

The status of semi-natural grasslands in the province of South Karelia, SE Finland

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The semi-natural grasslands were inventoried in the province of South Karelia (Finland) in 1992, 1993 and 1996. Altogether 89 different sites were found, covering a total area of 97 hectares. The sites were classified into five different biotopes, which comprised a total of 115 grasslands. Three-quarters of all sites (68, 76%), covering an area of 65 hectares (67% of total), were assessed as being in danger of losing their value because of either poor management or lack of management. The results indicate that the area of semi-natural grasslands in the province is now about 250 times smaller (0.4%) than at the beginning of the 20th century. The status of these environments in South Karelia is alarming.

Key words: agricultural management, grassland, grazing, mowing, pasture, semi-natural vegetation

INTRODUCTION

It is assumed that 30%–40% (400–500 species) of the Finnish flora has benefited from grazing and hay cutting (Alanen 1996). The loss of grasslands through cessation of these activities is assumed to be the main threat for 27% of all threatened plant species in Finland. The loss of open and semi-open habitats is also estimated as being the main factor threatening the status of the insects adapted to these environments, for the reason mentioned above. These make up 32% of all threatened insect species (Rassi *et al.* 1992).

In Finland natural grasslands occur only in

small patches on shores, mires, rocks and some larger areas on the fells in Lapland. The majority of grasslands have resulted from agricultural management. The practice of hay making and grazing by domestic animals has created these environments, which support a semi-natural vegetation (Kalliola 1973, Hæggström *et al.* 1995).

Traditional agricultural management was widely practised in Finland until the early 20th century. Almost every household in the countryside had cattle, sheep and a few horses. During the warmer part of the year, domestic animals were kept grazing outdoors, but in wintertime they had to be fed by leaf fodder and mown hay cut from

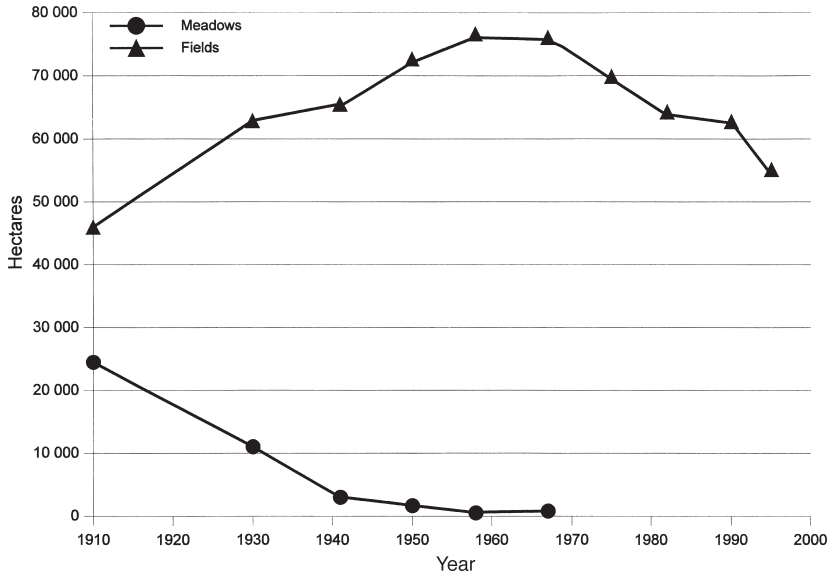


Fig. 1. Area of meadowland and fields according to the official statistics from 1910 to 1995 in the province of South Karelia (see references in the text).

meadows, reedswamps and fens in summer (Soininen 1974, Hæggström *et al.* 1995). The total area of meadows in Finland was assessed as 1.6 million hectares at its height at the end of the 19th century (Soininen 1974).

During the present century, there has been a massive shift in agricultural practice. Grasslands have been changed into arable land or they are being abandoned and reforested (Mukula & Ruutinen 1969, Raatikainen 1986). The recent status of grasslands is poorly known. In 1992 the Finnish Environment Institute started a nation-wide inventory of semi-natural grasslands and other agricultural biotopes. This work is still being carried out, and the results of only four provinces, Satakunta (SW Finland), Northern Ostrobothnia (W Finland), North Karelia (E Finland) and South Savo (E Finland) have been published (Jutila *et al.* 1996, Vainio & Kekäläinen 1997, Grönlund *et al.* 1998, Hänninen-Valjakka 1998). The total area of valuable grasslands, wooded pastures and grazed forests in the mid-1990s has been estimated as being only 20 000–25 000 hectares (Alanen 1996, Pykälä & Alanen 1996).

