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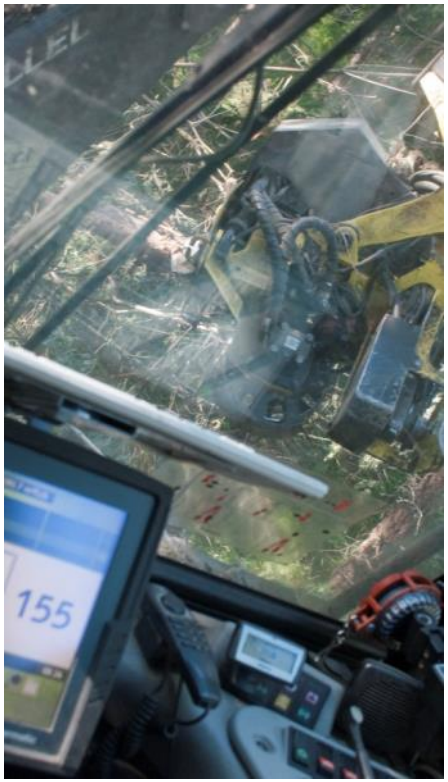
Innovation und Adaption in der Forstwirtschaft am Beispiel Schweden

Charlotte Bengtsson, CEO

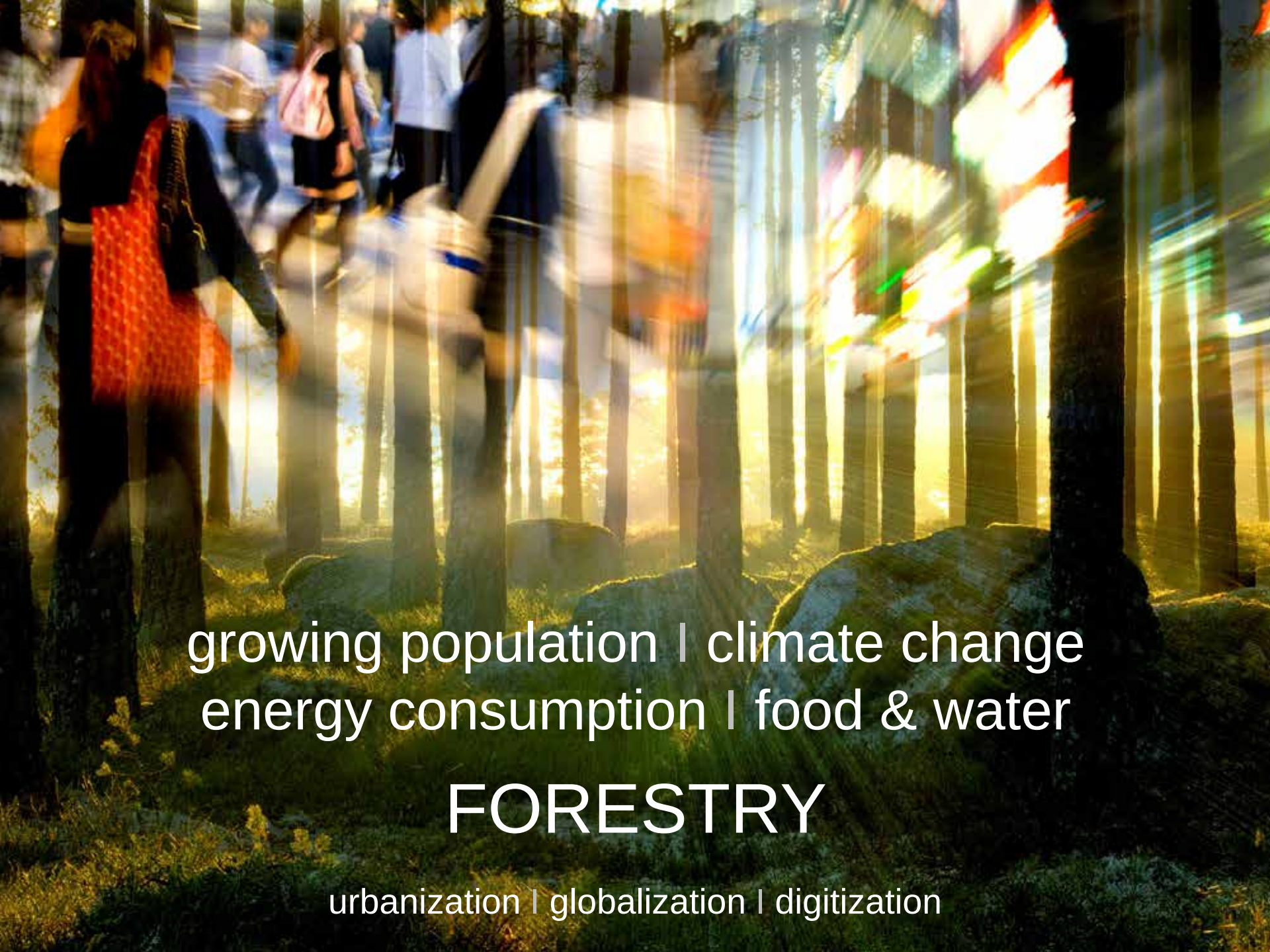


Short about me

- MSc in Civil Engineering, 1994
- PhD in Timber Engineering, 1999
- Prof in Wood Construction, 2008

- Manager SP Wood Technology, 2008 – 2014
- CEO Skogforsk 2015 -

- Researcher, grading of timber, durability, modified wood, glued wood products…
- European standardisation, structural timber
- Board member in several reserch foundations dealing with wood research and forestry


growing population I climate change
energy consumption I food & water
FORESTRY
urbanization I globalization I digitization

