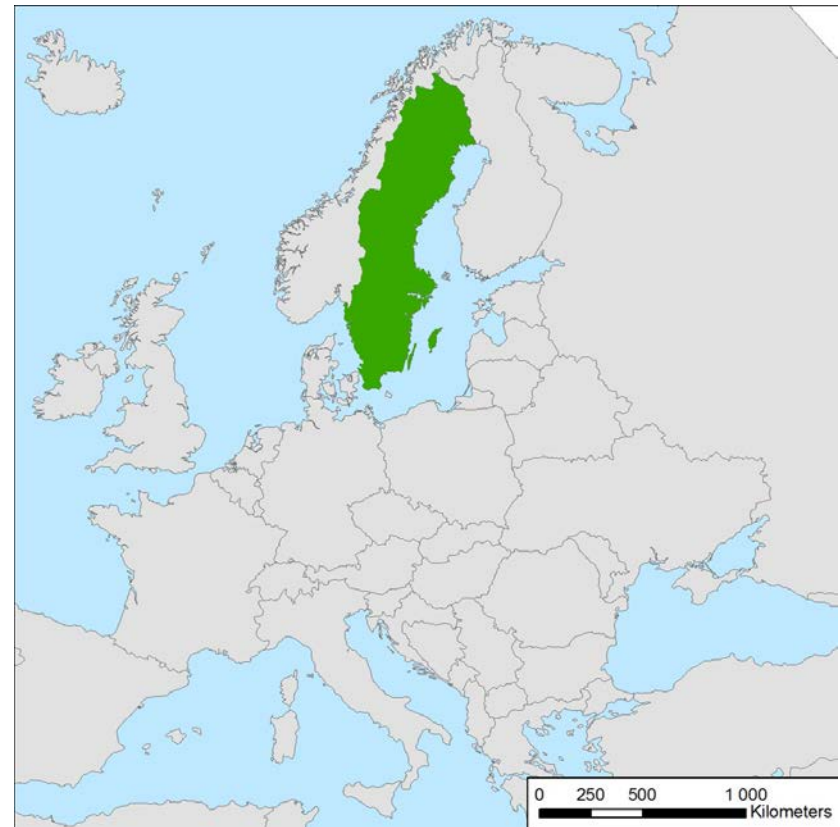


# The Heureka system for multi-objective forest analysis and planning

Tomas Lämås & Hampus Holmström  
Swedish University of Agricultural Sciences (SLU)  
Dept of Forest Resource Management

# A small country rich in forests

- Forest cover 68% (28 million ha) of Sweden's land area
- 22.5 million ha are productive forests ( $>1 \text{ m}^3\text{ha}^{-1}\text{year}^{-1}$ )



# Swedish forests and forest policy

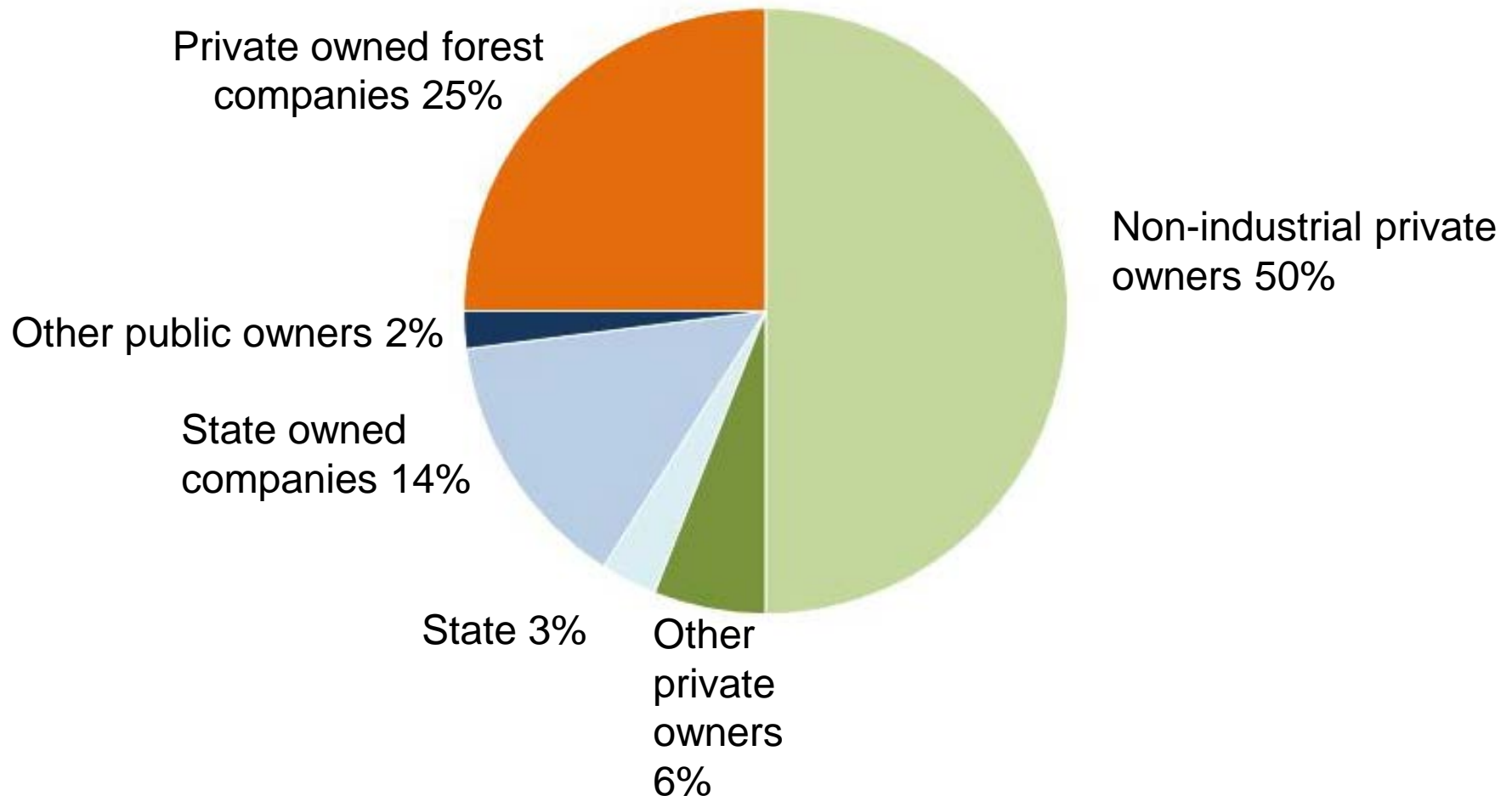
- Conifer dominated boreal forests
- Most of the forests used for production
- Low proportion of non-managed forests and protected forests



