birds (including endangered Baltic Dunlin *Callidris alpina schinzii*) vanish from the habitats. Support to traditional pastoral activities (or in some cases other ways to secure grazing or mowing) must therefore be the key part of management of Natura 2000 containing these habitats.

There is some variation in opinions about **suitable grazing pressure**. According to Estonian management rules, grazing pressure should fall between 0.4 and 1.3 livestock units per hectare (lu/ha) and at least half of the area should be short grass by the end of the season.

Other threats to these habitats can include agricultural intensification (**drainage, fertilisation)** or **building development**. Such activities **must be banned** on the habitats within Natura 2000 sites. At present, agricultural intensification is not a priority threat in the Baltics but building development is pressing in some sites.

To some extent, intensive visitation by tourists can also pose a threat to nesting birds. In such cases **measures to limit access** must be taken.

Another threat to successful nesting is the high predation risk that is also increased when visitors disturb birds. **Efforts to decrease numbers of common predators**, especially exotics like racoon dog or American mink, but also most numerous native predators like foxes of crows might be appropriate. However there are not many very successful examples.

Mudflats and sandflats not covered by seawater at low tide (1140) are also often present as can also be annual vegetation on drift lines (1210) in the same habitat complex - in such cases they are managed as the part of it.

Fencing coastal pastures means erecting fence also in the water as deep as possible (and removing these in autumn to avoid them being carried away by ice). Still, the animals sometimes escape via shallow water. An alternative means is to fence the coastline off but this tends to lead to gradual overgrowth of ungrazed coastline. These considerations apply to all grazed coastal sites.

Considering the drastic decline of the coastal meadows, the Estonian Ministry of Environment has initiated a **LIFE project 'Boreal Baltic Coastal Meadow Preservation in Estonia'** aimed at the preservation of a total 1,575 ha at 16 sites, i.e. 30 % of the remaining coastal meadow area in Estonia. The program includes the re-opening for grazing of 1.191 ha and mowing of 70.2 ha. This presupposes preparatory actions such as contract and management agreements with land-owners, and the purchase of cattle and sheep in order to secure a satisfactory number of grazing animals. A special feature of the project is the restoration or creation of 64 freshwater ponds for the Natterjack Toad (Bufo calamita), listed in Annex IV of the Habitats Directive. This species has suffered badly from habitat loss, such as destruction or overgrowth of breeding ponds, in large parts of Europe. In order to reduce the risk of inbreeding and secure the genetic constitution of the target species, tadpoles will be re-introduced at ten sites and reserve populations established at another six sites. The dissemination program for the project includes two training workshops and study tours to Denmark for Estonian experts. To promote the public awareness about coastal meadows as a

Fig. 1. Sometimes resuming grazing is sufficient to counteract the advance of the reed that had resulted in temporary lack of grazing. Heifers of Estonian native cattle at a coastal meadow.

A coastal meadow grazed by sheep

Fig. 2. Alvar with junipers grazed by horses

Alvar with sheep

Fig.3. A managed wooded meadow
Surrounded by stone wall

Mowing can be done with different machines

Photos by Aliine and Kaja Lotman

threatened habitat with a high biodiversity dependant on continuous management, an exhibition at Matsalu National Park is planned, as well as information boards, a web page and a video.

LIFE project 'Restoration and management of the Häädemeeste wetland complex' has partly similar objectives. The project targets to achieve favourable conservation status for important habitats, species and landscape values. This starts by preparing a management plan for the reserve. The implementation of this plan includes mowing of 150-200 ha and grazing of 150-200 ha, restoration of at least 10 shallow ponds for *Bufo calamita*, purchase of cattle and compensations for farmers with cattle, leasing and purchase of coastal meadows or other kind of habitats under building threats in order to graze or carry out other kind of biotope management. An important feature of the project is a need to achieve sufficiently short grass necessary for the waders and geese that demands strong grazing pressure while also maintaining some parts of the meadows with tall grass in order to conserve *Gladiolus imbricatus.* Control over tourism and recreation activities and channel these in more sustainable way and improve environment awareness is also important parts of the project.

