



Natural Resources Institute Finland

– a foundation for the bioeconomy



Vision

We are a bioeconomy pioneer – our expertise creates a basis for sustainable growth and well-being.



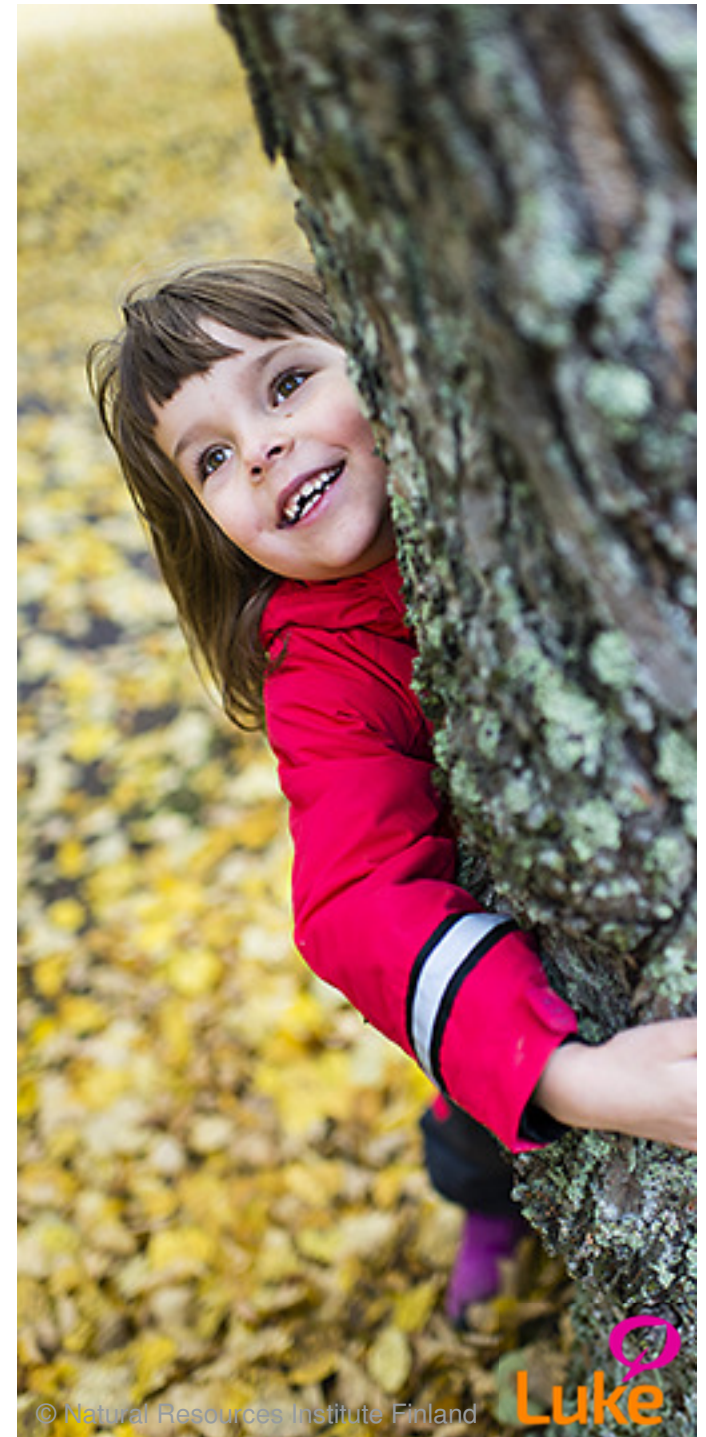
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Luke

