Norway Spruce Conversion Options and Consequences

Heinrich Spiecker

Chair of Forest Growth
Albert-Ludwigs-University, Freiburg
Faculty of Environment and Natural Resources

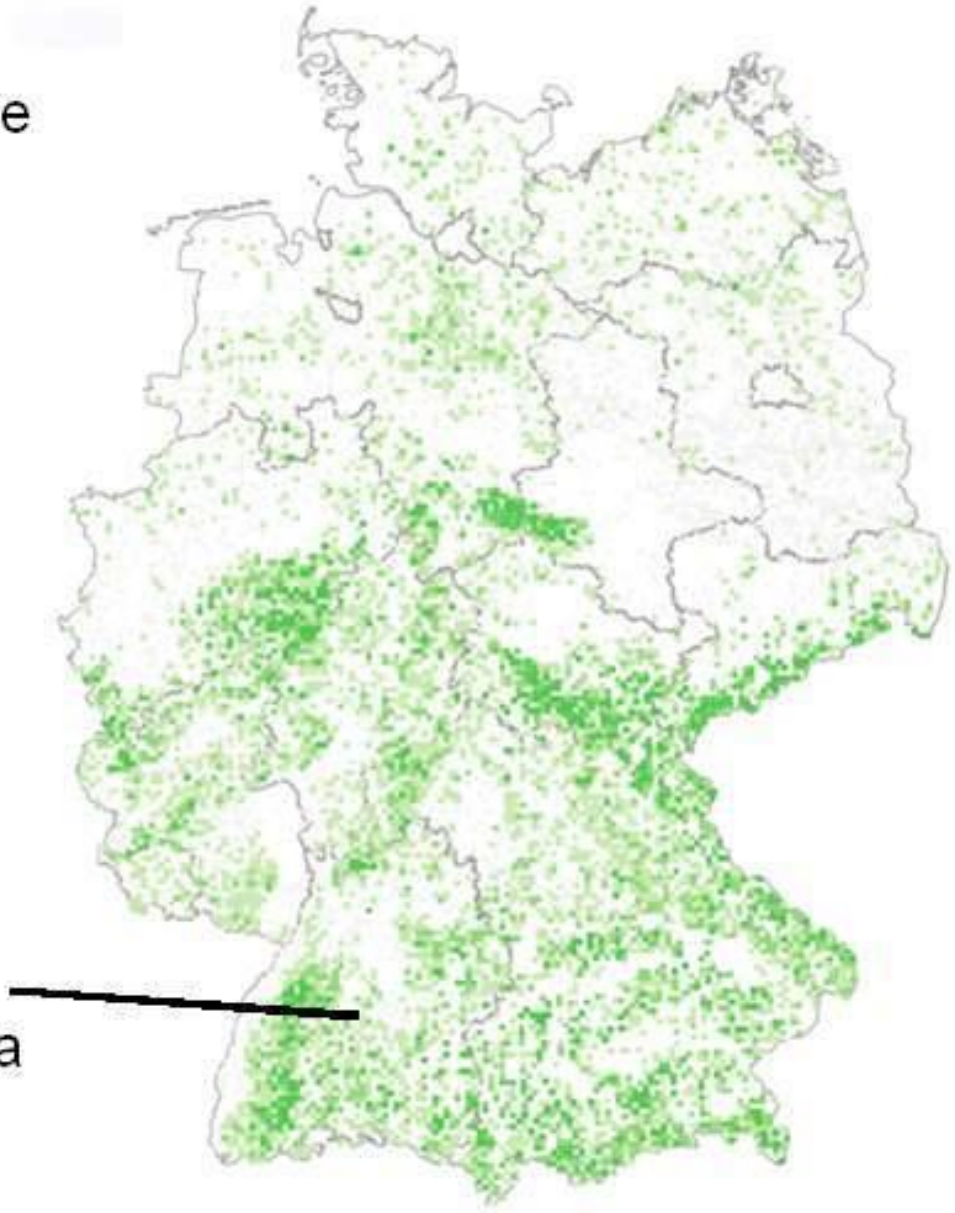
map: (Schuck *et al.* 2002)

Norway spruce in Germany:

…. it is the economically most important tree species!

Distribution of Norway spruce
in Germany in 2012:

