

**ELAV International exchange visit
Finland: 21 – 25 May 2007
'Forest Planning'**

The Scots group of Dave Bruce, Viv Halcrow, Ed Jackson and Rhys Llewellyn met at Aberdeen airport early on the morning of Monday 21st May. We flew to Helsinki via Amsterdam and then on to Joensuu in the east of Finland, arriving in the evening....without our luggage! However there was a later flight from Helsinki to Joensuu and by the time we'd had a beer and an excellent meal in the hotel, our bags had been delivered to the hotel. Joensuu is a university town, located in the district of Northern Karelia, with a population of about 58,000 people. The climate is characterised by short summers and long, cold winters when the temperature can be –30C for extended periods. We saw few old buildings in the town; most date from the 1960s and are of concrete construction. Roads and pavements are wide and there are a huge number of bicycles!

The following morning (**Tuesday**), after a good breakfast, we were greeted in the hotel foyer by Leena Karkkainen, the ELAV Finland Project Officer. Our guide for the day, Eero Lukkarinen, arrived and we sped off in his car. It seems the dirt roads off the main highways are excellent training grounds for would-be rally drivers. Eero is a forest manager employed by the Forest Management Association of North Karelia (FMA) which manages a range of forest operations in privately owned forests, on behalf of private forest owners.



Rhys, Ed, Eero and Dave look at birch management

By Dave Bruce:

The day was spent visiting a number of forest sites managed by the FMA. The North Karelia forest area consists of around 1.6 million hectares, just over 70% of the region's land area, and accounts for 7% of Finland's total forest area.

Restocking Site Visit.

The first stop of a rather drizzly day was to look at a typical Finnish restocking site; the site was approximately 1.7ha in size, generally a flat site, with moderately sloping ground to the south. Unlike most Finnish sites much of the brash had been retained on site after harvesting, although the residues were much less than what would be expected on a typical Scottish clearfell site.

Ground preparation had been carried out by excavator, producing individual planting positions, the previous autumn. Eero explained to us that the ground preparation is mainly carried out before the first snow of winter as this allows mounds to settle and make better contact with the ground beneath.

The planting technique, plant type and work method is markedly different to those employed in the North of Scotland. Planting densities tend to be lower in Finland, with around 1,600 trees being planted per hectare on the site we visited, whereas in the UK this figure is usually over 2,500 per hectare. The trees used on the planting site were 20cm container grown Norway Spruce, planted using a pottiputki device. The pottiputki is a foot-controlled tube device, allowing 1000 plants a day to be hand planted without bending down; planters work full time earning 7 Euro cents per plant and receive State Benefit during the frozen winter months. The pottiputki is ideally suited to cell grown plants and mineral soils with very few stones. The use of cell grown trees and mechanised planting aids are currently limited in Scotland, this is due in part to the continued use of bare root plants, which are required for their thicker root collar due to the problem of weevils on restocking sites, a problem not common in Finland.

One surprising aspect of the planting site was the absence of fencing; Eero told us that fences are not required due to the low densities of grazing mammals. The elk population in North Karelia is in the region of 7 elk per 100sq km, a level not likely to put forest establishment at risk, this is put in perspective when you consider that the deer population over much of Scotland stands around 18-20 deer per 100ha.



Eero and Rhys at the restocking site

Ground Preparation Site

The second stop of the day was to see how ground preparation is carried out. Again the site was quite small, being about 1.2ha, which Eero told us was a typical size of Finnish clearfell sites, although in certain circumstances clearfells could extend to around 15-20ha. The ground preparation contractor was using 13.5 ton Kobelco excavator, with additional guarding to the underside and tracks of the machine. In comparison ground preparation contractors in Scotland use very similar machines. The spoil mounding technique that we saw being employed on the visited site, whereby a drain is dug and the spoil used to create individual planting sites has widespread use across the north of Scotland.

One aspect of site preparation for restocking in Finland that differs considerably from Scotland is the complete removal of brushwood from site. This can be attributed to the well-developed fuel-wood industry in Finland, as well as resulting in an increase in income for the forest owner from the sale of fuel-wood, it also reduces the costs of ground preparation.

