

Society of Irish Foresters Study Tour to Norway 9-15 September 2007

On Sunday, 9 September, 40 members of the Society flew to TorpSandefjord Airport, 23 km north of Oslo, to begin the 64th Annual Study Tour. The party was welcomed at the airport by tour guide Tore Molteberg, and taken by bus to overnight accommodation at Hotel Budor, near Elverum.

Forests cover 119,000 sq km or 37% of the land surface of Norway. Productive forests comprise a smaller area, 72,000 sq km, about ten times the area of forests in Ireland. About 79% of the productive forest is privately owned, by some 125,000 forest owners. The annual roundwood harvest in 2006 was 12.2 million cubic metres. The forest resource is important to the country's economy as a source of raw material for the sawmilling, pulp and paper industries.

Monday - 10 September

The tour began with a visit to the Norwegian Forest Museum at Elverum, situated 145 km north east of Oslo. Norway has been an important exporter of timber since the beginning of the 15th century. The country's long forest history is portrayed in multi media presentations and well-preserved artefacts. Images show the development of forests since the Ice Age and the significant role played by the county's coniferous forests in the global ecological balance.

Norway's hunting and trapping traditions also feature, showing the equipment and techniques used by generations of hunters. In addition, an aquarium contains trout and char from mountain lakes, grayling from deep river pools and perch from forest ponds and lowland lakes.

The museum plays an important educational role in encouraging interest in forestry and wildlife among children, among an increasingly urbanised population. Displays encourage discovery through playing. Accommodation is provided in log cabins in a demonstration forest attached to the museum.

Educational programmes are designed for different age groups and levels of forestry/outdoor knowledge. Instruction and supervision is provided by museum staff and volunteers. Programmes are supported by a technical library comprising 25,000 volumes, as well as 200 periodicals related to the items featured at the museum.

Next stop was the Forestry Extension Institute at Biri, 162 km north of Oslo. We were welcomed by the Director, Dr Jon Pettersen, who outlined the institute's role in developing Norway's forest industry. The institute was founded in 1958 by the Norwegian Forestry Society and is a partnership of 38 member organisations, drawn from forest organisations and scientific institutions. The main objective is to provide continuous education in forestry and related areas by organising conferences and training courses, publishing educational material and funding research. On-site training is supplemented by an extensive, internet-based distance education programme.

Groups targeted by the institute are professional foresters, forest owners, forest workers/contractors, school teachers, pupils and the general public. Courses offered include silviculture, forest operations, forest economics and management, wildlife management and forest ecology. These vary from one to three days and attract in excess of 3,000 participants each year.

Financing is by way of grants from Norway's Ministry of Food and Agriculture, course fees, sale of educational material and funding received for research projects.

In 1977, the Forestry Extension Institute commenced a national programme of continuing education and extension courses entitled "Activity in Forests". The programme's objectives are to reduce the number of accidents/injuries, improve silvicultural practices and encourage better management of forest holdings. Its target groups are forest owners and forest workers/contractors. Course instructors are mainly foresters or skilled forest workers and farmers with some education in forest management and economics. Two important criteria for selecting instructors are forestry experience and a record of community involvement. All instructors are certified by the institute and must hold a diploma, which is awarded if the instructor successfully completes the institute's courses on forestry subjects and field use of educational equipment. There are 60 instructors throughout the country. Between 1977 and 2006, more than 19,400 courses were held, attended by 104,000 participants.

In Norway there is little tradition of co-operation between the formal education system and the forestry extension service. However, "Activity in Forestry" represents a successful bridging of this gap in educational collaboration. The overriding objective is to achieve a consistently high standard of forestry education and practice throughout the country.

Tuesday - 11 September

The party was welcomed to the nursery at Biri in Oppland by Dr Sjur Haanshus, President of the Oppland Forestry Society. Biri district is an important forest area which has an annual timber harvest of 1.2 million cubic metres; there is potential to increase this significantly as the annual increment is in excess of 2.4 million cubic metres.

The nursery manager, Mr Svein Krishansen, led the group on a tour of the nursery. Annual plant production is 5.5 million Norway spruce and 0.15 million Scots pine plants. The reason for the small production of Scots pine is that stands are mostly regenerated naturally. Most of the seed used is sourced from seed orchards, which results in a 10-15% improvement in growth over seed collected from the forest. It is expected that the next generation of seed orchards will provide a 20-30% improvement in growth. Seed from ten different provenances is used.