Photo T. Lämås

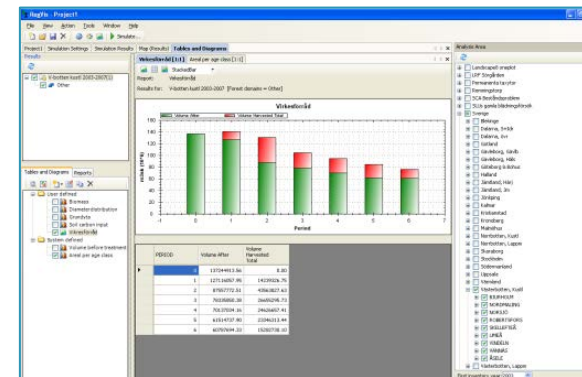
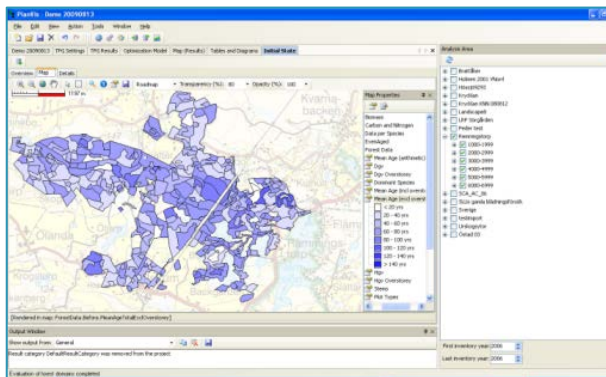
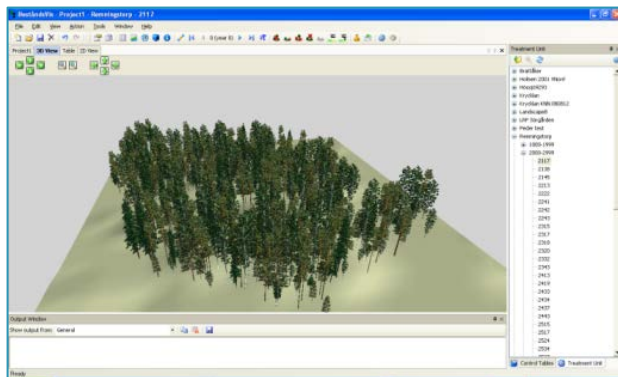
# Forest ownership