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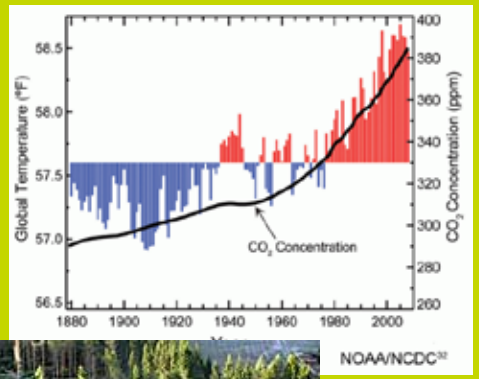
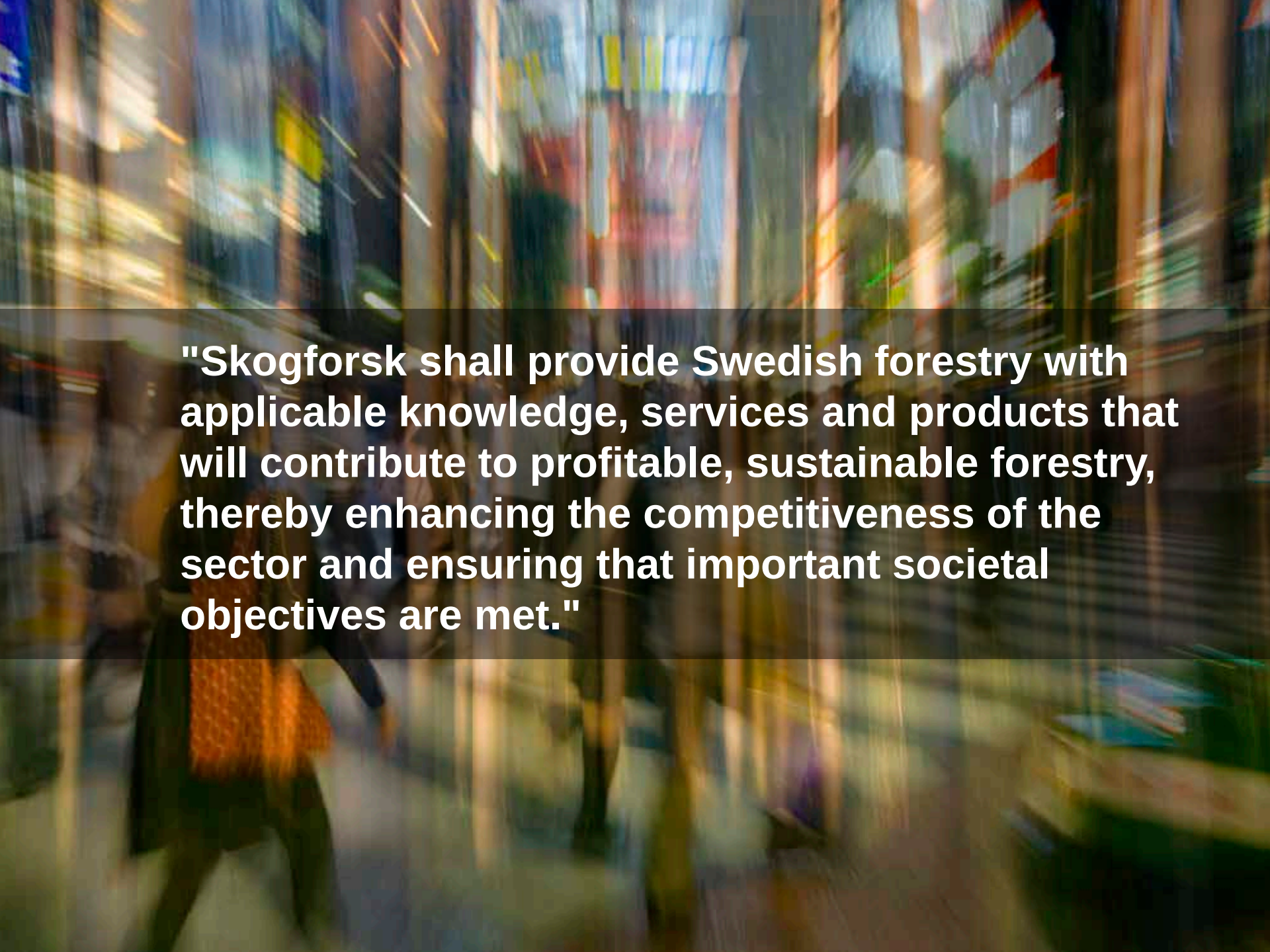
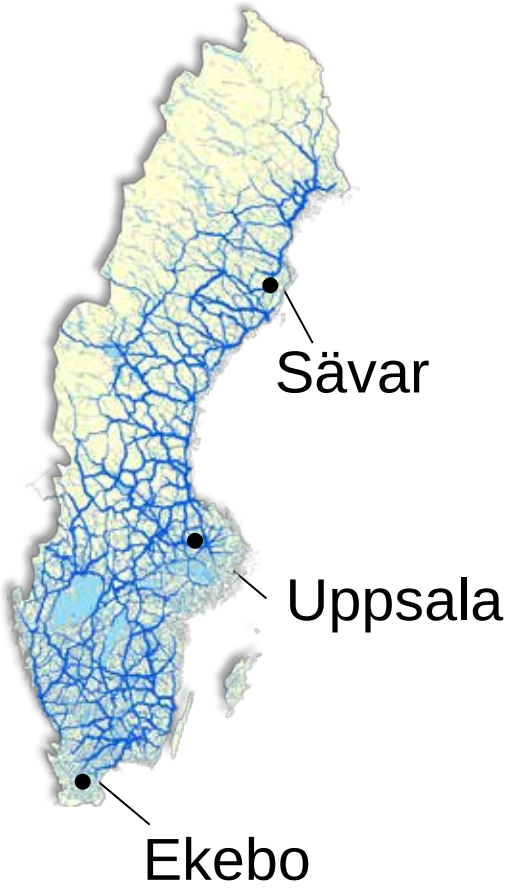
Forestry – many aspects and in

Overall perspective




"Skogforsk shall provide Swedish forestry with applicable knowledge, services and products that will contribute to profitable, sustainable forestry, thereby enhancing the competitiveness of the sector and ensuring that important societal objectives are met."

Skogforsk in brief



Forestry and the government in collaboration

Annual turnover ≈180 MSEK

Applied research, development and innovation for a sustainable and profitable forestry

Approx 125 employees in three locations

Research areas:

- Forest Production
- Wood Supply

Communication of knowledge

Seed- and fieldservice, nurseries

Research strategy and core competence

Forest Production

Marie Larsson-Stern

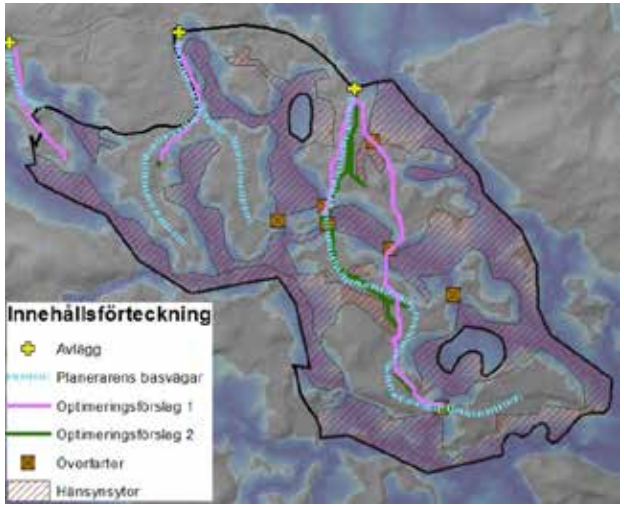
Wood Supply

Magnus Thor

Tree Breeding, North	Tree Breeding, South	Silviculture & Environment	Operations and Products	Forest Energy	Planning
					
Bengt Andersson Gull	*Bo Karlsson*	*Isabelle Bergkvist*	*Rolf Björheden*	*Maria Iwarsson Wide*	*Gert Andersson*