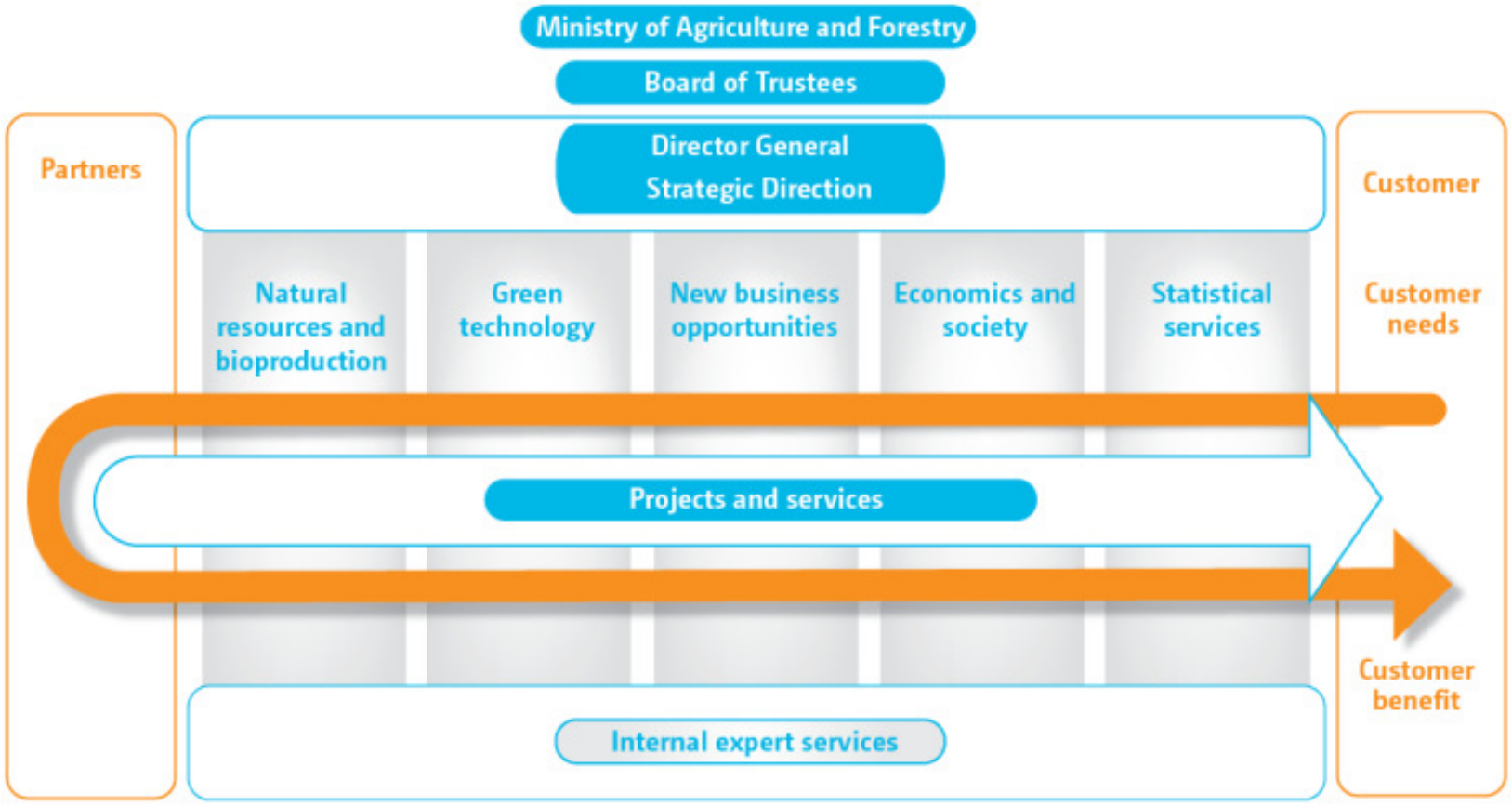
We concentrate on these things

Based on renewable natural resources

- biomass-based products and energy
- food system and food security
- health and well-being
- sustainable natural resources economy and policy



Organisation



Merged organisations

- MTT Agrifood Research Finland,
- Finnish Forest Research Institute Metla
- Finnish Game and Fisheries Research Institute RKTL
- Information Centre of the Ministry of Agriculture and Forestry Tike

formed Natural Resources Institute Finland January 1st 2015.