Productive forest land area (22.5 million ha) by ownership classes



# The Heureka system

- A set of software for different problem areas and users



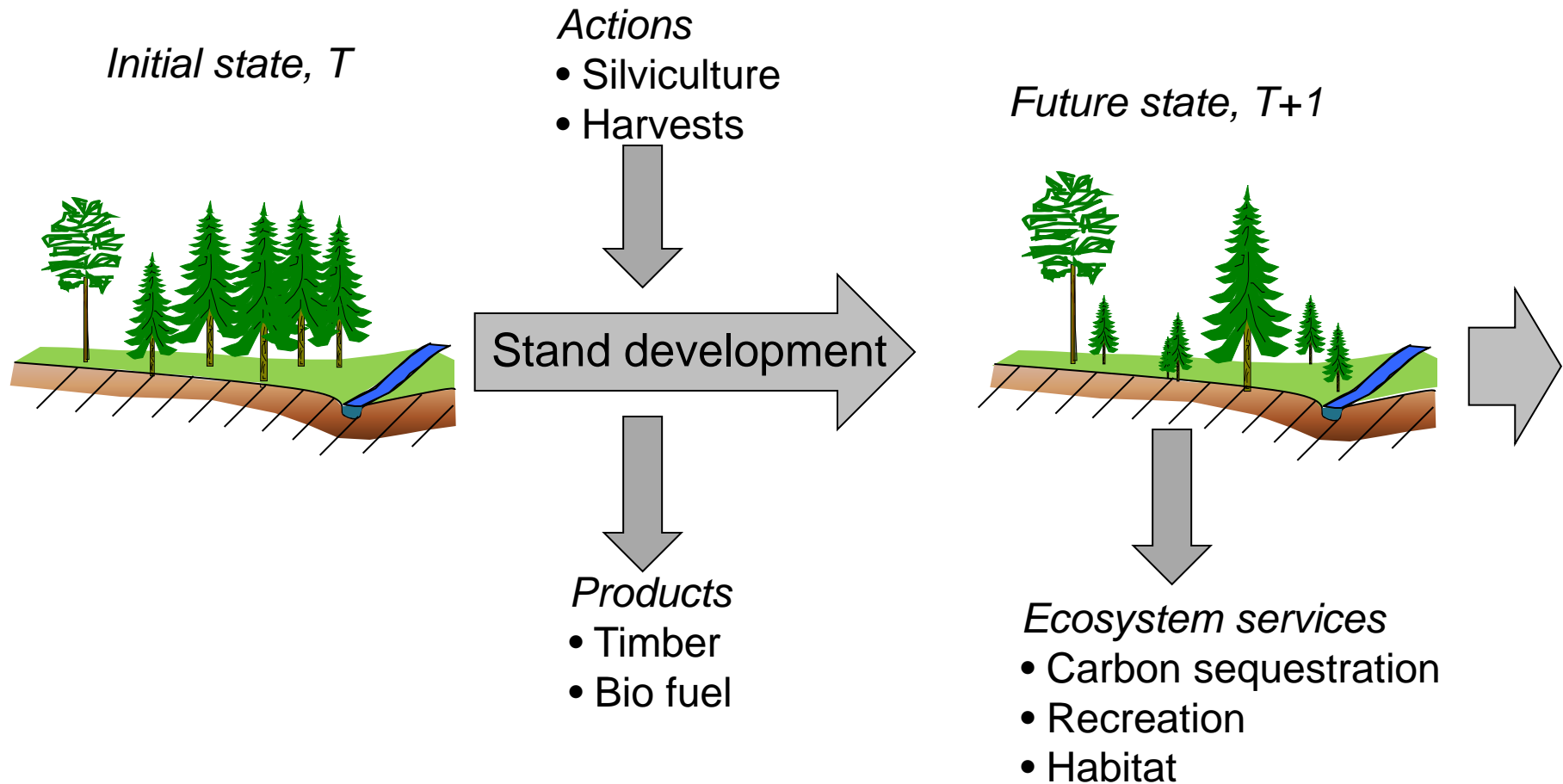
# The Heureka system

- A set of software for different problem areas and users
- Developed at the Swedish University of Agricultural Sciences (SLU) and the Forestry Research Institute of Sweden
- A multi-disciplinary research programme 2002 – 2009

# The Heureka system

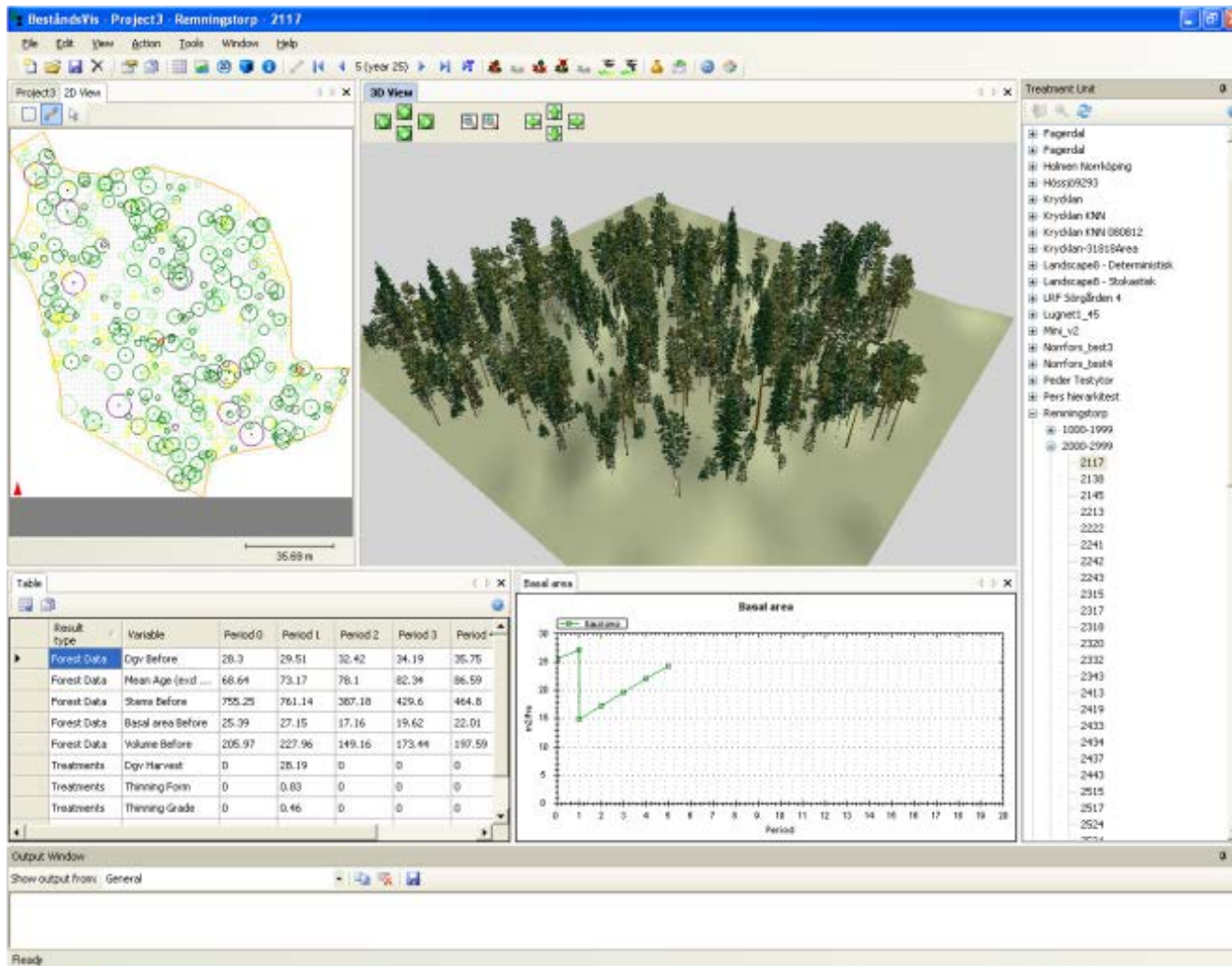
- First versions released in 2009
- SLU responsible for its maintenance and further development
- So far freely available

