



Samples of Forest Planning and Forestry Process Innovation

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Forest measurement

With the industrial and economical development the importance of forest resource overview has increased, different methods are in use

The first manual measurement devices were shown in Forestry museum.

The electronic measurement devices for forestry were taken into use in 1980-ties



Forest measurement

Samples from different producers

Masser OY, Finland (different Masser models)

Haglöf Sweden AB (Mantax and Digitech)

- Harvester producers - for harvester measurement calibration only (Ponsse)

- Other producers (PAV - Datafox,)

Main producers of computer callipers - Masser



Excaliper



*light weight and ergonomic design
*measuring range 50 / 65 / 80 cm
*optional GPS and Bluetooth

2000 GR



*rugged full aluminium construction
*measuring range 50 / 65 / 80 / 100 cm

2000 EXL



*special rugged construction for log measurement system
*accurate
*less stress on your back

35/45/55 (Led/LCD)



*measuring range 35 / 45 / 55 cm
*led or LCD display
*simple one button operation

35/45/55 GR



*measuring range 35 / 45 / 55 cm
*graphical display
*advanced user interface

Racal 560



*light weight one hand computer caliper
*measuring range 560 mm
*optional GPS and Bluetooth

RC2



*relascope counter calculator for productive inventory and planning work

Laser Caliper



*accurate non-contact diameter measurement at any height
*distance, height, diameter, azimuth, GPS
*built-in data collector

WRC



*advanced hand held data collector
*large library of software applications
*waterproof and shock resistant
*optional GPS and Bluetooth

Accessories



*MASER Developer-SW for data collection
*MASER GPS 232

*Electronic clinometer
*Bluetooth RS 232 adapter

Main producers of computer callipers - Haglöf



Main producers of computer callipers - PAV



Photography

- Black and white aerial photography



Meelis Teder, 2006
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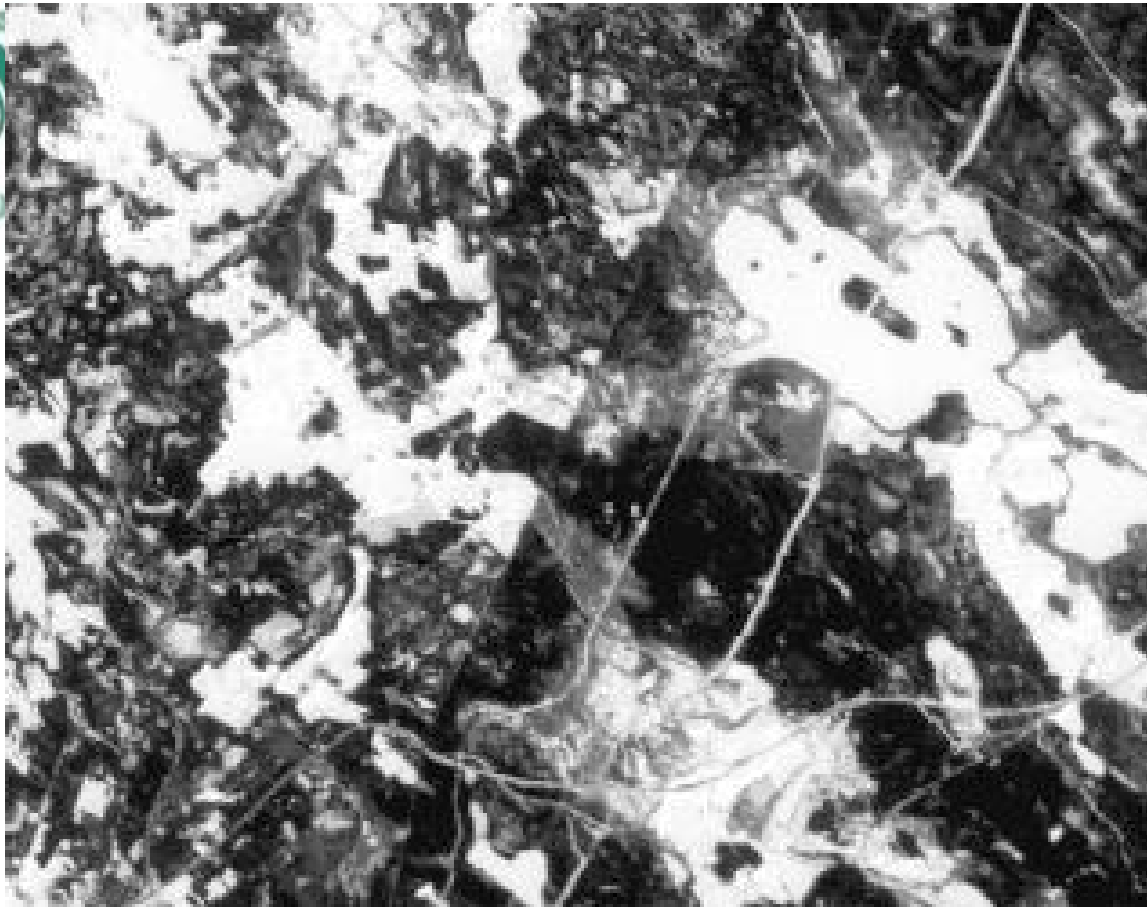
Photography