Harvesting Site

Our final visit of the morning, and by that time the weather had brightened up considerably, was to a harvesting site, again managed by the FMA on behalf of a private forest owner, with harvesting well underway on site. The timber on this site had been marketed by the FMA and sold to the timber purchaser Stora Enso. Harvesting was being carried out using a Ponsee harvester and forwarder, Ponsee are a Finnish brand and are manufactured in Finland and exported across Europe, including the UK.

The harvesting site consisted of mature Scots Pine, approximately 160 years old. In general 2 products are cut in Finland, sawlog, which goes for milling, and pulp which goes for use in engineered wood products or paper. Comparatively in Scotland rotation length is around 50 years, with up to 15 product types being cut on any one clearfell site. The range of products cut in Scotland can be attributed to the greater diversity of productive conifer species and numerous end product uses.

As part of the site visit we were given a demonstration to see how the harvester operated. We were able to sit in the cab with the operator. Apart from being a means of harvesting trees, we were shown that the harvester head continually monitored diameter and length of the tree so as to produce the optimum return for the forest owner (saw logs are worth more than pulp).



In the cab of the harvester

Harvesting techniques are remarkably similar in Finland as they are in Scotland, although a major UK difference in technology related to onboard GPS positioning and mapping. Another contrast, explained to us by Eero was that sites situated on soft ground or peat soils were generally left until the ground was frozen, so as not to damage the soil structure.

Forest Management Association Presentation

After a stop-off for lunch in a roadside café, we headed back to Eero's office where we were given a presentation on the structure and function of the FMA. The majority of people in Finland own woodlands, as part of family groups, syndicates or singly, with the average forest holding being around 30ha per person.

There is a long tradition of co-operation between forest owners in Finland with Forest Management Associations founded in 1907. In 1999 the role of the FMAs were updated through legislation to address the increased urbanisation of the forest owner and the downturn in general forest management. The aims of the FMAs are:

To promote profitability in forestry

To realise other goals such as economic, ecological and social targets as set out by the forest owner

As the FMAs run as a not-for-profit organisation for the forest owners, this enables them to collect a fee from the forest owner. On payment of the fee the forest owner is then a FMA member for the area in which they own forest. For forest owners who live some distance from their forest power of attorney can be granted to the FMAs to manage the forest on their behalf.

The FMA structure works well with around 80-90% of activities relating to timber production and 70% of preliminary planning for timber sales carried out by FMAs. FMA administration is based on elections that are open to all forest owners. A Council whose members are elected by mail voting holds the highest authority of the FMA. All FMA members have equal rights to participate in the elections and nominate candidates. The FMA organisation structure in Finland draws some parallels with private forest management companies in the UK.

Leena and her colleague then arrived and we piled into a people-carrier with our luggage and traveled to Koli National Park.

This is a relatively new (designated in the 1990s) and small National Park, set on the west shore of Lake Pielinen which is the fifth largest lake in Finland. We could (apparently) see the Russian border across the lake. Koli National Park is centred on a steep quartzite ridge rising to 347m; high altitude in Finnish terms. Old growth forest covers the ridge and the views across the lake are stunning, making it a popular area for walkers, and downhill skiers in winter. Our hotel was situated close to the top of the ridge and was accessed by a short cable railway. We enjoyed the walk to the high point and then repaired to the hotel for a beer and a good meal featuring elk meat and wild berries. On an evening ramble to see the sun set, lekking blackcock were heard, and the bird chorus included willow warbler, wood warbler, chiffchaff and blackcap which had recently arrived for the summer.



View eastwards from the hotel, Koli National Park

The following morning (**Wednesday**), Leena joined us at the hotel and took us to the adjacent heritage centre where we met Kyosti and Ulla from the Regional Forestry Centre of North Karelia.