# Basic principles





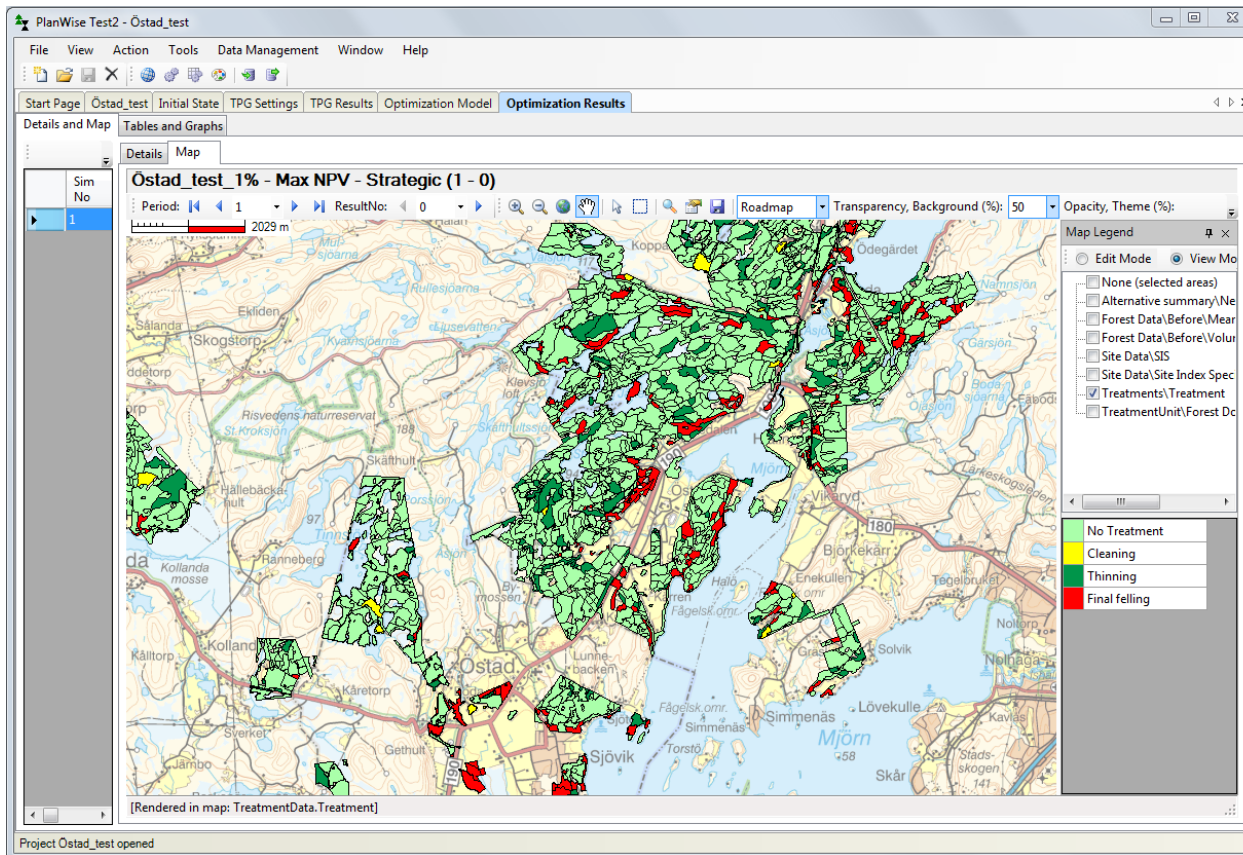
# StandWise



- Analysis of individual stands
- Interactive simulation

# PlanWise

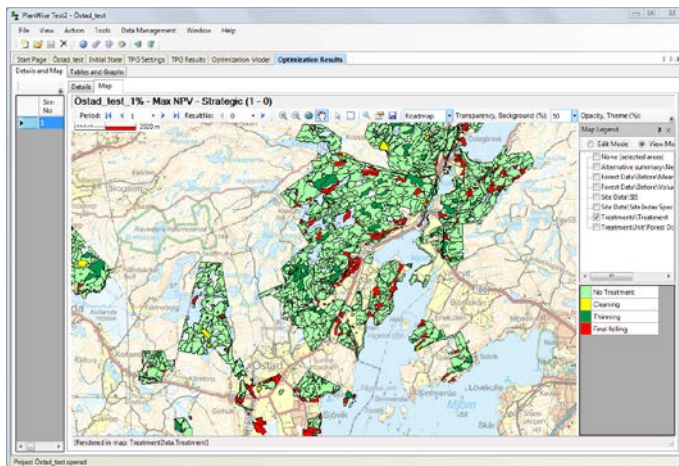
- Planning on estate and company level
- Landscape analyses
- Optimization procedures



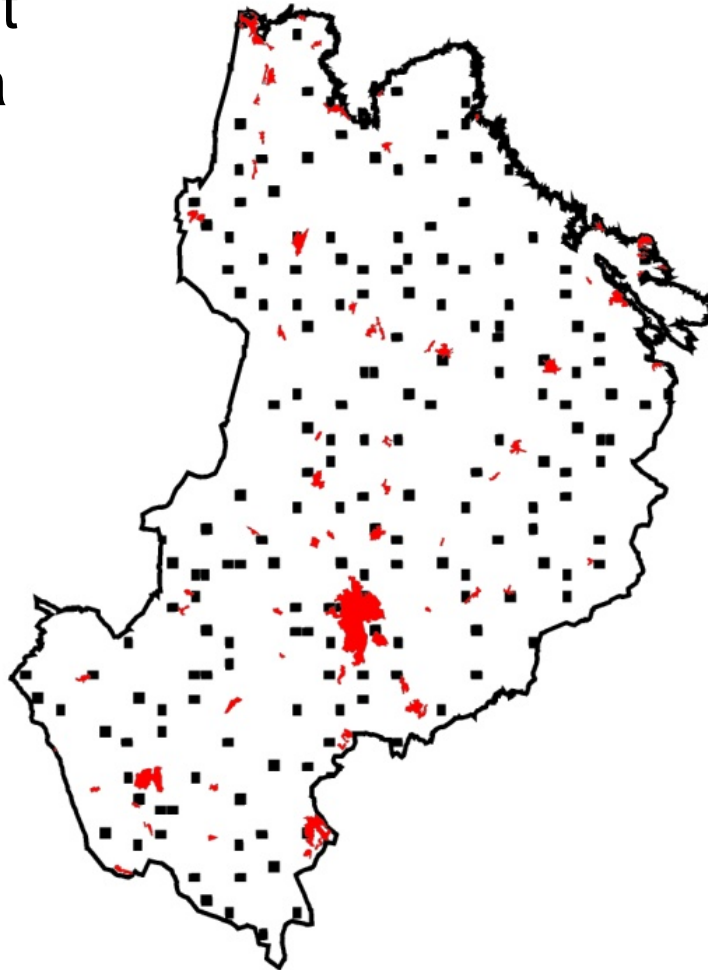
