Northern Lapland nature survey 1996–1999

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Abstract

The survey area includes all the protected and wilderness areas of Northern Lapland and other lands not used for commercial forestry. Altogether the survey area covers about 2.5 million hectares, which accounts for almost 30 % of the land area administered by the Metsähallitus – Forest and Park Service.

Interest towards northern nature is increasing. Decision makers need information about nature, its current state, and changes occurring. Information is needed for planning the use and management of northern natural resources on a sustainable basis. The Forest and Park Service needs information for land use planning and management, for instance in protected and wilderness areas. The Nature Survey gives a firm basis for monitoring environmental changes.

In the Nature Survey every hectars of the study area is classified according to the nature types.The biotopes are identified and their boundaries are marked on aerial infra-red photographs. In addition to aerial photographs, information from other sources, such as old surveys, topographic maps, previous studies and local inhabitants, is utilized.

The varios nature types are identified according to topography, vegetation, trees and natureless of the site. Nature types include rock, mineral soil, peatland, water and built environment. From the tree layer tree coverage, volume and species are listed amount other things. Naturalness of a compartment is estimated using sign and knowledge of earlier timber harvests, deterioration of vegetation and amount of buildings or their remnants.

The most important outcome will be a modern and continuously updated geographical information system covering almost the entire northern Lapland. In addition, the data base will make it possible to produce maps and reports for various purpuses.

This project has been started in the beginning of 1996 and it has to be completed by the end of year 1999. The budget for this is about 10 million FIM. European Community has granted about 2 million FIM for survey of Urho Kekkonen National Park.

1 Survey area

Mapping of the ecosystems of the protected areas, wilderness areas and other timberline areas in the Northern Lapland District for Wilderness Management and within Urho Kekkonen National Park commenced in the summer of 1996. The surface area of the region to be inventoried totals some 2.5 million hectares, which amounts to almost 30 % of the land area under Forest and Park Service (FPS) management (Fig. 1). The purpose of this work is to map the habitats, or biotopes, occurring in Northern Lapland. Data is being stored for computer processing on a real time basis. This is not a one-off documentation project but the creation of a permanent geographical information system (GIS).

2 Why is mapping data required?

The northern fell region and timberline forests were last mapped in the 1940s. Under the leadership of forester A. Hiilivirta, the mapping was based on field inspections, making use of the maps available at the time. The data recorded is imprecise and outdated. Lemmenjoki and Urho Kekkonen national parks were mapped during the late 1970s to early 1980s period, making use of monochrome aerial photographs taken mainly by aircraft. Using a method developed for forestry needs, it is not possible, however, to bring out all the essential features from the standpoint of protected area management and use. In the Nature Protection Unit it

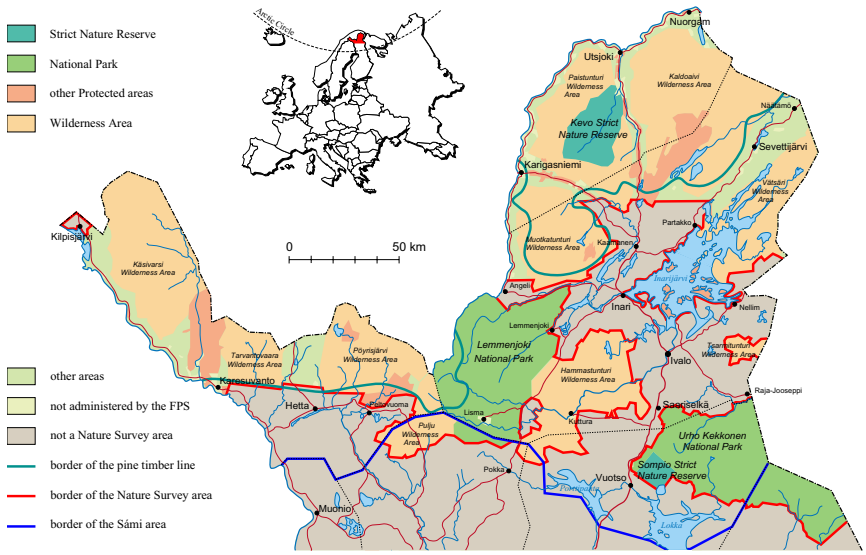

Fig. 1. Nature survey area.

was considered expedient to prepare a common biotope inventorying guideline for the entire country. The Northern Lapland District for Wilderness Management and Urho Kekkonen National Park constitute the first area to which the inventorying method has been applied.

