

# Inventories for nature protection in Estonia; problems and results

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After re-establishing political independence, Estonia has joined a number of international conventions, whereby Estonia has made commitments to protect areas, objects or functions of biodiversity and the quality of environment. The existence of a detailed overview of biodiversity on a species, community/habitat and landscape level is a prerequisite for the implementation of these conventions and for effective planning of nature protection. "It is not possible to protect something, if it is not known, where, how much, what, and in which conditions it exists (has been preserved) and what the factors threatening it are..." (Leibak & Lutsar 1996: 5). At the same time, drastic changes have been taking place in land-use practice in connection with the collapse of the collective farm system and the re-privatisation of land. The area and structure of agricultural land has been crucially changed mainly due to the abandonment of numerous cultivated grasslands, as well as arable land. Therefore, to create an effective nature management planning and protection system, several large-scale nature inventory projects have been carried out between 1993 and 2000 with the support of Finland, Denmark, Sweden and the Netherlands. The aim of the current paper is to give an overview of these studies.

## **Old Forest Stands in Estonia, 1993-1996**

The problems of preserving and protecting primeval forests as representatives of different site types have come sharply into focus after the 1992 Rio convention and other similar documents underlining the importance of biodiversity. Almost all Estonian forests have been managed to some extent. However, ineffective forest management during the Soviet occupation allowed the formation of non-managed forests also outside the officially protected areas. Until the commencement of this project a comprehensive survey of Estonian old and primeval forests, from the point of view of biodiversity and nature conservation, was lacking.

The project was carried out with financial and methodological help from the Finnish Union for Nature Conservation (SLL).

## **Objectives**

- (i) To find the best representatives of all Estonian forest site types and to evaluate them from the nature protection point of view.
- (ii) To hold negotiations and to prepare the necessary documentation for presentation to the Estonian Government for the establishment of additional nature reserves if the strictly protected area of a site type was not sufficient to maintain the best examples of primeval and nature forests.
- (iii) To disseminate knowledge and to increase public awareness about forest conservation.

## **Activities and results**

- (i) At first, a relevant selection from the database of the Estonian Forest Survey Centre was carried out to get an overview of old forests in Estonia, and the respective cartographic material was collected.
- (ii) The methodology and organisation of the project was discussed in several joint Estonian-Finnish seminars. The main criteria for estimating the quality of a (possibly primeval) forest from the point of view of nature conservation were elaborated.
- (iii) A questionnaire for field-work was designed on the basis of Finnish experience in a similar project.
- (iv) Field inventory of old forest was carried out all over the country. Special attention was paid on key habitats, including those which have become extremely rare elsewhere in northern Europe (alluvial forests, carrs, aspen-dominated forests) and which are unique in the whole Palearctic region (alvar forests). More than 60 Estonian and 25 Finnish specialists took part in the field-work. To make effective and comprehensively justified conservation proposals to the Estonian Government, a detailed inventory of forest areas with high conservation value was prepared, and expert assessments from various specialists gathered.
- (v) A relevant database was compiled and linked into a geoinfo system (GIS).
- (vi) Public awareness about old forest increased considerably. Before launching the project, very often even forestry officers did not understand clearly the special importance of old forests.
- (vii) Due to good co-operation with the Nature Conservation Department of the Ministry of the Environment, the collected data has been actively used for the correction of boundaries and for the zoning of existing protected areas.

## **WETSTONIA – Estonian Coastal and Floodplain Meadows; 1993-1996**

In Estonia we can still find numerous large areas of coastal and floodplain meadow which have been preserved in a rather good state, and which provide habitats for a number of species which either have become or are becoming extinct in the rest of Europe. Therefore, it is not only our desire but also an international responsibility to ensure their protection. That was also one of the main reasons that encouraged the Danish authorities to support this project. The project was implemented with the financial support of WWF-Denmark, the Danish Ministry of Environment and Energy, and the Danish Environmental Protection Agency (DEPA), co-ordinated by the Estonian Fund for Nature.

### **Objectives**

- (i) To elaborate the system of criteria for the assessment of the nature protection value of coastal and floodplain meadows.
- (ii) To provide a field inventory of the habitats considered.
- (iii) To create a relevant database of coastal meadows and floodplain meadows, and to link this with GIS.

