THE FINNISH FOREST RESEARCH INSTITUTE

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WHY INVESTIGATE FORESTS?

The Finnish Forest Research Institute has been doing its work for sixty years, already. As a result of its efforts and those of some other organizations much valuable information on Finnish forests and forest resources has been acquired. In the early 1970's the Finnish Forest Research Institute faced a new problem; the intensive stage of Finnish forestry that started in the 1960's continued. The development is indicated by the following figures on raw wood consumption in industry (excl. waste wood):

Year	Consumption
1938	18,2 mill. m^3
1950	17,5 "
1960	31,8 "
1970	43,9 "
1975	32,6 "
1980	50,1 "

The increased need of raw wood had to be satisfied by a forest area, which was 12 per cent smaller than in the 1930's. We had to take more wood out of our forests without jeopardizing our harvesting possibilities even in the following century. This was a great challenge to Finnish forest research.

The practical intensification of forestry is realized primarily by increasing forest improvement activities, the most essential of which are forest cultivation, ditching

and fertilization. When the output of forests is to be increased, the method must be understood in every detail. Intensive forestry requires more effective research work in the traditional fields of research, such as soil science, peatland forestry, silviculture, forest economics, forest inventory, growth and yield and the rationalization of forest operations.

Intensive forestry has, however, created new problems. In order to solve them it has been necessary to pioneer new research fields. Forest protection and forest tree breeding are two of these.

The energy crisis that started in the middle of the 1970's and the depression period resulting from it have had their share in bringing about new fields of study to find out the possibilities of using wood as a source of energy. By utilizing the existing forests it is possible and even necessary to produce plenty of fuel wood along with normal forestry. That is why information on the harvesting of this kind of wood is needed fast. At a longer term we have to find out the possibilities of producing wood for energy purposes on special short-rotation cultivations.

DUTIES OF THE INSTITUTE

The Finnish Forest Research Institute is the principal forestry research organization in Finland, subordinated to the Ministry of Agriculture and Forestry. It is a state-owned institute, its duties and organization were prescribed by a law and a statute in 1976.

As the law directs, it is the duty of the he Institute to "do research work to further the development of forestry and the expedient use of forest resources and forests".

The legal duty was made more precise by the statute, according to which it is the duty of the Research Institute

1 to carry out investigations and experiments in order to further the various methods of utilizing Finnish forestry, forest resources and forests

2 to publish the results of its work, to present important topical findings in a popular form and to communicate with other institutes in the field

3 to participate in international cooperation in forest research

4 to provide research opportunities for research officers and students

5 to provide information and recommendations when requested by the Government

6 to take the responsibility for its experimental forests and nature conservation areas

7 to carry out other assignments prescribed or ordered to it

Examples of the assignments mentioned above are, among others, the measuring research prescribed by the measuring law, the surveillance task provided by the law on the extermination of forest destroyers as well as the calculations on which the annual forest taxation is based.

DEVELOPMENT OF THE INSTITUTE

The Finnish Forest Research Institute was established in 1917. At that time it consisted of three small departments: silviculture, mensuration and inventory and soil science. The Institute started its activities under the supervision of the National Board of Forestry, with only two and a half rooms at its disposal.

The early 1930's were of great importance to the development of the Institute. It was then placed directly under the Ministry of Agriculture and Forestry. In the 1920's there had been a tendency towards an enormous expansion in forestry which led into an enlargement of the Institute, mainly in the 1930's. In the 1950's the organization of the Institute was improved and in 1962 it was given a Director, whose duties had earlier been given to one of the professors heading the departments. In the 1960's more attention was paid to regional problems in forestry and the research stations were founded. At the same time, however, the departmental structure was being improved. Today the Finnish Forest Research Institute has nine research departments and 13 professors working in them.

ADMINISTRATION

The highest decision-making body of the Institute is its Administrative Board. It consists of the Director as president, a vice president and five other members appointed by the Government for a period of three years at a time. Two of the members are professors of the Institute, one representing natural sciences and the other technical sciences and economics, one member is a head of a research station. The research staff is also represented by one member.

