

certain types of microbe, nutrient cycling in stands etc.

Analysis of the growth and development of forests, as well as prognoses concerning their future development, are being done on the basis of parameters depicting the state of the environment.

Counteraction of the harmful effects of air pollution through e.g. prescribed burning, liming and replacement with more resistant tree species, is being studied on the basis of existing experiments.

- The expertise of five departments is being utilized in the ILME Project.
- The individual departments are cooperating with a number of universities and research institutes.
- Implementation of the project within the institute is monitored by the coordination committee.

DEPARTMENT	FIELD OF ACTIVITY
Department of Forest Inventory and Yield	Establishing the permanent sample plot network and carrying out the basic stand measurements, analysis of stand growth and development
Department of Soil	Determining the effects of air pollution on the properties of mineral soils.
Department of Peatland Forestry	Determining the effects of air pollution on peat soils.
Department of Silviculture	Determining the effects of air pollution on tree stands and other vegetation layers on mineral soils.
Department of Forest Protection	Determining the effects of air pollution on forest damage.

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ILME PROJECT

The effect of air pollution on forest ecosystems



**THE FINNISH FOREST
RESEARCH INSTITUTE**

THE ILME Project

GOALS

In 1983 the Finnish Forest Research Institute initiated a research project (ILME) into the effects of air pollution on forest ecosystems. In addition to the funds available from the Institute's own research resources, the project is also being funded through the Ministry of the Environment and the Ministry of Agriculture and Forestry's joint acidification project — HAPRO. The ILME Project comprises three sections: the national monitoring network, special studies and preventive research.

AIMS OF THE NATIONAL MONITORING NETWORK

- to create a permanent sample-plot network for monitoring the state of health of forest ecosystems in Finland
- to inventory the extent of forest damage
- to determine the effects of air pollution on forest vegetation
- to determine the effects of acid deposition on forest soils and to estimate the susceptibility of different types of site to such damage
- to determine the relationships between various forms of forest damage and air pollution
- to prepare, on the basis of the results, a prognosis of future trends in Finnish forests

AIM OF THE SPECIAL STUDIES

- to develop methods and techniques for use in the national monitoring system
- to elucidate the relationship between air pollution and tree damage through field and laboratory experiments

AIM OF PREVENTIVE RESEARCH

- to develop suitable silvicultural methods for preventing and alleviating the harmful effects of air pollution

THE NATIONAL MONITORING NETWORK

Monitoring is being carried out at three levels:

1. The basic monitoring network comprises the 3000 permanent sample plots which are being established in 1985-86 in connection with the 8th National Forest Inventory. The basic inventory work done on these plots is designed to determine, at regular intervals, the magnitude and quality of Finnish forest resources, as well as to assess any possible changes taking place in their condition. The sample plot network covers the whole country.
2. About 600 of the permanent sample plots have been selected for more detailed analyses of the soil, vegetation and forest damage.
3. About 90 of the permanent sample plots have been selected for a programme involving continuous measurements and sampling over a number of growing seasons.

The aim of this part of the project is, among other things, to determine the effects of air pollution on the properties of the soil and the vegetation. The sample plots represent a wide range of different site and soil types, and stands of different tree species composition that are subjected to different pollution loads.

RESEARCH STRATEGIES

The tree stands on the 3000 permanent sample plots are being surveyed using a number of different visually estimated parameters, e.g. state of health, needle loss, the incidence of fungus and insect damage. The data collected in this part of the project will be used to determine the extent and severity of stand damage. The chemical analyses to be carried out on the moss, lichen and bark samples collected from the sample plots will be used to investigate the causal relationship between acid deposition and the incidence of tree damage.

The current state of soil acidification is being studied on soils of different type which are subjected to acidic deposition of varying intensity. The annual variation in the acid load in the soil is being followed on the basis of chemical analyses of soil water samples. The susceptibility of different site types to damage is being estimated on the basis of analyses carried out on samples from different soil layers and horizons.

Changes in the chemical composition of the tree stand are being studied on the basis of foliage and litter samples. In addition to foliar analysis, the microflora and ultrastructure of the needle surface are also being investigated. Changes in the chemical composition and structure of different litter components are being studied on the basis of litter samples collected over the period stretching from the 1950's up until the present day.

A large number of chemical and biological parameters are also being investigated in the ILME Project. Suitable parameters include plant bioindicators, needle metabolism, the occurrence and activity of