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Forest condition monitoring under UN/ECE and EU programmes in Finland

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Finnish Forest Research Institute

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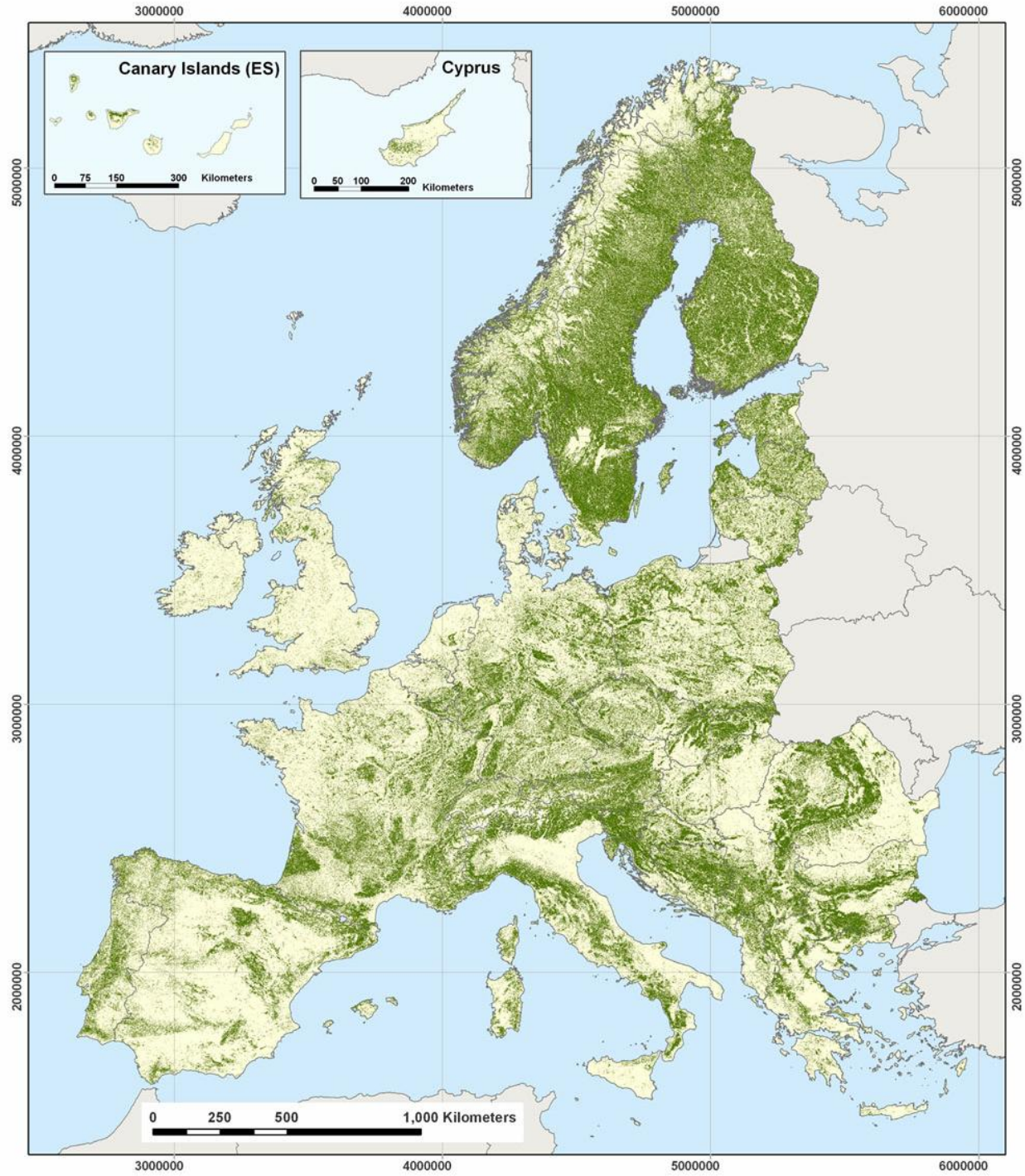

Source: A. Pekkarinen, L. Reithmaier, P. Strobl (2008): "Pan-European Forest/Non-Forest mapping with Landsat ETM+ and CORINE Land Cover 2000 data.", Manuscript. EC / JRC

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ICP Forests

The International Cooperative Programme on the Assessment and Monitoring of Air Pollution Effects on Forests (ICP Forests)

was established by

the United Nations Economic Commission for Europe (UN/ECE)

under

the Convention on Long-range Transboundary Air Pollution (CLRTAP)

in 1985

The Member States of the European Union (EU)

agreed upon

the European Union Scheme on the Protection of Forests against Atmospheric Pollution

in 1986

”Obligation” to report the state of the forests

ICP Forests

International Co-operative Programme on Assessment and Monitoring of Air Pollution Effects on Forests

Participating countries

please select a flag

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The role of European union?

- Several regulations 1986-2006
  - 1987-1992
  - 1992-1996
  - 1997-2001
  - 2002
  - 2003-2006
- Commission's support during 1987-2006:
  - ~ 300 million € (including projects to forest fire prevention)
  - ~ same amount from member states

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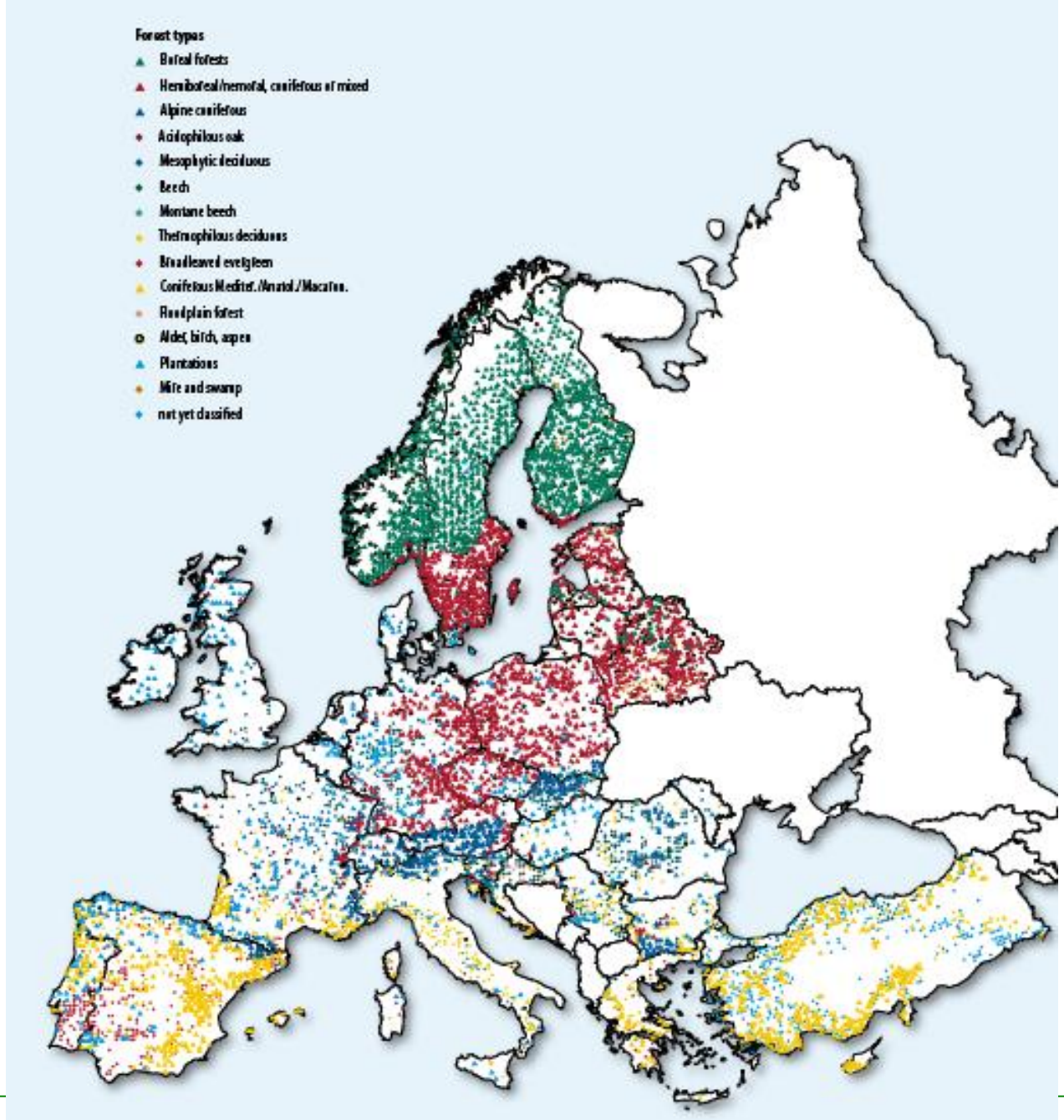