‘Restoration of habitats of endangered species in Silma Nature Reserve’ is another Estonian LIFE project dealing with coastal meadows but also other related habitats, as the deeply indented coastline of Estonia includes several coastal habitat types supporting a rich biodiversity. The key habitats, targeted by the project, include Baltic coastal meadows, Nordic alvars, Baltic islets, semi-natural dry grasslands (important orchid sites) and coastal lagoons. Also dependent on the maintenance of the open character of these habitats are rare species such as the Lesser White-fronted Goose *(Anser erythropus)*, Corncrake *(Crex crex)* and the Natterjack Toad *(Bufo calamita)*. Numerous species of breeding bird and meadow plants are also associated with the mosaic of habitats. In Estonia some 80% of the former area of coastal grassland has been lost in the past 50 years with the rate of loss accelerating in recent decades. A major reason for this loss is the abandonment of agricultural practices such as mowing, reed cutting and grazing by cattle, sheep and horses. There is a need to reverse these negative trends and this could be largely achieved through the re-establishment of traditional land management practices. Some work has already begun to engage with local communities and to re-establish livestock grazing on the wet meadows but with over 1000 hectares to be restored in the Silma area alone additional help is urgently required. The project will work on three nature reserves, Silma Nature Reserve, and two island reserves Osmussaare Landscape Reserve and Vormsi Landscape Reserve. Together these contain a significant share of these valuable habitats in Estonia. Livestock and machinery will be purchased to help farmers re-instate appropriate levels of mowing and grazing which will be funded through an annual management fee (co-financing contribution from the Ministry of Environment). But first there is a need to remove the build up of reed growth and scrub, and to re-excavate overgrown lagoons and shallow meadow depressions. The Natterjack Toad *Bufo calamita* will be re-introduced to this restored lagoon habitat. Overall the project will improve the habitat on about 1100 ha of coastal meadows, 100 ha of lagoons and 40 ha of small islets. The habitat-based approach over a large area and numerous sub-sites will improve the conditions for

the key species and will enhance overall biodiversity. Monitoring of project performance will be based on the indicator species of habitat quality and the use of GIS will assist with the development of action plans. The project aims to further develop a system of co-operation with the local community by promoting traditional economic activities, crafts and tourism and by improving the readiness of the farmers to participate in future agri-environment programmes. Two nature trails, several booklets and a video will be produced to help increase awareness of the value of the habitats and the need for management. All three project sites will become part of the Natura 2000 network.

3.2.3 Dunes

The **coastal dune habitats** (e. g. 2110, 2120, 2130, 2140, 2180, 2190) are also present in complex patterns - in the Baltic also together with 1640 **'Boreal Baltic sandy beaches'**.
The dune dynamics is important characteristic of these complexes and should not be interfered with. Excessive planting of dunes has indeed already much decreased the amount of open dune habitats.

The management must, therefore, deal with the whole dune complex as the internal dynamics due coastal erosion, landlift, sand movements and other processes should be left to nature.

Trampling by tourists can lead to serious deterioration of the habitats only where visitation pressure is very strong. In such cases either **access should be limited or infrastructure like stairs and boardwalks should be installed**.
More important than trampling can be the danger of off-road driving and conservation management must therefore **avoid the motorised access into the dunes**. Moderate trampling however is usually not a serious threat and in some cases can be even viewed as beneficial since typical dune species are often depending on patches of open sand. Development of holiday infrastructure like marinas and hotels can on the other site be a serious threat and must not be allowed in dune complexes in Natura 2000 sites.
Historically, (over)grazing has also been viewed as a serious threat as this tends to open up sand and accelerate the wind erosion but currently there is hardly any grazing in the dunes and adjoining sandy beaches. This can lead to decrease in open sand patches and reduced dune dynamics that might be detrimental to some invertebrate, reptilian or amphibian species. Therefore, it should be recommended that **extensive grazing should be resumed on some sites** with dunes and sandy coast.
To arrest erosion, lots of dunes have been planted with pines or deciduous trees. This has also contributed to decline in open dynamic dune habitats. In Natura 2000 sites, **new planting of trees has to be avoided in dune habitats and in some cases the plantations should be removed.**
However, some old dune plantations may have developed characteristics similar to naturally wooded dunes (habitat 2180). Management of the latter habitat depends on whether it has in addition to dune characteristics the values related to forest habitats. If the habitat has old-growth forest character the management

must also take account of that. In such cases ban on all cutting of trees might be the option, or management specially geared to the site. At least old trees and dead wood should be left untouched. If the dune woodland does not have much of nature conservation interest then the forestry must only take into account the erosion danger.