25 % of the foret area
33 % of the wood volume



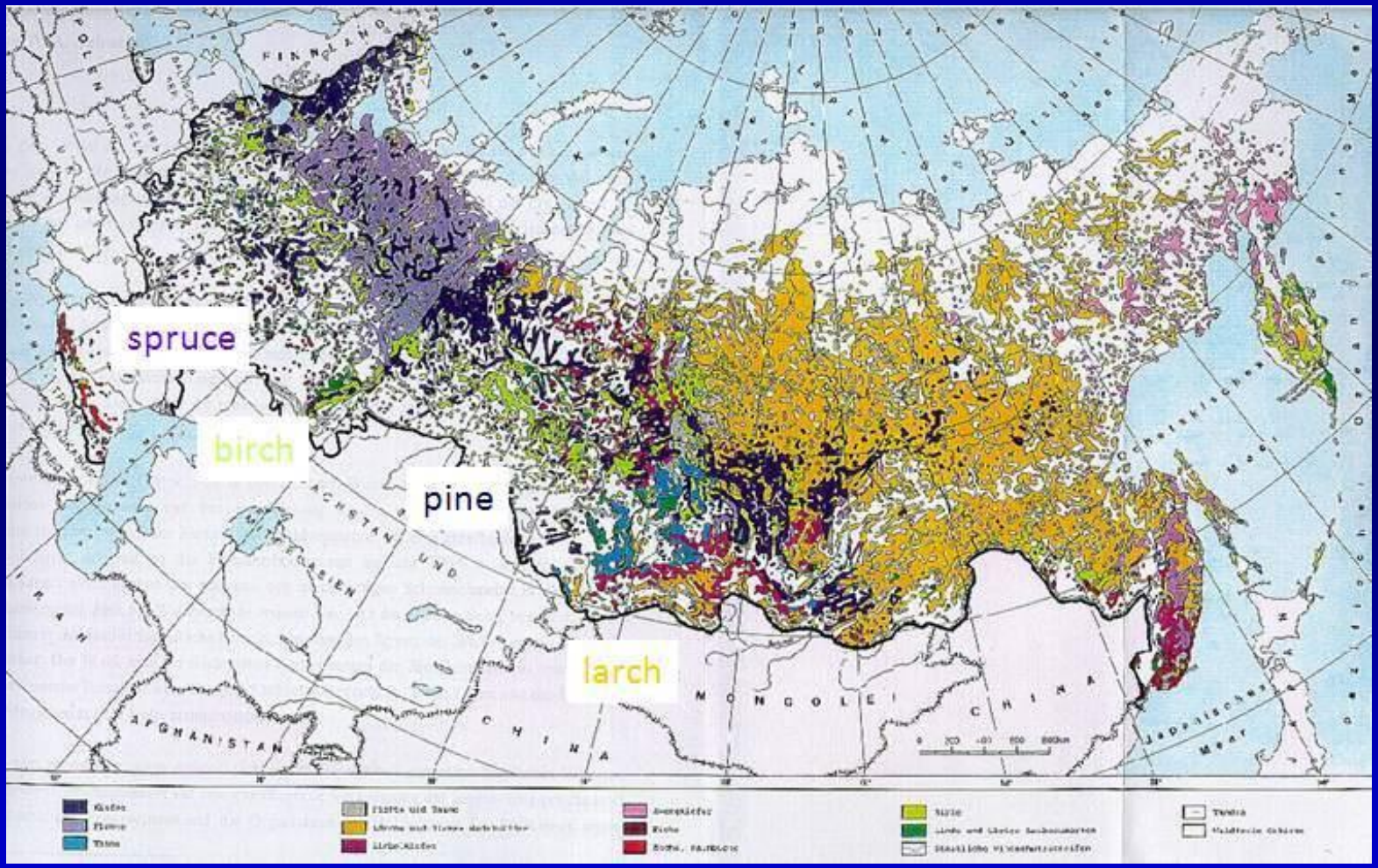
In Ba.-Wü. 2012:
34 % of the foret area

source: Der Wald in Deutschland, ausgewählte Ergebnisse BWI III, 2016

Norway spruce in Russia:

It is an economically important tree species in European part of Russia

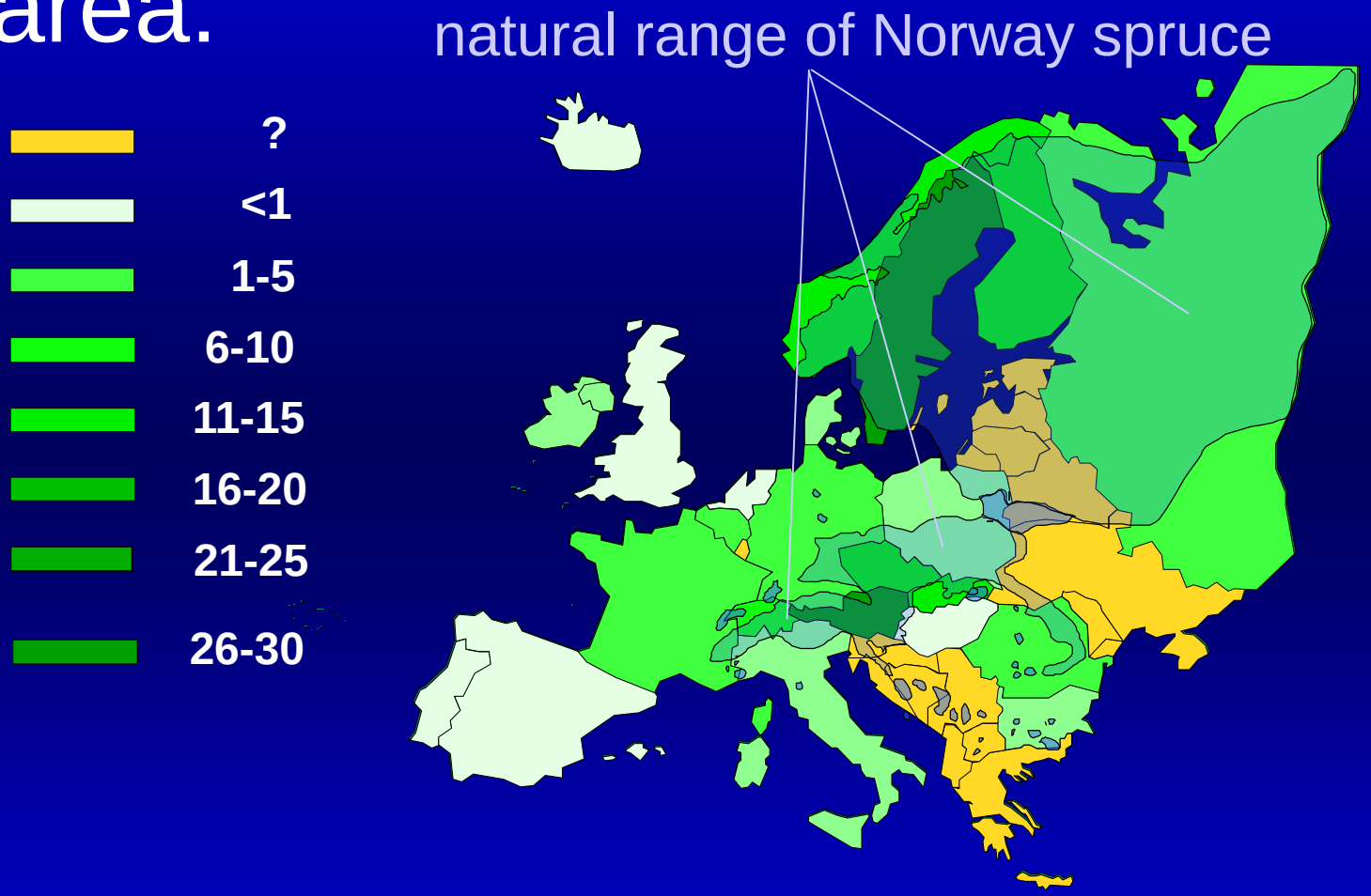
Forest and species distribution in the Russian Federation



source: Bundesanstalt für Forst- und Holzwirtschaft 1995


However, the natural range of Norway spruce in Germany is rather small; Norway spruce was growing only at high elevation at the border of moist areas.