> 6000

Level I plots

16*16 km grid

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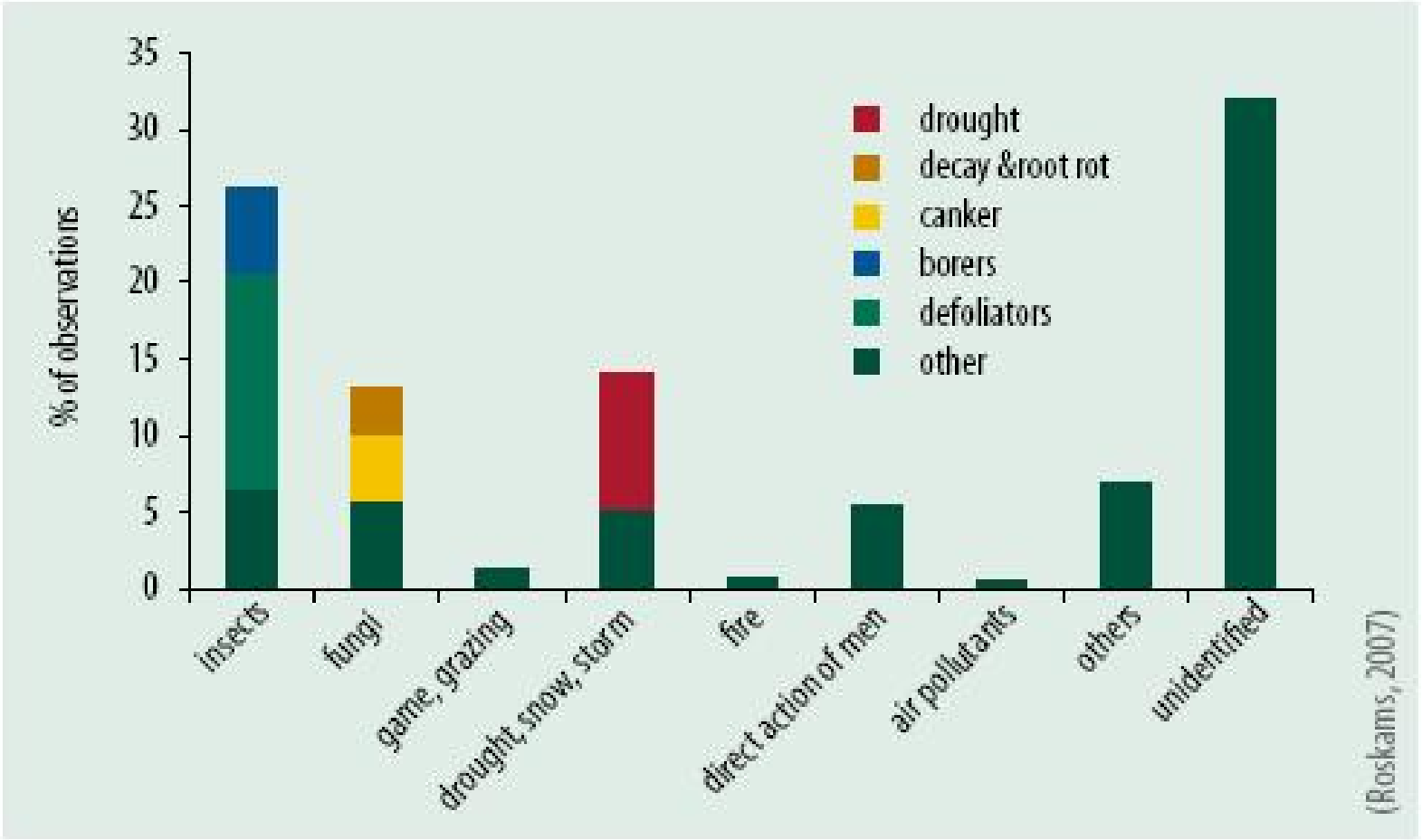
Forest health and vitality

Crowns of undamaged, slightly and moderately damaged Scots pine trees.

Photos: Mues



Percentage of observed damage causes. Insects, fungi and weather influences were most frequent.

Source: Roskams in 2007 Executive report

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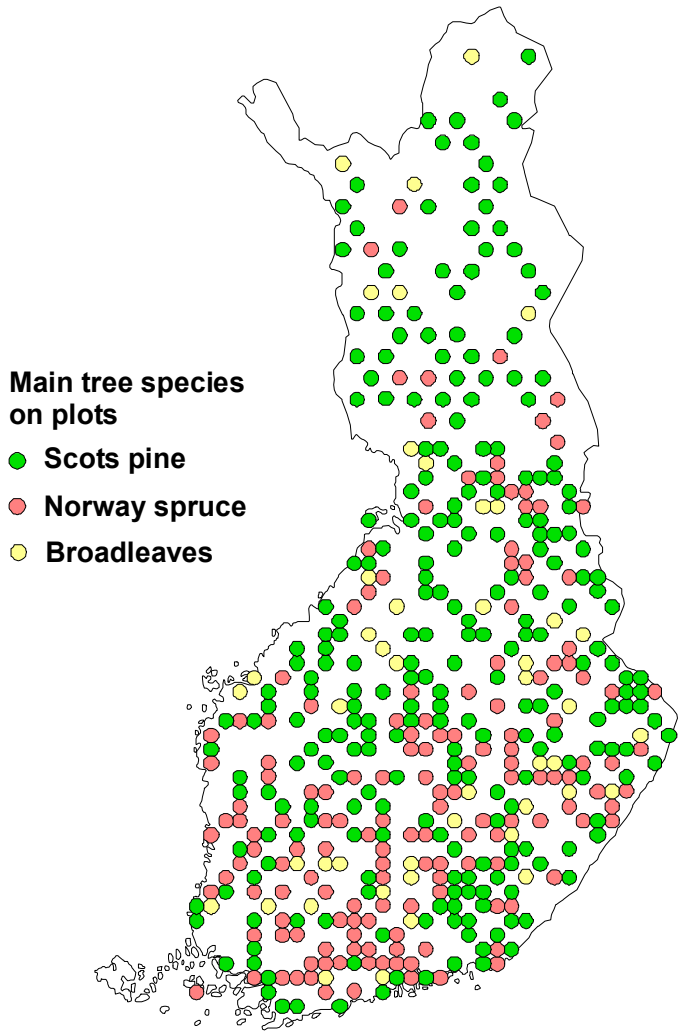
Monitoring activities on Level I plots

Crown condition assessment
Discoloration of foliage
Biotic and abiotic damage

Foliar chemical analyses
Soil chemical analyses

450 plots



The network of the annual, large-scale crown condition survey (Level I) in Finland