Seed is sown in a mixture of soil and vermiculite with a pH of 7.0. Germination rates of 96% are achieved regularly. Spruce seedlings are produced on a 2-year cycle, pine on a 1-year cycle. Fertiliser is applied through the irrigation system; levels are adjusted depending on foliar nutrient levels. Plants are treated with lambda cyhalothrin in the nursery to protect against pine weevil attack after outplanting.



Plant production in tunnels at Biri nursery.



Packing Norway spruce plants for dispatch at Biri nursery.

Almost all (97%) plants are containerised

More than 90% of spruce is artificially regenerated. Manual planting, carried out on contract, accounts for at least 97% of the annual planting programme. Only 2-3% of planting is machine based. By early to mid June, once the risk of frost is over, seedlings are moved out of the glasshouses. Snow cover, which persists from mid November to early April, protects 1-year-old transplants from frost damage by snow cover. In winter, glasshouses are heated by wood pellet boilers, supplemented by oil. In an effort to maximise the use of glasshouses, some 6 million tulips are grown during the winter. Overall, the greatest difficulty is forecasting demand – a problem familiar to nursery managers everywhere.

Wednesday – 12 September

From Biri the party travelled to Lillehammer, 180 km north of Oslo. We visited the Museum of Traditional Norse Architecture and the ski-jump used during the 1994 Winter Olympics.

Lillehammer district has a forest area of 27,500 ha, which produces an annual cut of 70,000 cubic metres, mainly Norway spruce sawlog and pulpwood, with some birch firewood. There are 545 forest owners in the district, with an average forest area of 50 ha.

Our first forest stop was a farm forest at an elevation of 600 m (in this part of Norway the tree line is at 900 m). The property is 103 ha, with four separate blocks producing 260 cubic metres/annum. To reach the site we travelled 22 km by forest road, through the properties of 60 separate forest owners.

Stands of naturally-regenerated Norway spruce aged 105–120 years, with a standing volume of 180 cubic metres/ha were being harvested by processor. Total harvesting costs were €14/cubic metre, while the expected log price was €50/cubic metre, at roadside. Prices had risen in the period before the visit, mainly due to curtailment of supplies from Russia, following the imposition of taxes on roundwood exports. Felled timber must be removed from the site within 14 days to avoid bark beetle damage. The processor contractor harvests 36,000 cubic metres/annum, working the machines in two shifts. Cable logging is seldom used nowadays.

On clearfell sites, at least ten deadwood/ha trees must be retained. Some high stumps are also left as platforms for hunting owls. Stumps are treated with urea on thinning sites but not on clearfells. The site was to be reforested with Norway spruce at a stocking of 1600/ha, at a cost of €880. Elk damage is a major problem in the locality - pine is rarely planted as it particularly vulnerable.

Our fourth stop was at the 45 ha farm of Erik Verdun, which comprised two stands of Norway spruce, planted on former farmland. One was 54-years-old, with a maximum mean annual increment of 8 cubic metres/ha. It carried 230 cubic metres/ha, and was approaching maximum mean annual volume increment. The other stand was 69-years-old, with the same productivity, and a standing volume of 300 cubic metres/ha. It had been thinned in 1975.

There was an ancient elk trap on the site. Such archaeological features must be included in forest management plans. A felling licence is not required but the forest owner must have a management plan.

Annual rainfall is 660 mm - it is seldom dry enough for forest fires to be a problem.

Thursday – 13 September

Sogn og Fjordane (Land of the Fjords) is a huge, sparsely populated district, 18,634 sq km in extent, with a forest area of 270,000 ha. Species composition is 13% Norway spruce, 33% Scots pine and 54% broadleaves (mainly birch, willow and aspen). Annual increment is 0.9 million cubic metres - 50% spruce, 28% pine and 22% broadleaves. Potential annual harvest is 400,000 cubic metres but the annual cut is only 53,000 cubic metres, due to lack of adequate forest roads and the difficulty of getting trained forest workers in this sparsely populated part of the country.

The greatest challenge is to manage the huge increase in the volume of spruce coming on stream. By 2015, the potential annual harvest will be 430,000 cubic metres – more than 10 times what is being cut at present.