The second largest research institute in the country

- Combined resources 2013 turnover 140 EUR milj
- Person-years aprox.1700
- Locations 38
- Headquarters in Helsinki

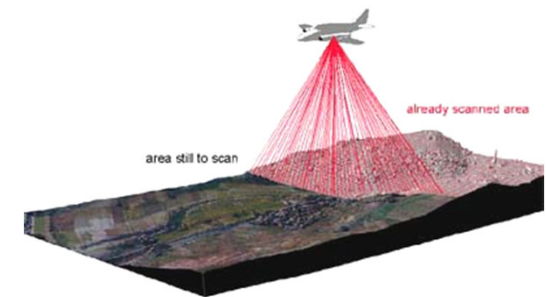
Some facts about Finland

- Population 5.2 mill.
- Land area 30.5 mill. ha
- Forest land (FAO) 22.1 mill. ha
 - 72 % of land is forest land
 - 57 % owned by private individuals (NIPF)
- Growing stock 2.2 mrd. m³
 - 104 m³/ha on forest land
 - 384 m³ per person
- Annual increment 104 mill. m³/year
 - 4.6 m³/ha/year
- Annual drain (2010, removals and mortality) 71 mill. m³/year
 - 70 % of increment

The Two Inventory Systems in Finland

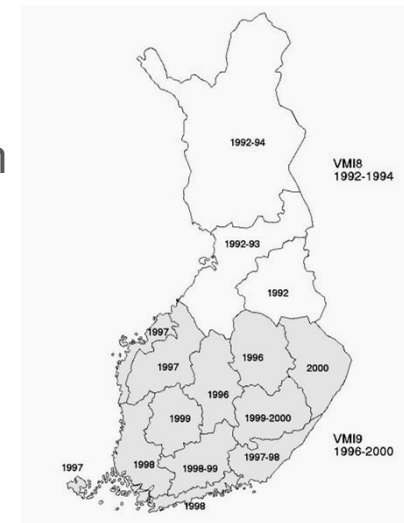
1. Management planning inventories

- Forestry Center for private forests, Forest Service and forest companies for their own forests
- to produce management plans (10 year period)
- Government supports, appr. 16.5 mill. €/year in private forests
- standwise inventory , new method based on laser & field plots



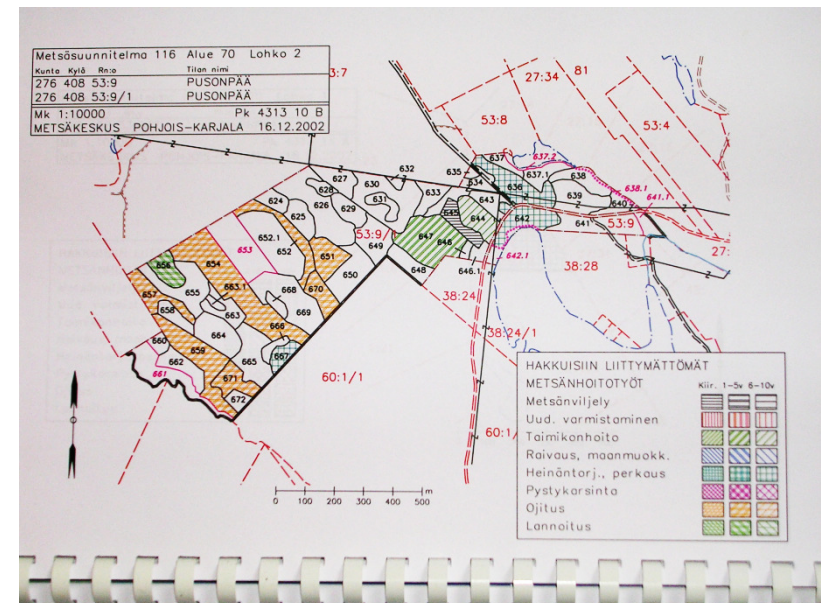
2. National Forest Inventory (NFI)

- country and district level results, based on statistical sampling
- covers all country, all land, all ownership groups...
- 5 year cycle
- annual budget appr. 1.6 mill. euro