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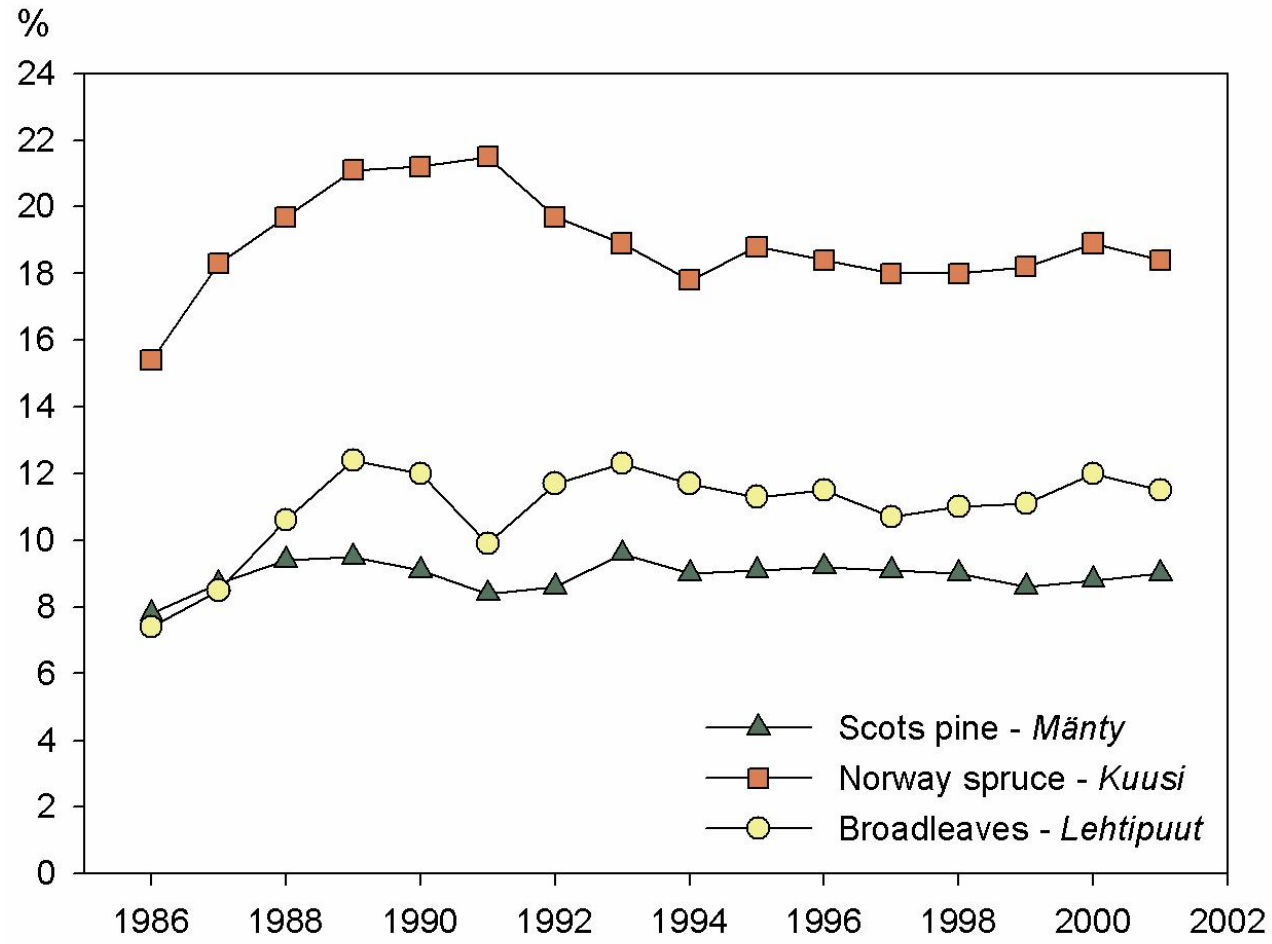

Lindgren, M. 2001

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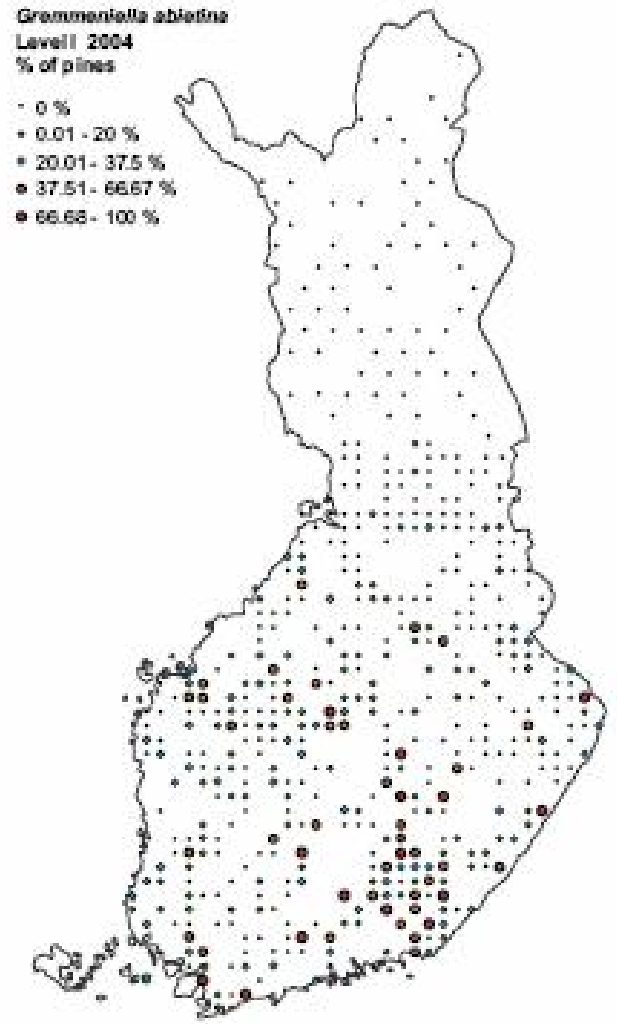

Figure 1. The occurrence of *Gremmeniella abietina* on Level I plots in 2004 as a proportion of the total number of Scots pine observation trees.
Kuva 1. Versosurman esiintyminen I tason havainto-aloilla vuonna 2004, % mäntyhavaintopuista.

Source:

Nevalainen et al. 2007

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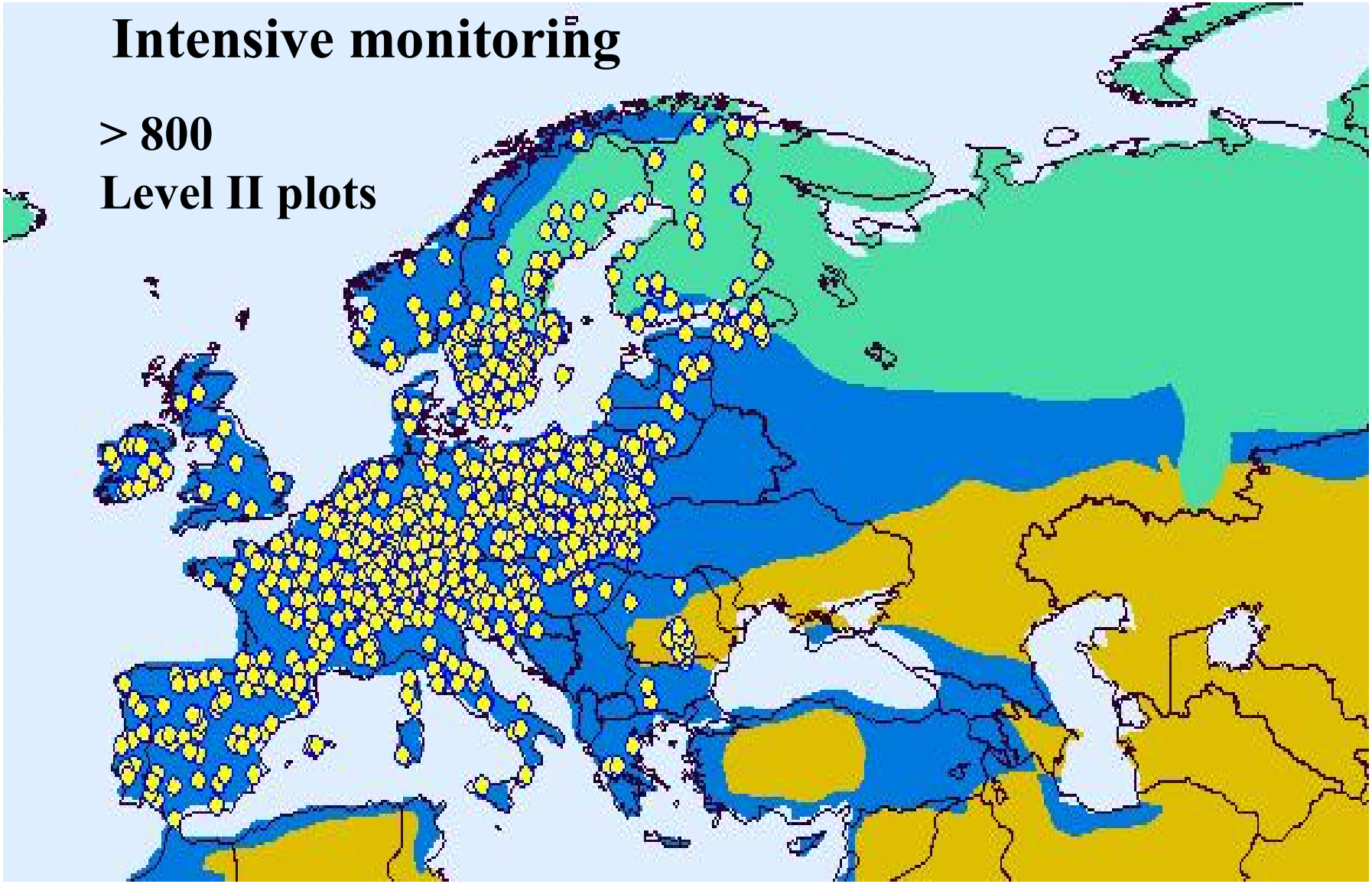
Intensive monitoring

> 800

Level II plots



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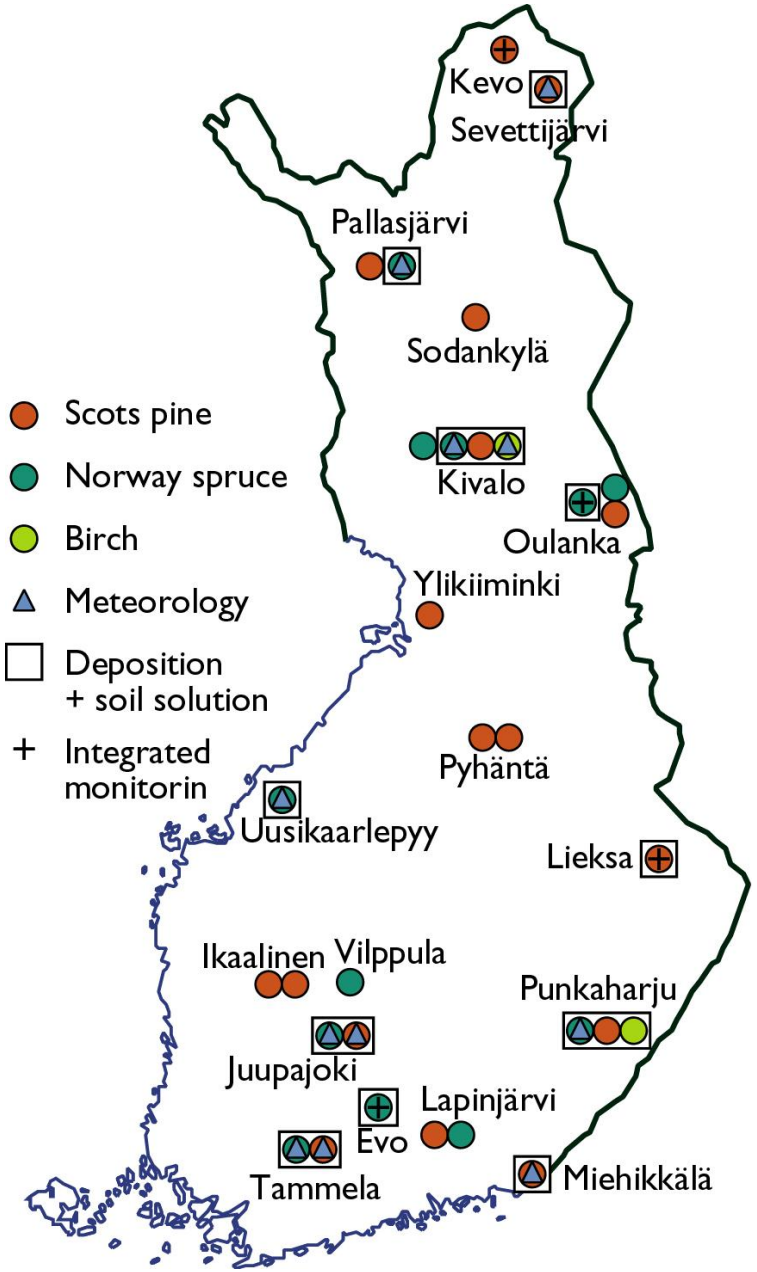

The observation plot network in Finland

31 monitoring plots

27 on mineral soil sites

4 on peatlands

4 plots represent natural stands in catchment areas (Integrated Monitoring plots)

27 plots represent commercially exploited forests

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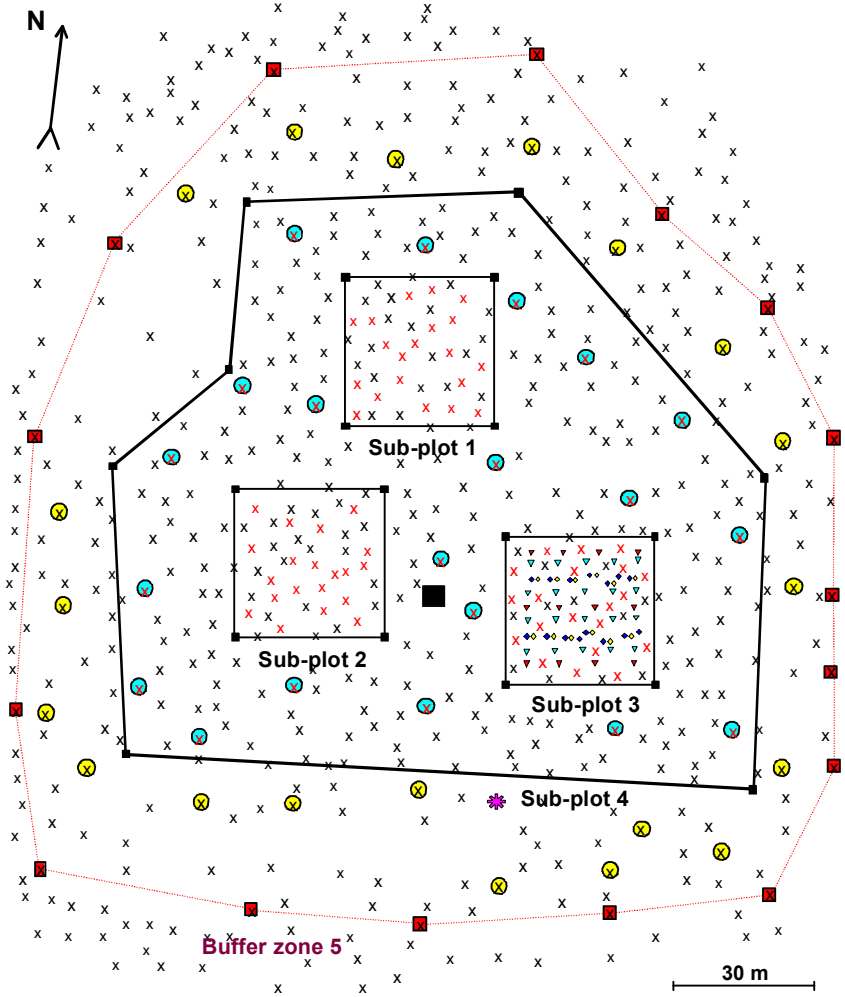
The design of the observation plot and location of the sub-plots