The history of semi-natural grasslands in the province of South Karelia, SE Finland, is poorly known. In the 1890s the use of hay seed became more general (Huuhtanen 1985). Between 1905 and 1920 hay making and grazing by domestic animals in semi-natural areas started to decrease

and the use of arable fields increased (National Board of Agriculture 1907, 1922). Over a period of 45 years, from 1950 to 1995, the number of domestic grazing animals has dramatically decreased from 138 450 to 44 090 (National Board of Agriculture 1951, 1970, Information Centre of the Ministry of Agriculture and Forestry 1996). Data obtained from the statistics of the National Board of Agriculture (1916, 1959, 1986), Länsi-Karjalan maanviljelysseura (1946) and the Information Centre of the Ministry of Agriculture and Forestry (1996) (Fig. 1) show that the total area of meadowland has decreased from 25 000 hectares in 1910 to almost zero in 1967 (since which no further records). The total field area has increased from 46 000 hectares in 1910 to 77 305 hectares in 1962 and has gradually decreased after that.

The aim of the present study was to clarify the status of semi-natural grasslands in the province of South Karelia.

MATERIAL AND METHODS

The inventories were made in the province of South Karelia (7 240 km²) from June to August in 1992, 1993 and 1996 (Fig. 2). Information on traditional agricultural environments based on the literature (Haapanen & Heikkilä 1992a, Haapanen & Heikkilä 1992b) (altogether 20 sites) or provided by environmental and agricultural administrative authorities, botanists, teachers, lepidopterists, apiculturalists and local

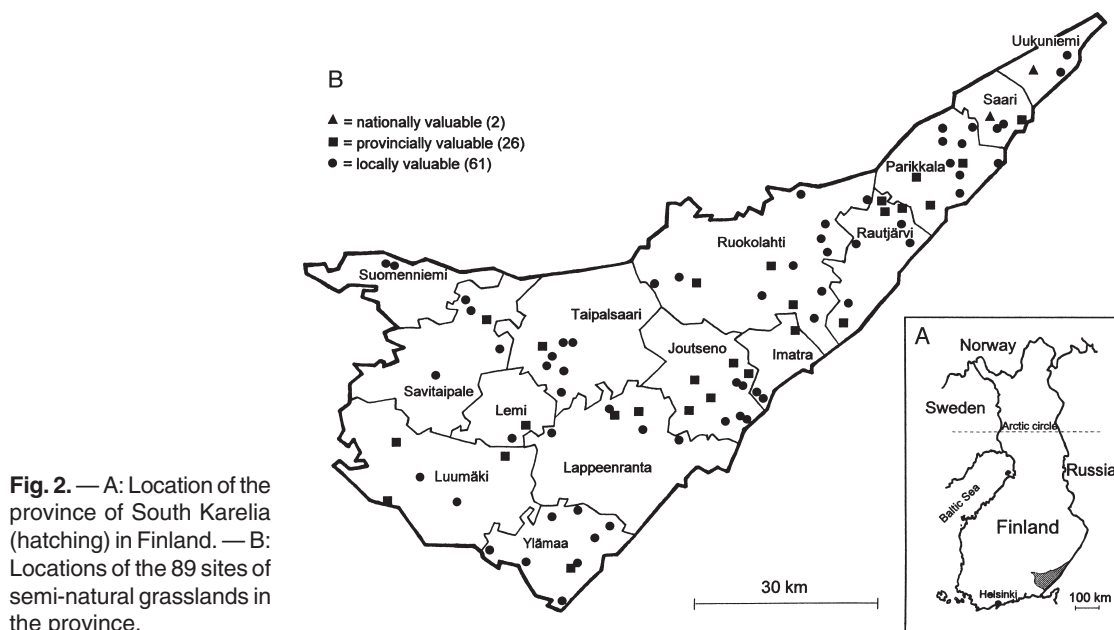


Fig. 2. — A: Location of the province of South Karelia (hatching) in Finland. — B: Locations of the 89 sites of semi-natural grasslands in the province.

farmers (65 sites), was checked in the field. Areas of interest were also actively searched by covering almost 10 000 kilometres by road in a criss-cross fashion during the three study years (hundreds of sites).