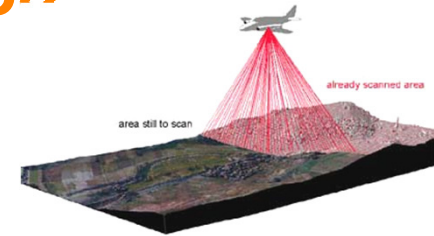


Management planning in private forests

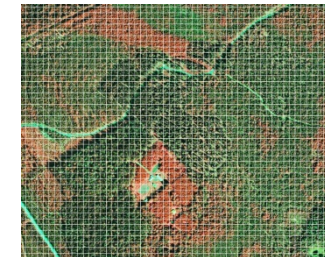
- About 1 mill. hectares per year
- Appr. 40 % of forest owners have valid management plan
- Paid by the forest owner, data collection supported by government
- Main aims:
 - locate cutting possibilities and necessary/recommended silvicultural measures
 - promote sustainable use of forests: good silvicultural practices & protection of rare biotopes



Management planning inventory method



- 1) Laser scanning and aerial images
- 2) Field plot measurements, plots selected to represent all kind of forests
- 3) Classification of laser scanning data -> Wall-to-Wall forest resource information (pixel size 16 meters by 16 meters)
- 4) Field checkings of data quality
- 5) Management plan



National Forest Inventory – Why?

Government needs

- Forest policy, forestry programs
- Protection of forests
- Assessing sustainability of forestry
- Estimating forest carbon budget, other international reports & statistics
- (Forest taxes)

Regional needs

- Regional planning: setting goals for thinnings, tending of seedling stands etc.
- Forest certification