Area of N. spruce in % of the land area:



The history of Norway spruce in Germany

Three Phases of forest development in Central Europe:

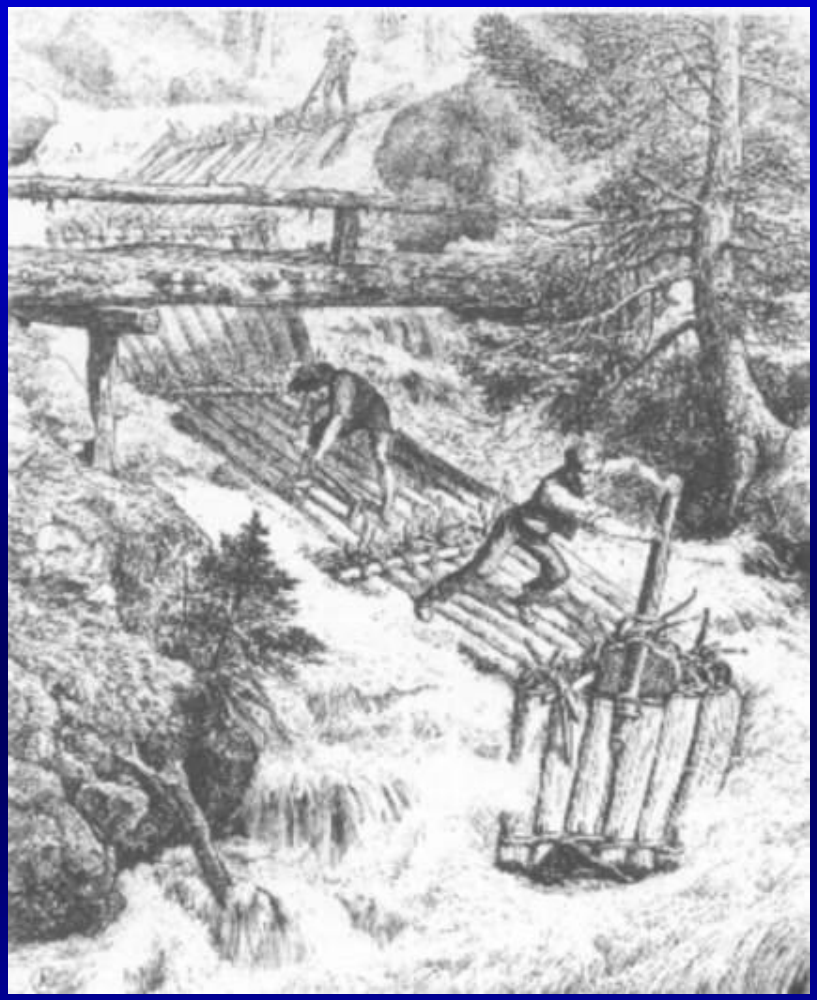
- Phase I: Forest exploitation
- Phase II: Forest restauration
- Phase III: conversion

Three Phases of forest development in Central Europe:

- **Phase I: Forest exploitation**
- **Phase II: Forest restauration**
- **Phase III: conversion**

Albrecht Duerrer 1483
Wood engraving

Wood rafting;
wood engraving
19th century



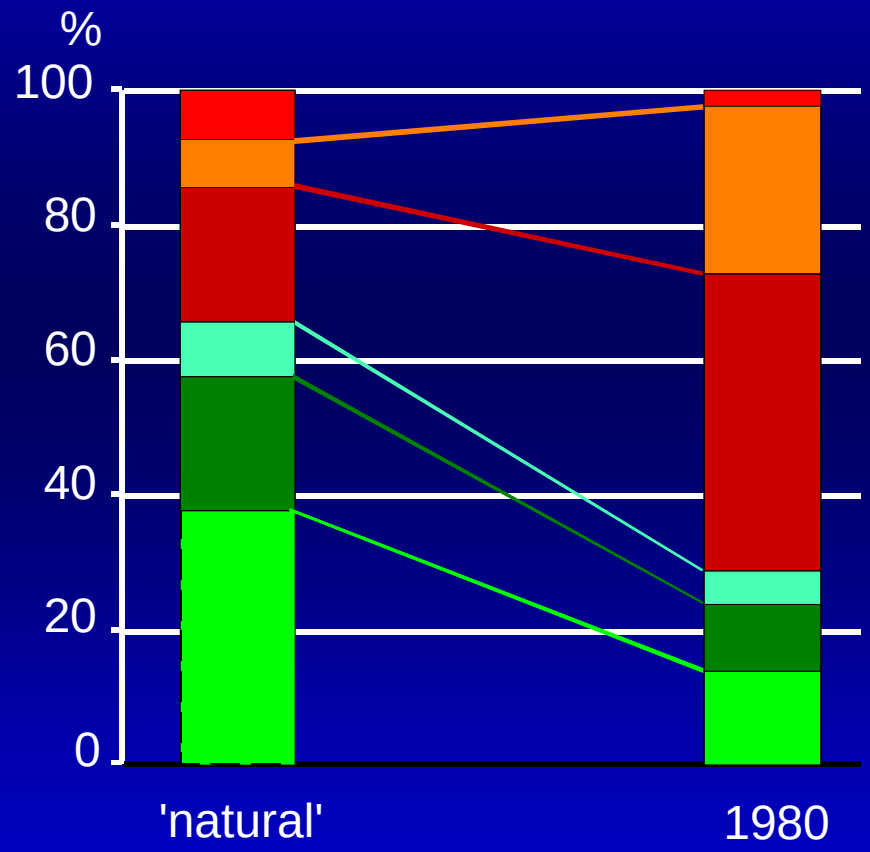
Charcoal production in the Black Forest in the19th century

Caspar David Friedrich, 1822, lonely tree, Germany

Three Phases of forest development in Central Europe:

- Phase I: Forest exploitation
- **Phase II: Forest restauration**
- Phase III: conversion

Changes in species composition in Central Europe



Coniferous sp.