# PlanWise

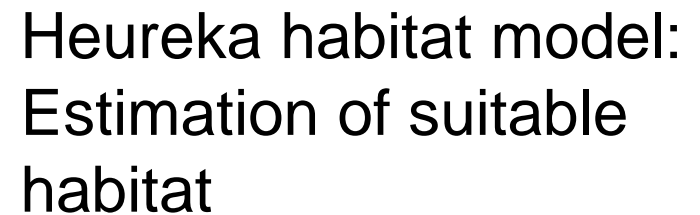
## Steps:

- Import of stand register and forest map
- Calculation of initial state
- Creating a set of potential management alternative for each stand: "Treatment programme generator"
- Optimization
- Reports



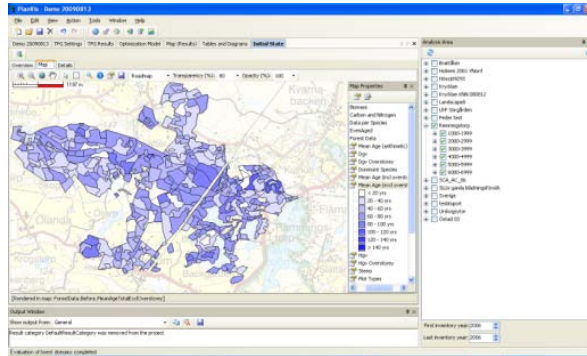
- Regional analyses
- National Forest Inventory data