## **Activities and results**

- (i) The whole coastline of the Estonian mainland and inhabited islands was inventoried.
- (ii) The locations, boundaries, and state of all recently preserved coastal meadows were checked and/or verified.
- (iii) Activities concerning floodplain meadows were similar, the mapping of the meadows being carried out according to river basins.
- (iv) It was found that the total area of coastal meadows with high and medium nature conservation value is 5,100 ha and that of floodplain meadows is 12,000 ha. At the same time, 4,720 ha of coastal meadows and 15,000 ha of floodplain meadows are situated within the boundaries of current nature reserves.
- (v) The recommendations for the protection and management of coastal and floodplain meadows were developed.
- (vi) A database of 3,170 records was compiled.
- (vii) The data obtained through the project was used directly for the establishment, or changes in status, of protected areas, e.g. the Soomaa and Karula National Parks, the Alam-Pedja and Muraka Nature Reserves, as well as for the development of proposals concerning protection regime and measures. The data was also forwarded to the Estonian database of the CORINE Biotopes Programme.
- (viii) The results are also of importance on the European scale, as they provide precise data concerning the distribution, state, and development trends of habitat which has been preserved only in relatively few areas in this part of the world.
- (ix) On the basis of obtained results a monographic report (Leibak and Lutsar 1996) was published, with parallel texts in Estonian and English.

## **Conservation and Management of Estonian Wooded Meadows, 1995-1996**

Some of the world's highest plant community small-scale species-richnesses (more than 70 species in 1 m<sup>2</sup>) have been recorded on old, regularly mown, temperate meadows, with a sparse tree layer, on neutral soils. The best still preserved examples of these communities are wooded meadows, particularly those on calcareous soils in western Estonia. Wooded meadows have been traditionally managed by farmers for not less than two millennia; usually they were mown for hay, and grazed. In that way, they represent a perfect example of sustainable management, with a very long-term and stable multifunctional use of the land, and are, therefore, an important part of Estonia's cultural heritage.

At the end of 19<sup>th</sup> century, wooded meadows covered about 850,000 ha (18.8% of Estonia's surface area). After World War II, crucial changes in land usage and management took place, and vast areas of wooded meadows were abandoned, starting to overgrow with bushes and trees. Today they have been preserved only fragmentally and are in a great danger of total extinction. It is extremely important to maintain traditional management methods as well as to educate people about the value of wooded meadows.

The project was supported through the Earmarked Grants Program of the Regional Environmental Centre for Central and Eastern Europe (REC, project #20392).

## **Objectives**

- (i) To complete an inventory of the survived wooded meadow habitats in Estonia, focusing of their location, size, present state of management, degree of overgrowth, and conservation value, and to carry out a botanical analysis of the better preserved sites to evaluate their species biodiversity.
- (ii) To organise teaching camps for the active management of wooded meadows and to educate volunteers through practical work in two well known wooded meadows of the highest conservation value.
- (iii) To increase public awareness of the value of this unique habitat type, whereby attention is paid to the biodiversity, as well as the cultural and historical value of these habitats, and to their uniqueness in the European context.

## **Activities and results**

- (i) Preliminary data was gathered, and a questionnaire was compiled and distributed in the local municipalities and forestry offices to obtain information on the location and status of known wooded meadows.
- (ii) A field inventory of 320 wooded meadows was provided. It is now possible to assert that in all of Estonia not more than 400-500 hectares of species-rich wooded meadows of high conservation value have been preserved. The majority of these are rather small in size – less than 5 ha on average.
- (iii) 11 wooded meadows were found to contain more than 50 vascular plant species on a 1 sq. meter plot. Moreover, the highest number of species, 74 on a 1 sq. meter, was found in Pärnu county in 1996. This set a new European record of plant species diversity on that scale.
- (iv) A database of wooded meadows, describing location, size, management activities, conservation value, etc. was compiled.
- (v) Six successful practical camps were organised for the restoration of wooded meadows.
- (vi) Recommendations for enhancing the sustainable management and conservation of wooded meadows were formulated.
- (vii) Public awareness about wooded meadows was significantly raised. This has been due to several newspaper articles at the county and local level, 4 national radio programs, a special TV program (“Osoon”, about 200,000 viewers). A homepage, in English, dedicated to wooded meadows has been compiled – <http://www.zbi.ee/ecophys/wood.htm>. Proposals were formulated to create a new Estonian NGO dedicated to the conservation of wooded meadows and other semi-natural cultural and traditional habitats in Estonia.
- (viii) The results of the project were published as a monograph by Kukk & Kull (1997).