3.2.4 Heath and scrub

Management issues related to **European dry heaths** (4030) are partly similar to those of dunes. Pressure from tourism, however, is usually not as strong on the inland heaths and hence management of the related problems has a lesser priority. **Grazing** of heaths has dramatically declined in the Baltics during the last half century. Therefore, they have largely overgrown. Overgrowth can only be stopped by grazing.
As means of restoration, **cutting and carefully planned burning** might be appropriate. The latter can also be used in combination with grazing as part of management. Since negative effects of burning might be severe, it is recommended that this should be carried out in late autumn, winter of very early spring.

Management of ***Juniperus communis* formations on heaths or calcareous grasslands** (5130) also implies **grazing**. Without grazing, the habitat develops into very thick uniform juniper stand and is later replaced by forest. Grazing can create mosaic habitat with high diversity.
In some cases **thinning of bush** might be needed. Burning is usually not an option due to high risk of fire getting out of control.

3.2.5 Seminatural grasslands

Management of **semi-natural dry grassland and scrubland facies on calcareous substrates** (6210) can be based either on **grazing or mowing, or combination of both**. Choice of management is usually based on availability of grazing animals, local interest and other practicalities as well as presumed ecological requirements of the species present and historical use of the grassland. In case of overgrown habitats **bush cutting** is needed and in some cases **burning** in winter or early spring might be appropriate.

Management issues of **Fennoscandian lowland species-rich dry to mesic grasslands** (6270) are basically similar to the previous habitat type.

Nordic alvars (6280) have mostly been used as pastures and grazing is also the key means of management nowadays. Alvars are better suited for **grazing of hardy local breeds of horses, sheep or beef cattle** than for dairy herd pastures. In addition to grazing, **bush cutting** may also be important on some sites. As a restoration tool winter/early spring **burning** can sometimes be appropriate.

When ***Molinia*** **meadows** (6410) are located within coastal pasture as part of mosaic dominated by coastal meadows (1630), the appropriate management is **grazing in line with historical use**. It must be noted that the grazing animals do not prefer *Molinia*. Therefore, these patches are usually not grazed short. This is favourable to large species like Curlew that can hide their nest there. However, due to less intensive grazing they can also get overgrown and therefore might require **bush cutting** once or twice per decade.
Burning in winter two or three times per decade might also be appropriate.
In other cases *Molinia* meadows are mostly hay-meadows and most appropriate management is **mowing**.

Fringe vegetation (6430) can require management in form of **grazing or mowing** but is some cases this seems to be not necessary. This habitat is relatively dynamic and its management is inseparable from management of the bordering habitats.

Key issue in conservation of **alluvial meadows** (6450) is to **secure continuation of mowing or in some cases grazing**. Without these, the alluvial meadow would get overgrown and lose its significance for waders and corncrakes.

At the same time it is important to **mow late enough to avoid nestling mortality**. However, it is not possible to postpone the mowing indefinitely and hence some compromise is inevitable. In Estonia, the farmers who get paid for mowing of alluvial meadows are required to start the mowing not earlier than on 1st of July. Also, to avoid nestling mortality, the **mowing must not be carried out in circles from side to centre but vice versa or from side to side**.
These same requirements are also valid to other meadow habitats (6210, 6270, 6410, 6510) when mowing is used for management.

In case of overgrown sites **bush cutting** is necessary. This must be carried out in such a way that the restored habitat is suitable for mowing. In addition to mowing and related activities, **maintaining sufficient flooding** is a priority for alluvial meadows. Draining cannot be allowed in this habitat and in some cases activities to restore more natural flooding might be needed in sites where drainage has earlier been carried out.

Management of **lowland hay meadows** (6510) is similar to that of the previous one but due to lack of flooding it is simpler.

Management of the **wooded meadows** (6530) must be a top priority to any Natura 2000 site where this habitat is present. Wooded meadows were once very common but have declined severely during the 20th century.