Forest Industry needs

- Planning of forest industry investments
- Timber procurement

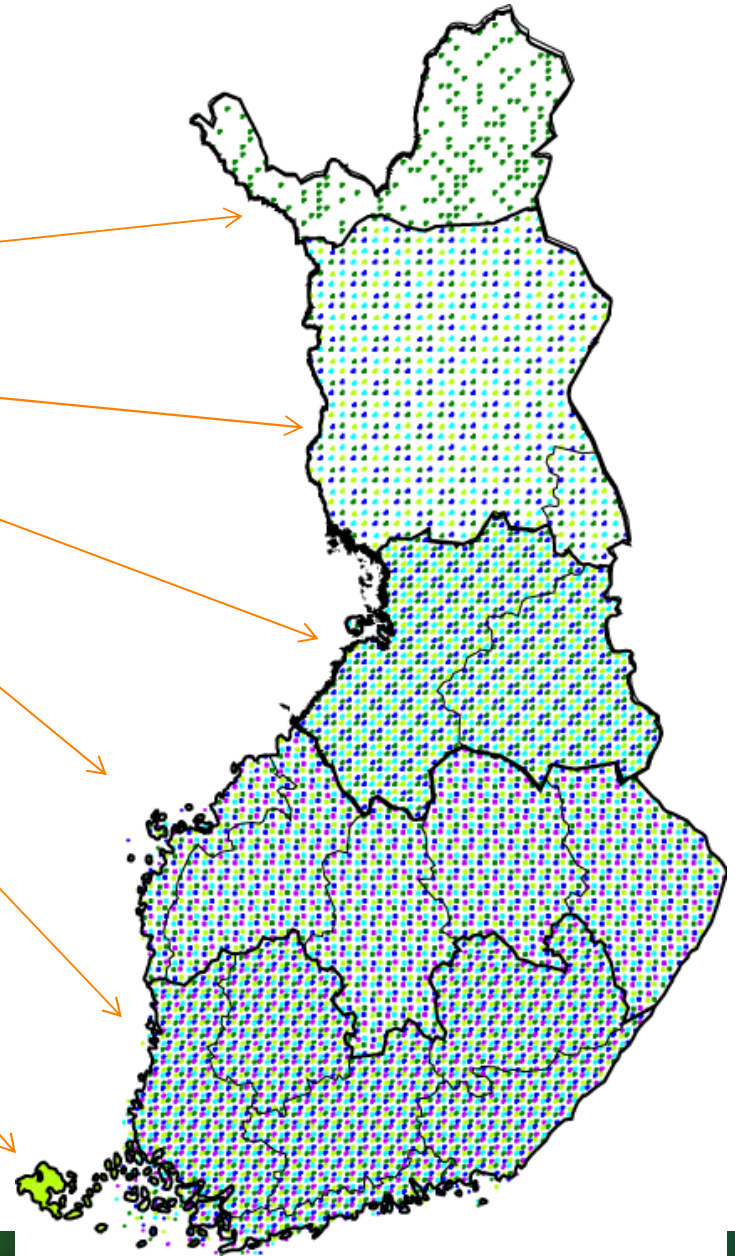
Research

History of NFI in Finland

- Statistical sampling applied since the first inventory
- The first NFI in 1921-1924
 - The first four NFIs using linewise survey sampling
- Clusterwise systematic sampling since the fifth NFI (1964 -)
- Aerial photos in North Finland in 5th - 7th NFIs
- Implementation of satellite image based inventory during 8th NFI (1986-1994)
- 10th NFI 2004 – 2008
 - Five year cycle
 - All country measured each year, full sample in 5 years
- 11th NFI 2009-2013

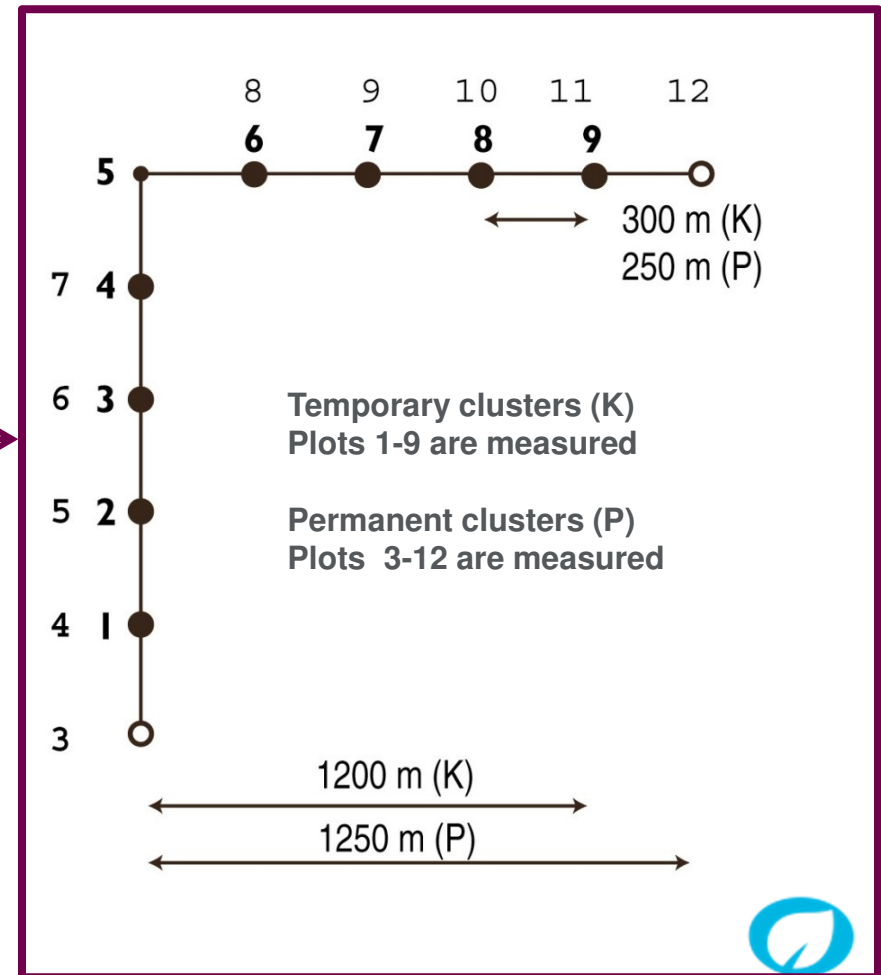
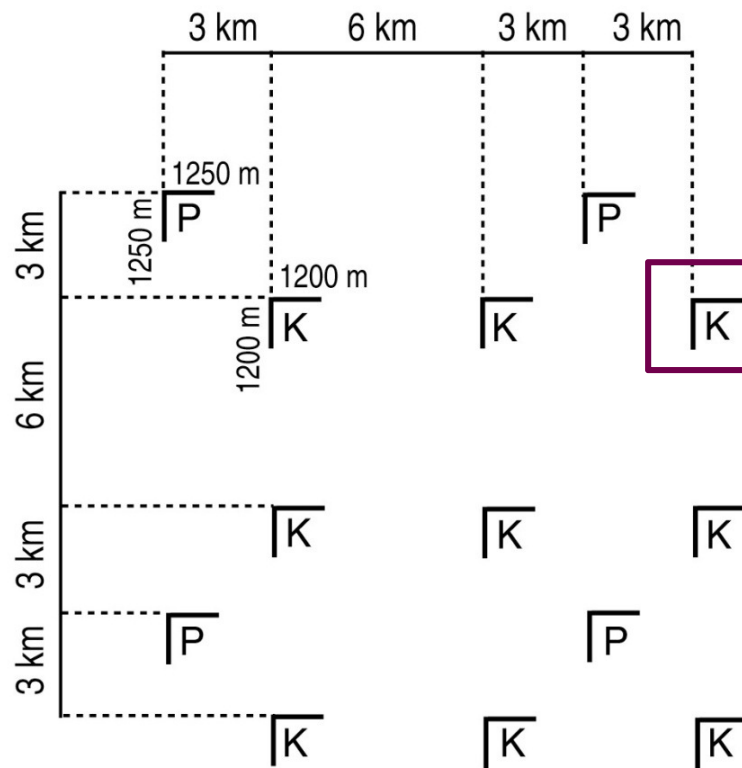
The 11th NFI (in 2009 – 2013)