- Colour -infrared photography



Product innovation support to process innovation
Result –maps for forest management planning are made quicker and the quality is better

Satellite photography – remote sensing



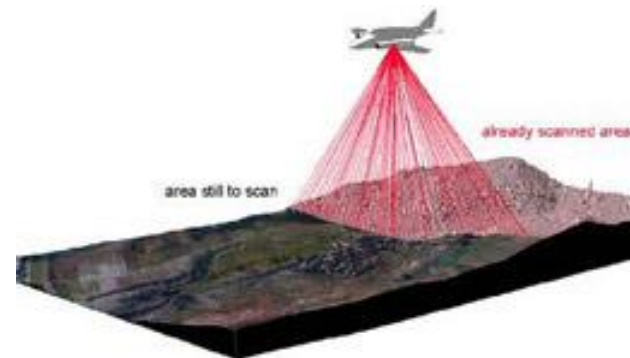
Result - Forestry
research can be
done without
visiting the forest

is Teder, 2006

Source: Dr Urmas Peterson, Estonian Agricultural University / Tartu Observatory

Laser Scanning of forests

The airborne laser scanner is mounted in an aircraft. On the average, the plane will be 1100-2000 m above the ground. The laser transmits at 1064 nm (near-infrared), and the scanner transmits the laser pulse and receives the first, second third and last echoes of each pulse. Each pulse is given an x,y,z-coordinate by a GPS-system. The average footprint diameter is around 20 cm and the average distance between the footprints on the ground is approximately 0.9-1.1 m.