Regular mowing - preferably late in summer when most plants have bloomed - is the key issue in wooded meadow management.
Careful removal of the hay - necessary in all meadow habitats managed by mowing (6210, 6270, 6410, 6450, 6510) - is especially important for the wooded meadows.

Grazing after hay harvest has been practised in many sites and hence appropriate as the management while it should be probably avoided on sites where it has not been practised earlier. By Estonian management rules the maximum allowed post-mowing grazing pressure is 0.5 lu/ha.
Thinning of the tree cover and bush is sometimes necessary.
In addition to hay the **leaf fodder was historically harvested** in wooded meadows. In Estonia, the trees were usually shredded or felled (coppiced) for that, while in Sweden pollarding was a common practice. Modern management should in general follow the tradition.

The key to management of **wooded pastures** (9070) is securing continuation or reintroduction of **grazing**. Again, the opinions on suitable grazing intensity may vary. In Estonian rules, the pressure is set as 0.3 – 1.0 lu/ha. Apart from that **thinning of trees or bush** might sometimes be appropriate.

A relevant LIFE project in Latvia is **'Implementation of management plan for Lake Engure Nature Park'**. This project tackles the overgrowing of the lake's shorelines, islands and shore meadows by cutting reed in 330 ha, restoring and grazing of meadows in 107 ha in co-operation with local farmers. Effects of these management measures will be closely monitored. Tourism is channelled by building two bird observation towers, one nature path and a summer lecture room where the area can be presented to visitors. Due to the vast size and structure of different habitat types, wardens are hired to control illegal activities of the area.

Management of grasslands is an issue in many LIFE projects.

'Protection and management of the Northern Gauja Valley' is another Latvian LIFE project dealing among other issues with the seminatural grasslands. This project focuses on the middle section of the River Gauja close to the Estonian border. The total project area includes over 140km of extensive river valley of outstanding importance for a wide range of species and habitats. At least 17 habitats listed in the Habitats Directive are represented here of which 7 are considered priority including wooded meadows and other grasslands. The area is equally important for a large number of species, such as *Crex crex* (250-350 pairs) and the rare hermit beetle, *Osmoderma eremita*. In recent time the natural habitats and species have become increasingly threatened by a lack of management (which has led to the severe overgrowth of the floodplain meadows) and by intensive forest cutting, particularly on private lands. This is further exacerbated by the fact that the area has no protection status at the moment. The aim of this project is therefore to assign the most appropriate national protection status to the project area and create the basis for including the site in the Natura 2000 network. In order to achieve this, the beneficiary will start by undertaking a complete survey of the areas' conservation values (surprisingly little is known about the site) and placing this information on a series of digital maps. This will then be used to draw up a detailed management and zoning plan for the whole territory in close collaboration with the key stakeholders. At the same time, draft regulations will be prepared for the Cabinet of Ministers to assign a legal protection status to the area and a management body will be set up to secure its long term administration and control. Practical on-site actions will also be launched during the course of the

project. This will include the restoration and active management of around 350 ha of grasslands for the corncrake. Finally, in order to raise awareness and win the support of the local communities for the sustainable management of this important area, a lot of attention will be paid to disseminating the findings of the project and raising the profile of the area in terms of its natural values e.g.: information booklets, training seminars, video, nature trails etc.

3.2.6 Fens

Alkaline fens (7230) and other mire habitats are usually open due to combination of hydrological conditions and old history of grazing or mowing. Loss of open fen habitats after cessation of those traditional uses can be detrimental to wetland birds and plants. Therefore continuation of **grazing or mowing** should be secured in those rare occasions when it still exists. In some other sites efforts should be made to restore those activities.

3.3. Restoration

Many valuable sites have been abandoned and need to be restored.
In case of habitat overgrowth, only in initial stage resuming of grazing or mowing can be sufficient. Resuming of grazing mostly means (re)building of fences.

Burning can also facilitate the return of short vegetation. In order to avoid negative side effects as much as possible, burning is carried out on frozen land.

Sites overgrown with bush are cleared mechanically to larger or smaller extent depending on site character and objectives for habitat restoration. Important requirement that is not always fulfilled is that mowing or grazing must be possible after bush cutting. Levels of mechanisation vary. Most widespread is cutting with chain saws and bush cutters but some work is carried out with rotovators mounted to tractors.