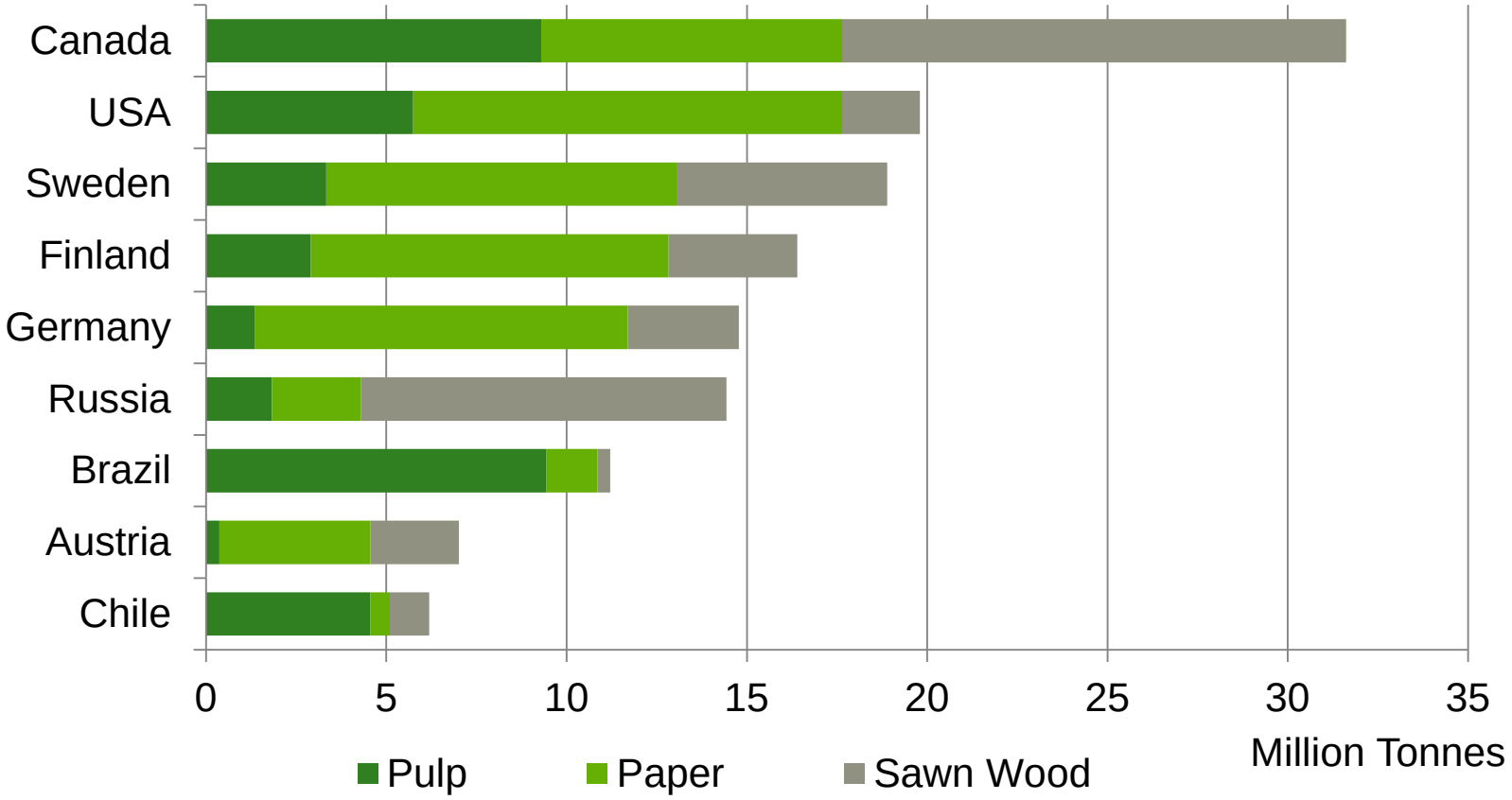
Productive and gentle forest operations

- financed by Swedish forestry (50 MSEK through Skogforsk's Board of Directors)



World Leading Exporters

Pulp, Paper and Sawn Timber



Source: Swedish Forest Industries Federation, CEPI, PPI, FAO, National Associations

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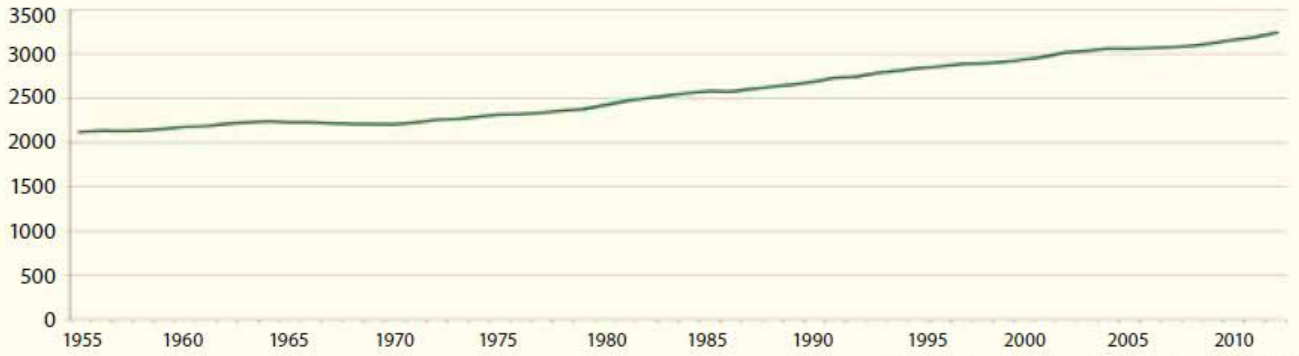
Growth is larger than fellings

Total standing volume

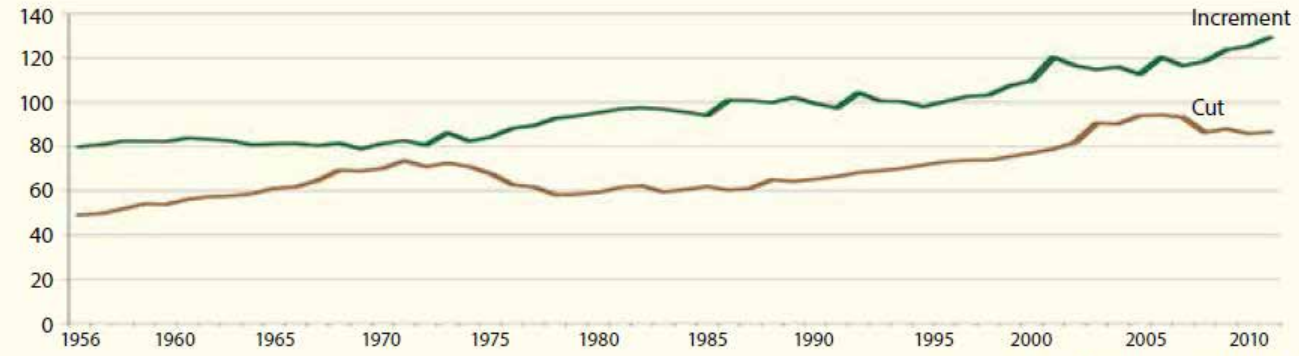
Million m³ total volume over bark



Source: The Swedish National Forest Inventory (NFI) 2010–2014.