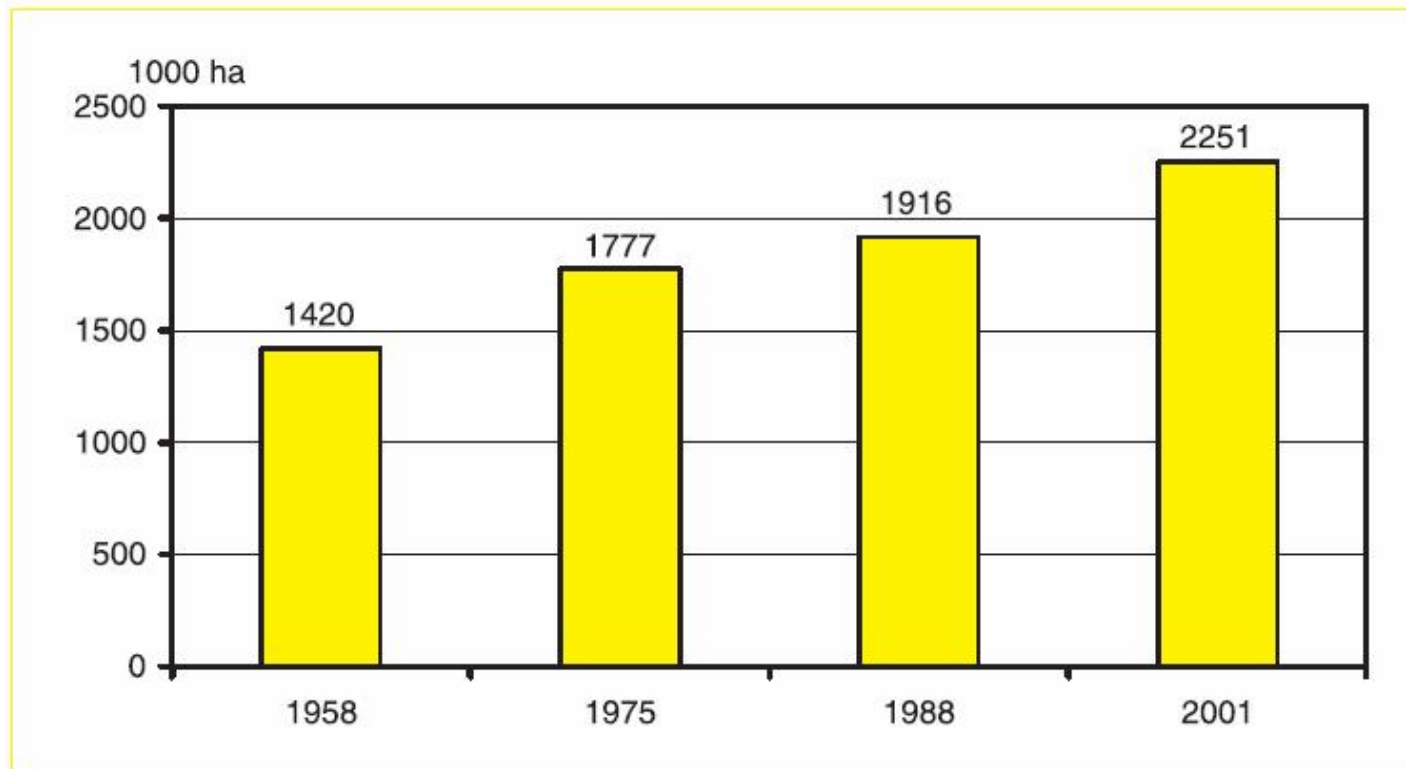
Source: www.prevista.no



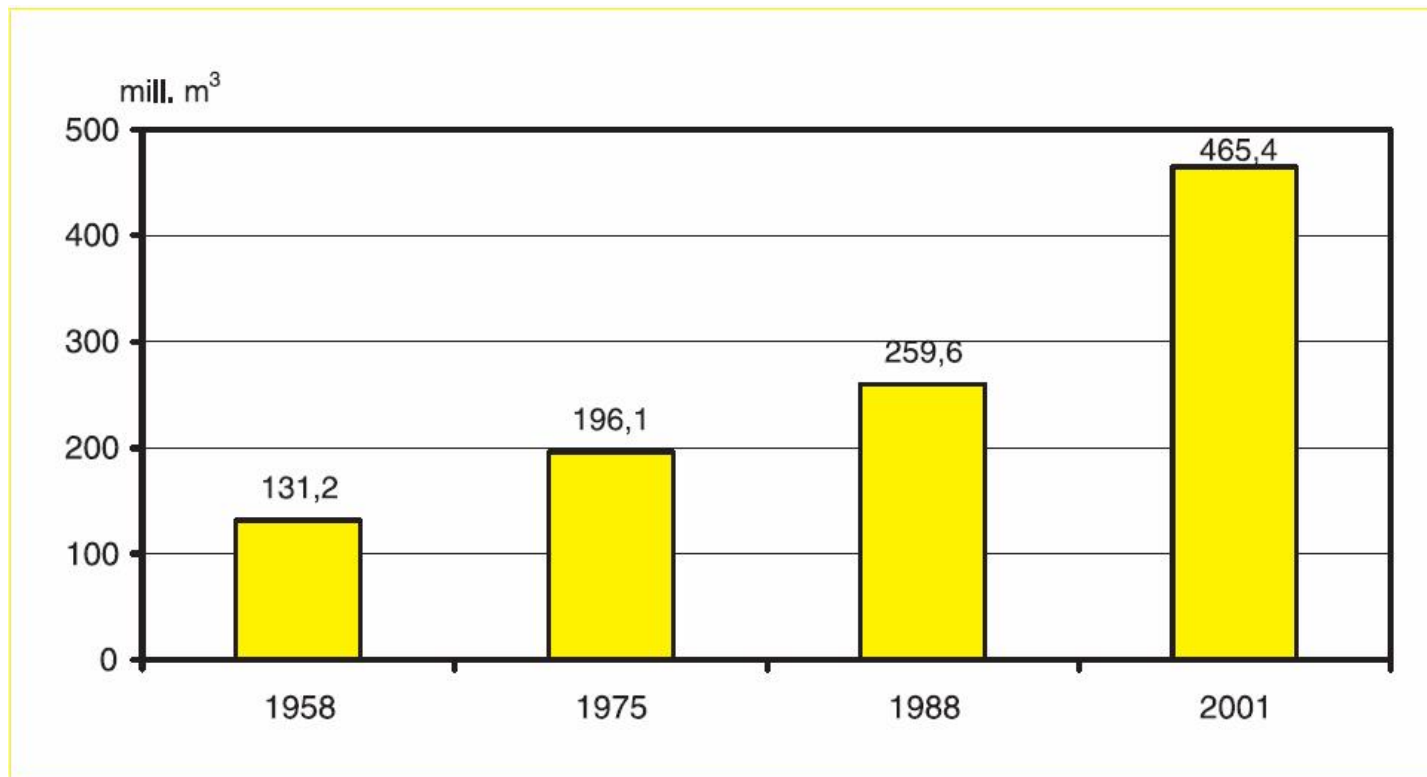
Containerized seedlings

- First time the containerized seedling (CS) were produced 1979 – 1985, annual production 0,3 – 0,9 million
- CZ were not very well accepted by foresters in that time. The equipment was depreciated and finally the production was closed
- Nowadays the lack of planting material has created the need for CS-s and several producers had started the production