Sometimes **mechanical removal of the reed** is carried out. Here also the job can be done by cutting with bush-cutters or more mechanised solutions can be applied.

Clearing of shallow depressions can also be necessary - both tractors and manual labour can be used. This far it has mostly been made on coastal meadows in order to restore the Natterjack Toad spawning sites but wetland birds also benefit.

Many LIFE projects have been carried out in order to restore seminatural grasslands. Swedish project **'Kinnekulle plateau mountain - restoration and conservation'** is one of those. It includes clearing calcareous grasslands (6210) and woodpastures (9070) from overgrowth, fencing and resuming of grazing. The aim is to restore the habitats and resume appropriate management so that the site

would be eligible for agri-environmental support after the project.

Approaches of some other Swedish projects like **'Protection and restoration of parts of Stora Alvaret'** and **'Coastal Meadows and Wetlands in the Agricultural Landscape of Öland'** are basically similar. The first deals mostly with alvar (6280) and the second with coastal meadows (1630). Both include clearing the bush, fencing and installing grazing so that the agri-environmental support will take care of the subsequent management.

Some wet grasslands that have been partly spoiled by drainage might require **restoration of (more) natural hydrology**. Since this subject has been discussed in a BEF seminar dedicated to wetland restoration and management, this will not be discussed here.

4. Impact of CAP and structural funds

EU Common Agricultural Policy has in general been a motor of intensification of EU agriculture. Production-oriented subsidies have favoured large and intensive production units located in fertile areas close to major markets at the expense of extensive units in agriculturally marginal high nature value areas. This has lead to intensification of production on some high nature value farms and hence damage to grasslands and coastal habitats from overstocking, fertilisation, drainage etc., and to abandonment of other high nature value farmland sites. Indirectly, the CAP has also been responsible for abandonment problems in Eastern Europe in the nineties: highly subsidised agricultural exports from EU to the newly open markets of these countries resulted in artificially low prices (EU products were much cheaper in Estonia than in countries of origin) that the farmers of these countries who were left totally without the state support had to compete against. This lead to dramatic drop in agriculture and hence to abandonment of many valuable sites.

However, there has been a welcome shift (though too slow) in CAP since the early nineties. Several regulations, most notably the agri-environmental regulation, were adopted to be later replaced by one **rural development regulation**.

Rural development regulation includes provisions for the **agri-environmental scheme** in the frame of which **support for management of grasslands** (grazing or mowing) can be organised.

As has been shown above with the example of the Swedish LIFE projects, the agri-environmental support can be used to secure continuation of grazing after the project end.

Apart from agri-environmental measures, the regulation also includes **support for less favoured areas** that is important since many high nature value areas are marginal from production point of view and also because Natura 2000 sites are specially addressed in this point.

Each member state has to adopt a **rural development plan** that lays out the way for implementation of the regulation. It is important to note that all three Baltic states have protection of grassland biodiversity included in the plans.

Thus CAP has introduced some instruments favourable to the habitats formed by long-term agricultural activities.
However it should be noticed that money available under rural development regulation is only a small fraction of overall CAP spending and that differently from production subsidies the national co-financing is required here.

It must also be noted that the grasslands' management is dependent not only on the rural development regulation but also the main part of CAP. Intensification that is still promoted by the mainstream CAP is driving the dairy herds away from seminatural pastures. Among other the quotas allocated can have significant impact on the grasslands. For example, if Estonia would have received the low beef quota that was offered by the EU Commission during the accession negotiations securing the appropriate grazing would have become impossible. Luckily enough, the Estonian agricultural sector - supported in this case by the environmental NGOs - was able to secure that more normal quotas were allocated by the Commission.

Apart from CAP payments, other structural funds have also influenced the fate of grasslands but especially that of coastal habitats. Infrastructure development in EU has been and still is to a large extent fuelled by structural funds and other public money. Thus loss of these habitats has also been largely triggered by availability of EU funding. Situation has improved to some extent and especially in the Natura 2000 sites destruction of valuable habitats with EU money is not so easy any more.