## **Estonian Biodiversity Country Study, 1996-1997**

Despite the comparatively intense study of Estonian nature, for many taxa of organisms, as well as their communities, an overview is lacking or outdated. This project was launched for the purpose of getting a generalised conspectus on the diversity of various organism groups and communities on the basis of a synchronised approach. The final task of the project was to supply data for the compilation of the Estonian National Biodiversity Action Plan.

The project was supported by UNEP and administrated by the Estonian Ministry of the Environment with the assistance of the Resident Representative UNDP in Tallinn.

## **Objectives**

- (i) To get a possible comprehensive overview on the diversity of various groups of organisms, as well as plant communities and habitats.
- (ii) To specify the state of different taxa and communities, and potential threats to them.
- (iii) To elaborate recommendations for sustainable management and protection of biodiversity on species, communities/habitats and landscape levels.
- (iv) To compile the Estonian National Biodiversity Action Plan.

## **Activities and results**

- (i) An expert working-group of leading specialists was created, covering almost all the main organism groups and community types, and the methodological problems were discussed.
- (ii) An overview concerning fungi, lichens, bryophytes and vascular plants, invertebrate and vertebrate animals, domestic animals, game animals, cultivated and medicinal plants, plant communities, forests, mires, and coastal areas was compiled.
- (iii) The general results were published in Klvik & Tambets (1998). Part of the results were published as separate monographs by Paal (1997) and Kukk (1999).
- (iv) In 1999 the Estonian Biodiversity Strategy and Action Plan was compiled and published in Estonian and in English (Kull, 1999a,b).

## **Estonian Wetland Conservation and Management Strategy, 1997**

Since the early 1990's, in connection with large political and economical changes, many drainage systems have fallen into disrepair in Estonia. On the basis of a World Bank loan the Government of Estonia has implemented the Agriculture Project, the main task of which is to support the rehabilitation of drainage systems on agricultural land; otherwise the benefits of the original investment in drainage will be lost.

At the same time, considering the value of nature conservation, water regulation and purification, as well as the cost of rehabilitation, it is obvious that numerous areas with decayed drainage systems should be allowed to revert into (sub)natural wetlands, and the selection of new areas for drainage must be discussed very carefully. To avoid potential environmental or social conflicts, and to ensure the positive result of the project, it was necessary to elaborate The Estonian Wetlands Conservation and Management Strategy. This is an important component of the Agriculture Project because the recommendations have been used to select and prioritise areas for drainage rehabilitation, the rehabilitation of areas exploited for peat mining, and wetland restoration projects to be funded by the Estonian Government.

The strategy study was carried out by the most competent Estonian institutions and experts, with Norwegian experts contributing as advisors and discussion partners. The project was funded by the Government of Norway, under the auspices of the Government of Estonia/World Bank Agriculture Project.

## Objectives

- (i) To develop a classification and identification system for the identification of the nature conservation value of wetlands, taking into account the current international conventions.
- (ii) To characterise and evaluate Estonian wetlands, based on the aims of their future management and/or conservation, with special consideration of the environmental impact of the activities carried out under the Agriculture Project.
- (iii) To develop the database and the GIS on Estonian wetlands.
- (iv) To develop a national strategy for wetland management in Estonia

## Activities and results

- (i) Background data from all relevant institutions was collected.
- (ii) A wetland classification and evaluation system was elaborated, to serve as the basis for activities under the Agriculture Project and for evaluation of all Estonian wetlands in view of their potential use in the future.
- (iii) A unified data format for field inventory was designed (cf. Appendix 1), the cadastral maps (on a scale of 1:20,000) of study areas and their surroundings were prepared.
- (iv) Supplementary field-work was carried out in wetlands which are likely to be influenced directly by the activities foreseen in the Agriculture Project, and/or in wetlands about which insufficient information was available.

Altogether, between June and November 1997, 1,376 wetlands were visited and described, totalling up to about 90% of all the areas planned to be studied. In addition, 184 data sheets based only on purchased data were compiled.

The following features were examined: 1) habitat type, 2) state of the shrub layer, 3) state of the tree layer, 4) human impact, 5) water regime, 6) value for the maintenance of biodiversity, 7) value for nature protection, 8) composition and state of the flora, 9) if possible, then also composition of (ornitho)fauna. For plant species, a standard registration list of the Estonian flora was used.