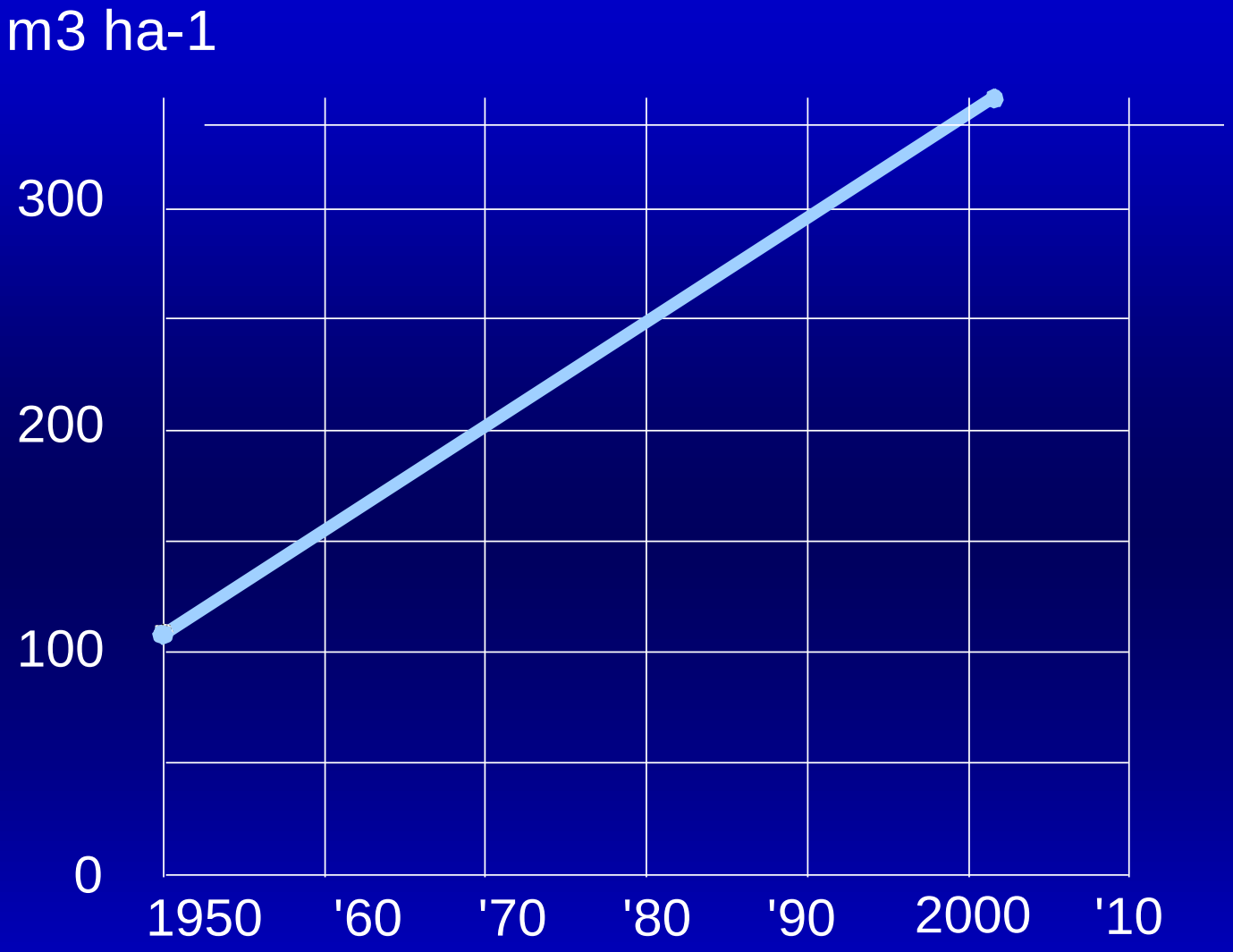
- Abies alba
- Picea abies
- Pinus sp.

Broadleaved sp.

- other broadleaved sp.
- Quercus sp.
- Fagus sylvatica

source: Mayer 1984

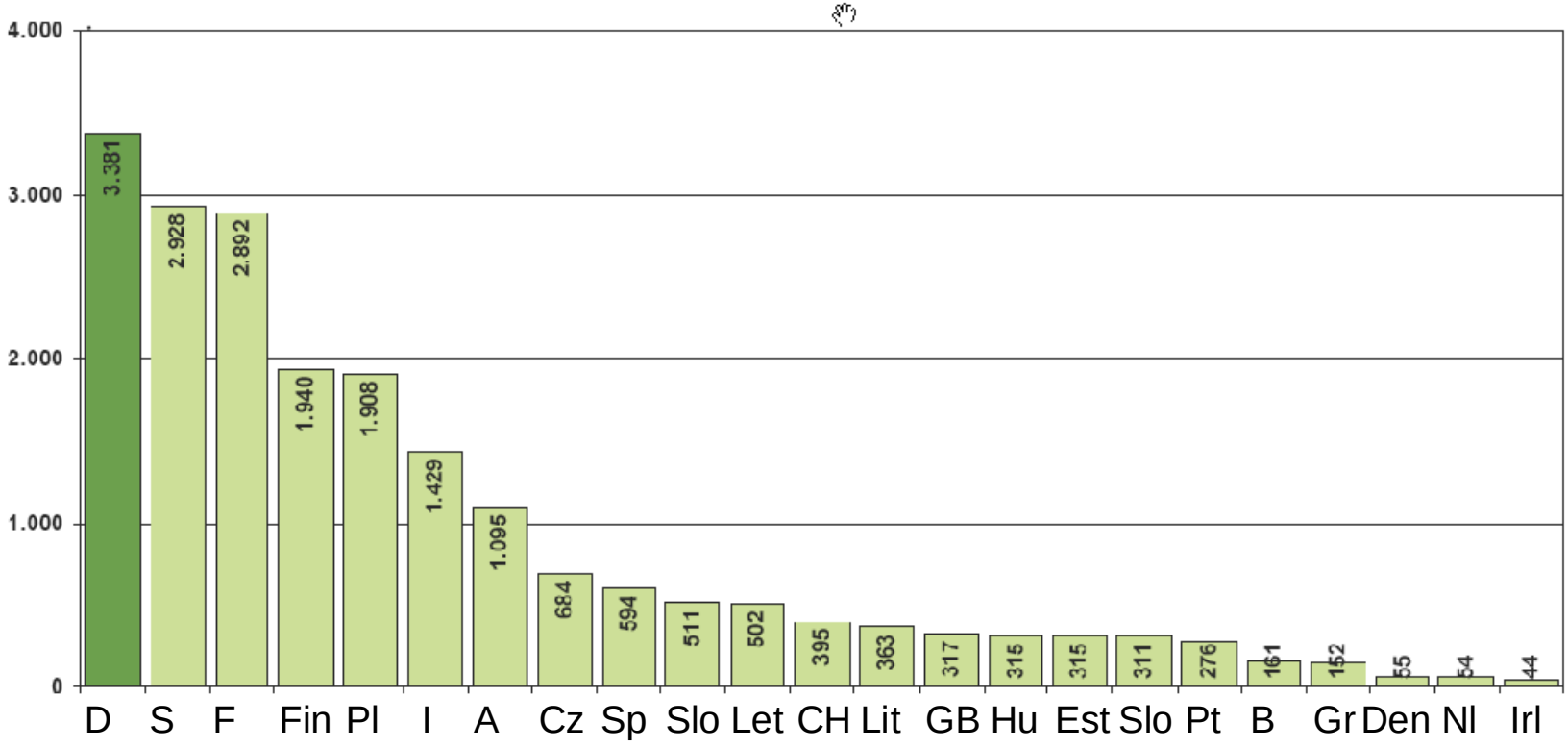
Growing Stock (former W.Germany)