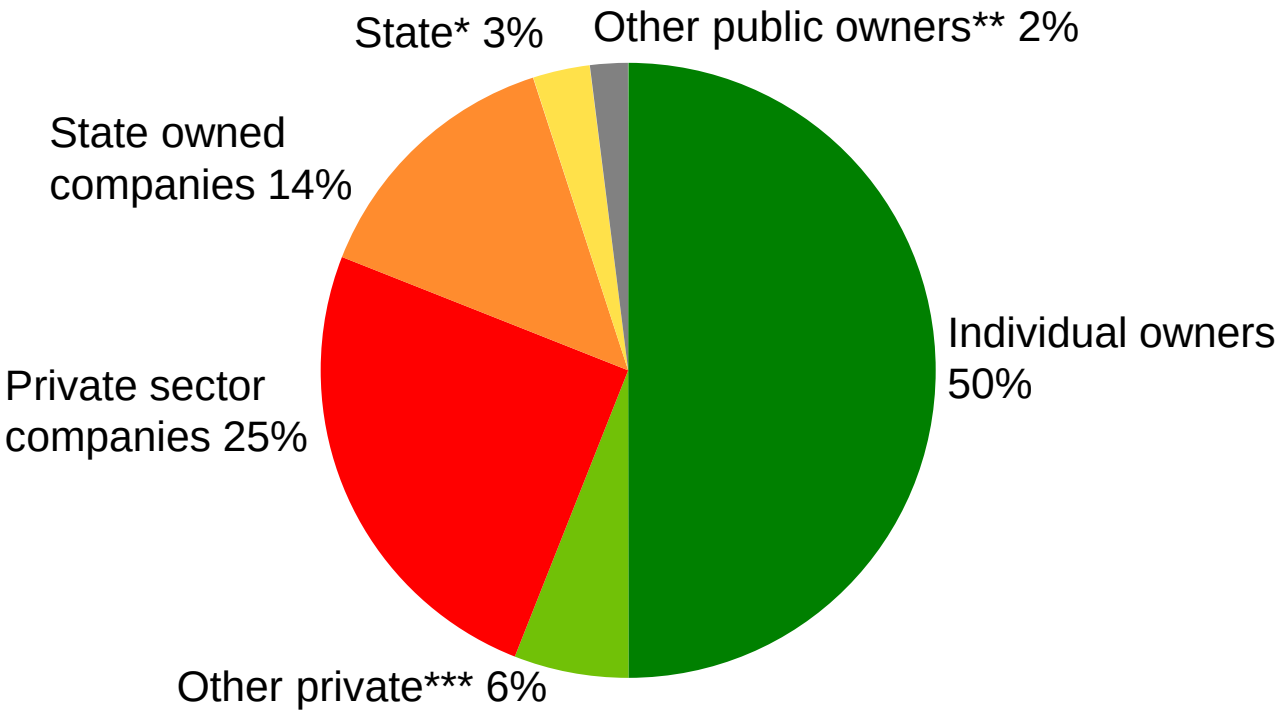
Annual cut and annual forest increment

Million m³ total volume over bark



Source: The Swedish National Forest Inventory (NFI) 2010–2014.

Ownership of Forest Land



*State funds, Foundations etc.
**Municipalities, Country Councils, Foundations, Funds, etc.
***Common Lands, Forest Commons, the Church of Sweden.

Source: Swedish Forest Agency

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Protection of forests

Forest exempted from forestry, year 2011

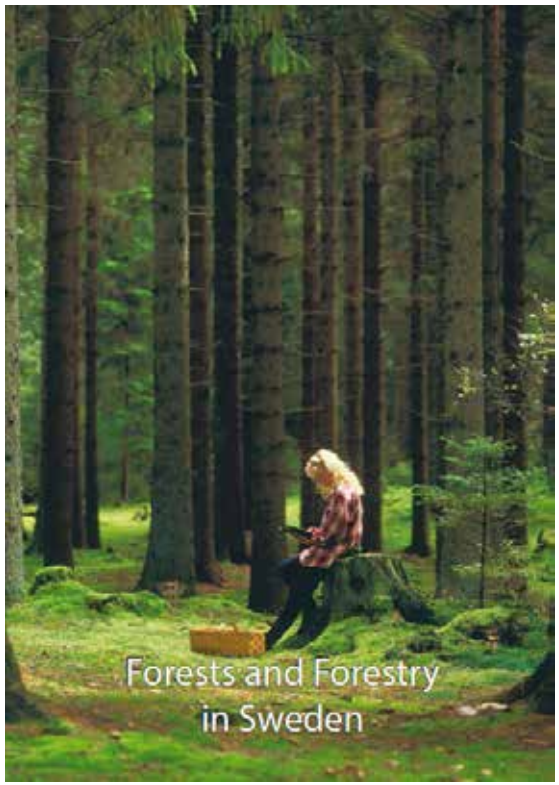
Protection type	Million hectares	Percentage of total forest area
Formally protected	2.0	7.0 %
Forest land voluntarily set aside for conservation purposes	1.1*	3.9 %
Unproductive forest land, i.e. low productive forest land which is protected according to the Forestry Act	4.0	14.1 %
Total	7.1	25 %

*) The figure refers to productive forest land below the boundary of sub-montane forest.
A recent study indicates that the figure is underestimated.

Source: Statistical Yearbook of Forestry. Swedish Forest Agency.

More data and information can be found in

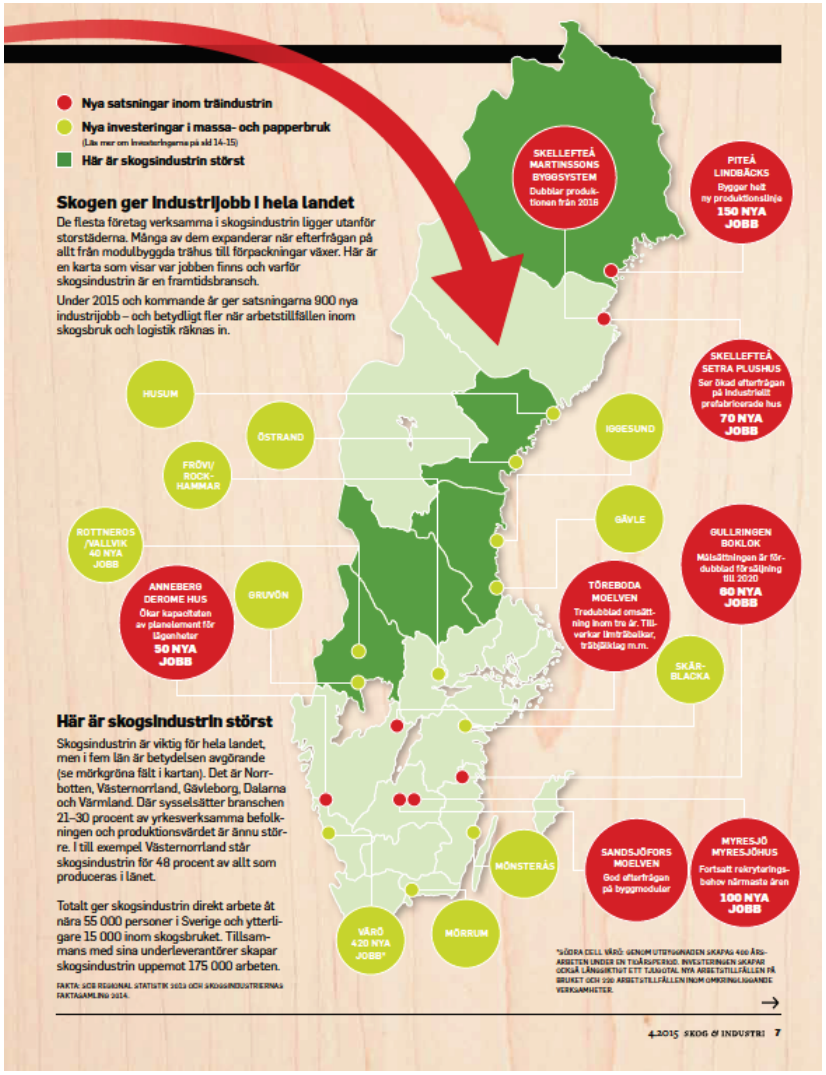
http://www.ksla.se/publikationer/ovriga-publikationer/forests-and-forestry-in-sweden/



Large investments

- 17 billion SEK decided
- Main investments in upgraded pulp- and sawmills
- Also new factories for pre-fabricated houses (multi-storey houses)

- What does this mean for our forestry?