Next was a visit to the Tree Breeding Centre at Aroy, an important seed orchard and gene bank for Norway spruce. Here we were met by Ms Merete Larsman, a professional forester, forest owner and geneticist. She outlined the development of the Norway spruce breeding programme since the early 1920s.

Middle European provenances are most suited to the district. In the main, Russian and Alpine provenances of Norway spruce, grafted onto native stock, have the highest seed production.

In selecting seed stands, 138 separate Norway spruce blocks were assessed, from which 47 were selected as suitable.

Afforestation levels in the district have dropped significantly – from six million plants in 1965 down to 0.2 million in 2007. Species composition of recent afforestation is 35% Norway spruce, 35% Scots pine and 30% broadleaves. State subsidies are available for afforestation. Eco-tourism is now an important contributor to the economy of the district, and there is intense debate on the best way to develop multi-use forestry in the area.

At the next stop we met Mr Arnt Hovland, the owner of the nearby salmon fishery and hatchery at the Aroy river. This 2 km stretch of fishing was bought by the great, great, great grandfather of the owner in 1746. The hatchery dates from 1936. Sea lice pose a serious threat to fish farming so smolts are fed an anti sea lice supplement, which is proving to be very effective.

The fishing season lasts from 1 June to 31 August. The largest fish ever caught was a 31 kg salmon in 1895. In recent times, a 25 kg salmon was landed in July 2006. Fishing does not come cheaply; the price for a full season's fishing for four rods is €52,600. Any fish caught belongs to the fisherman.

Most fishermen are Norwegian, but in recent years there have been an increasing number of British and Russian anglers. Since 1991, the local hydro electric power station has funded approximately 20% of the smolts released each year. Currently, the water level in the river is being lowered by the three hydro electric power stations up-stream, with the result that only 47 salmon were caught in 2006, whereas the normal annual catch is close to 100.

We departed the fish farm and headed for Amblegard where we were met by the forest owner, Mr Gjert Heiberg, who is also the local District Forest Officer. The forest at Amblegard is 2,550 ha in area, and is located on the western edge of Sognafjord. As it receives the full benefit of the Gulf Stream, the climate is quiet mild. Apples, pears, plums and cherries can be grown commercially. The soil is generally shallow. Annual precipitation is 740 mm.

The forest at Amblegard was bought by an ancestor of the present owner in 1687. The timber dwelling house, still in use today, was built in 1690 – the year of the Battle of the Boyne.

Over the intervening 300 years, the forest has been harvested regularly. The more accessible areas, along the valley floor and lower slopes, comprise one third of the productive area and are harvested each year, whereas the less accessible, higher slopes are harvested only when timber prices are high. The high elevation forest blocks became accessible in the past 35 years only, as a result of an extensive road building programme. Forest road building began in 1938, but it was 1971 before a significant programme began. Today there are 39 km of truck roads.

Prior to 1930, all pine forests were naturally regenerated. Between 1930 and 1950 artificial regeneration (often combined with burning of the lop and top) was introduced. After 1950 there was a gradual move towards artificial regeneration using 2-year-old transplants. This change arose, partly from a scarcity of good seed, but also concerns were surfacing regarding the loss of nutrients following burning. Planting after burning gave a quick start to the young pine transplants but the initial boost was often followed by a long period of growth stagnation, which allowed heather to become established. Windthrow and snow break, following heavy snowfall, are the main causes of forest damage. Insect or fungal attack are not major problems.

The main sources of revenue are timber sales; rent from the letting of five holiday houses (from May to October); shooting lettings – usually six red deer stags, valued at €65 apiece, are shot each year; and the sale of organic fruit and vegetables grown on the farm. The main land types in the forest are:



Group at Mr Gjert Heiberg's forest in the Sogn og Fjordane district.

| <i>Land type</i> | <i>ha</i> | <i>%</i> |
|------------------------------------------------|--------------|------------|
| Productive forest land | 1,280 | 50.1 |
| Bogland (within the productive forest area) | 80 | 3.1 |
| Waste land (within the productive forest area) | 400 | 15.7 |
| Pine forest (above the commercial timberline) | 230 | 9.1 |
| Birch forest (above the commercial timberline) | 40 | 1.6 |
| Unplanted mountain land and lakes | 500 | 19.6 |
| Farmland | 20 | 0.8 |
| Total | 2,550 | 100 |

We were treated to a lunch of homemade Hunters soup (a thick broth made from venison and vegetables), washed down with locally brewed beer and homemade apple juice.