All annually grazed or mown semi-natural grasslands were included according to the instructions of the national inventory (Pykälä *et al.* 1994). Old fields with a high diversity of vegetation and occasional grazing or mowing could also be included, but fallow fields, ruderal grasslands and sites with signs of heavy use of fertilisers were excluded. Following Pykälä *et al.* (1994), all the sites were classified into three categories (nationally, provincially, locally valuable) and five main types of biotopes:

1. Dry rocky grassland. Dry and rocky place, usually small and located near village. Indicator species *Sedum* spp., *Potentilla argentea* and *Festuca ovina*.
2. Dry grassland. Place with low-growing vegetation in sandy soil, usually located on a sunny slope. Indicator species *Galium verum*, *Campanula rotundifolia* and *Pilosella officinarum*.
3. Mesic grassland (non-riparian moist grassland included). Place with management-dependent vegetation, located in mineral soil. Indicator species *Ranunculus acris*, *Potentilla erecta*, *Galium boreale*, *Agrostis capillaris* and *Deschampsia cespitosa*.
4. Riparian grassland: place with zonal vegetation, located on shore of river or lake.
5. Other grassland. Old field, or mown or grazed place with high diversity of vegetation, but not original traditional agricultural environment.

Management and threats to the sites were evaluated on the grounds of vegetation, by interviewing landowners and

by using indicator species: a common occurrence of plants such as *Plantago major* indicating overgrazing with nutrient enrichment, a vigorous growth of *Aegopodium podagraria*, *Anthriscus sylvestris*, *Urtica dioica*, *Taraxacum* spp., *Poa pratensis* and tall grasses indicating nutrient enrichment, and the common occurrence of species and features such as *Epilobium angustifolium* and *Filipendula ulmaria* and shrubs and tree saplings indicating encroachment and a low intensity of management. The occurrence of plant species threatened in Finland (Rassi *et al.* 1992) was also noted.

RESULTS

Altogether we found 89 sites, which comprised a total of 115 different semi-natural grasslands. Two sites (2%) were classified as nationally, 26 (29%) as provincially, and 61 (69%) as locally valuable (Fig. 2B). The total area of the sites was 97 hectares (mean 1.1 ha, range 0.1–18 ha). The most common biotope type, also having the largest area, was mesic grassland, while the rarest biotope was riparian grassland. The biotope with the smallest area overall was dry rocky grassland (Table 1). The total number of observed vascular plant species was 404, the average on a site being 79 and the range 37–128 species. The five most common species, all found at more than 90% of all sites, were *Achillea millefolium* (97%), *Veronica chamaedrys* (96%), *Poa pratensis* (93%), *Stellaria*

graminea (93%), and *Vicia cracca* (93%).

Almost half of all sites were at least in some way managed (41, 46%), covering an area of almost two-thirds (61 hectares, 63%) of the total area. The sites were managed either by grazing (28, 68%) or by mowing (13, 32%). The total amount of all grazed sites was 33 hectares (34% of total area), of which almost two-thirds was grazed by cattle (21 ha, 64%), the rest being grazed by sheep (4 ha, 12%) and horses (8 ha, 24%). The total area of all mown sites, included areas not traditionally managed, was 28 hectares (29% of total area), of which nearly three-quarters was mown for protecting vegetation (20 ha, 72%), and the rest were mown for cattle feed (4 ha, 14%) or for aesthetic reasons (4 ha, 14%).

Three-quarters (68, 76%) of all sites were estimated as being in danger of losing their value due to poor management or lack of management, covering an area of two-thirds (65 ha, 67%) of the total area. Many of the sites were threatened

by either overgrowing (38, 56%), nutrient-enrichment (13, 19%), or both (12, 18%), while the rest were threatened by overgrazing (5, 7%).

Threatened vascular plants, a total of ten species, found on the sites are listed in Table 2.

DISCUSSION

The basic results were gathered during the first two years in 1992 and 1993, and the results were widely reported to colleagues, authorities, naturalists and other interested bodies (Saarinen *et al.* 1993). The work was also publicised by the media. However, despite reporting and informing the public we discovered only 11 new sites as a result of fresh information received. Bearing in mind our previous knowledge and active search during the study years, we conclude that there might exist some more grasslands for inclusion in the inventory, but without doubt these are not many.