Besides the Administrative Board there is also a Negotiating Board, which is to suggest new investigations and ways of improving the research activities. The Board is a link between the Institute and the representatives of forestry, in which the Institute is represented by the Director, one professor and a representative of the research staff. The rest of the members, ten at the most, are appointed for a period of three years at a time by the Ministry of Agriculture and Forestry. They are to represent the Ministry of Agriculture and Forestry, the Ministry of Finance, Helsinki University, the National Board of Forestry, the Central Forestry Associations, the Agricultural Research Centre and other fields of forestry.

The Institute has two offices to handle practical and administrative matters. The Administrative Office deals with accounting and general administration. The Experimental Forest Office administrates the experimental forests and the conservation areas controlled by the Institute.

STAFF

At the beginning of 1982 the Forest Research Institute employed approximately 600 persons, of whom 170 were research officers. The number of staff members varies depending on the season; during summer and field working season the staff exceeds 1000 persons.

Each department is headed by a professor. In four departments there are two professors, between whom the field is devided. The rest of the research staff consists of research specialists, senior research officers and researchers. They are assisted by forest technicians, lab assistants, secretaries etc.

RESEARCH ACTIVITIES

The actual research work is carried out in the research departments as well as in the four research and four experimental stations. Field experiments are being done in all parts of the country.

The following brief descriptions of the departmental research work have been prepared in order to present a more detailed picture of the actual work of the Institute and its departments.

The Department of Soil Science

The research work of the department deals with mineral soils and their use in forestry. Thus the department

investigates the physical, chemical and microbiological properties of mineral soils and their effects on fertility. The department also conducts investigations into the development of soils and the methods of soil amelioration.

During the last few years particular attention has been paid to the improvement of soil fertility by means of fertilization, prescribed burning and tilling. At the same time the nutritional balance of soil has been studied and methods of determining its nutritional status have been developed.

The Department of Peatland Forestry

The department studies the utilization of peatland forests, the basic factors, methods, technique and realization of forest improvement. A huge part of the material is acquired from special experimental fields, actual forest improvement sites as well as from ditched and fertilized areas.

In the basic research the emphasis is on the changes in the ecological system of peatland forests caused by forest improvement activities and especially on the total mobilisation and use of nitrogen.

The forest hydrology studies deal with the effects of ditching and fertilization on the amount and quality of water discharging from forest improvement areas and the effects of flood on growth.

The studies on the establishing of peatland forests, their ecology, cultivation and multiple use involve the changes in water and nutrient economy and their effects on establishing forests and their development; tending stands of planted trees, the consequences of forest improvement activities as well as their effects on the production of mushrooms, berries and game are also improtant items of study.

The studies on nutrient status and hydrological arrangement concern the realization of continued fertilization on various fertilizers and their combinations as well as the methods of defining the need of fertilization and the effects of the timing of fertilizing on growth.

The forest improvement studies deal with the methods of fertilizing and cleaning out forest ditches, excavators used in ditching as well as the structure and planning of forest roads.

The Department of Silviculture

The department investigates natural forest regeneration and its components as well as forest tree seed crop to facilitate an effective seed service in Finland. Artificial regeneration and afforestation are studied to their full extent. In southern Finland the work is concentrated on Suonenjoki Experimental Station for Forest Regenetation and in the northern parts of the country on Rovaniemi Research Station.

The department also studies the qualifications and possibilities of short-rotation cultivations as a part of an international co-operational project. The research work

is carried out as team work together with research officers from the Department of Forest Protection, Department of Peatland Forestry, Department of Forest Technology and the Department of Forest Economics. Forest growth is studied in cooperation with specialists in forest yield studies. There is also cooperation with university institutes concentrating on basic research.

The Department of Forest Genetics

The department carries out studies on the genetic structure of forest trees, applying the results obtained to tree breeding and regeneration. The goal is an increase in timber production in collaboration with researchers involved in improving ecological conditions and silvicultural methods. An attempt is also made to find genetically well-adapted varieties for each different locality and site, particularly in the severe conditions of Lapland. The department works in close cooperation with some other forestry organizations involved in forest tree breeding. It is also responsible for the scientific planning and control of the research activities within its field. In addition, a national central register covering all the tree breeding material is kept by the department.