5. Public awareness

Public awareness related to coastal and grassland habitats have some specific features in addition to the overall need to educate people in nature conservation. This is due to the need of active management implying regular human activities and restoration that is often meant not to mitigate the human impacts but rather to counteract natural successional processes.

The public awareness work in question can be subdivided into the one **aiming at the general public** and that **addressed to the local people directly involved in management**.

It is mainly the first category that often needs lengthy explanations why should nature conservation management 'work against nature'. And this is often townsfolk with generally high awareness of global environmental issues but not very big real knowledge of nature who need most education in that sense. However, showing the lists of bird and plant species that are endangered by abandonment of rural

landscapes usually helps. It is also necessary to explain the long history of land-use that the plants and animals have adapted to. Brief look into the large herbivore hypothesis is also good for people with some basic knowledge of ecology. It is then also up to the site manager to be able to explain the particular management choices made locally. Therefore, visitor centres, on-site information boards and guided tours must all provide sufficient info on the seminatural habitats, their characteristic species and management needs.

The farmers with whom the site manager works day to day and who are actually carrying out the mowing and grazing activities need this kind of education also but with somewhat different emphasis. For them the problem of whether it is natural what they are doing is usually less pressing. However showing them the importance of their work for so many species is good as a means of triggering their pride and understanding that they are carrying on something very important passed over from their ancestors. And in turn this would make them more receptive to 'nuisance' demands like late start of the mowing or need to avoid mowing in circles from outside. How this is practically done varies a lot. Very much can be done by simply talking to the farmers in your day-to-day work. Farmers tend to appreciate if you take time to talk to them. Special seminars and study tours (both domestic and abroad) can also be helpful.

6. Monitoring

Monitoring should provide site manager with the data necessary to decide whether the management is going the right way. This should include registration of both the overall habitat characteristics and the typical species.

For the first task on-site visits, photos (including aerial) and space images could be used. It must be admitted however that no good example of combined application of these methods is known to the author.

Monitoring of species has mostly concentrated on birds and plants. Both groups are important but it is clear that so are also invertebrates. Understanding of this has triggered increased efforts in monitoring insects and other groups during last years.

Bird monitoring on the coast and grasslands can concentrate on specific indicator species or include overall bird counts. Ornithologists prefer the latter since they consider the data thus generated more objective and systematic. However, the overall counts are more resource consuming and therefore cannot be carried out on all managed sites. Implementation of simplified monitoring scheme for the sites where full-scale bird counts are not possible should be recommended so that those site managers who are not ornithologists or even interested farmers could directly check the management impacts.

Plant monitoring is also using mostly methods implying professional botanical

skills like the square counts.

In order to secure that the monitoring data is really helpful for evaluating the management the latter must also be documented with sufficient details, and these two activities must be co-ordinated so that for example data from well-grazed sites can be separated from that related to poorly grazed or ungrazed ones.

7. Recommended actions for near future

Seminatural grasslands and related habitats have suffered considerable loss during last century. Quantitative estimates of this loss vary, but rough estimate of tenfold decrease would not be an exaggeration. As significant part of this resource is not actively managed and some also threatened by development, further loss is to be expected if no action is taken.
This would with big probability lead to extinctions, as several species are dependent on these habitats. There has been lot of discussions of how much of original size of a diminishing habitat must be preserved in order to avoid serious risk of species loss. Recently, the minimum necessary size of strictly protected habitats has been estimated for forests in many countries, but no such study has been conducted regarding the grasslands or coastal habitats. However, the basic logic of these estimations can be applied here also. It is in general considered that serious risk of species extinction appears if habitat is reduced below 20% of initial coverage. As many processes can create ‘replacement’ habitats (some meadow species can live on roadside while others can find livings pace on cuttings in the forests) but not on sufficient scale, it is considered that at least 10% of initial area of an endangered habitat should be protected. Since this is what we have at present, this means that no effort should be spared to stop further decline of the habitats in question and as many of them as possible should be designated as Natura 2000 sites and/or national protected areas. In case of grassland habitats but often also coastal ones this also implies active management.