- (v) A preliminary list of wetlands which might be adversely influenced by the activities in the Agriculture Project, or by other planned usage, was compiled.
- (vi) Recommendations were proposed on measures necessary to protect valuable wetlands and prevent activities which might have negative impacts.
- (vii) All data was added to the database using the program software VisualFoxPro 3.0. The GIS was developed on the basis of the program software MapInfo Professional 4.1 that directly links with the database format of VisualFoxPro.
- (viii) It was found that, of the inspected localities, 419 have certain special value, making up about 21% of all the inventoried wetlands. 99 mires, 6 floodplain grasslands, and 21 coastal grasslands were recommended to be taken under protection. On 678 mires, 101 floodplain grasslands, and 60 coastal grasslands limited exploitation *resp.* traditional management should be continued or restarted.
- (ix) As a result of the described project also
  - \* recommendations for wetland conservation were formulated;
  - \* a system of measures for reducing potential conflicts and negative environmental impacts of the future development of land amelioration in Estonia was proposed;
  - \* the screening categories and criteria as well as the screening scheme for drainage rehabilitation areas were elaborated;
  - \* recommendations for administrative, legal and procedural changes were proposed, as well as recommendations for future wetland research.
- (x) Results of the project are published in English (Paal et al. 1998) as well as in Estonian (Paal et al. 1999).

## **Woodland Key Habitat Inventory in Estonia, 1999**

A large part of the Estonian net export income is attributable to forestry, which therefore has a great socio-economic importance. At the same time, the forestry authorities recognise the importance and prestige of the maintenance and enhancement of forest biodiversity. It was necessary to elaborate the methodology for identifying the forest localities where the biodiversity is extraordinary high (so called key elements and key habitats). This will help to maintain a large amount of biodiversity in a cost-effective way.

The project was funded by the Swedish Environmental Protection Agency, the Swedish National Board of Forestry, the National Forestry Board in Estonia, and the Estonian Environmental Fund.

### **Objectives**

- (i) To develop the inventory methods and classification systems for woodland key elements and key habitats for Estonian conditions.
- (ii) To get an overview of woodland key habitats.
- (iii) To develop a scheme for the implementation of woodland key habitats in forest management plans and to find ways of financing a full-scale inventory in Estonia.

### **Activities and results**

- (i) The methodology for the woodland key habitat inventory was elaborated and published in Andersson et al. (2000).
- (ii) The pilot inventory of woodland key habitats was carried out on 167,500 ha, representing all 15 counties in Estonia. In total, 569 woodland key habitats and 104 potential woodland key habitats were found, covering altogether 1247 ha or 0.74% of the total area of forests.
- (iii) A popular book about Estonian forest key habitats (Palo & Külvik, 1999) was published.

## **Estonian Forest Conservation Areas Network, 1999-2001**

According to the Estonian Forest Policy not less than 4% of the total forest area is to be taken under strict protection, but altogether not less than 18% of the forest area should have some protected status in order to ensure the maintenance of our forests' diversity. Recently protected forests are quite often not very representative from the viewpoint of forest typology or state (structure). Therefore, the stands that are valuable according to certain criteria of nature protection and/or are good examples of their site type must be identified, and the existing system of forest protection areas reorganised.

The project is funded by the Danish Ministry of Environment and Energy, and the Danish Environmental Protection Agency (DEPA). The responsibility for carrying out the project is put on the Forestry Department of the Estonian Ministry of Environment.

## Objectives

- (i) To establish criteria and indicators for the identification of valuable forest stands.
- (ii) To carry out public consultation on a county level about new forest-conservation areas, in order to involve different interest groups in the decision making process, define problems and obstacles, gather information about additional nature assets.
- (iii) To create a sub-optimal forest protection network that is representative in relation to species, habitats, and ecosystems and corresponds to the relevant international conventions and EU directives.
- (iv) To increase the area of strictly protected forest to at least 4% of total forest area, and to increase the area of forest of any different conservation status up to 19% of the Estonian forest area.
- (v) To create a relevant database connected with GIS.
- (vi) To elaborate special management guidelines for supporting the biodiversity of protected forests.
- (vii) To raise public awareness in issues of biodiversity protection in forest communities, through the media, educational materials, articles etc. To disseminate knowledge and experiences in biodiversity protection in forests, and in nature value assessment, for the use of all those interested, but especially for the forest and nature protection sectors.