The Department of Forest Protection

In forest zoology the emphasis is on the biology and occurrence as well as on the damages caused to forests by injurious animals. Observations are made on large-scale damages and particularly on the fluctuations of the number

of needle-injuring insects. The most essential items of study being carried out deal with the damages caused by elks, the influences of fertilization on the occurrence of injurious insects, the damage caused by them in seed orchards and the animal damages in afforestation areas in northern Finland. The biology and the damage caused by sawflies and voles are also studied and protective means applicable against them are being developed.

The departmental section of forest pathology studies the abiotic damages in forests, tree diseases and the damages caused by them as well as the ways of preventing them. The utilization of forest mushrooms, the damage caused by fungi and their extermination in regeneration areas and forests are also important items of study. Especially the department studies root-rot fungi Fomes annosus, their spreading mechanisms, occurrence and preventation as well as the ways in which the root-rot revealed in final cutting passes over to the next tree generation. Investigations are made into pine needle cast, the damages in northern regeneration areas, rust fungi diseases and their preventation in nurseries. Estimations on forest mushroom yield are made.

The Department of Forest Technology

In wood research the emphasis in on the structure and properties of wood, on the industrial use of wood as raw material and on timber scaling. During the past few years the department has concentrated on the technical properties of domestic tree species and those of foreign species adaptable in Finland. Also, there have been studies on logging waste and its properties, mainly form the point

of woodworking. Scaling studies are also of importance. Due to the rationalization of logging the department has been striving at developing new methods of measurement.

The section of forest operations investigates forest work, its mechanization and development as well as the ergonomy of forest work and the questions of wages in forestry. Lately, the emphasis has been on whole-tree harvesting as well as on the rationalization and ergonomy of forest work. In addition, the department has made large-scale studies on logging waste harvesting and developed methods for forest workers, many of which have been adapted in Finnish forestry.

The Department of Forest Inventory

The department investigates the methods of forest surveying, carries out continuous forest-inventory studies and investigates forest reseources and their distribution with respect to forest management. In addition, forest balance investigations are conducted in collaboration with the Department of Forest Economics.

The most important long-term work being carried out is the seventh national forest inventory. Among the other investigations in progress are developing a two-stage sampling method for forest surveying, the use of aerial photos and field excursions, improving the methods of calculating the volume of standing trees and determining volume calculations for standing trees subject to the timber measurement law.

In the section of growth and yield research investigations are carried out into the structure of stands, growth and yield and their improvement in various ways. Among the most essential questions are the effects of intermediate cutting on growth and yield. Besides this, research on fertilization is becoming more prominent. A new object of research are the losses in growth and yield caused by the mechanization of logging and their preventation. The department has started an investigation into the importance of the structure of mixed stands to wood production.

Besides many permanent experiments there are also temporary experim ntal plots. The material acquired in the national forest inventories is utilized in the study of growth in all kinds of forests. Lately, there has been an increase in the number of cooperational projects in the Nordic countries.

The Department of Forest Economics

The section of national economics produces continuous information in its forest balance research, which includes an estimation on the annual wood consumption and removal and their comparison with the planned allowable cut. The rating methods are being improved. Forestry and forest industry are investigated as an intergrated subsystem of national economy, the emphasis is on the influences of the output of forestry on the whole society. Also, questions of labour force in forestry and forest industry are studied and prognoses are made.

The behaviour of private forest owners and the structural changes in forest ownership are also investigated in the department. In the research on multiple use of forest areas the alternatives are compared with each other; the relations between wood production, reindeer husbandry etc. are studied in this respect.

The section of business economics investigates the profitableness of different ways of producing forests. The question is studied form nursery to final cutting. There are also studies on the planning, decision-making and supervision in forestry and forest industry enterprises as well as on the demand, supply and prices of raw wood, in which these factors are explained, described and prejudged from the point of view of the enterprice as well as from that of national economy. The same points are taken in the study of the production, marketing and consumption of forest industry products.

The Department of Mathematics

The department develops and investigates statistical methods required by research, it cooperates with the researchers in applying mathematical and statistical methods and trains the researchers in their use.

The researchers of the department participate in applied forest research together with other departments. It also supervises and develops data processing for the Institute, publishes 'Annual Yearbook of Forest Statistics' and prepares a yearly proposition for forest taxation.