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Monitoring activities

Survey	*No of plots*	*Frequency of assessments*
Crown condition	31	Annual
Soil condition	31	Every 10 years
Needle chemistry	31	Every 2 years
Tree growth	31	Every 5 years
Stem diameter growth	12	Continuous*
Deposition	16	Continuous (Sampling every 4 weeks, but every 2 weeks during the snowfree period)
Soil solution		
- gravity lysimeter	16	Continuous (Sampling every 4 weeks during the snowfree period)
- suction-cup lysimeter	16	Continuous (Sampling every 2 weeks during the snowfree period)
Meteorology	12	
- air temperature		Continuous*
- relative humidity		Continuous*
- soil temperature (-10 cm & -20 cm)		Continuous*
- precipitation		Continuous*
- wind speed		Continuous*
- wind direction		Continuous*
- photosynthetically active radiatin (PAR)		Continuous*
- solar radiation		Continuous*
- soil frost (-10, -20, -30, ... -100 cm)		Continuous*
Ground vegetation	31	Every 5 years
	6	Every year
Litterfall	13	Every 2 weeks
Phenology	5	Three times/week during the critical period

* = Hourly measurements

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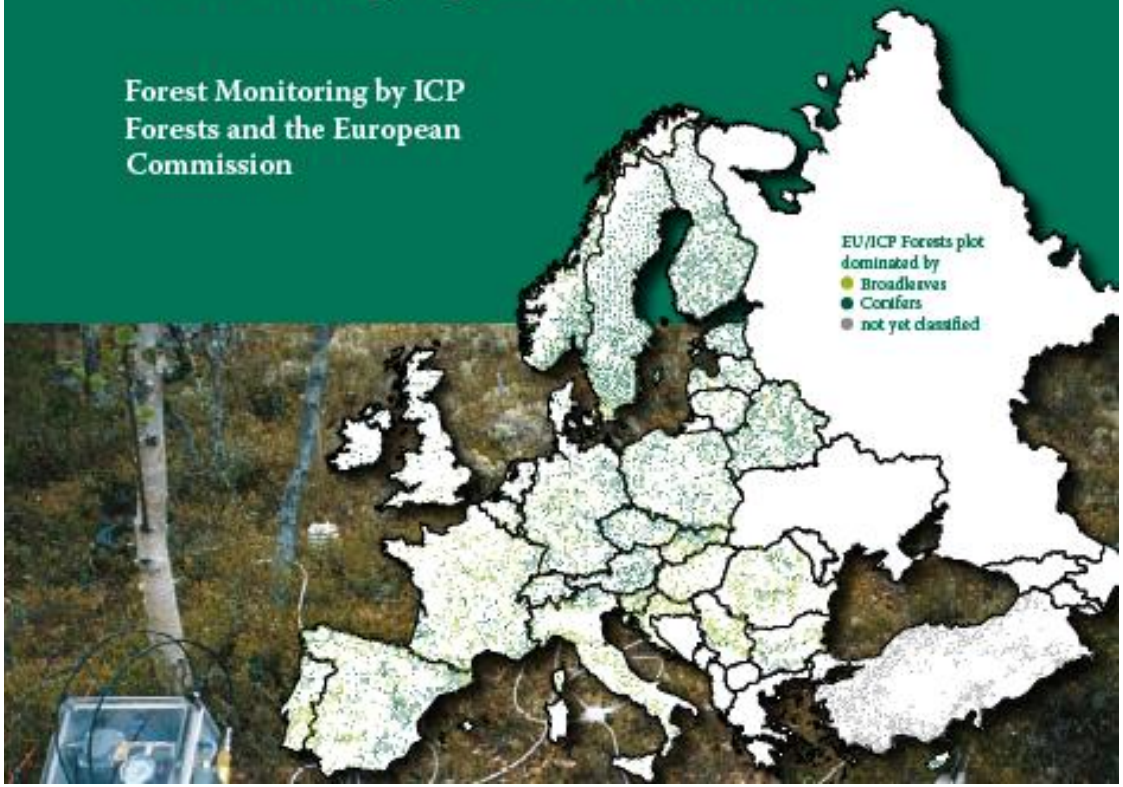
LRTAP

International Co-operative Programme
on Assessment and Monitoring of Air
Pollution Effects on Forests (ICP Forests)

European Commission

European Forests in a Changing Environment

Forest Monitoring by ICP Forests and the European Commission



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E.g. in Belgium:
800- 2200 mg / m2

Figure 1. Mean SO_4-S deposition (mg m^{-2} yr^{-1}) in stand throughfall for the period 2001–2004.
Kuva 1. Keskimääräinen SO_4-S -laskeuma (mg m^{-2} v^{-1}) metsikkösadannassa tutkimusjaksolla 2001–2004.