## Activities and results

- (i) A special methodology for field-work was developed in order to register the assets of forest communities.
- (ii) Around 300 persons have been educated in forest asset assessment and in the management of protected forests, 50 persons as forest assets guides, and 15 in the preparation of forest management guidelines.
- (iii) In 1999 all strictly protected forests in recently created conservation areas, covering altogether ca 85,000 ha, were inventoried. It was established that only 3.5% of them have high biological value.
- (iv) Special pre-selection criteria for databases covering altogether 1,600,000 ha of state and private forest lands have been worked out for identifying potentially valuable forest stands outside conservation areas, including forest habitats for the future *Natura 2000* project *sensu* Habitat Directive.
- (v) In 2000, 81,678 ha of forest land outside of protected territories was selected and inventoried as potential areas for a future forest conservation network. It was also established that about 4% of them have high biological value.
- (vi) Data from field inventories have been digitised into GIS for further analysis, as well as for the Forest Key Habitats Register and for the National Nature Values Register.
- (vii) All forest areas proposed as potential constituents of the typologically representative forest conservation areas network have been introduced and discussed in the course of 15 county level public meetings.
- (viii) To raise public awareness, the concept of the forest conservation area network has been introduced and discussed more than 85 times in different seminars, workshops, conferences, TV and radio programs, consultation days, etc. In addition, 16 special radio programs have been recorded in the current year to follow the development of the project. Concerning the project, it has produced more than 20 articles in different newspapers and magazines, 2 posters and educational materials for children; there are also 5 books published or prepared for publication. A video has been made about the old-growth forests and the project's home-page has been compiled: <http://www.envir.ee/emkav.htm>.



- (ix) Report of the project, including a detailed overview of used methods and criteria, lists of forest protection network areas and their maps were published as a separate book by Viilma et al. (2001).

## **Estonian Semi-natural Grassland Inventory Project, 1999-2000**

In the Estonian Environmental Strategy, a system of measures for the protection and management of semi-natural habitat types, like natural grasslands, is presented. Until now, this item in the strategy had been worked out in the course of inventories for only some regions of Estonia, like coastal and floodplain zones, wet grasslands, and wooded meadows in Western Estonia. A national strategy concerning these valuable habitats is lacking. Nevertheless, in the accession-period to membership of the EU, the CEEC have to prepare strategies dealing also with rural development, including agri-environmental programmes and management of rural areas. The Estonian Semi-natural Grassland Strategy will provide Estonia with a tool for setting priorities in the protection of the biodiversity of these habitats and for starting the necessary management in grassland areas.

The project has been launched in co-operation with the Royal Dutch Society for Nature Conservation; financially supported by the Dutch PIN-MATRA funds.

### **Objectives**

- (i) To develop a classification and identification system for establishing the value of four groups of semi-natural grasslands: wooded meadows, coastal meadows, floodplain meadows, and alvars.
- (ii) To produce a characterisation and evaluation of Estonian semi-natural grasslands, depending on the aims on their future management and/or conservation.
- (iii) To develop guidelines and recommendations for the best management practices of semi-natural grasslands, concerning the principles of sustainable management and conservation.
- (iv) To deal with aspects of accession to the EU, regarding implementation of agri-environmental and other regulations.

### **Activities**

- (i) Data obtained by previous projects, like the Inventory of Estonian Coastal and Floodplain Meadows, the Inventory of West Estonian Wooded Meadows, and the Estonian Wetland Strategy, as well as all possible supplementary data, were analysed and the gaps were identified;
- (ii) Field-work was carried out in areas which had not been investigated in the course of the last years; only semi-natural grasslands of considered groups and with an area of at least 1 ha were included in the inventory;
- (iii) A classification and evaluation system was elaborated, and the grasslands were categorised according their protection and management needs.
- (iv) Recommendations were elaborated concerning measures that are necessary to protect valuable semi-natural grasslands and to prevent activities which might adversely influence the grasslands.
- (v) Several seminars and workshops were organised to discuss the details of the project with the stakeholders.