Looking ahead – big picture

- Compliance
  - Climate change and other global challenges
  - Public confidence/reliability
- Attractiveness
  - Sustainability
  - Rural development
  - Reliable market for manufacturers
- Adaptability
  - New technology in forestry applications
  - Raw material supply for coming needs

Examples

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Productivity in forest operations, m³fo/manday
(3 year mean values)

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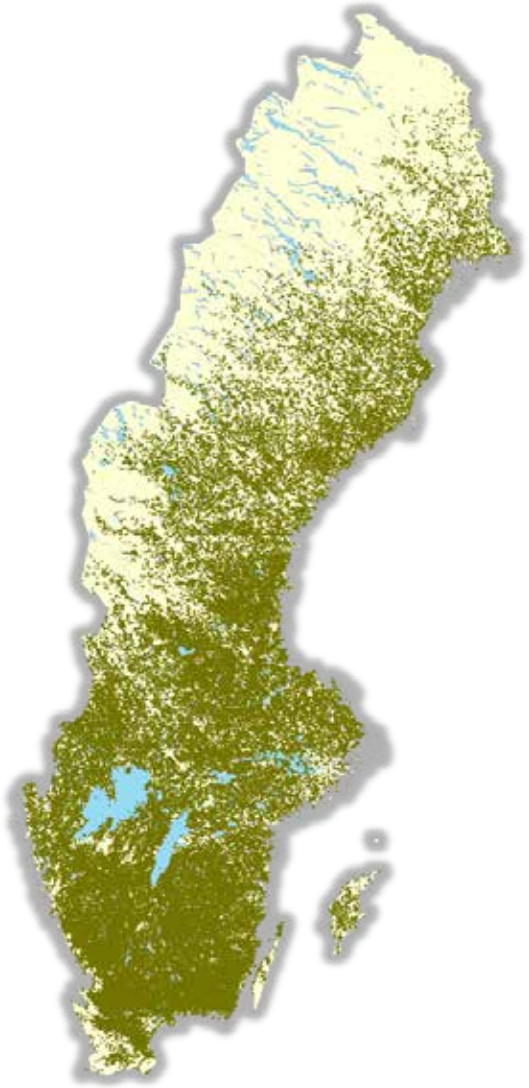
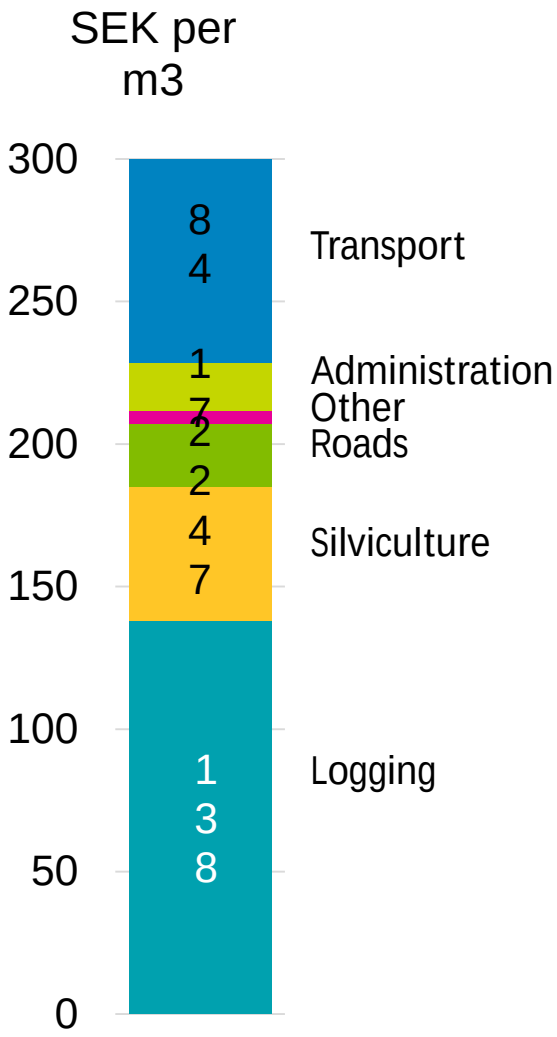
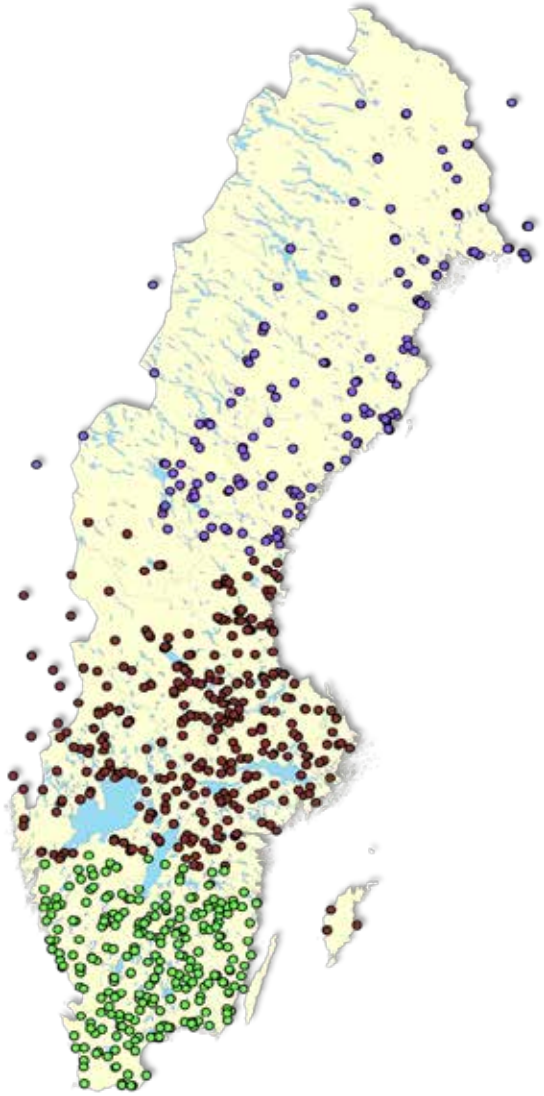



SEK per m3
300
250
200
150
100
50
0
8
4
1
7
2
2
4
7
1
3
8
Transport
Administration
Other
Roads
Silviculture
Logging