source: Weck 1961 and BWI 1990/2002

Forest Resources in Europe without Russia
Comparison of Total Growing Stock

Growing Stock [mio m3]



source: UN-ECE/FAO, New York and Geneva, 2000

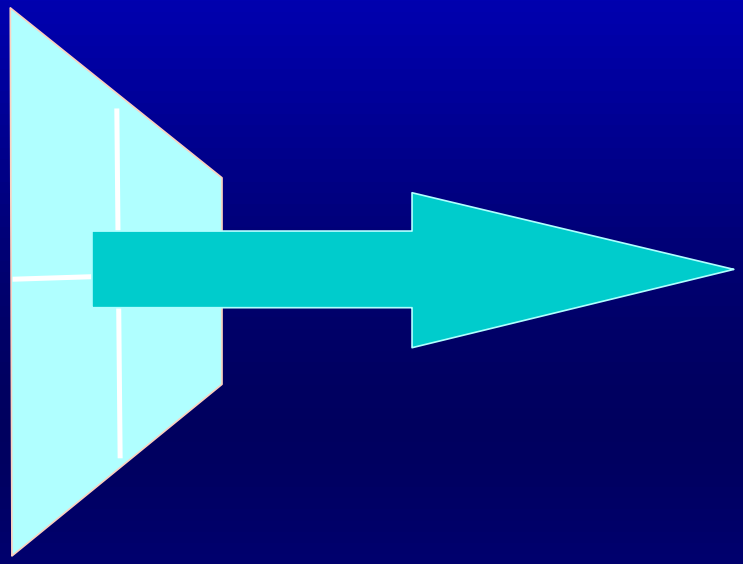
Increment of German Forests

2002 - 2012

Total average increment: 11,2 m^3 ha^{-1}

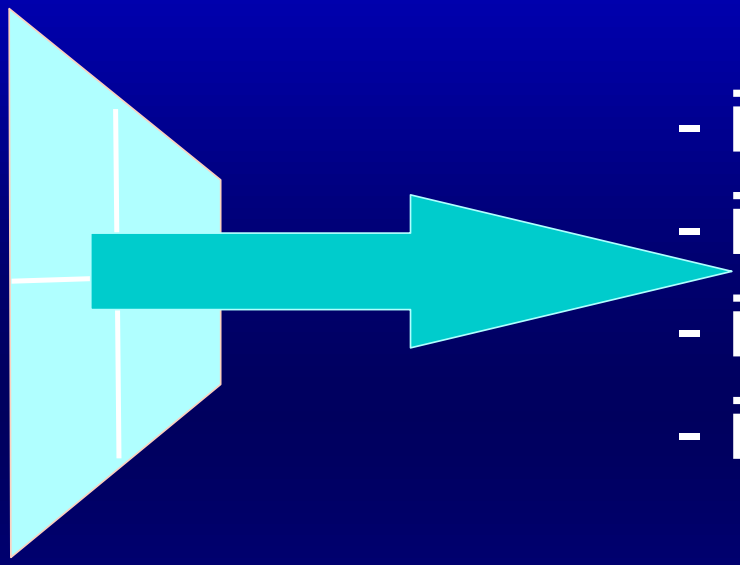
Norway spruce increment: 15,3 m^3 ha^{-1}

Source: Der Wald in Deutschland, ausgewählte Ergebnisse BWI III, 2016



Have the aims of the restoration been achieved?

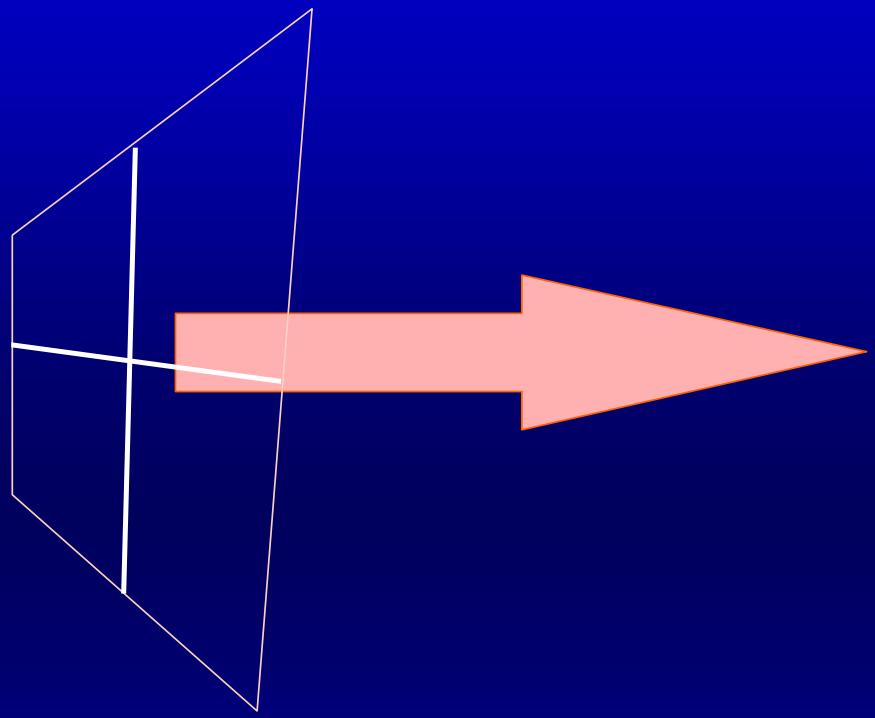
past present



- increase of forest land
- increase of wood production
- increase of growing stock
- increase of wood quality

past

present


?
today
future

How should the forest of the future look like?

Ecological conditions?

changing conditions in space; changing conditions in time

Economic conditions?

markets, salaries, infrastructure

Options of forest operations?

machinery, training, organisation

Peoples perceptions and preferences?

nature conservation, green economy, climate change mitigation

People are not happy with the current forest conditions!