- (vi) A database of the semi-natural grasslands, connected with the GIS in MapInfo format, was compiled similarly to the earlier wetland database (Paal et al. 1998). All field questionnaire (cf. Appendix 2) data, including notes, was put into the FoxPro database. The input programme contains procedures for data verification and a user-friendly menu system for inputting species names as well. The latter uses a digital checklist of Estonian vascular plants, mosses, animals, and more common lichens, and also a checklist of synonyms to make it easier to find the correct names. The FoxPro database consists of two coherent tables – one for site-related data, and another for species-related data. The spatial data (i.e. polygons on map layers etc.) is managed with MapInfo. The map layer with the Estonian Cadastral Map was used as a background for digitising the site boundaries to a separate map layer. The site ID code is the input in MapInfo used to associate the latter and FoxPro tables with each other (Mägi et al., 2000).

### ***Regional Implementation of the EEC Habitats Directive (92/43) and the EEC Birds Directive (79/409) in Läänemaa and Raplamaa Counties, Estonia (Estonian Natura 2000 Pilot Project), 2000-2002.***

The project concerns, as a main objective, the demarcation and designation of a network of protection areas, which are necessary for the full implementation of the EEC Bird Directive (79/409/EEC) and the Habitat Directive (92/43/EEC), in two counties of Estonia — Läänemaa and Raplamaa. During the preparation of the Terms of Reference for this project the Estonian Ministry of Environment was expecting to implement the Natura 2000 requirements, as stipulated in the relevant directives, over some 7 years. Still, it was decided by April 10, 2000, that no transition period for the implementation of the EU Bird Directive and Habitat Directive would be requested or granted and, consequently, Estonia is committed to completing the required activities by the date of accession. Therefore, the deadline set by the Estonian Government for completing pre-accession activities is set at December 31, 2002. In that way, the experience gained can be used immediately in other counties in 2001 - 2002 (Inception report 2000).

The project is financed by the Danish Environmental Protection Agency, and by the Danish Co-operation for Environment in Eastern Europe (DANCEE).

### ***Objectives and activities***

- (i) The immediate objective of the project is to secure a basis for full implementation of the EEC Bird Directive and Habitat Directive in Läänemaa and Raplamaa counties, as well as to create a basis for managing localities of international importance in the region.
- (ii) Description of biological diversity with relevance for the two directives and other international agreements in the two counties.
- (iv) Assessment and improvement of the draft version of the “Interpretation Manual for Natura 2000 Habitat Types in Estonia”, as well as compilation of the related documents.

- (v) Analysis of the present protection regime for both protected and unprotected areas of international importance from the standpoint of the two directives mentioned. This must cover demarcation of areas, monitoring, management, costs, environmental impact assessments, and public participation in securing the necessary regime.
- (vi) To increase public awareness, training courses and seminars for county authorities and key stakeholders are planned throughout the whole project implementation period; pamphlets and posters concerning important nature types and species in the two counties will be published; a video film concerning the Natura 2000 network will be produced, etc.

## Acknowledgements

For the compilation of the current overview, information was supplied by Kaili Viilma, Alex Lotman, Robert Oetjen, Toomas Trapido, Jaak Tambets, Eerik Leibak, Lauri Lutsar, Toomas Kukk, Mart Külvik, Tiit Sillaots and Mattis Mägi. The author is very grateful to them all.

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## ESTONIAN WETLANDS FIELD STUDY – 1997

SiteNo:.....Date:.....Investigator(s):.....

**1. General data**

- 1.1. Administrative district, commune.....  
 1.2. Name of area.....  
 1.3. Number of mire.....  
 1.4. Wetland type: 1 – bog, 2 – transitional bog, 3 – fen, 4 – floodplain, 5 – swamp forest, 6 – paludified forest, 7 – coastal meadow .....

**2. Flora and vegetation; fauna**

- 2.1. Species list: 0 – not made, 1 – list of plants, 2 – list of animals enclosed .....
- 2.2. Red list/protected species: 0 – none, 1 – present, cf. species list .....
- 2.3. Habitat type number *sensu* Paal (1997) .....
- 2.4. Shrub layer: 0 – none, 1 – normal to the type, 2 – expanding
- 2.5. Species composition of tree layer (10 points formula)
- 2.6. Age of tree layer: 1 – young, 2 – immature, 3 – old/mature, 4 – of various age
- 2.7. Tree layering: 1 – sparse, 2 – multilayered with gaps, 3 – closed canopy
- 2.8. Decaying logs: 0 – none, 1 – < 5%, 2 – 5...20%, 3 – >20% of growing trees
- 2.9. Number of standing dead trees: 0 – none, 1 – < 5%, 2 – 5...20%, 3 – >20%