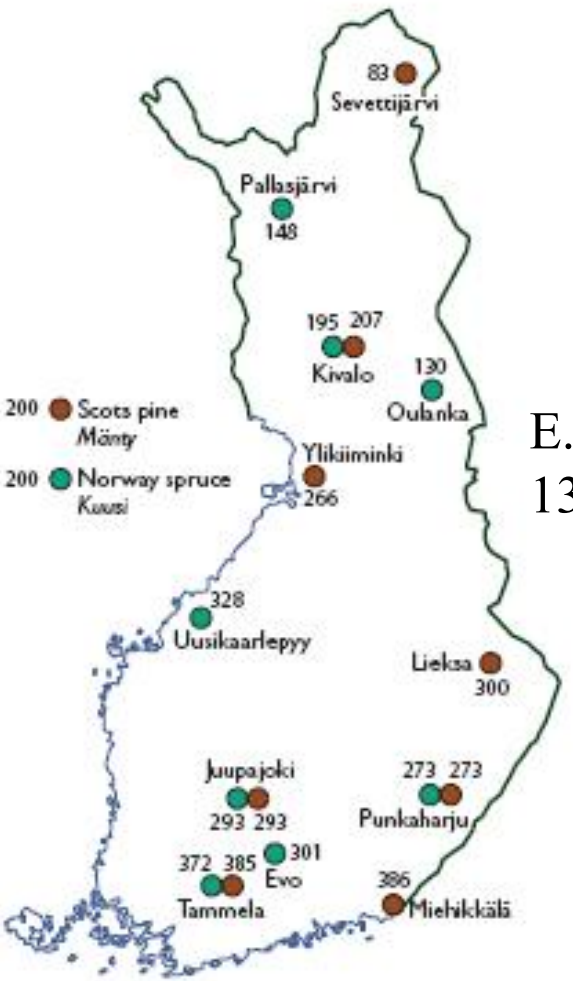
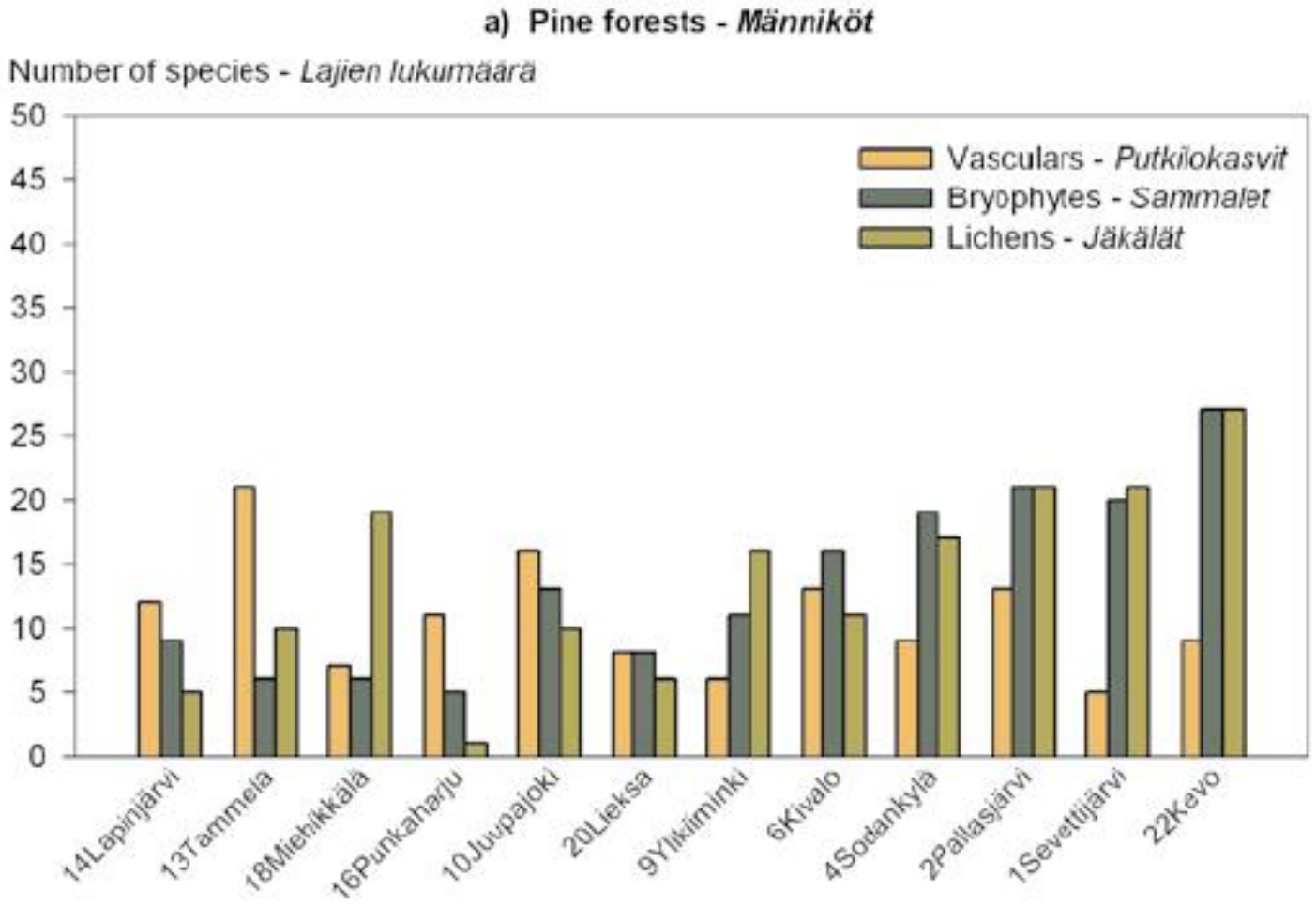


Figure 2. Mean total N deposition (mg m^{-2} yr^{-1}) in bulk deposition for the period 2001–2004.
Kuva 2. Keskimääräinen totaali-N -laskeuma (mg m^{-2} v^{-1}) avoimella paikalla tutkimusjaksolla 2001–2004.

E.g. in Belgium:
1300-4300 mg / m2

Source:

Lindroos et al. 2007



Source:

Salemaa & Hamberg 2007

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Other uses of the sample plots

- Level I = In Finland the 8th National Forest Inventory
- BioSoil: Biodiversity and soil parameters measured in pan-European level
  - Project ends in September 2008

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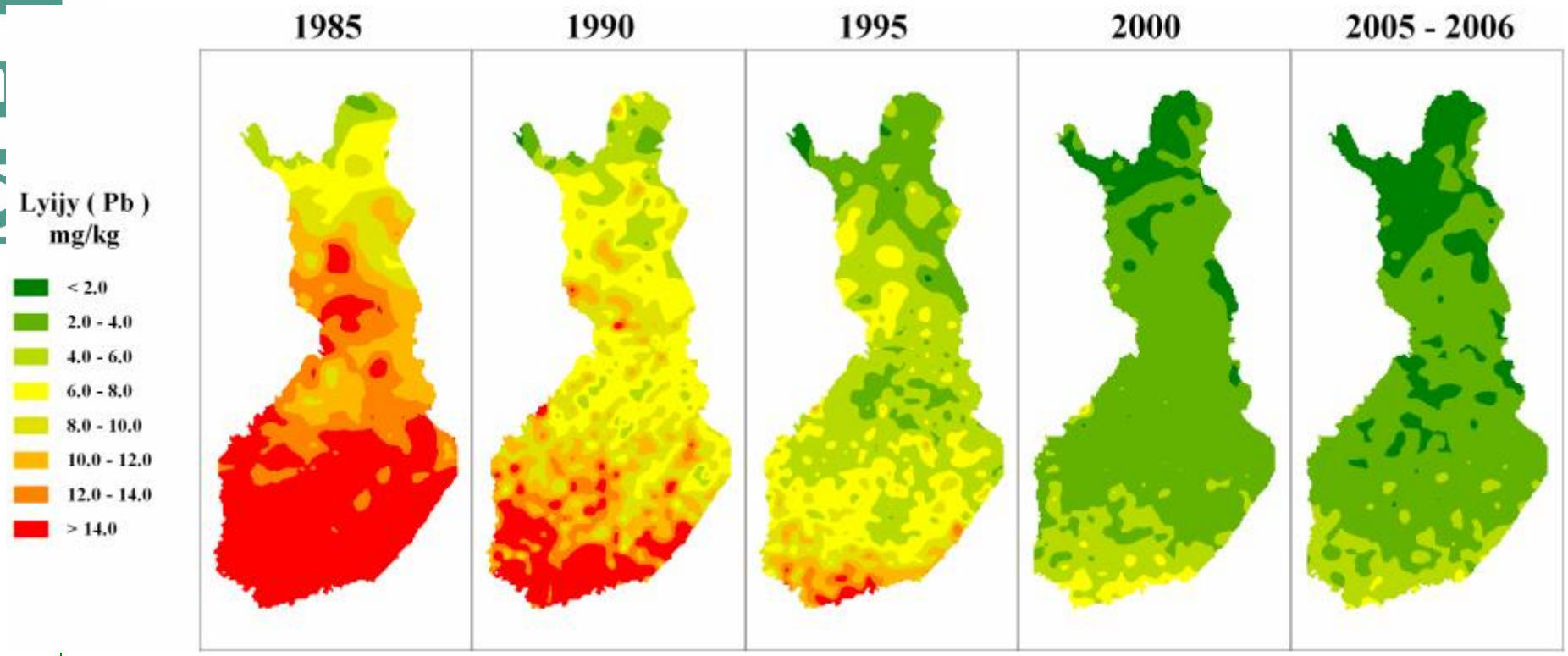
Heavy metal concentrations in mosses



Source: METINFO (http://www.metla.fi/metinfo/metsienterveys/raskasmetalli/index.htm