Future of the coastal and grassland habitats is dependent on many policies. Nature conservation has to act as the watch-dog and as the catalyst of necessary management. Natura 2000 sites and other designated areas play a key role as special restoration and management projects can be carried out here. However, only if agricultural policies will secure normal functioning of extensive pastoral systems can these habitats survive in the long run, especially since it is practically impossible to designate all meadows as protected sites. Relevant payments under agri-environmental and less-favoured area schemes must therefore be available at sufficiently large scale. It is also clear that apart from the rural development regulation, the future of grasslands and coastal habitats will be dependent on quotas and direct payments or other instruments relevant to economic standing of dairy, beef, sheep and goat sectors. These must be changed in a way that would favour use of seminatural grasslands. Among other necessary changes, the inequitable treatment of farmers from new member states that have significant resource of highly valuable grassland habitats should end.

In addition to CAP, other structural funds and cohesion fund must be used in a way that would benefit the habitats in question. The provisions of the national developing plans for Natura 2000 site conservation should be fully used and they should be significantly expanded for the next planning period. It must also be secured that the use of these funds same for building development that can harm the coastal habitats will never be allowed.

For example, energy developments - even such generally environmentally friendly ones like wind power - can strongly harm the habitats in question if put in the wrong places. At the same time, removal of excess biomass like reed, grass or bush during habitat management and restoration can produce significant energetic resource.

Thus, integration of the various sectorial policies and nature conservation is a must if we want to secure the favourable conservation status of the coastal and grassland habitats in the long run.

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Annex 1. Coastal and grassland habitat types present in the Baltic States

Habitats	Estonia	Latvia	Lithuania
1140 Mudflats and sandflats not covered by seawater at low tide	X		
1150 *Coastal lagoons	X	X	X
1210 Annual vegetation on drift lines	X	X	
1220 Perennial vegetation on stony banks	X	X	
1230 Vegetated sea cliffs of the Atlantic and Baltic coasts	X	X	
1310 *Salicornia* and other annuals colonising mud and sand	X	X	
1630 *Boreal Baltic coastal meadows	X	X	
1640 Boreal Baltic sandy beaches with prennial vegetation	X	X	
2110 Embryonic shifting dunes	X	X	X
2120 Shifting dunes along the shoreline with *Ammophila arenaria* (“white dunes”)	X	X	X
2130 *Fixed coastal dunes with herbaceous vegetation (“grey dunes”)	X	X	X
2140 *Decalcified dunes with *Empetrum nigrum*	X	X	X
2180 Wooded dunes of Atlantic, Continental and Boreal region	X	X	X
2190 Humid dune slacks	X	X	X
4030 European dry heaths	X	X	
5130 *Juniperus communis* on heaths or calcareous grasslands	X	X	
6210 Seminatural dry grasslands and scrubland facies on calcareous substrates (*Festuco-Brometalia*) (*important orchid sites)	X	X	X
6270 *Fennoscandian lowland species-rich dry to mesic grasslands	X	X	
6280*Nordic alvars and precambrian calcareous flatrocks	X		
6410 *Molinia meadows on calcareous, peaty or clayey-silt-laden soils (Molinion caeruleae)*	X	X	X
6430 Hydrophilous tall herb fringe communities of plains and of the montane to alpine levels	X	X	X
6450 Northern boreal alluvial meadows	X	X	
6510 Lowland hay meadows (*Alopecurus pratensis, Sanguisorba officinalis*)	X	X	X
6530 *Fennoscandian wooded meadows	X	X	
9070 Fennoscandian wooded pastures	X		X
7230 Alcaline fens	X	X	X

Annex 2. Threats and management of the relevant habitats

Priority threats in the Baltic States and relevant management prescriptions are given first; low priority threats and facultative management appropriate only in some cases are given in brackets