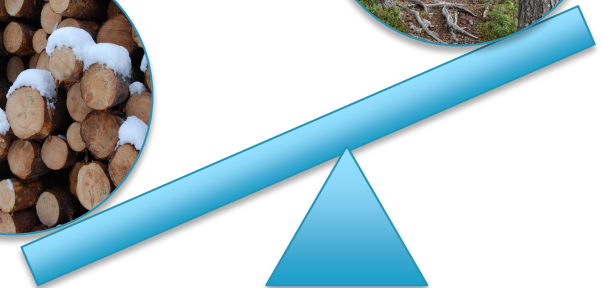
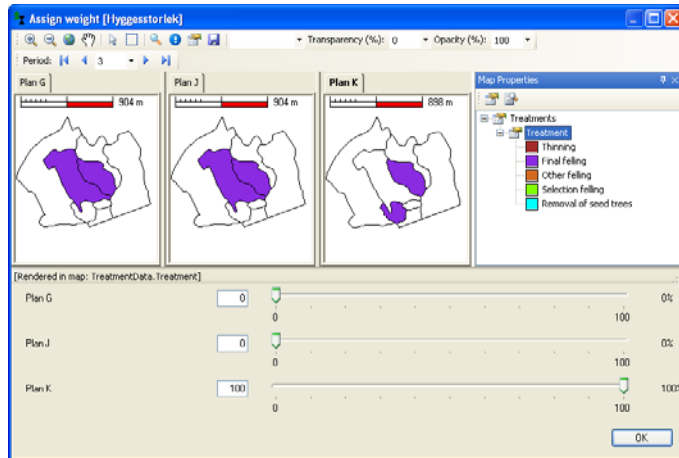
# Multi-criteria decision making



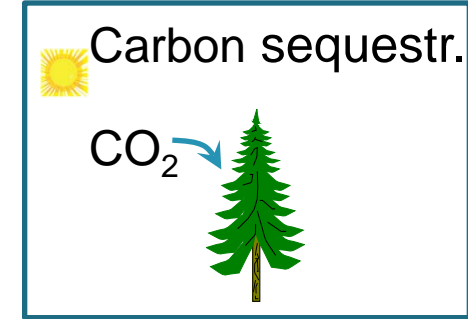
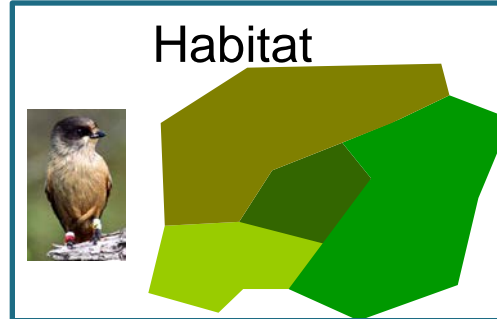
PlanWise:  
A set of alternative  
management plans