Smarter operations

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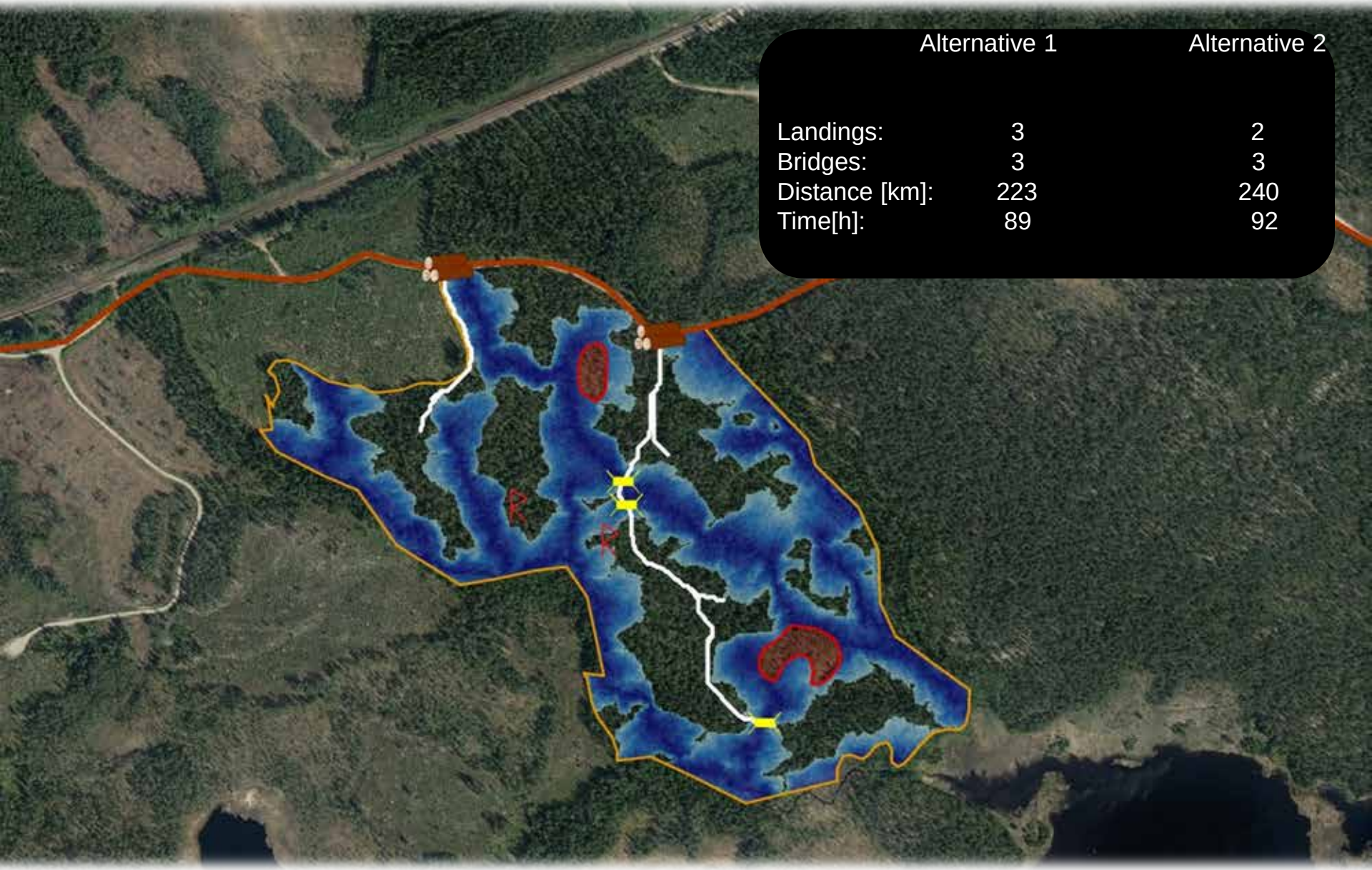
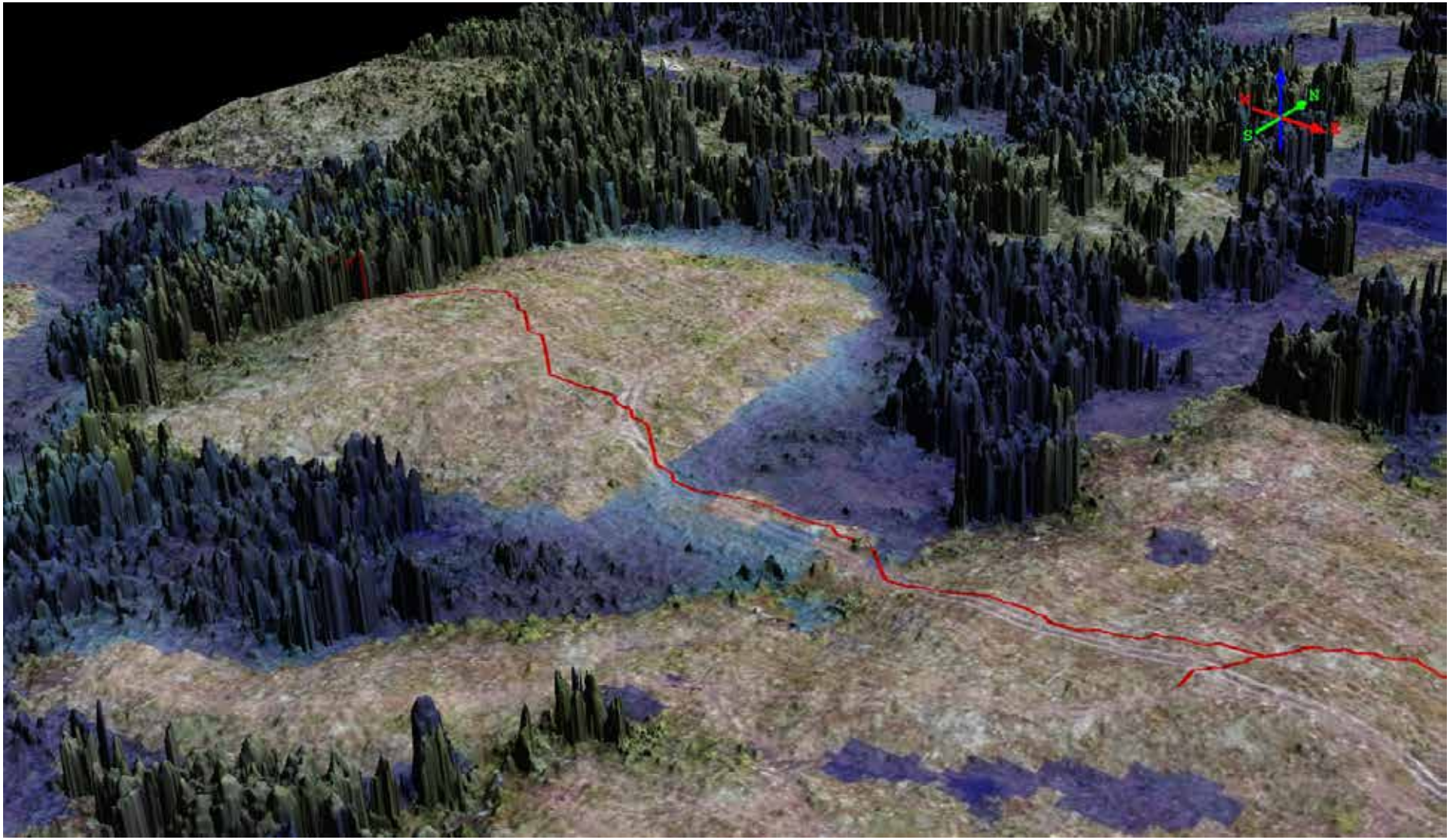
Best

Way


Alternative 1
Alternative 2
Landings: 3 2
Bridges: 3 3
Distance [km]: 223 240
Time[h]: 89 92