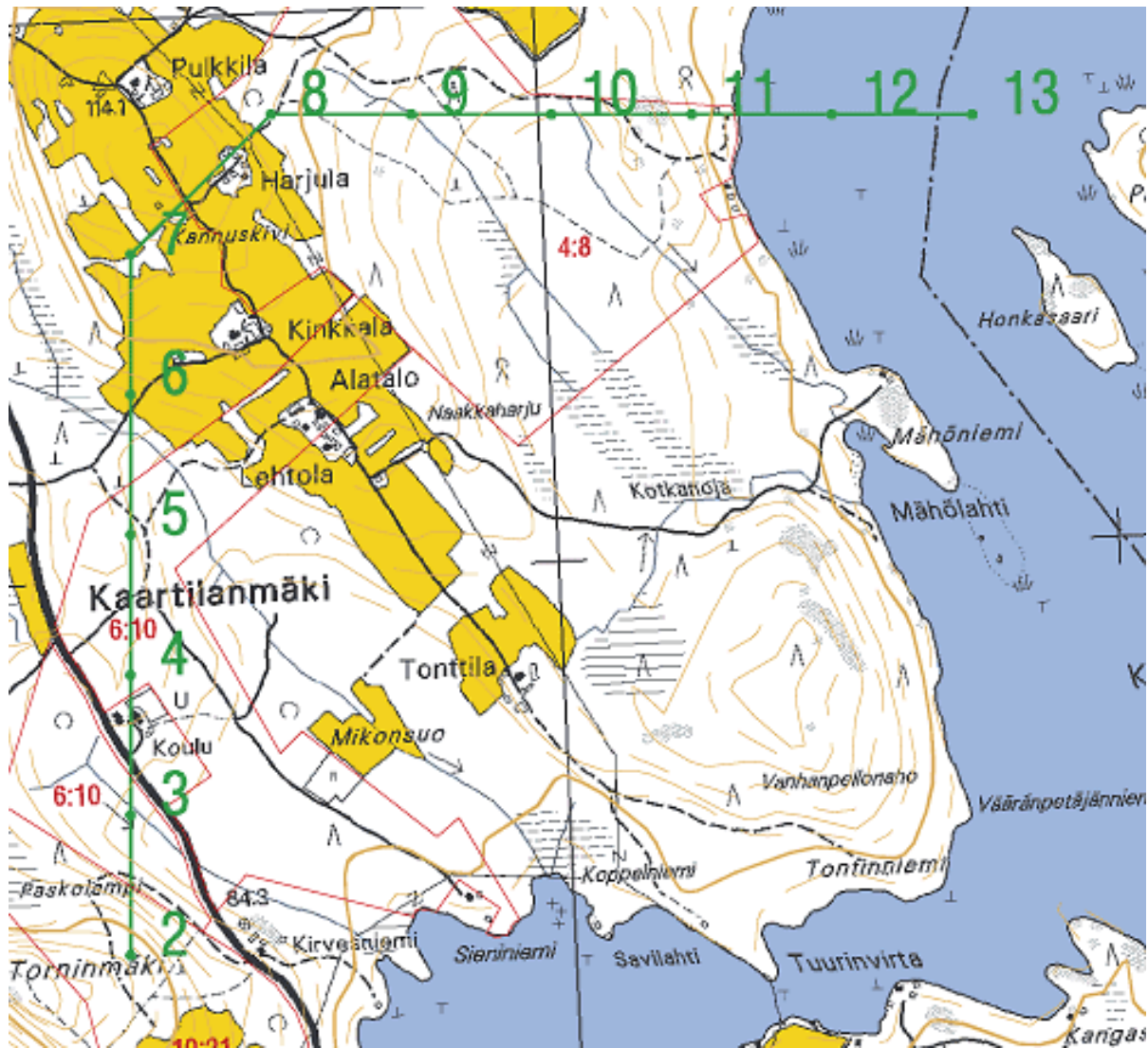
- 6 regions with slightly different sampling designs
 - two phase sampling
 - systematic cluster sampling
- Ca. 60 000 plots
- Temporary and permanent clusters of sample plots (ca. 12 300)
- 1/5th of the field plots measured each year
- 22 – 24 field crews (2 – 3 persons)