RESEARCH AND EXPERIMENT STATIONS

Forest Research Stations were established mainly to facilitate the investigations of regional problems, especially those of northern Finland. Each station has a permanent research staff. They form a link between research and forestry. Administratively the stations are subordinated to the Director of the Institute.

Parkano Forest Research Station investigates hydrological and ecological problems related to peatland forestry as well as forest regeneration on peatlands. Moreover, studies are made on silviculture (artificial regeneration) and attention is also paid to questions of forest protection and soil science. The station serves the needs of southwestern Finland.

Kolari Forest Research Station has concentrated on forest tree breeding applied to the local conditions in Lapland. Ecological and hydrological peatland forestry are central items of research.

Muhos Forest Research Station performs research work in silviculture, peatland forestry, forest entomology and forest yield.

Rovaniemi Forest Research Station investigates problems of silviculture, forest protection, multiple use of forests, forest economics, growth and yield as well as those of soil science. The Department of Forest Inventory is also represented in the staff. The emphasis is, however, on research work on reforestation in Lapland.

Suonenjoki Forest Research Station concentrates on different nursery and reforestation studies. The permanent research staff of the station represents silvicultural, genetical and forest pathological expertice. The Institute also maintains a nursery at the station.

Joensuu Forest Research Station is the most recent of the Research Stations. Soil science, peatland forestry and silviculture, as well as multiple use of forestry will cover the main part of the research to be carried out in Joensuu.

Tree breeding stations at Punkaharju and Ruotsinkylä are subordinated to the Department of Forest Genetics. Particularly in spring a major part of the department' s activities is performed at these stations.

Kannus Energy Forestry Experiment Station investigates possibilities to use wood as energy source.

The vole studies of the Department of Forest Protection are performed at the Ojajoki Experiment Station.

EXPERIMENTAL FORESTS

Unlike in several other countries noted for their forestry the Finnish Forest Research Institute has experimental forest areas covering nearly all parts of Finland. At the present these forests cover more than 80 000 hectares. Some of them have been acquired from the National Board of Forestry, some have been bought and some acquired through barter trade. The experimental forests serve the needs of research work. Those not used in this sense are managed to serve commercial purposes.

The experimental forests have been brought about to secure the opportunities of making long-term experiments and to concentrate the activities. Most of the methods in afforestation, nursery treatment and thinning as well as in peatland draining used today have been developed through the knowledge and experience achieved in the experimental areas, where representatives of forestry can learn about research work and get practical advice from the research officers. For this purpose there are excursion trails in many of the areas and special guidebooks with detailed information on the various objects of study. These areas contain 23 000 sample plots, which indicates the intensity of their use.

The Experimental Forest Office of the Institute in charge of the areas. The office is led by the Chief Forest Officer and his staff. The forests have been devided into two districts, which are supervised by two district forest officers. Most of the forest areas have a forest technician to tend the forests and to act as a local guide.

In addition to the experimental areas the Institute controls nature conservation areas to the total area of over 62 000 hectares. These, too, can be used in experiments. The biggest nature conservation areas controlled by the Institute are the national parks of Pallas-Ounastunturi and Pyhätunturi, the strict nature reserves of Malla, Pisavaara, Häädetkeidas, and Karkali and the conservation area of Aulanko.

Some of the experimental areas are noted for tourism, which

causes extra work to the local officials. In addition to the areas mentioned above Saanatunturi, Koli, Punkaharju and Saariselkä are some of these.

The Forest Research Institute has made agreements with the Central Board of Forestry and some wood industrial enterprises on the use of forest areas in research. Short-term investigations are also in progress in private forests.

INFORMATION AND PUBLICATION ACTIVITY

The Institute publishes the results of its work in three series, of which the scientific series 'Communicationes Instituti Forestalis Fenniae' is the more important. Since 1918 nearly 600 studies have been published, many of which have been in English.

The results of research work aiming at practical forestry as well as preliminary results of long-term projects are published in 'Folia Forestalia' -series. Since 1963 there have been 530 publications in the series. The number increases by 40 - 50 each year.

Since 1981 practical studies and preliminary results have been published in the third series issued by the Institute, Metsäntutkimuslaitoksen tiedonantoja, which is mimeographed and aimed primarily for domestic use.

It is the aim of the information activity of the Institute to make the acquired information accessible to everybody.

