

# The changes in the understorey vegetation composition and functional groups of forested mires in Finland during 1985–2006

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## Introduction

Understorey vegetation of forested mires has been surveyed three times (1985–86, 1995 and 2006) on the same monitoring plots by the former Finnish Forest Research Institute (Metla). The objective of this study is to analyse the changes taken place in the vegetation of drained and undrained mires with different kind of forest cutting treatments between the inventories 1985 and 2006, during 21 years.

## Material and Methods

The data consists of 100 forested mire plots derived from the systematic network of Finnish Level I/BioSoil-plots (n=650, EU Forest Focus project in 2006) (Fig. 1)

Composition and percentage covers of plant species were identified on the same four sampling units (squares of size 2 m<sup>2</sup>) on each plot in both surveys. The mean covers of the functional species groups were compared between the years 1985 and 2006 (Fig. 2).

The temporal change in the community pattern was analysed using NMDS ordination including the plant species data of both years.

The plots were divided into ten groups according to two fertility level, two drainage phases and three cutting treatment. The centroids of the groups were calculated separately for the years 1985 and 2006 (Fig. 3a) and their temporal changes were analysed. Tree stand volume was used as explaining variable in GAM-surface (Fig.3b).

## Results

### The change in the covers of vegetation groups (Fig. 2.)

**In drained site groups,** post-drainage vegetation succession has proceeded during 21 years. The cover of mire dwarf-shrubs clearly decreased in nutrient-poor sites. The cover of *Sphagnum* was already decreased 21 years ago in sites. The decrease in the cover of other mire mosses in all sites was obvious. The cover of grasses and sedges decreased in drained peatland forests.

**In undrained site groups** the changes were not so clear. Forest dwarf-shrubs showed slight increase in lower nutrient level sites and herbs and forest mosses slightly increased in more nutrient-rich sites. Mire dwarf-shrubs, *Sphagnum* mosses and other mire mosses were slightly decreased also in undrained sites.

### The treatment centroids in 1985 and 2006 in NMDS-ordination (Fig. 3b)

**Nutrient-poor site group:** Hardly any temporal changes were observed in the undrained (uncut or thinned) plots. On the other hand, the centroid of drained plots had moved in the direction of increasing stand volume.

**Nutrient-rich site group:** The temporal change in the centroids of undrained and drained plots followed the direction of increasing stand volume. Only the centroid of drained plots with clear-cut showed a change to the opposite direction.

### NMDS-ordination of the plots in 1985 and 2006 (Fig. 3a)

There was a temporal change between the plots of 1985 and 2006. The plots measured in 2006 were located more in the upper part of the ordination space than the plots measured in 1985. In most cases the change followed the direction of increasing stand volume and slightly the nutrient level, too.

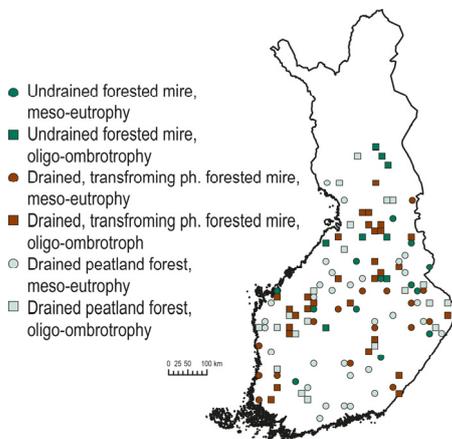
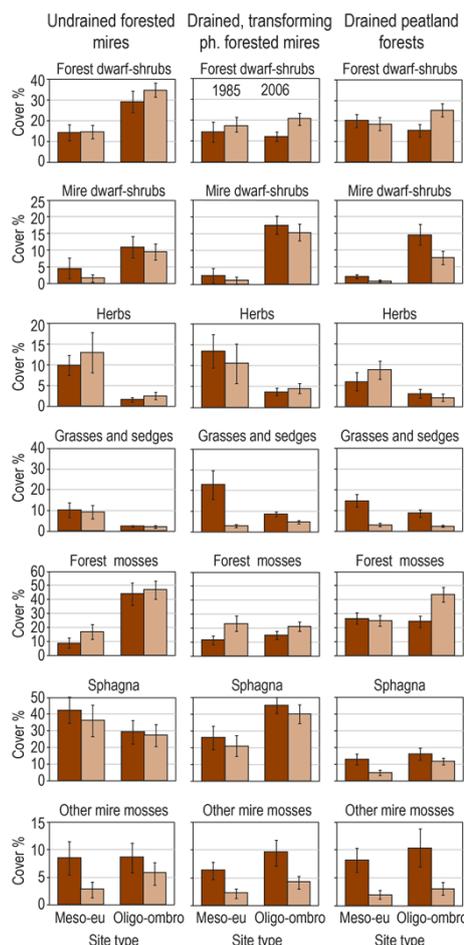


Fig. 1. The location of the forested mire plots surveyed in 1985 and 2006. The plots have been grouped according to the site fertility (trophic) level and drainage phase.

Fig. 2. The mean percentage covers (+ s.e.m.) of the functional species groups of vegetation according to two site fertility levels and three drainage phases in 1985 and 2006.

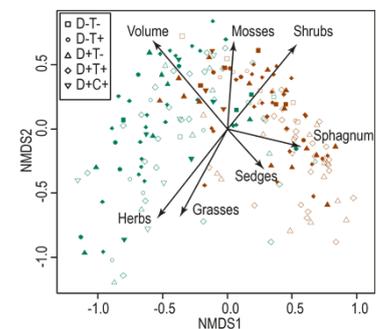


Fig. 3a. The two-dimensional NMDS ordination of the sample plots in 1985 (empty symbols) and 2006 (filled symbols). The more similar the plant species composition in the plots, the closer they are located to each other in the ordination diagram. Fertility level: meso-eutrophic plots (green color) and oligo-ombrotrophic plots (brown color). Treatments in the legend: undrained (D-), drained (D+), no cuttings (T-), thinning cuttings (T+), clear-cuttings (C+). The cover of species groups and stand volume are depicted in the ordination space as linear vectors.

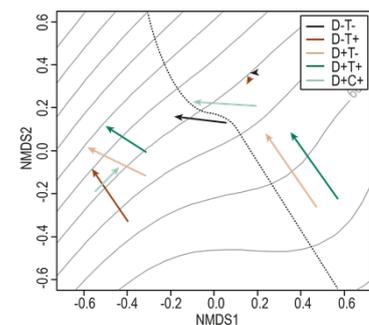


Fig. 3b. The temporal change in the centroids of the plot treatments (see legend and Fig. 3a) from 1985 (base of arrow) to 2006 (point of arrow). The meso-eutrophic and oligo-ombrotrophic treatment groups have been separated by a dash-line. Stand volume is depicted by non-linear GAM surface.