

Preface

In Fennoscandia and Iceland, large parts of particularly elevated areas are treeless. Below these areas there is often a belt of Nordic mountain birch trees, now often called *Betula pubescens* ssp. *czerepanovii*. In Fennoscandia, this plant is also common in a zone north of the coniferous trees and is found in small forests in the southwestern-most parts of Greenland and more locally in other parts of Europe.

Before the begin of the International Biological Programme (IBP) in the late 1960s and early 1970s, only minor fractions of these ecosystems had been studied. Therefore, alpine and subalpine systems were chosen as the main areas of study in this first, larger interdisciplinary and integrated project in natural science across national borders and, in this way, they made an important contribution to such research in the Nordic countries. In addition to an interdisciplinary steering committee in each country, a Nordic administration was also established for the so-called IBP "Tundra Biome" studies in the region (although permafrost is not common in most of the region). At the end of the IBP, many results from this research in alpine, subalpine and northern Fennoscandian mountain birch forests were published in two early volumes of the Ecological Studies Series (Wielgolaski 1975a, b).

As is common at the end of scientific projects, many questions were not really answered, and this was also the case after IBP. However, the project showed the good collaboration within the Nordic countries. Therefore, in the late 1970s, it was decided to establish a "Nordic Subalpine-Subarctic Ecology" network project (NSSE) across the national borders within the Nordic mountain birch ecosystem at a lower intensity level, as only very limited funding was available for this cooperation after the IBP. In Finland, after some years, this project was accepted as a Man and Biosphere (MAB) network, resulting in a better status of the project in that country than elsewhere. This made it also possible to obtain results from the joint Nordic mountain birch studies more than 20 years after the IBP published their findings in a volume in the UNESCO-MAB Series (Wielgolaski 2001).

Within the EU, international scientific projects, including several European member countries and associated EU countries, are recognized as important to increase the knowledge and cooperation in Europe. Particularly important are natural science projects that also relate to man and socio-economy. Therefore, the 3-year project "Human Interactions with the Mountain Birch Ecosystem: Implications for Sustainable Development" (HIBECO) was funded by the EU from the year 2000. Here, results from new mountain birch studies in the Nordic countries including Greenland are added to older ones concerning both the growth of the birch itself, and the use and limitations of these forests by animals and man, with the objective of finding the best sustainable management for mankind in this ecosystem. Furthermore, Scotland was included in this project because of the good knowledge from earlier projects there on the influence of grazing, e.g. by sheep in their mountain birch regions. The results of this EU project are summarized in this volume.

What has changed in the Nordic mountain birch ecosystem in a long- or short-term perspective? In the short term, a possible increment of the forests in elevation by global climate change may be included, either induced by man or not. In Iceland, large areas of the original birch forests were cleared by man. Later, strong sheep grazing prevented resprouting of the trees and caused heavy erosion (Aradottir and Arnalds 2001). A similar development has, to some extent, taken place in the birch zone of southern Greenland. In addition, in Fennoscandia, the mountain birch forests have been suppressed in sub-alpine districts due to sheep grazing. In later years, however, this sheep-grazing pressure was lower in those areas. This may be another reason for the recent increased elevation of the upper birch tree line in the region, in addition to climate change. In northern Fennoscandia, the birch forests are strongly influenced by reindeer grazing and trampling, as reported in several chapters.

Modern infrastructure is also very important for development in the Nordic mountain birch region. A denser road net makes a larger fraction of the birch forests accessible for firewood cutting. Similarly, increased tourism after road building may increase the tree cutting and reduce the birch forests. At the same time, in some districts, less forest is used for firewood, because many inhabitants, also from the mountain birch region, are going over to heating by electricity and oil. This shows how sustainable use of mountain birch depends on the political decisions taken in a district.

The main objectives of the various chapters in this volume are to give examples from different sites (see Fig. 1) in the Nordic countries (and Scotland) of the influence of climate change and human decisions on growth of birch and the understorey. It has been discussed how climate change through time may be of importance for the adaptation of the trees in various regions and how such changes may cause variations in attacks, e.g. by insects. Shifts in the grazing pressure, e.g. by sheep and reindeer, will be important for the