By Ed Jackson:

Various reading materials were provided describing the background to Finland. Key points of information are:

- 1 The population of Finland is 5.2 million people.
- 2 There are 20.5 million hectares of forest in Finland covering 86% of the land area; Lapland has coniferous trees only.
- 3 The forests are 60% privately owned with about a million people having an interest in forest ownership; the average size of a forest is 30 hectares, largely unfenced. The growing season is shorter than Europe ranging 120-180 days between north and south; typically there is 90 years growth before felling.
- 4 The forest business sector employs about 90,000 people, generating 7% GDP and accounting for about 30% exports; the national forest is growing at a substantially faster rate than felling.

- 5 The forests are largely silver birch, spruce and pine; which are widely used for pleasure and support extensive berry and mushroom cottage industries. About 38% of Finns fish in inland waters for recreation of which 40% are women anglers – the catch is largely perch and pike and forms a significant and important source of food.
- 6 The rural economy is very much based upon the family farm that extends to the management of forests commercially; at the same time family income is supplemented by related work activities in contracting, tourism and food processing.
- 7 The State owns about a third of forests and there is an extensive public consultation process with regard to management planning. In addition, the old growth forests of Lapland are strictly protected.
- 8 The forests of Finland are subject to a regular inventory and data collection procedure that is undertaken every ten years, first commenced in period 1921-4.

In view of the extent and importance of forestry throughout Finland major management organisation infrastructure and support services have evolved whilst supported by a useful and accepted legal framework.

The role of the Regional Forest Centres was described by Kyosti:

- 1 There are 13 regional centres that provide harmonised planning services throughout Finland as well as promoting specific regional projects and satisfying local requirements. The Forest Centre of North Karelia employs 80 people of whom 20 are planners responsible for about 600,000 hectares of forest.
- 2 There is a legal requirement for all owners to replant felled forests in accordance with a national planning framework; the management of a forest is at the discretion of the owner although a management plan is mandated and prepared every ten years. There is a charge for such plans which are grant and tax funded.
- 3 The Regional Centres prepare about 90% of all forest plans using a unified system for each region that will extend in the next three years as a single countrywide database.
- 4 A forest management plan is prepared in accordance with an owner's wishes and needs and can focus upon timber production, conservation and nature or recreation. A plan would typically include the following items:
 - Description of state and condition of forest
 - Management and felling recommendations together with cost and yield estimates
 - Map of forest
 - Description of conservation interests and guidance to important habitats
- 5 The Regional Centres are the authority for distributing State support for work prescribed in the Forest Acts:
 - Forest regeneration and burning
 - Young forest management

- Harvesting timber for energy use
- Maintaining health of forest
- Making drains
- Improving and constructing forest road network

6 The Regional Centres provide a range of advisory, information dissemination and training services on behalf of forest owners and forestry professionals:

- Forest management and improvement
- Forest management plan deployment
- Conservation and wildlife initiatives
- Drainage and water protection
- Road construction and management
- Forest laws and taxation

7 The Regional Centres are responsible for the implementation and supervision of the Forest Act:

- Habitat management
- Forest regeneration
- Forest thinning
- Drainage
- Regional development and coordination with other organisations

After lunch at the hotel, the group visited a nearby forest holding which Ulla, who carries out forest mapping, had recently surveyed. We were joined by a photographer, whose work was made difficult by heavy rain! Ulla and Kyosti showed us the range of data collected and how this is done. They described management options. They pointed out areas of wildlife value, and a stand of Norway spruce which had been subject to elk attack; if the density of elk is too high, the animals eat the bark of Norway spruce, resulting in damage to the tree.

Leena then took us to visit The Stone Museum, near the site of one of the largest soapstone quarries; soapstone is relatively easy to carve and possesses unusually high thermal capacity. We enjoyed an interesting display on geology, archaeology and industrial uses of stone products, a range of soapstone carvings, and an exhibition of photography. Adjacent to the Stone Museum was a café and stone-stove centre with many different types of wood-burning stoves made from soapstone; state-of-the-art and inspiring until we saw the price-tag! Over a cup of tea we agreed that Dave could install one in his new house-to-be and perhaps become the sole UK importer....