Habitats	**Threats**	**Management**
1140	Coastal development	Regulations
1150	Overgrowing (siltation)	Grazing, cutting (removal of sediment)
1210	Coastal development (Overgrowing)	Regulations (Grazing)
1220	Coastal development Overgrowing	Regulations Grazing
1230	Coastal development	Regulations
1310	Overgrowing Coastal development (Trampling)	Grazing Regulations
1630	Overgrowing Trampling, coastal development	Grazing, mowing, (controlled burning) Regulations
1640	Coastal development Excessive trampling (Overgrowing)	Regulations (Grazing)
2110	Coastal development Excessive trampling (Overgrowing)	Regulations (Grazing)
2120	Coastal development Excessive trampling (Overgrowing, forest planting)	Regulations (Grazing)
2130	Coastal development excessive trampling, forest planting (Overgrowing)	Regulations (Grazing)
2140	Coastal development Excessive trampling, forest planting (Overgrowing)	Regulations (Grazing)
2180	Forestry coastal development (Overgrowing)	Regulations (Grazing)
2190	Drainage (Overgrowing)	Regulations (Grazing)
4030	Overgrowing Uncontrolled fires Building development	Grazing, controlled burning fire prevention Regulations
5130	Overgrowing Fires Building development	Grazing, bush cutting Fire prevention Regulations
6210	Overgrowing Building development	Grazing, mowing, bush cutting, (controlled burning) Regulations
6270	Overgrowing Building development	Grazing or mowing, bush cutting Regulations
6280	Overgrowing Building development	Grazing (or mowing), bush cutting Regulations
6410	Overgrowing Drainage, (fertilisation)	Mowing or grazing, bush cutting, (burning) Regulations
6430	Drainage (Overgrowing)	Regulations (Mowing or grazing)
6450	Overgrowing Drainage, (fertilisation)	Mowing (or grazing), bush cutting, rotovating Regulations
6510	Overgrowing Drainage, (fertilisation, forest planting)	Mowing (or grazing), bush cutting, (burning) Regulations
6530	Overgrowing Forestry	Mowing (+ grazing), cutting trees and bush Regulations
9070 7230	Overgrowing Forestry Drainage (Overgrowing)	Grazing, cutting trees and bush Regulations Regulations (Mowing or grazing)

Annex 3. Life-Nature projects dealing with the coastal and grassland habitat management in Europe.

(year of financing shown in brackets)

Belgium

- Restoring and Managing Calcareous Habitat types in the region of Lesse and Lomme (2001)
- Restoration and sustainable management of upper Meuse dry Grasslands (2002)

Denmark

- Restoration of Dune Habitats along the Danish West Coast (2002)
- Improving status of coastal lagoon Tryggelev Nor (2002)

Estonia

- Conservation of Natura 2000 biotopes in Karula National Park (2001)
- Restoration and management of the Häädemeeste wetland complex (2000)
- Boreal Baltic Coastal Meadow Preservation in Estonia (2000)
- Restoration of habitats of endangered species in Silma Nature Reserve (2003)
- Management of Natura 2000 habitats of the Kõpu Peninsula (2004)

Finland

- Restoration and management of meadows in Finland, Sweden and Estonia (2000)

Germany

- Regeneration and preservation of dry grassland in Germany (2001)

Italy

- Urgent actions for conservation of pSCI Orbetello Lagoon (2000)
- HABIO: Biodiversity protection in Calvana-Monferrato areas (2001)
- Conservation of Tuscan Apennines mountain grasslands (2001)
- Petrifying springs and seminatural dry grasslands in Valle S. Croce e Valle del Curone (2001)
- Alpe Veglia and Alpe Devero: actions of conservation of mountain grasslands and peatlands (2003)

Latvia

- Implementation of management plan for Lake Engure Nature Park (2000)
- Protection and management of coastal habitats in Latvia (2002)
- Lake Pape - conservation, preservation and evolution (2003)
- Protection and management of the Northern Gauja Valley Duration (2003)

Portugal

- Serra da Estrela: management and conservation of priority habitats (2002)

Slovenia

- Management plan and urgent actions for Veternik and Oslica high dry meadows (2001)

Spain

- Conservation of coastal habitats of the Province of Cadiz (2003)
- Dune regeneration on Laida beach (2004)

Sweden

- Protection and restoration of parts of Stora Alvaret (1996)
- Coastal Meadows and Wetlands in the Agricultural Landscape of Öland (2000)
- Restoration of alvar-habitats at Stora Karlsö (2001)
- Kinnekulle plateau mountain - restoration and conservation (2001)

United Kingdom

- Improving the management of Salisbury Plain Natura 2000 sites (2001)
- Yorkshire Dales Limestone Country Project (2002)
- Sustainable Wetland Restoration in the New Forest (2002)