N
W
E
S

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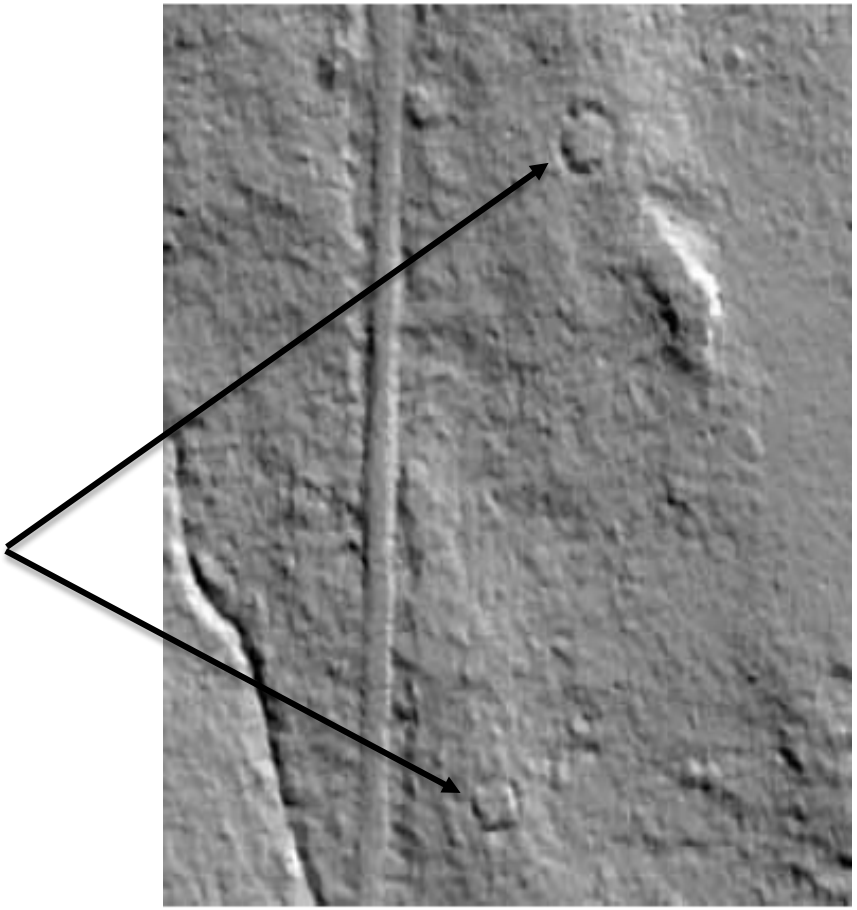
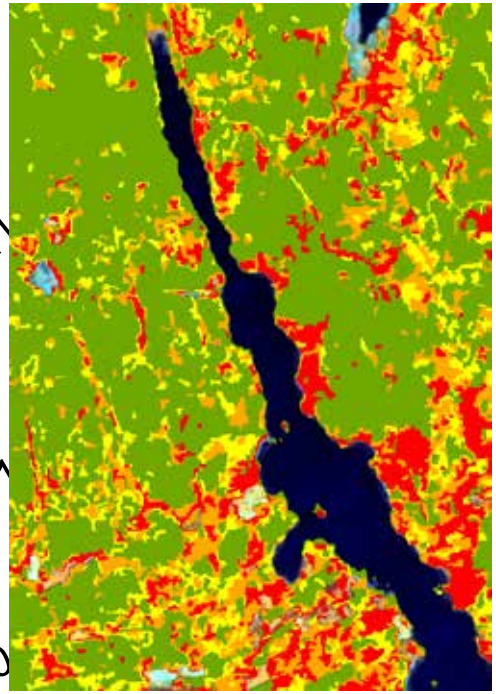
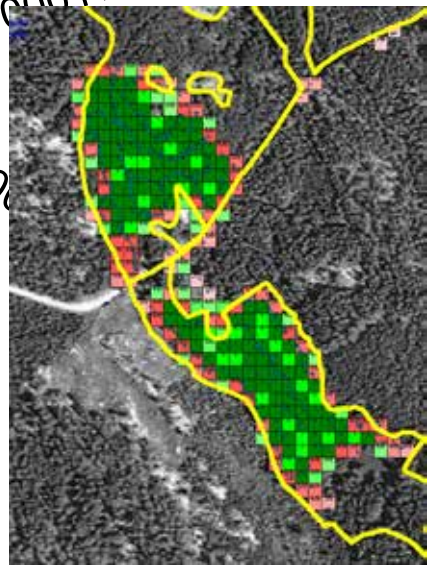
Cultural heritage

- Hillshade from digital elevation model (DEM) derived from lidar data
- Signs of ”rings” indicate charcoal pits



Digitalization and Big Data





Transport

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High Capacity Transport

- 74-90 tonnes
- 8-20 % less CO_2 and fuel
- No effect on road wear

- 42 vehicles in demonstration
- Mostly timber trucks
- New legislation in pipeline

Technical development

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Gentle ground contact

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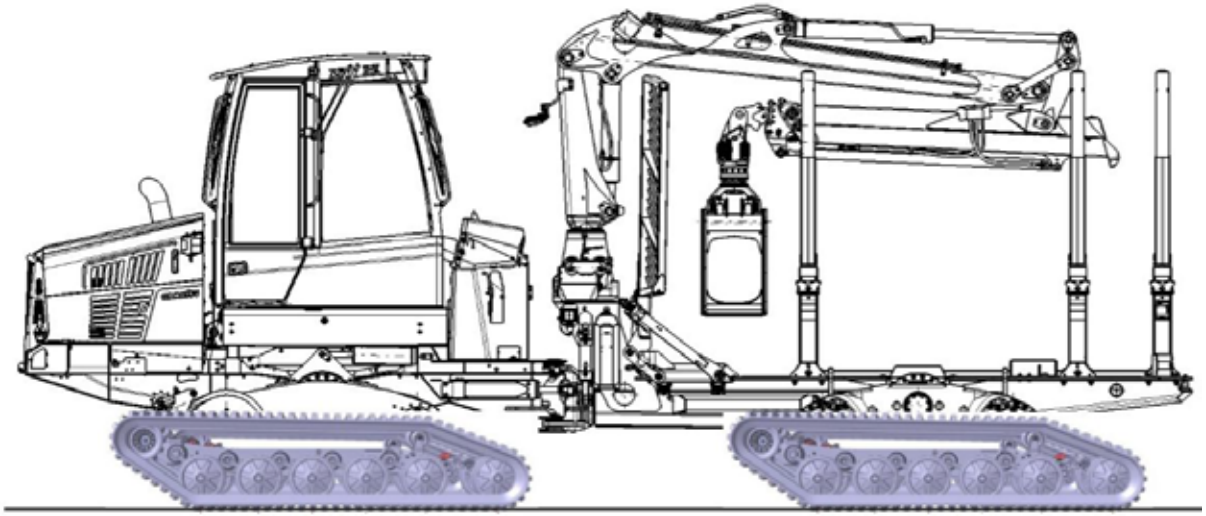

(Semi) automation

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”Invers site preparation” gives better survival and lower cost for plantation
- Mechanised plantation (next step)