**3. Human impact**

- 3.1. Forest cutting: 0 – none, 1 – single trees, 2 – moderate, 3 – clearcutting
- 3.2. Grazing: 0 – none, 1 – weak, 2 – moderate, 3 – strong, 4 – overgrazed
- 3.3. Mowing: 0 – none, 1 – weak, 2 – moderate, 3 – regular
- 3.4. Burning: 0 – none, 1 – weak, occasional, 2 – strong
- 3.5. Drainage: 0 – none, 1 – weak, 2 – moderate, 3 – strong
- 3.6. Other impacts: trampling, building, rides/lines, etc., roads/winter-roads, peat-cutting, quarries, pollution, waste (old, during last 3 years, recent)

**4. Hydrological type (water regime):** 1 – stagnant, 2 – flooded (every year, irregularly), 3 – flowing over, 4 – flowing out, 5 – flowing through**5. Field evaluation of the site**

- 5.1. Typical (representative) for 1 – bog/fen region, 2 – phytogeographical region, 3 – development processes
- 5.2. Rare type in 1 – national scale, 2 – regional scale
- 5.3. Special value due to 1 – hydrological features, 2 – vegetation type(s) and/or structure, 3 – flora, 4 – fauna, 5 – development processes
- 5.4. Valuable due to diversity of 1 – landscapes, 2 – plant communities, 3 – species composition
- 5.5. Valuable for science as 1 – classical site (reference area for certain topics), 2 – showing regeneration after peat-cutting, haymaking, etc., 3 – part of landscape or habitat type complex
- 5.6. Valuable for educational purposes (excursion sites, nature trails etc.)
- 5.7. Valuable for 1 – flood and water-table regulation/control, 2 – maintaining water quality, 3 – as a compensation area (recreation, tourism), 4 – local use of resources (haymaking, peat-cutting, berry-picking etc.)

**6. Evaluation of natural status:** 1 – totally intact, 2 – minor human impact, almost unchanged, 3 – minor to medium impact, but if set aside will regenerate, 4 – significant human impact**7. Summary:** 1 – use allowed without restrictions, 2 – use should be restricted due to (cf. above), 3 – site is recommended for protection due to (cf. above)

## ESTONIAN SEMINATURAL GRASSLANDS INVENTORY

Record no.....Date: .....

Investigator(s):.....

**1.General data:** 1.1. Name of area.....

1.2. Village(s):.....

**2. Flora (species list on the other side) and vegetation:**

Species	tree cover % typical to this plant community .....			tree cover developed after human impact .....		
	medium height, m	max height, m	cover (0-1)	medium height, m	max height, m	Cover (0-1)
1.						
2.						
3.						
4.						
5.						

2.1.Habitat type codes and/or name (Paal, 1997) .....

2.3. **Tree layer:** 0 – none, 1 – species composition ....., cover (0,1 – 1,0).....2.4. **Forestification:** covered ..... % of the area2.5. **Species richness of the grass layer** 0 – poor, 1 – secondarily poor, 2 – usual, 3 – rich**3. Humidity regime** (if many codes, underline the main): 1 – dry, 2 – medium humid, 3 – paludified, 4 –swamp**4. Fitness for mowing** (if many codes, underline the main): 0 – doesn't fit, 1 – only handwork, 2 – medium, 3 – good If 0-2, then why:.....**5. Human impact** (if many codes, underline the main)

5.1. Drainage: 0 – none, 1 – minor, 2 – medium, 3 – significant

5.2. Mowing: 0 – ended &gt; 10 years ago, 2 – ended 4-10 years ago, 3 – mowed 1-3 years ago, 4 – at present.

5.3. Grazing: 0 – ended &gt; 10 years ago, 2 – ended 4-10 years ago, 3 – grazed 1-3 years ago, 4 – at present.

5.4. Other impact (underline): buildings, barn(s), tramping, roads, wires, quarries, trash, stone fences,.....

**6. Evaluation of the nature protection value**

6.1. Phytocoenological value: 0 – none, 1 – small, 2 – medium, 3 – high

6.2. Estetical value: 0 – none, 1 – small, 2 – medium, 3 – high

6.3. Other values:.....

**7. Additional comments:**