# Preface

Since 1985, Finland has been participating in the Pan-European forest condition monitoring programme — the International Co-operative Programme on the Assessment and Monitoring of Air Pollution Effects on Forests (ICP Forests) — which was launched under the CLRTAP (Convention on Long-range Transboundary Air Pollution, United Nations Economic Commission for Europe). In member countries of the European Union, forest condition monitoring has been based on regulations enacted in 1986 and 1994, and on modifications subsequently made to these regulations. During 2003–2006 the monitoring programme was implemented under the EU Forest Focus regulation.

Since 1986, the Finnish Forest Research Institute (Metla) has carried out annual forest vitality and health surveys on ca. 600, systematically located permanent plots (Level I, extensive monitoring) as a part of the Pan-European Level I network (ca. 6000 plots throughout Europe). In 1996, following Finland's accession to the European Union, Metla established a network of 31 intensive monitoring (Level II) plots, located throughout the country (Fig. 1), in order to study the functioning of forest ecosystems and to investigate the causal relationships between forest condition and air pollution and other stress factors. The Level II monitoring network currently comprises plots in Scots pine (17 plots), Norway spruce (12 plots) and birch (2 plots) stands in both commercially managed (27 plots) and conservation (4 plots)



**Fig. 1**. Location of the Level II intensive monitoring plots in Finland.

forests, the latter forming a part of the ICP Integrated Monitoring Programme. A wide range of attributes and parameters are monitored either continuously or at regular intervals on the plots (Table 1). The monitoring data that have been collected during the past 12 years represent a unique time series that have already greatly increased our understanding of the functioning of forest ecosystems, and are currently being utilized by researchers from Metla, as well as other national and international collaborating institutions. All the data have been stored in the Forest Monitoring database at the EU/Joint Research Centre in Ispra, Italy, as well as the data from the ICP Integrated Monitoring plots in the database at the Programme Centre in Helsinki, and are available for research purposes on request.

In addition to the monitoring activities, Metla has also received co-funding under the EU Forest Focus regulation to carry out pilot studies and demonstration projects designed to integrate and fur-
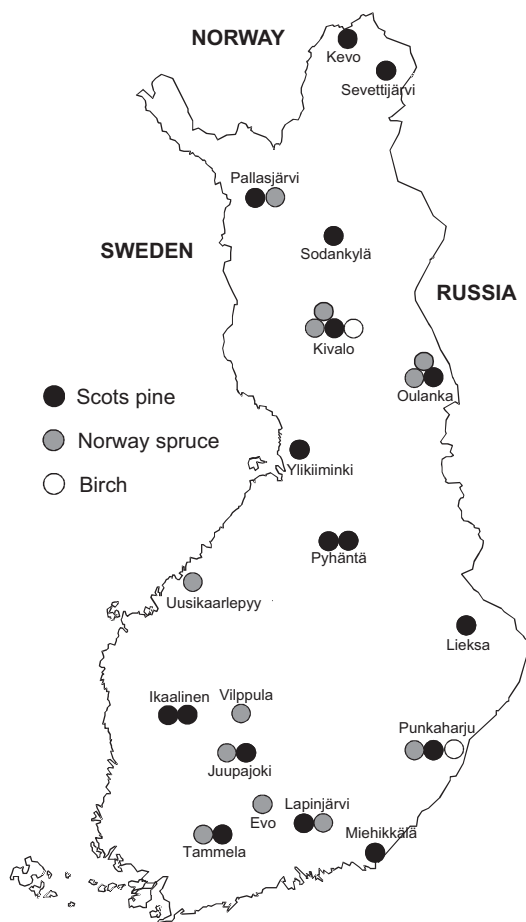
ther develop existing monitoring techniques, and to develop tools for addressing the new monitoring challenges. Three of the papers published in this supplementary issue have been carried out under this co-funding programme.

The results of the monitoring activities have earlier been published in technical reports for 1998 (Raitio and Kilponen 1999), for 1999 (Ukonmaanaho and Raitio 2000), for 2000 (Ukonmaanaho and Raitio 2001), for 2001 (Rautjärvi *et al.* 2002), and for 2002–2005 (Merilä *et al.* 2007). The main aim of these reports has been to provide data users and other interested parties with information about the condition of forests and ecosystem functioning in Finland. The data collected under the monitoring programmes have already made a considerable contribution

**Table 1**. Monitoring activities on the Level II plot network.

| Survey | Number of plots | Frequency |
|---|---|---|
| Deposition | 16 | Continuous |
| Soil solution | 16 | Continuous (snow-free period only) |
| Litterfall | 16 | Continuous |
| Meteorology | 12 | Continuous (above/inside stand) |
| Phenology | 8 | Spring and autumn |
| Tree condition | 31 | Annual |
| Foliar chemistry | 31 | Every 2 years |
| Tree growth | 31 | Every 5 years |
| Ground vegetation | 31 | Every 5 years |
| Soil condition | 31 | Every 10 years |

to assessing the impact of acidifying N and S deposition on Finnish forests, and are now proving invaluable in evaluating and predicting the possible effects of the new threats (e.g. climate change, changes in carbon sequestration, loss of biodiversity) to forest condition and ecosystem functioning, and in investigating the relationships between tree condition and anthropogenic, biotic and abiotic stress factors. The purpose of this supplementary edition of Boreal Environmental Research is to present researchers working in this field with the latest results of scientific studies carried out under Metla's forest condition monitoring programme. The papers cover a wide range of topics including the optimization of techniques for monitoring carbon stocks in large-scale surveys, carbon, nitrogen and other nutrient fluxes, the relationships between foliar, soil and soil solution chemistry, the species composition and coverage of ground vegetation in boreal forests, and the contribution of the ground vegetation to carbon and nitrogen stocks in the soil.

The co-funding provided by the European Commission, and the work carried out by the field, laboratory and office staff of Metla's research units, are gratefully acknowledged.

**John Derome**　　　　　　　　　　**Päivi Merilä**

National co-ordinator　　　　　　　Level II co-ordinator
John.Derome@metla.fi　　　　　　　Paivi.Merila@metla.fi

# References

Raitio H. & Kilponen T. (eds.) 1999. Forest condition monitoring in Finland. National report 1998. *The Finnish Forest Research Institute, Research Papers* 743: 1–147.

Ukonmaanaho L. & Raitio H. (eds.) 2000. Forest condition monitoring in Finland. National report 1999. *The Finnish Forest Research Institute, Research Papers* 782: 1–151.

Ukonmaanaho L. & Raitio H. (eds.) 2001. Forest condition monitoring in Finland. National report 2000. *The Finnish Forest Research Institute, Research Papers* 824: 1–157.

Rautjärvi H., Ukonmaanaho L. & Raitio H. (eds.) 2002. Forest condition monitoring in Finland. National report 2001. *The Finnish Forest Research Institute, Research Papers* 879: 1–117.

Merilä P., Kilponen T. & Derome J. (eds.) 2007. Forest condition monitoring in Finland — National report 2002–2005. *Metlan työraportteja/Working Papers of the Finnish Forest Research Institute* 45: 1–166. http://www.metla.fi/julkaisut/working-papers/2007/mwp045.htm