After lunch, the group visited the following areas:

- A 65-year-old stand of naturally-regenerated Scots pine, which had been thinned twice and is programmed to be clearfelled when 95-100 years old.
- Artificially regenerated Scots pine, planted in 1956 following burning of the lop and top. It has never been thinned and is now greatly overstocked. It will be thinned next year and will be thinned once more, probably in 2020, before being clearfelled in 2035.
- A stand of Douglas fir, planted in 1965 using 4-year-old plants. It has been thinned once and 30% of the stems were pruned to a height of 3 m. The thinnings were sold to the local sawmill. The final crop will supply transmission poles. Generally, there is little planting of Douglas fir in Norway as there is a strong environmental lobby which is opposed to the planting of exotic tree species.
- A stand of grand fir, planted in 1946 and thinned twice. This species is 10 times more productive than Scots pine but there is very little demand for the timber which has to be sold for pulp.
- A stand of European larch (Scottish origin) which was planted in 1946 at 3 x 3 m spacing and later underplanted with Norway spruce. It has been thinned twice but has not been pruned. The timber is used around the farm for fencing posts, gates, light construction work and repairs.
- A stand of Scots pine, with a mean maximum volume increment of 6-8 cubic metres/ha, which was planted in 1948 using 4-year-old plants. In 1986, it was designated as a Health Stand and is assessed each year to monitor the health of the forest. The main assessment criteria are the density of the crop (stems per ha), the number of cones produced per annum and the colour of the cones.
- A small clearfell site. The felled crop was 120-year-old Scots pine, mean maximum volume of 6-8 cubic metres/ha, which produced 450 cubic metres/ha when clearfelled in 2006. The site will be reforested in spring 2008 using Norway spruce tubed seedlings. No mechanical site preparation will be necessary.
- The final stop was a magnificent stand of 114-year-old Scots pine which is programmed to be clearfelled in 2021, when it will be 120 year old.



Thinning of Scots pine in the Sogn og Fjordane district.

Friday – 14 September

The group enjoyed a very pleasant drive through the Hallingdal Valley with its spectacular scenery and extensive forests. We joined our guide, Mr Tore Molteberg, for lunch in the picturesque holiday village of Gol, which is located at the eastern end of the valley.

Following a brief tour of Gol we set off for the Forest Park at Ringerike to see the animals of Norway's forests at close quarters – bear, elk, wolf, reindeer and arctic fox. Our guide gave us detailed information of their history, habitats, life-cycle and the threats to wild populations posed by more intensive forest management practices.

Recorders, chairman and accommodation

| <i>Date</i> | <i>Recorder</i> | <i>Chairman</i> | <i>Accommodation</i> |
|---------------------|-----------------|------------------|-----------------------------------|
| 9 September | - | - | Hotel Budor, Elverum |
| 10 September | Frank Nugent | Michael O'Brien | Forestry Research Institute, Biri |
| 11 September | Bob Dagg | Liam O'Flanagan | Fossberg Hotel, Lom |
| 12 September | Kevin Collins | Ken Ellis | Eikum Hotel, Hasfeld |
| 13 September | Brigid Flynn | John Connelly | Stalheim Hotel, Voss |
| 14 September | Paddy O'Kelly | Kevin Hutchinson | Klaekken Hotel, Honefoss |
| 15 September | - | - | Return to Dublin |

Participants

Denis Beirne, PJ Bruton, Frances Burke, Kevin Collins, John Conneff, John Connelly, Jim Crowley, Bob Dagg, Ken Ellis, Jerry Fleming, Brigid Flynn, Tony Gallinagh, Sean Galvin, Eugene Griffin, Christy Hanley, George Hipwell, Liam Howe, Jim Hurley, Kevin Hutchinson, Kevin Kenny, Tony Mannion, Ted McCarthy, Pat McCloskey, Kevin McDonald, Tom McDonald, Jim McHugh, PJ McElroy, PJ Morrissey, Liam Murphy, Jim Neilan, Frank Nugent, Dermot O'Brien, Michael O'Brien, Pat O'Callaghan, Liam O'Flanagan, Derry O'Hegarty, Paddy O'Kelly, Tim O'Regan, Denis O'Sullivan, Trevor Wilson.



8: Group photograph at circa 2,000 m.