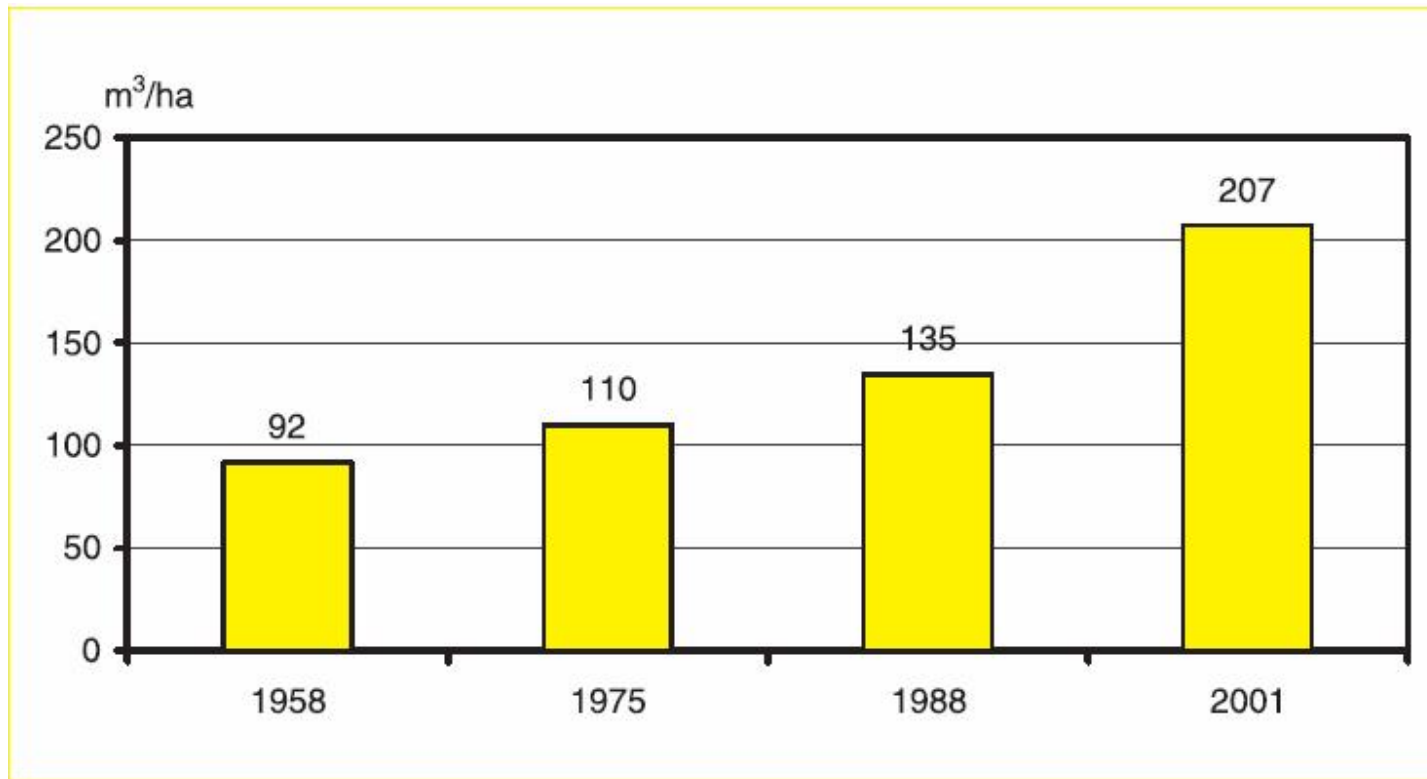
Estonia: Changes in the area of Forest land (1000 ha)



Estonia: Changes in growing stock (mill.m³)



Estonia: Changes in the mean growing stock (m³/ha)





Question for discussion

- Why Estonian forest resource has increased during 1960 – 1990?
- Can it be called as an innovation??



Sample of Estonian Forest Register

- To avoid the illegal activities in forestry, the limitations to the forest inventory have been stipulated
- According to the current Forest Act: forest inventory and management planning field-persons should be acknowledged (licensed forest surveyors), and company can apply the licence, if it employs the appropriate persons. At the moment ca 116 persons have that type of acknowledgement and 10 companies have the licence.
- After the forest management plan has created the digital data as well as paper report has to be checked and “validated” by special state officer. The digital data goes directly *Metsaregister* (Forest register). The max time limit for validation is 30 days.



Sample of Estonian Forest Register

- Forest inventory company will send the validated forest management plan to forest owner, the copy will be sent to the local (county) environmental service
- If the forest owner wants to carry out some forest operation based on the forest management plan, he has to ask permission from county environmental service. Owner can start the activities after permission from the forestry specialists of the environmental service
- If the activities are finished, owner must send report to the county environmental service (e.g. after cuttings the quantity of assortments sold from each stand, etc)



Sample of Estonian Forest Register

- If the forestry specialist of environmental service is going to the forest with the field computer, equipped with GPS, he can find his exact position in the forest, then he will open the online connection (GPRS) with Forest Register Database - he can see the forest map and all database information –
- Ownership information
- Detailed map with limitations (if they are applicable);
- Detailed information from the forest management plan, what kind of activities have been done in that stand and what is allowed to do (e.g. if there are going on some thinning or cutting activities, he can control – is it allowed?)



Sample of Estonian Forest Register

- Limited, public information about every forest compartment is available at http://www.metsad.ee/mets_reg/index.htm
- Soon will be finished “E-forest notification” project, where forest owner can via Internet inform public/ forestry authorities about the planned activities in the forests



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- Questions?
 - Thank you