Tree breeding

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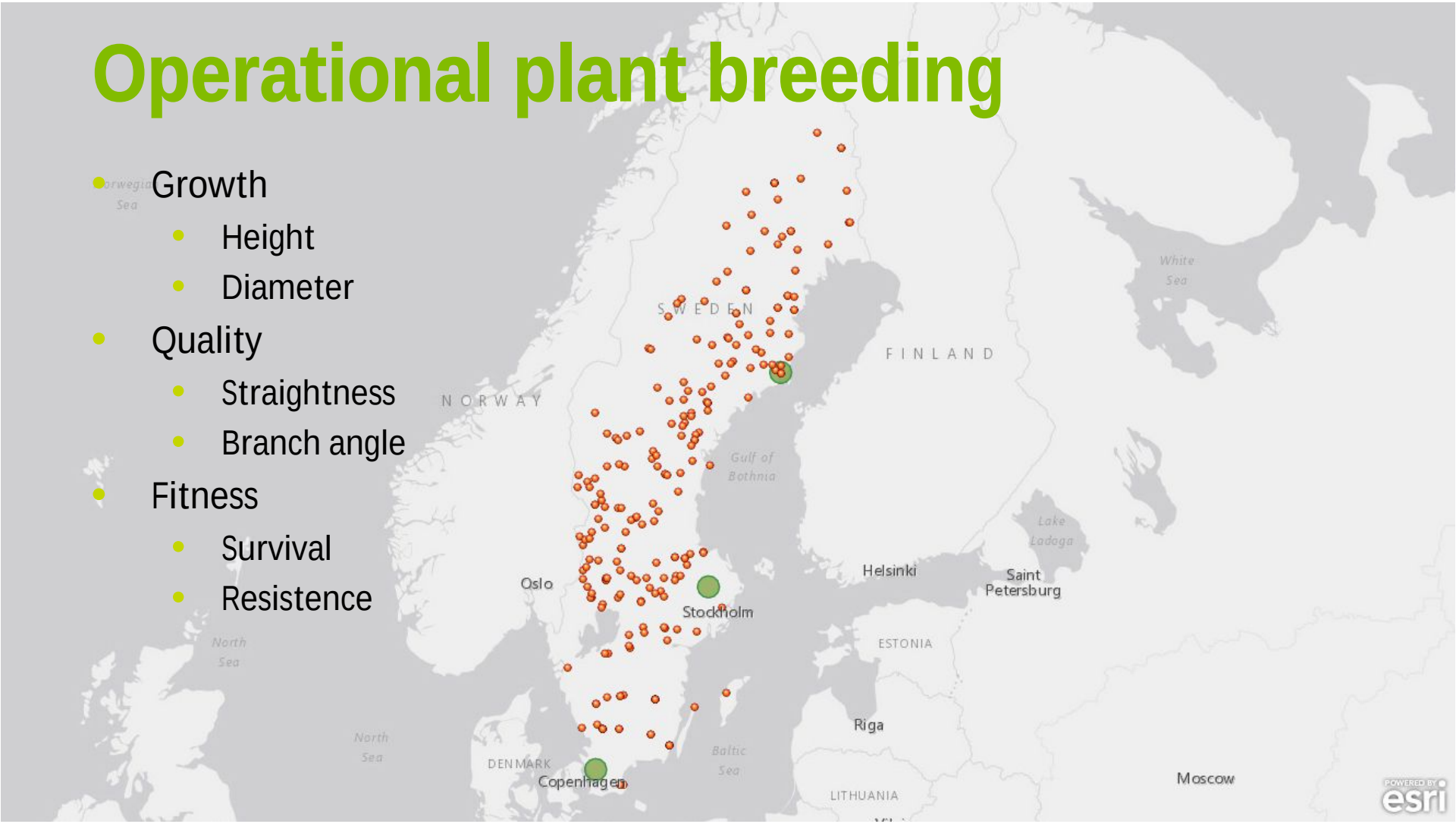
Tree breeding for efficient and sustainable forestry

- Seedlings adapted to future climate
- Fast growth (15-20% greater than local materials, soon more)
- High genetic variation
- High quality and resistance against pathogens
- Norway Spruce, Scots Pine, Birch, Lodgepole pine

- **Operational plant breeding and research in strong collaboration**

Operational plant breeding

- Growth
  - Height
  - Diameter
- Quality
  - Straightness
  - Branch angle
- Fitness
  - Survival
  - Resistence



Forestry and conservation at the same time

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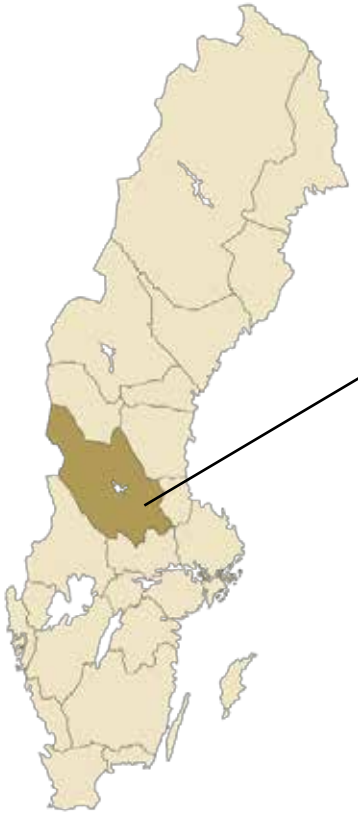
Effaråsen – a research project exploring the trade-offs between production and conservation goals



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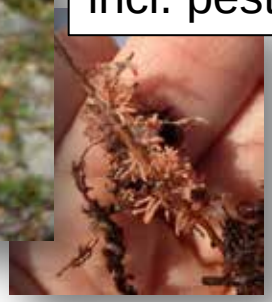
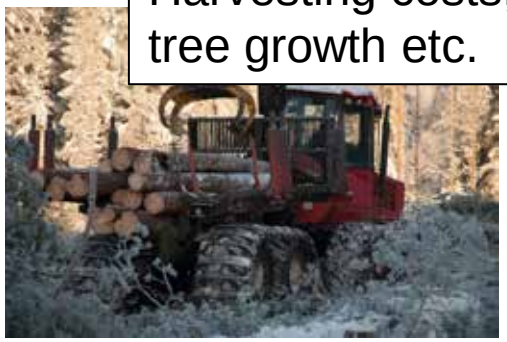
Different levels of tree retention and prescribed burning

effect on

Biological diversity
incl. pest species



Harvesting costs, regeneration,
tree growth etc.



Forest energy

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Productify to communicate

effective management of forest fuel by well-specified fuel products

In March we want

1750 MWh of TRB - 8 and

1350 MWh of TRB - 13 ”

”1750 MWh TRB - 8 is OK!

But we have only 900 MWh of TRB - 13.

Can we deliver 450 MWh of TRB - 11

instead ? ”

Fuel product	Moist (M %)	Ash (A %)	Main fract. (P)	Fine fract. (F)	Origin	
					1	2
TRB-8	M45+	A1.0	P45	F15	Woody biomass	Stem wood
TRB-11	M45	A3.0	P45	F15	Woody biomass	Logging residues
TRB-13	M45+	A3.0	P45	F15	Woody biomass	Logging residues

The Product characteristics can be measured and monitored throughout the hole supply chain...

… and communicated via national wood procurement systems...
…to obtain:

- Distinctive Order of fuel
- Clear goal for production
- Production follow-up
- Quick & distinct forecast
- Transport optimization

Measurement for production management

- Using historical weather data to predict moisture content in road side piles

- Using integrated radar to determine moisture content directly when chipping

Measurement for payment

Using radar to determine moisture content for the hole truckload.

- No sampling
- Fast < 2 minutes to measure all the chips in the truck

Using X-ray to simultaneously determine:

- Moisture content (M)
- Ash content (A)
- Net calorific value (Q)

Developing possibility to also determine:

- Main fraction (P-class)
- Fine fraction (F)

Forestry an obvious part of the bioeconomy

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- Increase the pace of innovation and renewal
- Use and develop the sustainability of forest products
- Focus on both value and volume, **overall perspective**
- Productive and gentle forest operations
- Reliability of the forestry sector
- Maintaining and developing new deep knowledge and at the same time be open for **collaboration** with new competences
- Academia – Institute – Industry


Thanks for listening!
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www.skogforsk.se