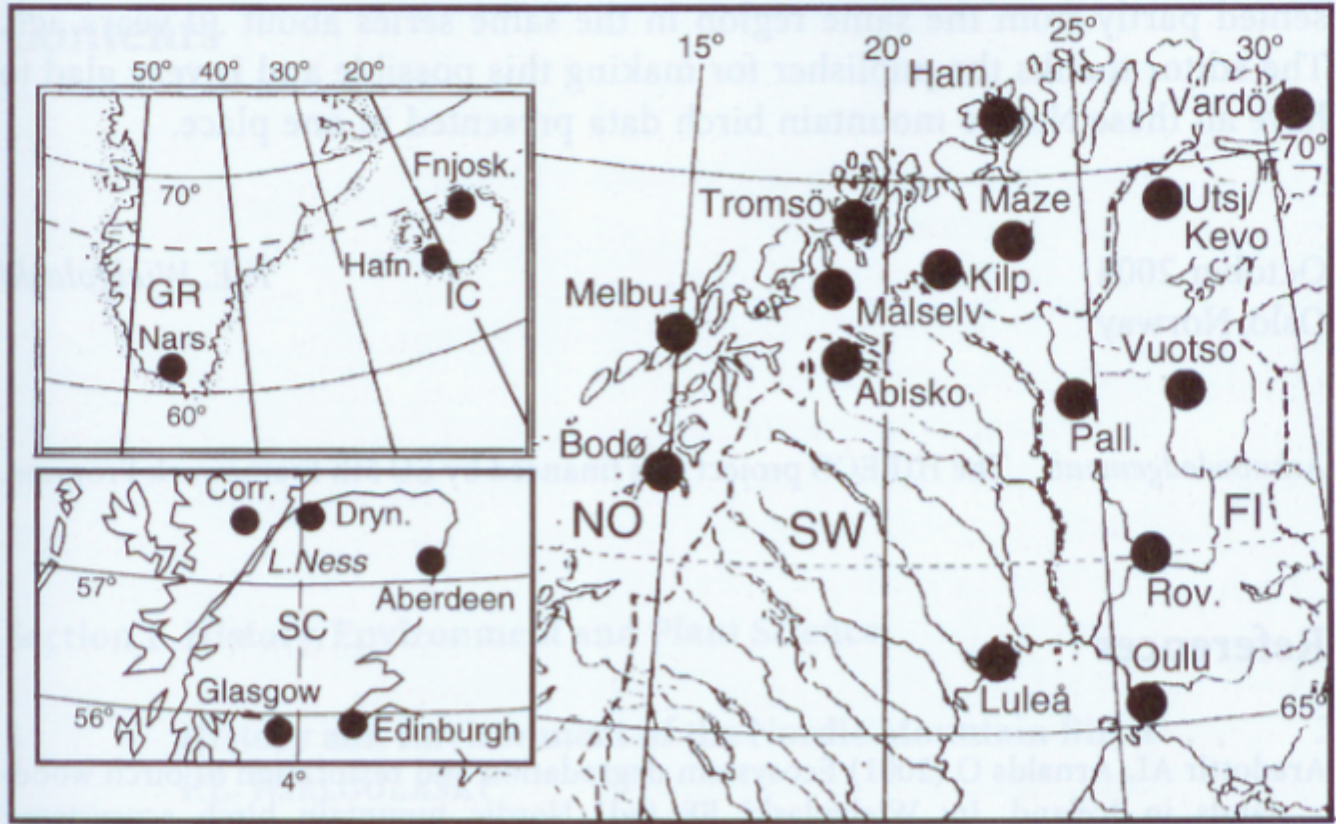


Fig. 1. Map of northern Fennoscandia (FI Finland, SW Sweden, NO Norway), Iceland (IC), southern Greenland (GR) and parts of Scotland (SC), showing sites used in connection with the HIBECO project and some towns in the regions (Rov Rovaniemi, Pall Pallasjärvi, Kilp Kilpisjärvi, Utsj/Kevo Utsjoki/Kevo, Ham Hammerfest, Fnjorsk Fnjoskadalur, Hafn Hafnarskogur, Nars Narssarssuaq, Dryn Drynachan, Corr Corrimony). Broken line at 66°33'N denotes Arctic Circle. Provenance sites used in phenology studies are given in the Fig. 7.1

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Nordic mountain birch ecosystem in the future, but probably the greatest change in this system will be the degree of tourism permitted in the region, as influenced by the future infrastructure.

The possibilities for sustainable use of the Nordic mountain birch ecosystem are evaluated in various models presented in the volume, giving answers based on the scenarios chosen. However, it is NOT the aim of the volume to present a preferred future in the Nordic mountain birch ecosystem. That is up to the politicians and other decision-makers to determine, but the chapters in this volume have been planned to make it possible to choose the best solutions in various countries and districts. However, it is recommended that decisions should be made in cooperation with the local people in a district, and should not be made SOLELY by the central authorities in the various districts.

It is very valuable for the Nordic scientists working in the mountain birch regions to present various results from an interdisciplinary and integrated project, including social scientific subprojects, all together in a new volume of the series Ecological Studies as a sort of continuation of the results pre-

sented partly from the same region in the same series about 30 years ago. The editor thanks the publisher for making this possible and is very glad to have all these Nordic mountain birch data presented in one place.

October 2004
Oslo, Norway

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Acknowledgement. The HIBECO project was financed by EU 5th Framework Program.

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