The press distribution covers all the professional papers in the field of forestry as well as prominent daily newspapers, news bureaus and other news media. An important way of informing are the excursions and training occasions where research officers give lectures.

Guidebooks on experimental areas and other information material on the Institute can be acquired from the Information Service.

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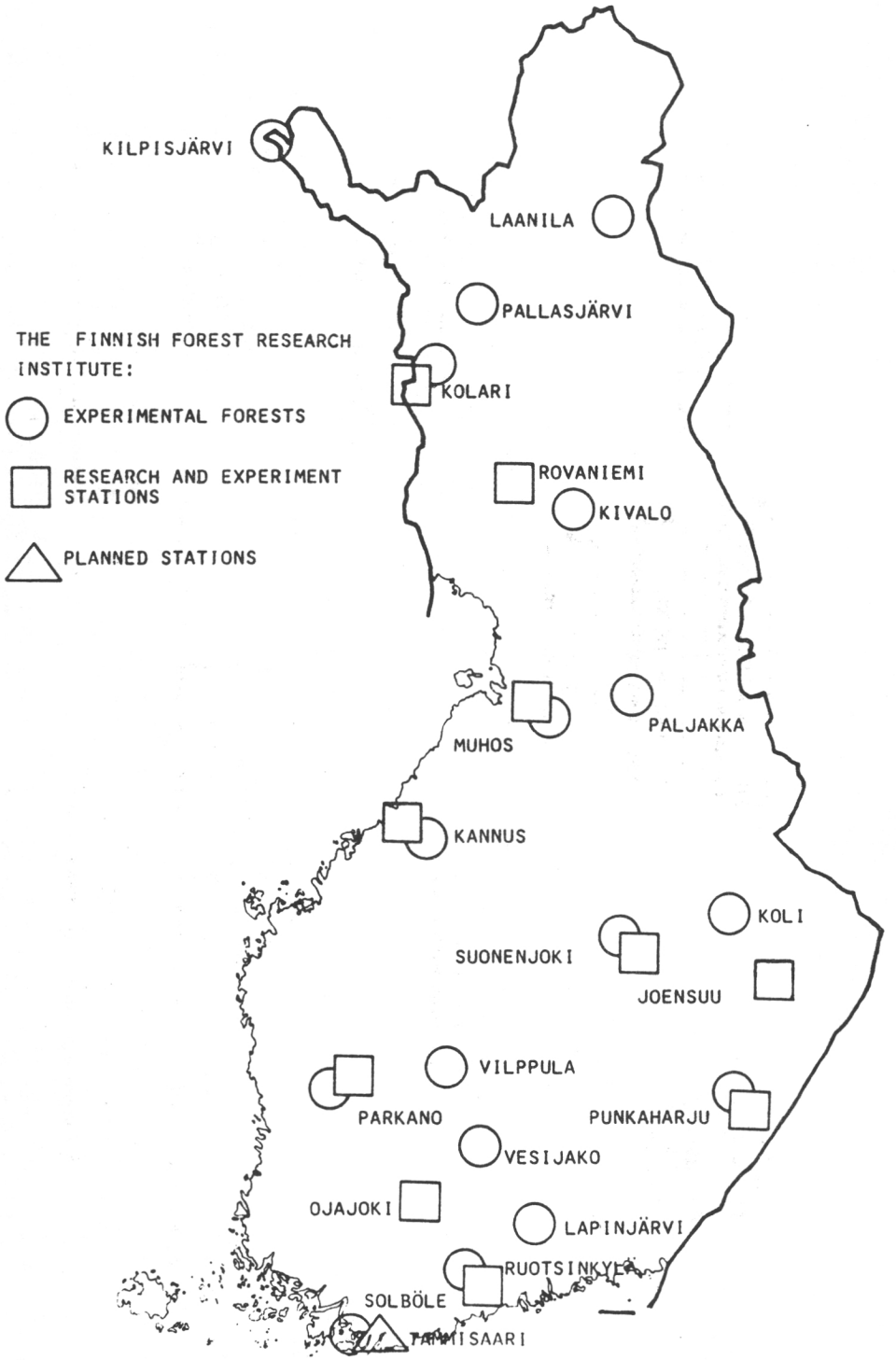
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