Table 1. Five biotopes of semi-natural grasslands in South Karelia. SD = standard deviation.

Biotope	<i>n</i>	%	Total area (ha)	%	Mean size	SD
Dry rocky grassland	15	13	4.4	4	0.3	0.22
Dry grassland	26	23	9.5	10	0.4	0.40
Mesic grassland	51	44	47.1	49	1.0	1.05
Riparian grassland	9	8	4.8	5	0.5	0.26
Other grassland	14	12	30.8	32	2.2	4.44
Total	115	100	96.6	100	0.8	

Table 2. Threatened vascular plant species (Rassi *et al.* 1992) in semi-natural grasslands found in South Karelia.

Classification in the province	Species	Number of sites
Endangered	<i>Carex atherodes</i> Spreng.*	1
	<i>Botrychium multifidum</i> Rupr.	1
Vulnerable	<i>Botrychium matricariifolium</i> A. Br.*	1
	<i>Carex spicata</i> Huds.	1
In need of monitoring	<i>Alchemilla hirsuticaulis</i> H. Lindb.*	1
	<i>Draba nemorosa</i> L.*	2
	<i>Herniaria glabra</i> L.*	1
	<i>Ajuga pyramidalis</i> L.	2
	<i>Thalictrum simplex</i> L.	1
	<i>Vicia tetrasperma</i> Schreb.	2

*Nationally classified as in need of monitoring

Status

The area of semi-natural grasslands in South Karelia has changed enormously during the current century. The present area of 97 hectares is about 250 times smaller (0.4%) than the 25 000 hectares of meadowland recorded in 1910 (National Board of Agriculture 1916).

The present area of semi-natural grasslands comprises 0.01% of the total area of South Karelia. The result is parallel to those from inventories made in four other provinces in Finland. The corresponding proportions of grasslands were 0.01% in South Savo, 0.01% in North Karelia, 0.08% in Northern Ostrobothnia and 0.07% in Satakunta (Jutila *et al.* 1996, Vainio & Kekäläinen 1997, Grönlund *et al.* 1998, Hänninen-Valjakka 1998). The somewhat smaller proportion of these environments in South Karelia compared to the provinces of Northern Ostrobothnia and Satakunta is most probably based on the large grasslands by the sea in coastal areas (Kalliola 1973). These are not present in South Karelia.

The numbers of threatened vascular plant species found on the sites were surprisingly low. In addition, most of the species were observed only at one site. This result might be due to the low number and small area of valuable grasslands, and to the fact that there were only two sites classified as nationally valuable.

Future

Almost half of all sites (46%) were managed in one way or another, but management was poor or there was no management at all on three-quarters of all sites (76%). Grasslands have commonly been afforested, but reduced utilisation and abandonment eventually also lead to coverage by woodland vegetation through the natural succession. The rate of change is slower in dry grasslands, but the succession will take place without exception, as indicated by many studies (cf. Persson 1984, Ellenberg 1988, Ekstam & Forshed 1992, Stampfli 1992, Huhta 1996).

There is no comprehensive programme in Finland for protecting environments of the kind established for such entities as old-growth forests,

eskers, river banks and lake shores (Maa- ja metsätalousministeriö 1977, 1982, Ympäristöministeriö 1992, 1996, Heikkilä & Heikkinen 1993). There is no financial support available to enable farmers to manage their valuable grasslands, and the farmers have not been very interested in the poor support offered by the European Union (EU). Minimum size for an area is 0.5 hectares, the maximum award is FIM 1 748/hectare/annum, and the management contract is for a period of five years (Maa- ja metsätalousministeriö 1995). There are also several other restrictions in the programme, as a consequence of which many landowners can not be given financial support. However, 2 sites in 1995 (6.4 hectares), 7 sites in 1996 (33.2 hectares), 5 sites in 1997 (13.7 hectares) and 7 sites in 1998 (9.6 hectares) were started being managed with this support in South Karelia, but only a few sites presented here are managed using EU support (unpublished data, Employment and economic development centre for Southeastern Finland).

Concluding remarks

We conclude that there are only a few valuable semi-natural grasslands in South Karelia. The status of these environments in the province is extremely poor, and without strongly intensified management their future seems to be highly uncertain. There is an urgent need for a comprehensive programme for protecting semi-natural grasslands in Finland. The need for education on management is obvious, and cooperation with the environmental and other authorities in regard to these areas should be intensified.

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