- more emphasis on ecosystem services other than wood procurement
- more close to nature forestry

As forests change slowly and management aims change fast

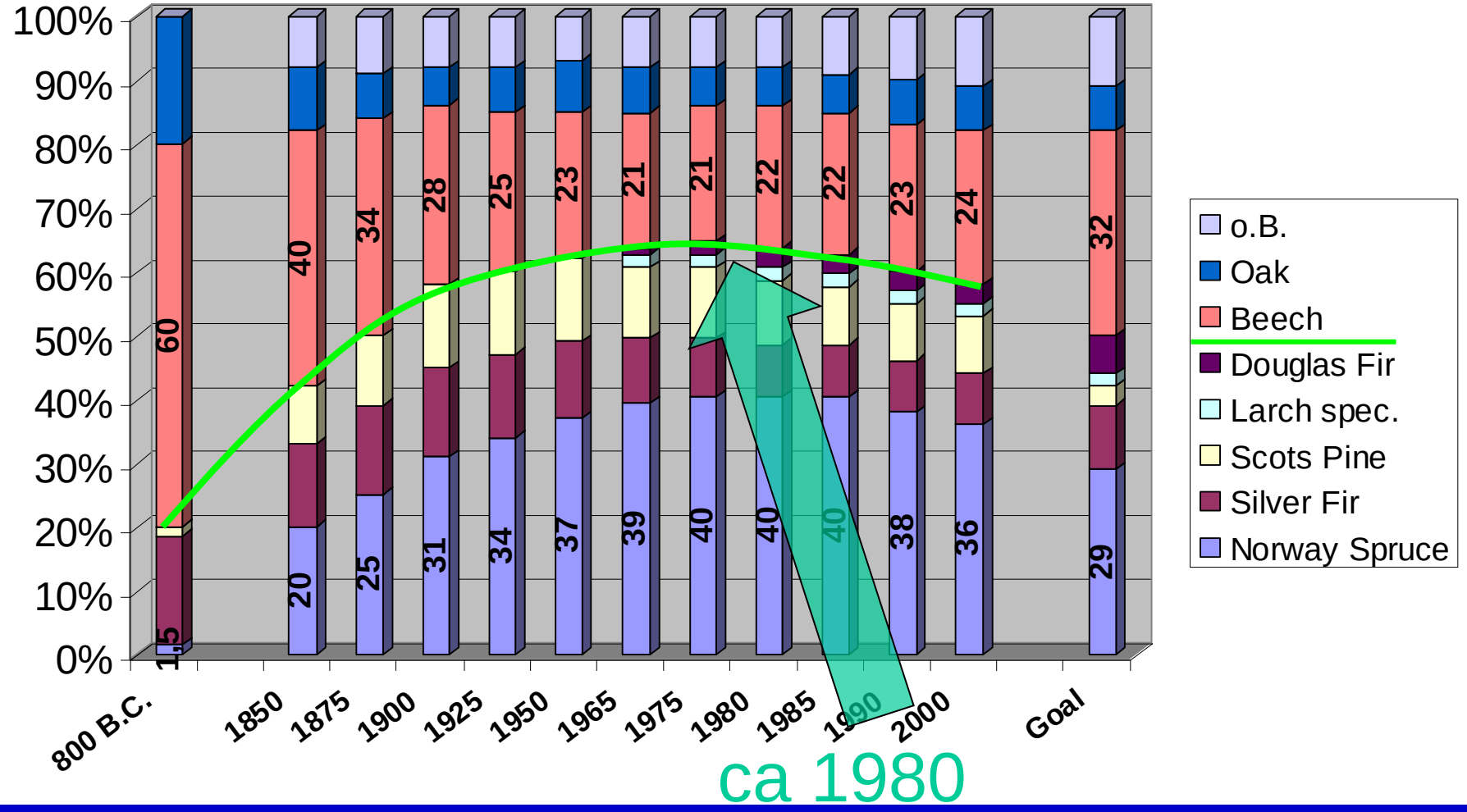
→ the question of conversion comes up!

Three Phases of forest development in Central Europe:

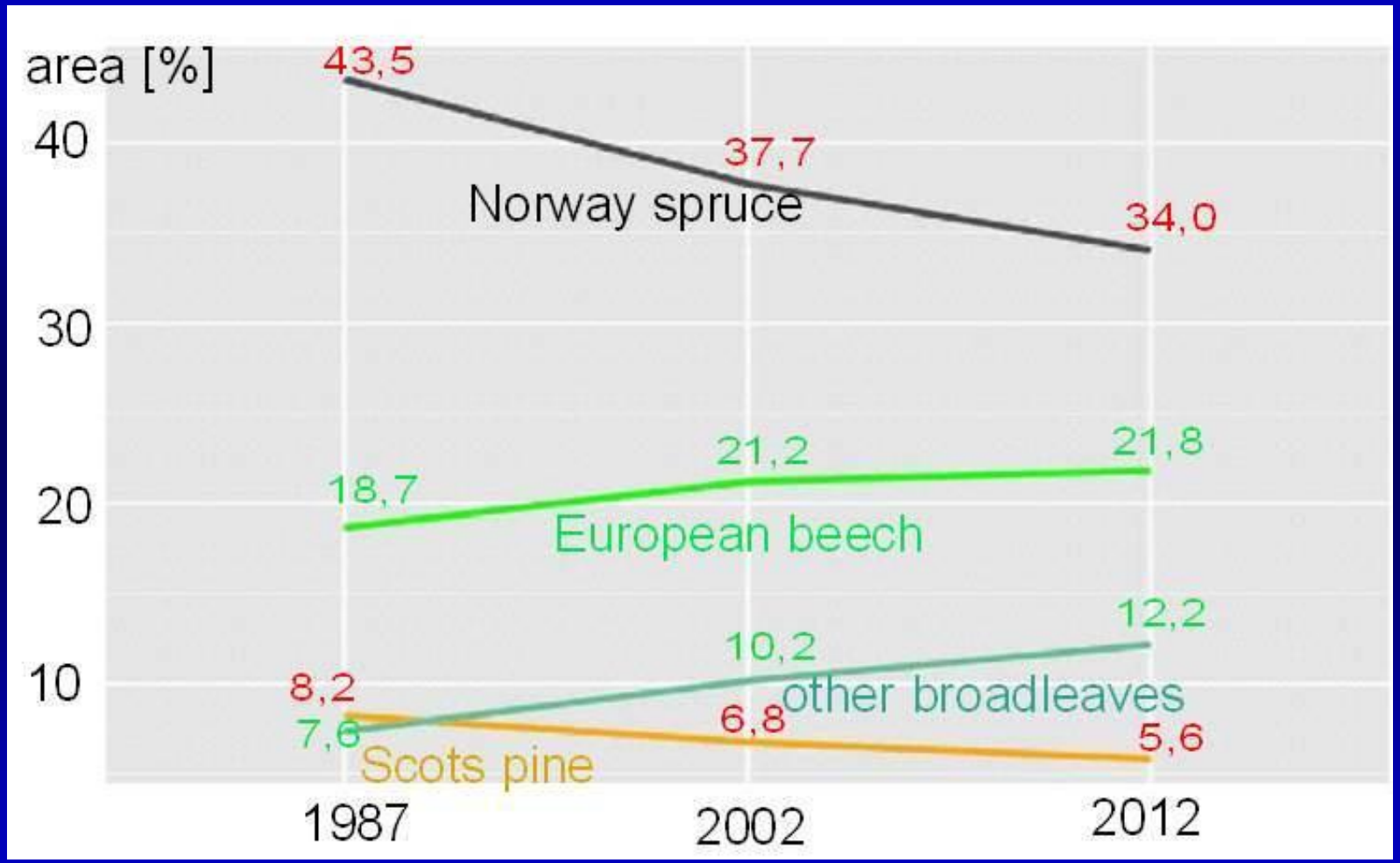
- Phase I: Forest exploitation
- Phase II: Forest restauration
- **Phase III: conversion**