Leena, Ed, Dave and Rhys in the Stone Stove Centre

Back to the hotel in Koli and we were entertained in the evening with a guided walk in the National Park, where our young guide told us folk tales and superstitions associated with the area. We then enjoyed supper prepared for us in a wooden hut, which had sheepskin-covered benches around the walls and a cooking area in the centre. On plates of birch bark we were served Karelian pies, disconcertingly like moccasins to look at, which were made of pastry wrapped around a filling of barley (good with lots of butter) and fish soup in round wooden bowls with a handle. For pudding we had warm cheese with cloudberry jam, and to drink a refreshing combination of birch sap and rhubarb juice. After a wet day the sun appeared to shine in the door of the hut and was setting over the forest as we walked back to the hotel.



Supper in the hut

The following morning (**Thursday**) we said farewell to Koli and travelled with Leena and her colleague back towards Joensuu where in hot sun we tracked down the Project Leader for the 10th **National Forest Inventory**, Dr Kari Korhonen, who is based at METLA in Joensuu. With Kari were two men from Chile who were translating the NFI technique into Spanish for use in Chile. We battled through dense growth of young Scots pine, Norway spruce and downy birch to meet the men carrying out NFI work in the forest.

By Rhys Llewellyn:

Two types of inventory work are undertaken in Finnish forests –

1. National Forest Inventory collects information at national & regional levels inventories for management planning

NFIs have been undertaken since the 1920's as a means of obtaining national & regional information on forest resources (timber dimensions & quality), site characteristics, forest health & management practices and land ownership patterns.

The 10th NFI was initiated in 2004 and will be complete by 2008; it is being undertaken by around 20 three-man field teams; each team consists of a team leader & two assistants. Field workers undergo a refresher course on an annual basis to ensure good quality assessments are carried out on a uniform basis.

The inventory field work is carried out on a clusterwise systematic sampling pattern throughout the country and consists of clusters of 14 plots laid out in different patterns

according to latitude – c-shaped clusters in central Finland, L-shaped in north & south Finland. Here in North Karelia, c-shaped patterns are used as there are fewer rivers & less agriculture. The system is not ideal – there is degree of statistical skew to the results due to the corner plots in each pattern being relatively close to each other, but the pattern is more practical and efficient compared to a straight transect of plots.

Previous NFIs have utilized 'square transects' with clusters of 18 plots laid out on the line of the square; this NFI uses a revised layout where one side of the 'square' has been removed, leaving 14 plots – the average number of plots that a field team can complete in a day. 66,000 plots are laid down in all throughout the country.

One fifth of the field sample plots are permanent & remeasured at each NFI; the non-permanent plots in the 10th NFI have been moved 1km east & north from the 9th NFI position.

The field team was made up of two team leaders for the purposes of our visit. They patiently showed us the methods for data collection and we 'helped' to collect data for three plots.

Two types of data are collected – tree data and field data.

Unbiased plot location is achieved accurately using a GPS, compass and measuring tape; the plot centre is marked using a small wooden peg; a temporary steel rod is inserted in the plot center while field work is carried out.

Tree Data

A relascope is used to assess which trees (sample trees) are to be included in the plot data following the Bitterlich basal area sampling system. Trees that are counted 'in' are measured by caliper (with the caliper jaws always pointing towards the plot centre), and assessed for crown class (dominant/co-dominant); stem quality is assessed if the diameter is greater than 4.5cm (straightness, knots, damage, forks). Every seventh sample tree is a tally tree, and has additional information recorded - an increment bore taken for analysis in Helsinki, tree volume, growth, health and timber assortments are also assessed. Tally tree numbering rolls from one plot to the next, so e.g. the 28th sample (4th tally) tree may be the second tree in the third plot.

All data is recorded on a Psion field computer.