PlanEval:  
Evaluation of  
the plans based  
on set of criteria



# Ecosystem services



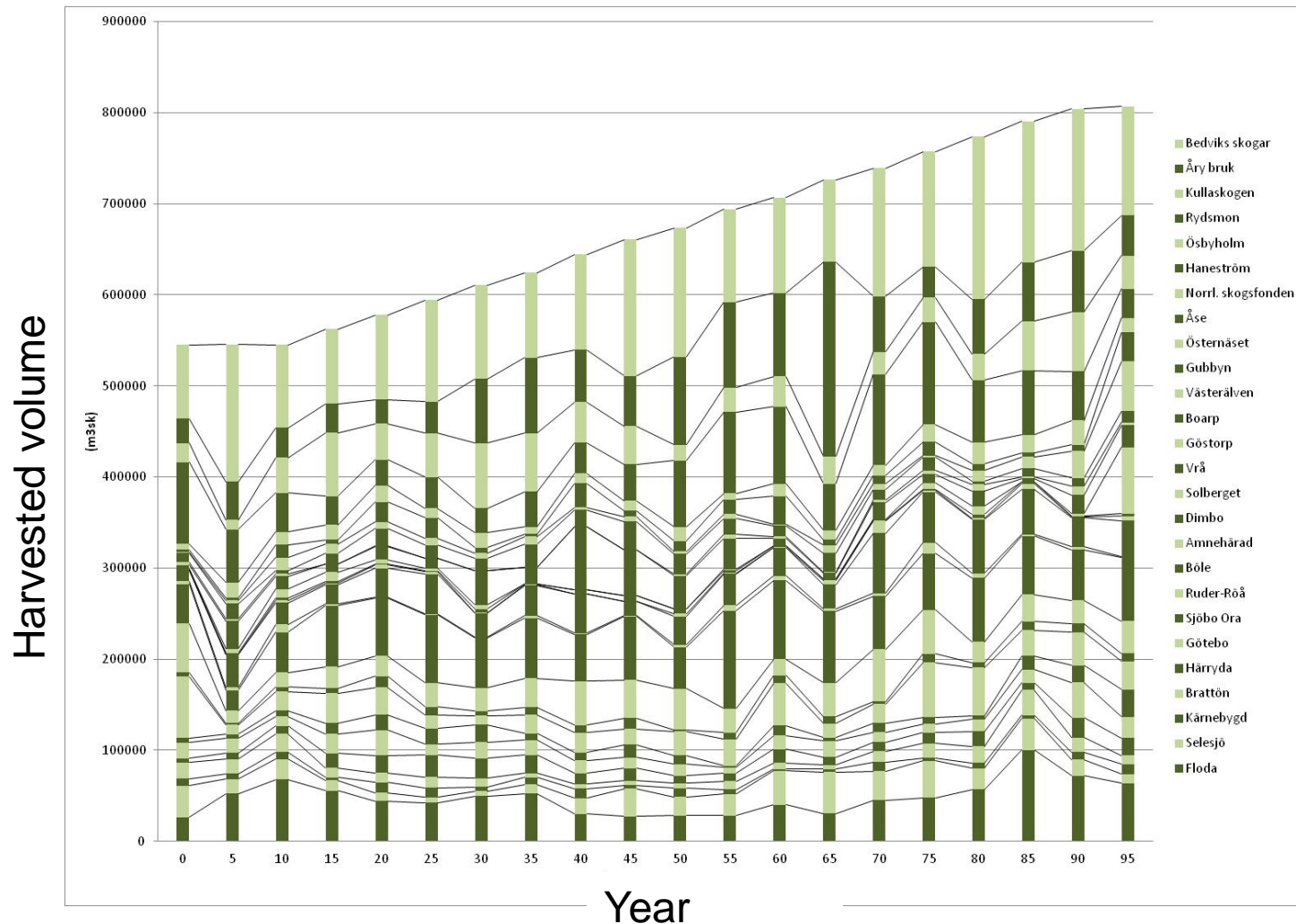
# Users of Heureka

- All large forest companies in Sweden for their strategic but also for tactical planning
- Consultants for making management plans for medium sized forest holdings
- Research
- Environmental assessment
- Teaching



# Example of analyses

**Strategic planning of 26 different estates (30000 ha) all over Sweden**

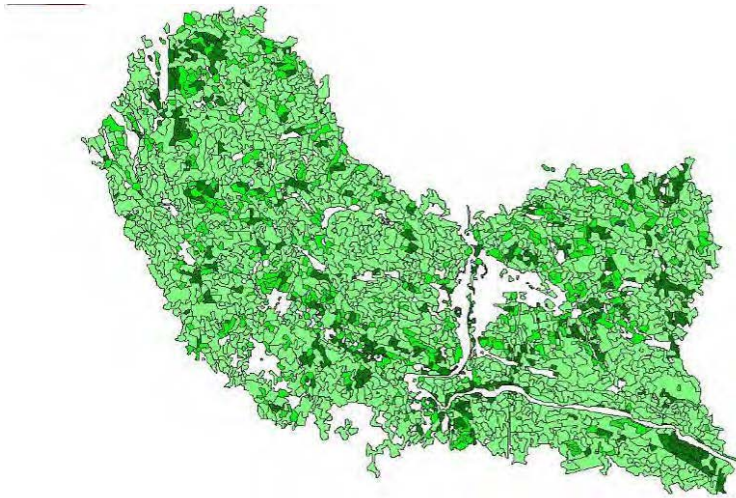


# Exemple of analyses

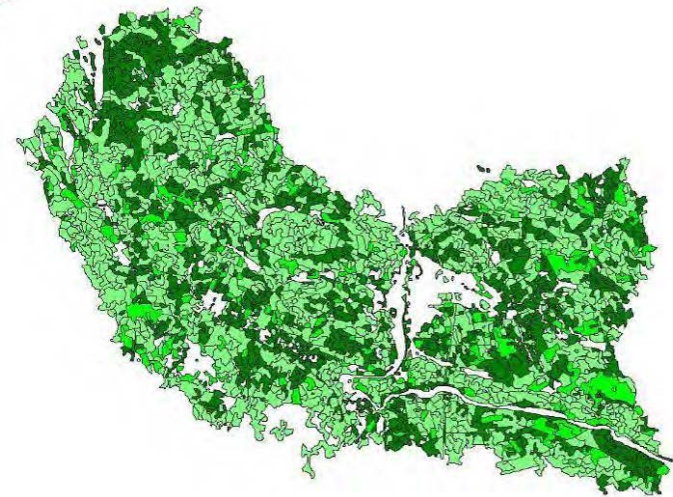
## Areas rich in deciduous tree 19 000 ha landscape

Darker green = higher volume of deciduous trees

(Holmström & Korosuo 2011)