“Conversion”: Species Composition

Public Forests of Baden-Württemberg, SW Germany



Baden-Württemberg



Source: Der Wald in Deutschland, ausgewählte Ergebnisse BWI III, 2016, Ba.-Wü.

Federal Republic of Germany (1987 – 2002 “old federal states”

Reduction of the area of Norway spruce:

1987 – 2002: **– 8 %**

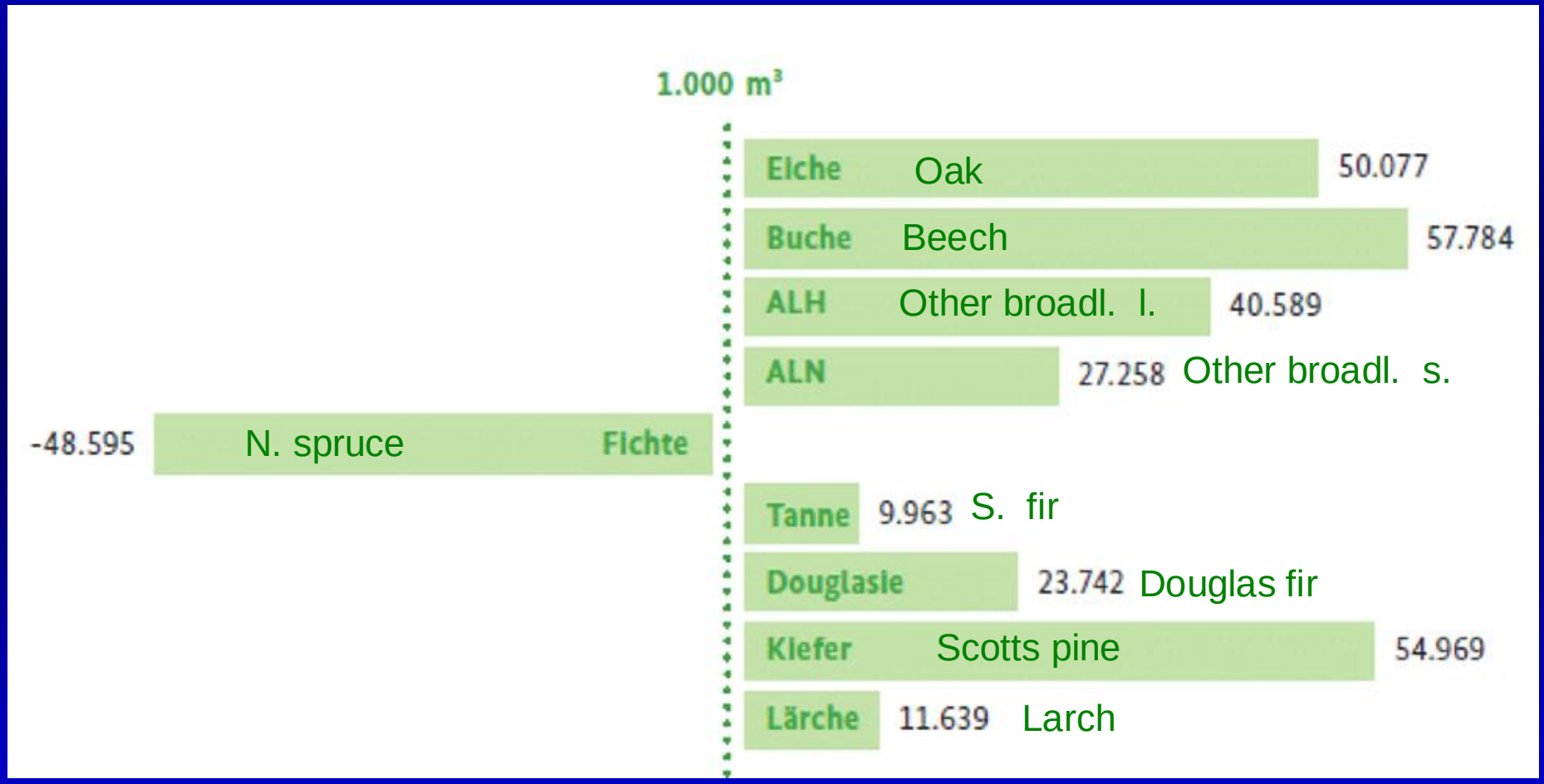
2002 – 2012: **– 8 %**

Increase of the area of European beech:

1987 – 2002: + **12 %**

2002 – 2012: + **6 %**

Change in growing stock by species in Germany 2002 - 2012



Change in Growing stock

Example: Baden-Württemberg:

From 1987 to 2012 The growing stock of Norway spruce decreased by 13,3 % while the growing stock of all species increased in total by 7,7 %!

Source: Der Wald in Deutschland, ausgewählte Ergebnisse BWI III, 2016, Ba-Wü

Age structure and it´s changes

Source: Der Wald in Deutschland, ausgewählte Ergebnisse BWI III, 2016

Regeneration (2012):

85% of German forest regeneration is natural regeneration!