Field data

Around 91 primary elements can contribute to the field data element of the survey including:

owner type; land use; soil samples from around the plot (up to four samples); an assessment of site classification – typically either peat forest or mineral forest which cover 30 and 70% of Finland respectively; vegetation type (coverage %) in order to estimate soil fertility which can also be checked against tree growth; growing stock within the plot species mix is assessed from 5 positions within the plot; mean diameter & mean height of the plot; recent operations within the plot (detail activity if within the last ten years, or a simple yes/no if work has been carried out 10-30 years ago); tree damage & deficiencies within the plot & possible causal agent; proposed silvicultural operations are also indicated – felling, ground prep and other maintenance works

Other details

3% of plots are audited on a random basis, audits being particularly concentrated in the early part of the season to ensure that work is being undertaken correctly.

Work clothing is supplied by METLA, along with a 31euro daily allowance for expenses; accommodation is paid in addition to this. Monthly pay is around 2400euros for team leaders & 1240 for assistants.



Kari and NFI team leader

After a roadside picnic, Leena and her colleague drove us into Joensuu where we checked in to a different hotel. The town was buzzing with excitement as a Deep Purple concert was to be staged that night. In the afternoon we had a visit to the METLA House, where Marcus showed us round and described features of the building.

The METLA house was conceived in 2002, and built in 2004, as a result of a competition run to establish a design for the new office complex for the Finnish Forest Research Institute (METLA).

METLA was formed in 1917 as part of the Ministry of Agriculture and Forestry to carry out scientific research within 9 research units around Finland.

METLA is situated in Joensuu, south east Finland, a town that previously had many wooden buildings, however most of these were demolished to make way for concrete buildings arranged around a grid road system to accommodate an expanding population in the 1950's & 60's. The idea of the wooden building was to incorporate some of Joensuu historical building materials in a modern architectural design that promoted energy efficiency, a quality working environment and also showcase the use of Finnish wood.

The floor plan of the building incorporates a cloistered area which follows on from historic building practice for educational establishments. The external cladding of the building is partly by 100-year-old reclaimed logs from old buildings and by large expanses of glass that provides a well-lit, airy working environment.

The external design of the auditorium is based on that of an upturned boat with weather-proof cladding in the form of tarred shingles that are re-treated on a regular basis; the seating within the auditorium is constructed from 12 different types of Hardwood that can be found in Finland.

The most striking feature of the entrance hall are the clustered glulam beams that support the 3-storey high ceiling; the design of the beams being based on fish chests used to catch Lamprey eels (a jawless fish with a toothed, funnel-like sucking mouth [Wikipedia]).

The main staircase within the building is intentionally narrow in order to encourage the usually reticent Finns to interact more with each other!

The building has been built with energy conservation in mind, in particular to have a good score in terms of its Life-Cycle-Assessment; this is assisted by the extensive use of wood and the building has been shown to use 55% less non-renewable energy and 75% less non-renewable materials.

The building is connected to the Joensuu district heating system which is situated around 3miles away (in a straight line). Heat is distributed by room radiators; cooling is provided by a series of thermostatically controlled cooling beams in each room.

Lighting is provided by automatically adjustable luminescent lamps that provide a good working environment during the short winter days.

Overall dimensions of the building are:

Gross area- 7650m²

Gross volume – 33150m³

Construction cost – €16million (around £11million).

Technical information derived from:

http://www.learn.londonmet.ac.uk/packages/euleb/en/p5/index_s2.html



The METLA house exterior

We returned to the hotel to get our glad rags on before walking back to the METLA house for a farewell social evening. Leena had organised a lovely buffet and we contributed (and cooked) a Bonar Bridge haggis, oatcakes and cheese, shortbread and of course whisky. We had had a very interesting, informative and enjoyable few days and it was a pleasure to spend the evening in company with those people who had made us feel so welcome. The men emerged rather flushed from the in-house sauna and then we all enjoyed a convivial evening of food, drink and conversation, kicked off by delicious cloud-berry liqueur. We then continued late into the night in a pub where karaoke was taken almost as seriously (*some* of them were good – the highlight being two young lads who were born entertainers!) as vodka....

Compiled by Viv Halcrow using material written by Dave Bruce, Ed Jackson and Rhys Llewellyn



Leena, Ed, Rhys and Dave at Koli National Park