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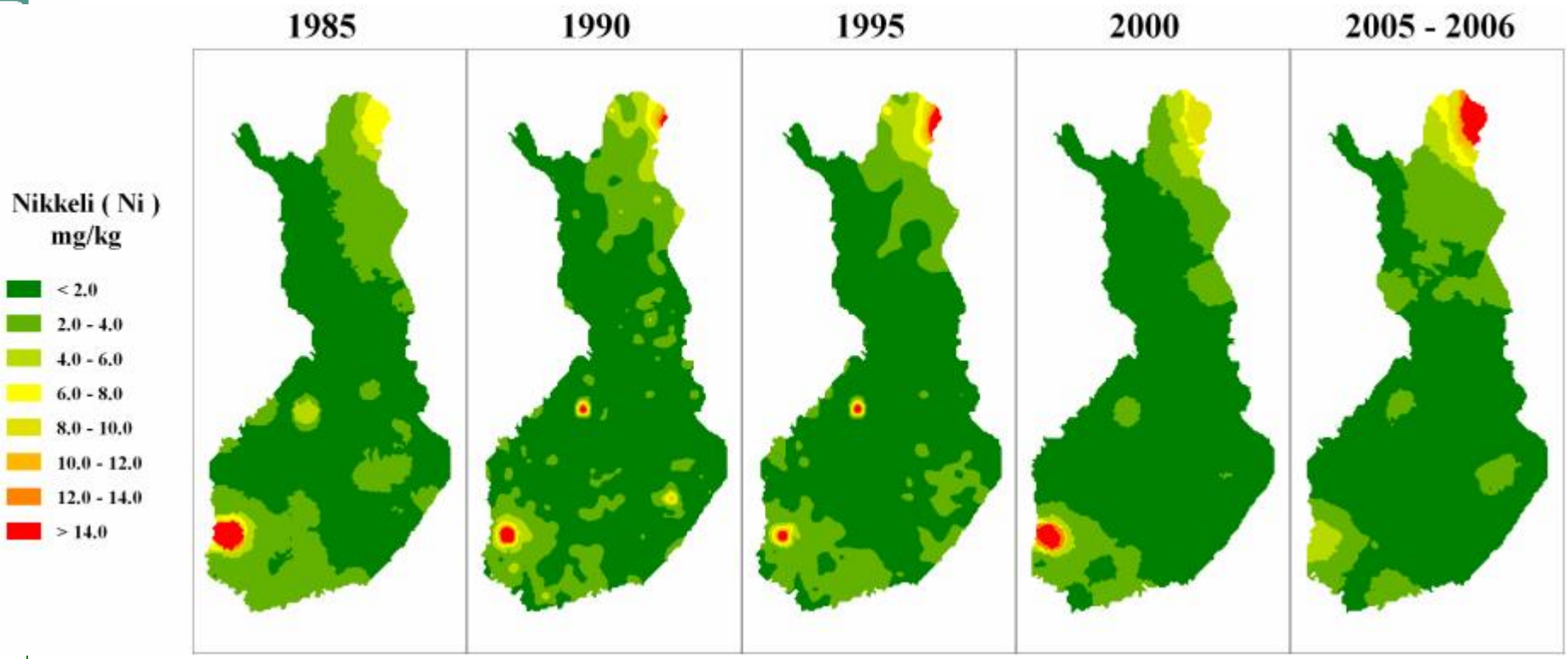

Source: METINFO (http://www.metla.fi/metinfo/metsienterveys/raskasmetalli/index.htm

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Other uses of the sample plots

- Russian / Finnish / Norwegian studies of heavy metals and other toxins in berries and mushrooms

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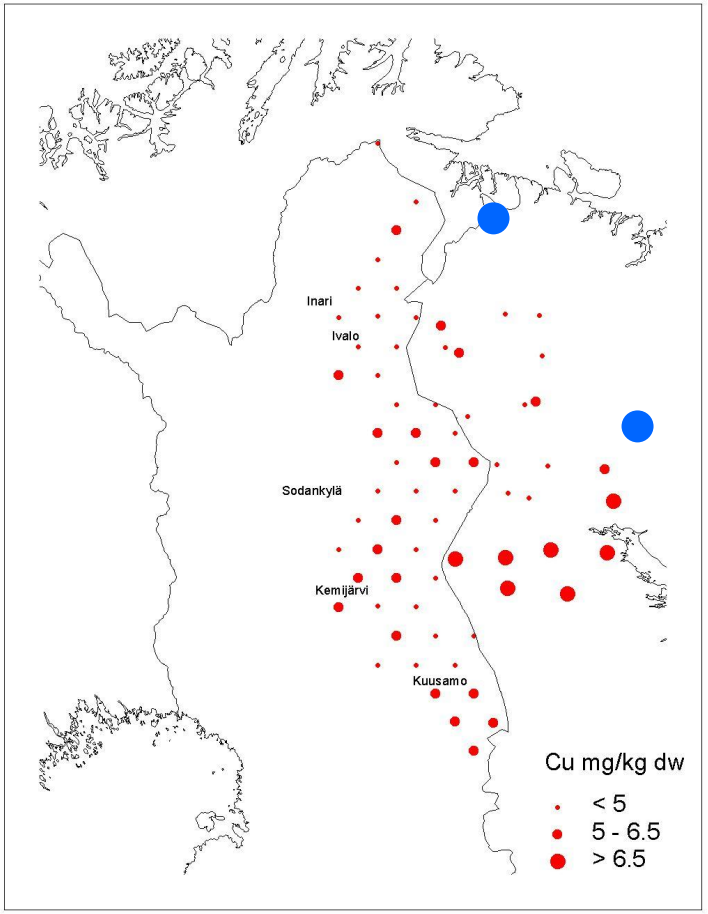
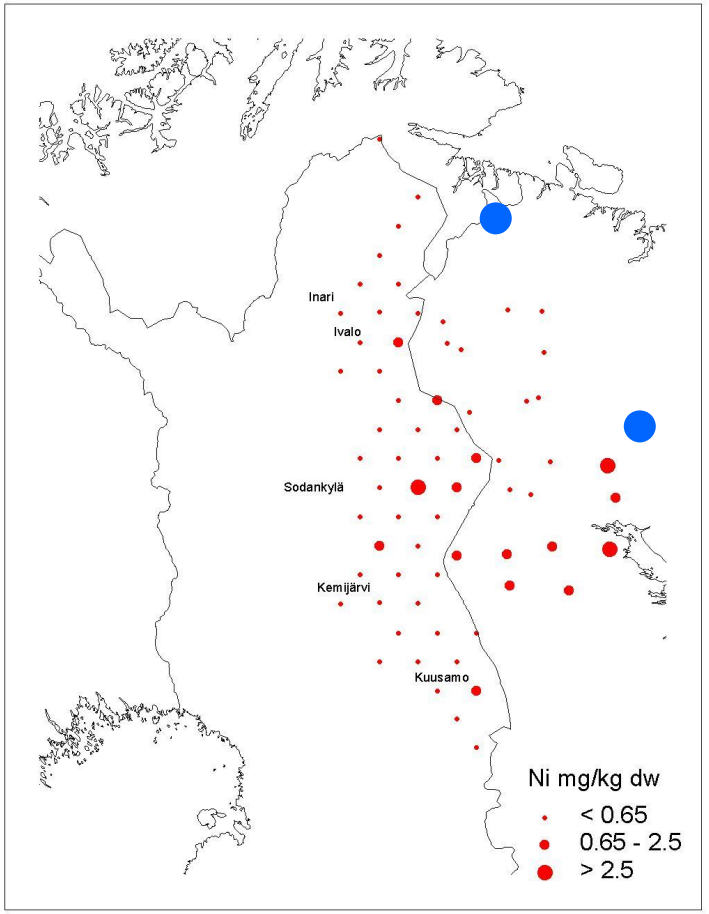
Bedrock composition appears to be the main factor affecting metal concentrations in berries