"Business as usual", year 40



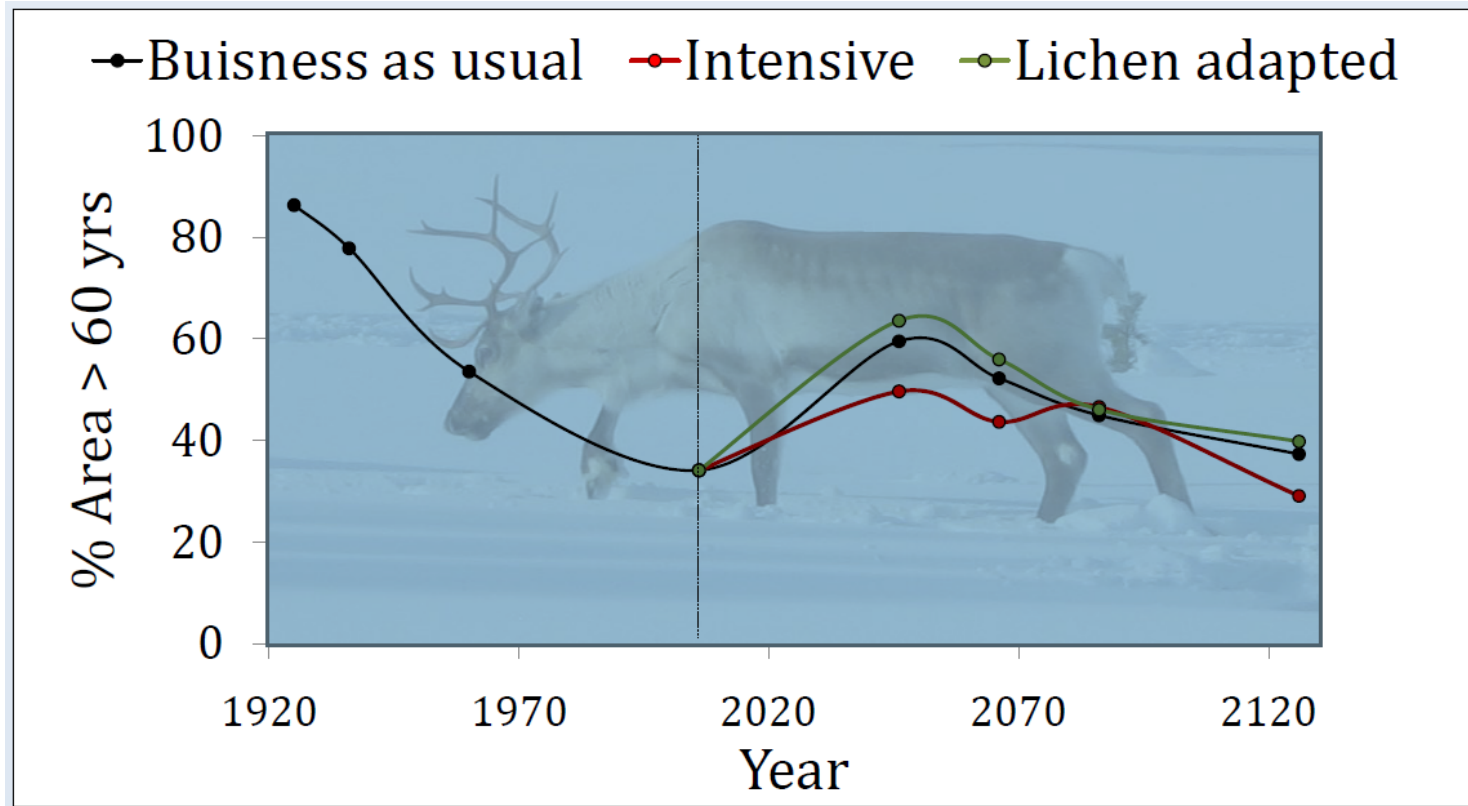
Favouring deciduous trees, year 40

# Reindeer herding



# Example of analyses

Akka, Norrbotten, 26 600 ha  
(Hortskotte et al. 2011)





# Example of analyses

Long term regional level forest fuel potentials  
(Eriksson et al. 2013)

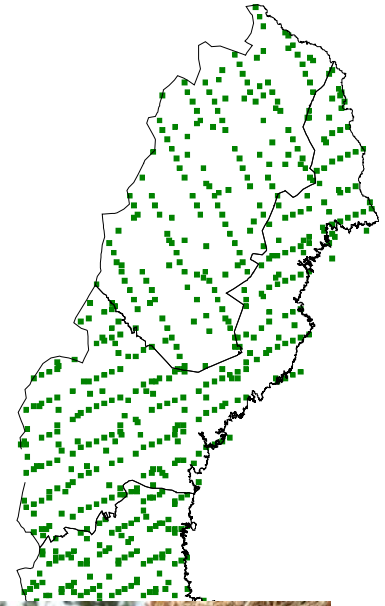


Photo T. Lämås



Photo T. Lämås

# Heureka internationally?

- Commercially used in Sweden, Finland and Norway
- Research programme ongoing in Norway, Norwegian growth and yield functions preliminary implemented

# Concluding remarks

- Powerful and versatile tools can be built around a core of growth and yield models
- The outcome of different ecosystem services can be projected given alternative management strategies
- Timber resources still important but there is an increasing interest in non-timber resources



Photo T. Lämås



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Swedish University of Agricultural Sciences

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## Read about Heureka in New Insights

"A single tool can be used to combine economics, ecology and social values – a globally unique concept."

"The unique feature of Heureka is that it enables users to compare the long-term consequences of various types of forest use."

[Contact](#) Tomas Lämås or Karin Öhman for more information.



### Latest publication

The legacy of logging. Estimating arboreal lichen occurrence in a boreal multiple-use landscape on a two century scale

[More publications](#)


## About SHa

The aim of SHa is to provide decision support tools and analyses related to forest resource development – including the production of goods and services – to policy developers, decision makers and managers within sectors like forestry, environment and energy.

## Services

SHa is responsible for the maintenance and development of the [Heureka-system](#) and performs introductory courses at forest companies, organisations and for an interested public.

## SHa projects

SHa both initiates research and development projects and takes part in projects initiated by others. For example, in collaboration with the research programme [Future Forests](#)  at SLU, SHa elaborated landscape scenarios