Definition: trees: height > 0,2, d1.3 < 7 cm

Example: Baden-Württemberg:

Norway spruce:	**21,8 %**	(total area 2012: 34,0 %)
Beech:	28,8 %	(total area 2012: 21,8 %)
Other long living broadleaves: (ash, maple, hornbeam, lime)	34,7 %	(total area 2012: 5,6 %)
Conifers:	28,6 %	(total area 2012: 53,2 %)
Broadleaves:	71,4 %	(total area 2012: 46,8 %)

Source: Der Wald in Deutschland, ausgewählte Ergebnisse BWI III, 2016, Ba-Wü

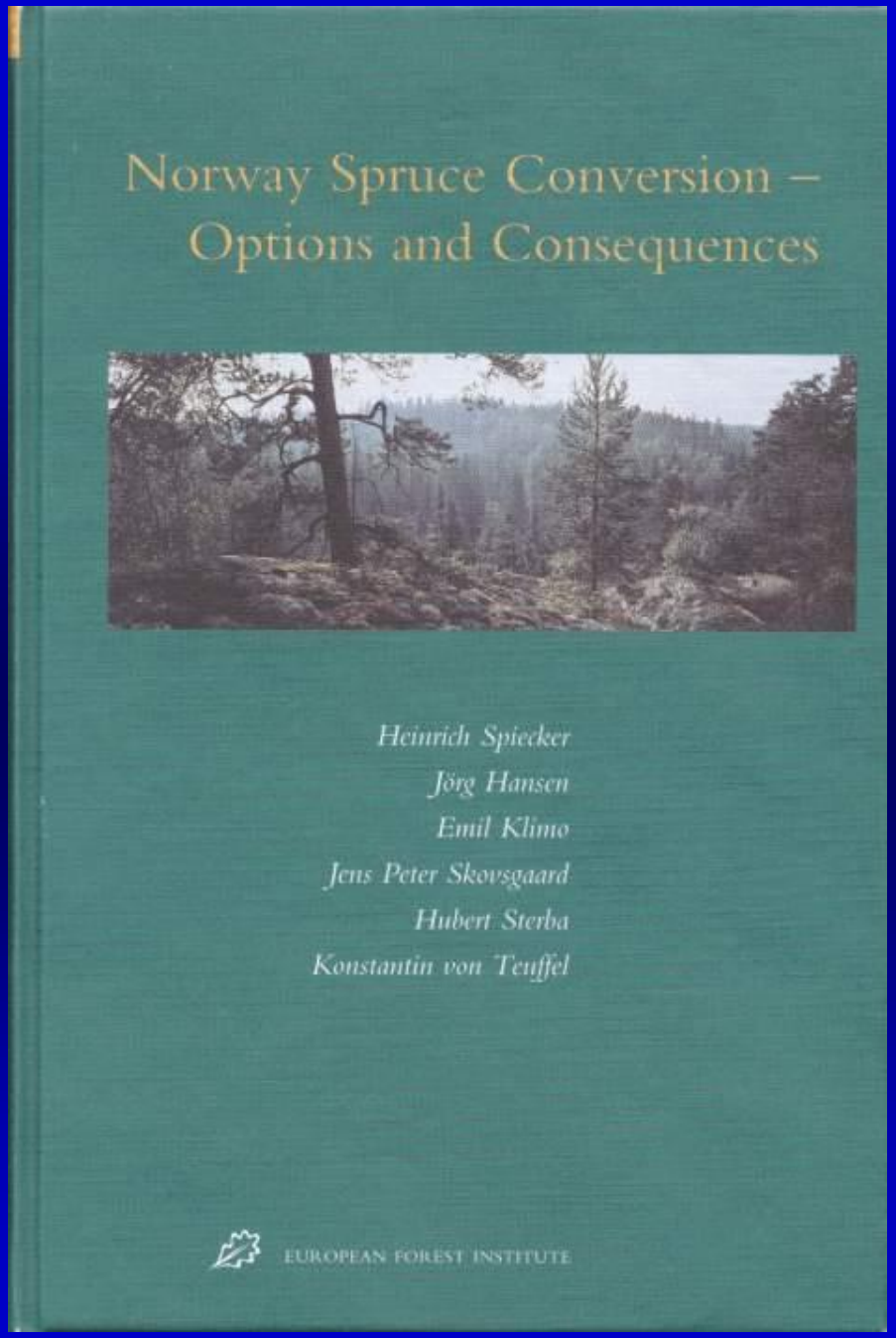

Research approach in an
European Project Centre
at Freiburg

To answer some of these questions an EFI Project Centre "CONFOREST" has been established

*The Question of **CON**version of Coniferous **FOREST**s on Sites Naturally Dominated by Broadleaves for Sustainable Fulfillment of Society's Needs.*

EUROPEAN FOREST INSTITUTE


ON FOREST
Welcome to:
Members login
Introduction
Member institutes
Organisation
Research
Events
Documents
Publications
Links
Overview
Challenge
Objectives
ON FOREST
EFI Project Centre ConForest:
The question of CONversion of coniferous FORESTs
on sites naturally dominated by broadleaves
for the sustainable fulfilment of society's needs
Please pass any comments to: stuart.dedrick@iww.uni-freiburg.de
E F I


Norway Spruce Conversion –
Options and Consequences
Heinrich Spiecker
Jörg Hansen
Emil Klimo
Jens Peter Skovsgaard
Hubert Sterba
Konstantin von Teuffel
EUROPEAN FOREST INSTITUTE

To provide a solid base for answering the question of conversion various disciplines need to be involved!

History

Inventory

Ecology

Policy

Silviculture

Forest Operations

Economy

Focus of research by the RPC:

Analysis of the ecological and economic impact of pure coniferous stands **as compared** to broadleaf mixed stands

Analysis of the ecological and economic consequences **during the conversion process**

EFI RPC-CONFOREST: Discussions

Results:

No one single optimal solution:

- site conditions
- state of the forest
- economic conditions (forest size, location etc.)
- aims of the owner

Results:

besides traditional economical aims such as:
- net revenue
- cash flow
- reduction of risks
- others

new aims get more important:
- flexibility

Results:

On sites naturally dominated by broadleaves coniferous forests are less favorable from the **ecological** point of view.

Economically coniferous may still be preferable on many sites.

How should the forest of tomorrow look like?

Forest ecosystems should be:

- robust and resilient (“high adaptive capacity”)

- Provide multiple services such as:
  - protection
  - recreation
  - sustainable production and use of valuable wood
  - maintenance of cultural values

How should the forest of tomorrow look like?

highest priority for conversion:

productive sites which are naturally dominated by broadleaves and which show high risk for coniferious trees (storm, drought, bark beetles).

How should the forest of tomorrow look like?

We may also in the future find in Europe diverse ways of management:

- forest site diversity
- cultural diversity
- ownership diversity

What does this mean for future forestry in the European part of Russia?

Good market conditions for selling Norway spruce wood and - wood products to Germany.

Heinrich Spiecker <instww@uni-Freiburg.de