Finland has long traditions in matters associated with forest management. Our forests have been mapped for forestry purposes for more than a century. One requirement of the sustainable use of forests is the availability of up-to-date information. A forest management plan is required.

Data on ecosystems, their state, and changes in them is also needed as a basis for decision making connected with the management and use of protected areas and wilderness. The FPS requires documentable data for land use planning and control. Information is needed to make it possible to manage and use natural resources – both material and non-material – sustainably.

Mapping will provide better knowledge on the representativeness of protected areas, making their comparison possible. Afterwards we will know more about the natural values of the protected areas. Mapping data also provides basic information for studies on protected areas and for more precise mapping of the vegetation. Mapping provides a foundation for monitoring the state of the environment and changes taking place therein. Is the Scots pine limit shifting? Are the birch woods damaged by the autumnal moth recovering? Up-to-date data on these and other subjects becomes available after mapping.

The results of ecosystem mapping published in various forms can be benefitted from by e.g. decision-makers, researches, reindeer herdsmen, hunters, berry pickers, and those who generally ramble in the wilds for pleasure.

3 How is mapping carried out?

During mapping, the biotopes are recognised and their boundaries established, i.e. they are depicted using colour aerial infrared photographs (Fig. 2). The different biotopes are clearly distinguishable from each other in these so-called false-colour aerial photos, because the image on the aerial photos is based on the reflection of the near infrared radiation by the vegetation. Distinguishing different tree species and different degrees of moisture from false-colour aerial photos is thus easier than doing so e.g. from an aeroplane. In addition to aerial photos, information is also obtained from other sources, including old maps, topographic maps, studies, and local inhabitants.

Old maps and documents provide information on single tree selection cutting and forest management practices, as well as on pest epidemics. For instance, data is being entered in the database on the rather extensive Scots pine planting undertaken in Utsjoki and the northern part of Inari in the 1920–50 period north of the present Scots pine limit. FPS forest fire reports furnish us with information about fires that have raged in the

Fig. 2. The biotopes are identified and their boundaries are marked on areal infrared

region as far back as the late 1800s. Further information has been obtained on the damage caused by the autumnal moth in the Utsjoki fell districts during the 1960s, and on the extent of this destruction, from studies carried out on the outbreak.

Biotopes are determined on the basis of the terrain, vegetation, tree stand, and closeness to the natural state. A biotope may consist of exposed bedrock, mineral soil, peatland, water, or a heritage or cultural environment. The canopy coverage (%), amount of timber (cu.m), and tree species composition, among other things, are determined for tree stands. "Natural state" is assessed according to e.g. cuttings, physical damage to the vegetation, and construction. The inventorying method is based on evaluation of the data regarding the characteristics of the biotope. In the evaluation the classi-

fication system is incorporated in the GIS. This forms the biotope with the desired definition in each case.

The documentation work is divided into two stages. In summer, the surveyors visit the terrain and determine how the various biotopes are distinguished on the aerial photograph. Owing to the size of the area being mapped, it is not possible to visit every point in the terrain, so the surveyor carefully selects the aerial photographs beforehand by studying those areas in which he or she will perform field inspections. The aim is to obtain as comprehensive a set of data as possible on the different biotopes of the area. Field inspections are carried out over about 10 % of the total surface area. Making use of these keys to interpretation, the actual interpretation is then carried out in the winter as an indoor job. The boundaries of the biotopes are brought out by viewing the aerial photos with a three-dimensional stereoscope, and the data for each of them is entered in the GIS.

4 What is the result of mapping?

The primary result of the mapping is a GIS covering almost the whole of Northern Lapland which is kept constantly up to date. As a final result of the work a book is to be published showing Northern Lapland's ecosystems and biotopes. Once the GIS data base is ready, it is possible to produce themetic maps (Fig. 3) and reports for various purposes from the material gathered.