Sampling design

NFI11 Southernmost Finland





NFI Field measurements

Plots are located with GPS
at each point stand level assessment & tree
measurements

Stand level assessment of appr. 100 variables
describing:

- Administrative status: protection, ownership etc.
- Soil, site, drainage...
- Growing stock (species, density, age...)
- Accomplished and recommended cuttings & silvicultural operations
- Damages
- Biodiversity (NFI9-)

Tree measurements on relascope plots,
maximum radius 12,52 meters -> on average 10
trees per plot



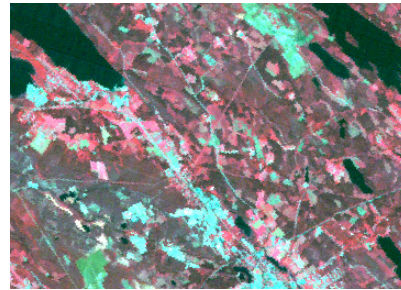


Multi-source NFI

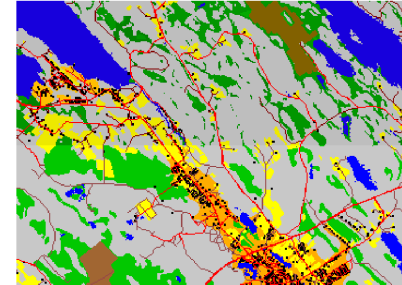
Field data



High resolution satellite imagery

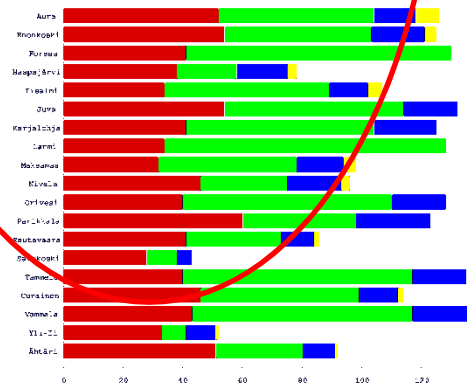


Digital maps and other data sources

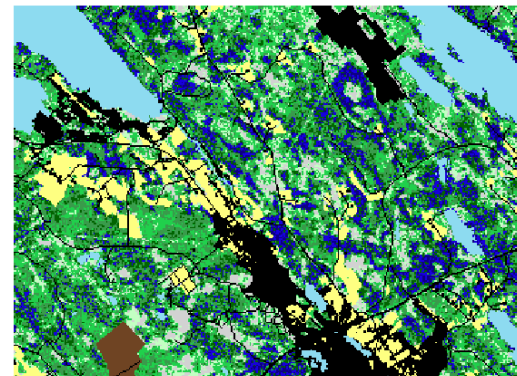


Processing

Statistics



Thematic maps





www.luke.fi