Cowberry (V. vitis-idaea) Cu and Ni concentrations, mg/kg dm

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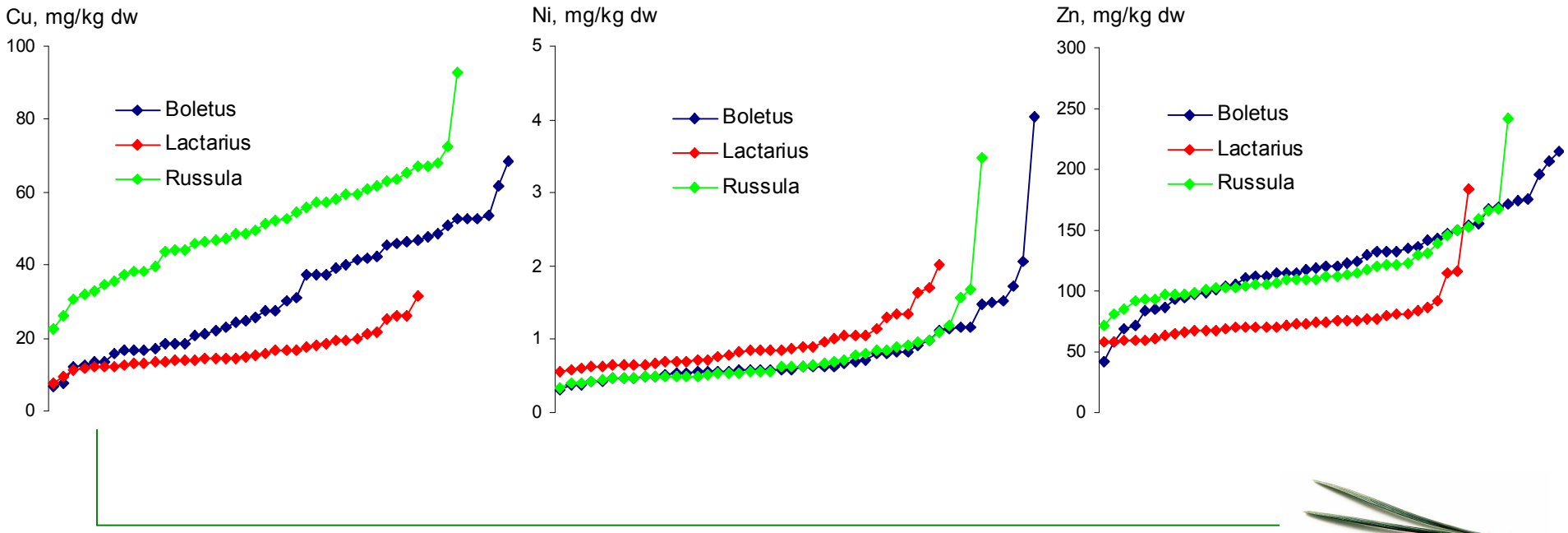
Distribution of the Cu, Ni and Zn concentrations (mg/kg dw) in three mushroom ”groups” in eastern Kainuu



Boletus = tatti, Lactarius (milk cap) = rousku, Russula = hapero

ICP Forests: Bodies and structure

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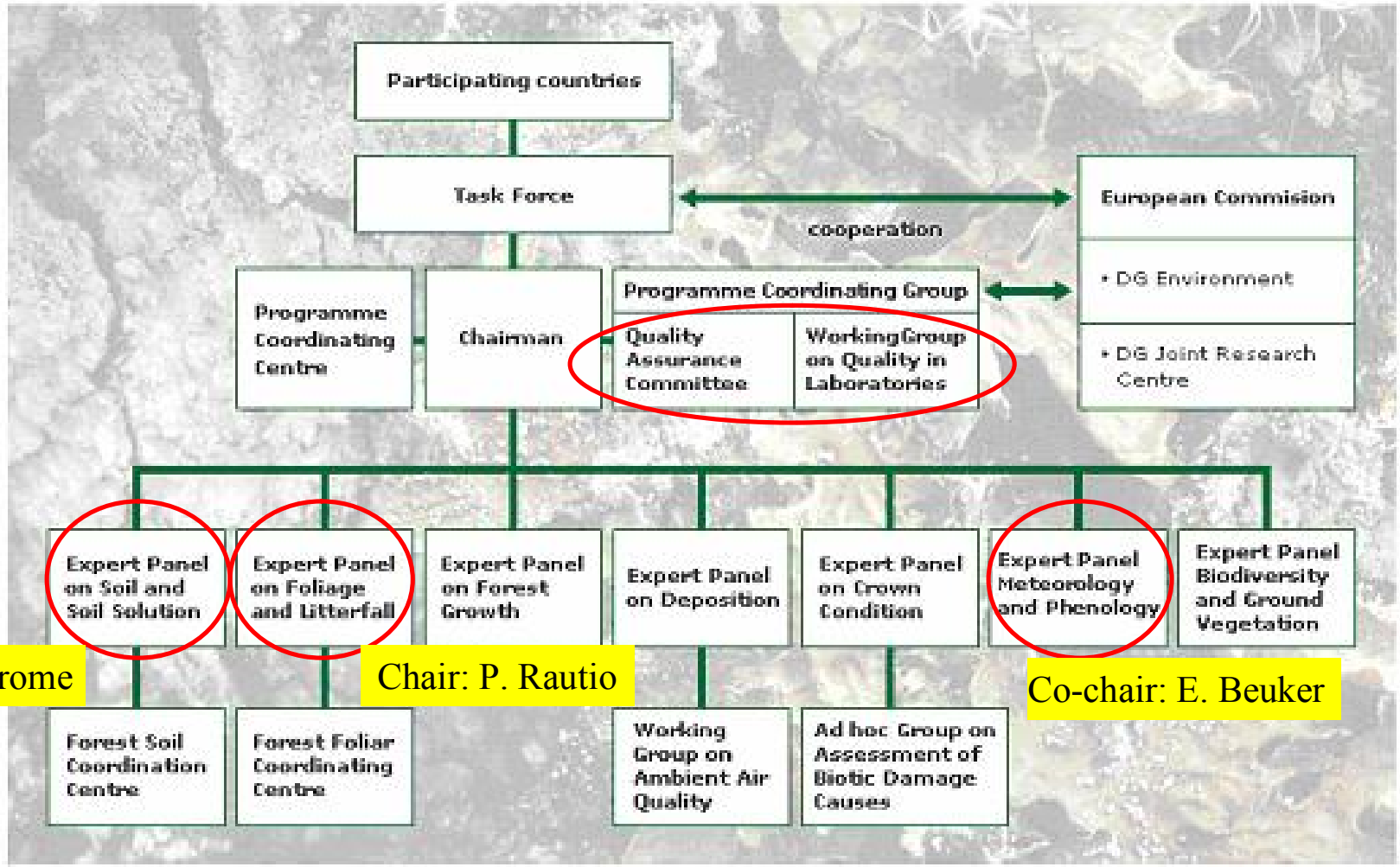

Co-chair: J. Derome

Chair: P. Rautio

Co-chair: E. Beuker

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Quality assurance & control

- Quality of the data determines the quality of the programme!
- Expert panels control the quality (e.g. ring-tests), make recommendations about methods, revise manuals etc.

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The future?

- Several regulations 1986-2006
  - 1987-1992
  - 1992-1996
  - 1997-2001
  - 2002
  - 2003-2006
  - ?
- New EU funding instrument: LIFE+
  - FutMon (Further development and Implementation of an EU-Level Forest Monitoring System) was accepted and runs 2009-2010
    - Aims to develop methods to monitor climate change effects and biodiversity change more efficiently

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Thank you for your attention!

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National Report 2002–2005

Edited by Päivi Merilä, Tuire Kilponen and John Derome

http://www.metla.fi/julkaisut/workingpapers/2007/mwp045-01.pdf