5 EU financing

The overall costs of the ecosystem mapping are around FIM 10 million. Funds to the total amount of FIM 1 million have been received from the EU's construction fund target 6 programme for the Urho Kekkonen National Park part of the project. In addition, FIM 50,000 has been obtained from the European social reserve (ESR), and a further FIM 20,000 of provincial development funds to help meet the costs of the project's training phase.

Field work in conjunction with the ecosystem mapping was carried out in the summers of 1996 and 1997. The intention is to complete the documentation by the end of 1999. At the moment, about half of the mapping work has been completed and the numbering of sites is taking place.

The work is being carried out by the FPS's Rovaniemi Property Unit staff of 20. Additionally, use is being made of the expertise of the FPS's Data Services and Nature Protection staff.

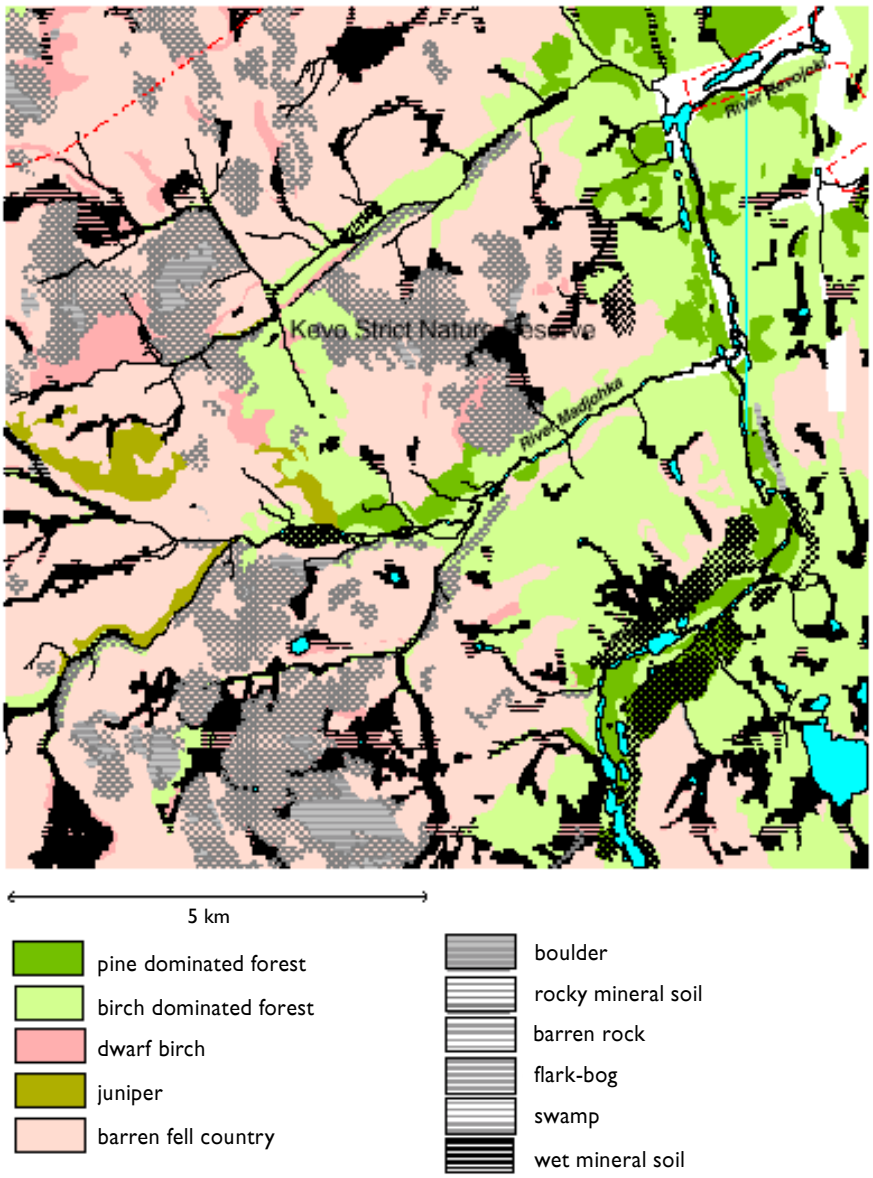

Fig. 3. Themetic map of northern part of Kevo Strict Nature Reserve: Birch and pine dominated forest and barren fell country.