



EUROPEAN FOREST INSTITUTE

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# **Policy changes and their effects on sustainable forest resource utilization in Europe**

**The European Forest-Based Sector : Bio-Responses to Address New Climate and Energy Challenges?**

**6-8 November 2008, Nancy, France**

[www.efi.int](http://www.efi.int)





# Overview of the Talk

## Intro

- Changing needs for goods and services from forests
- Policy options need to be evaluated

## Approach

- Resource projections
- Sustainability impacts

## Discussion

- Trade offs between policy targets
- Importance of decision support tools



# SENSOR: sustainability impact assessment of land use



Agriculture



Forestry



Nature Conservation



Transport Infrastructure



Energy



Tourism



Social



Economic



Environment





# SENSOR: sustainability impact assessment of land use



**Agriculture**



**Forestry**



**Nature  
Conservation**



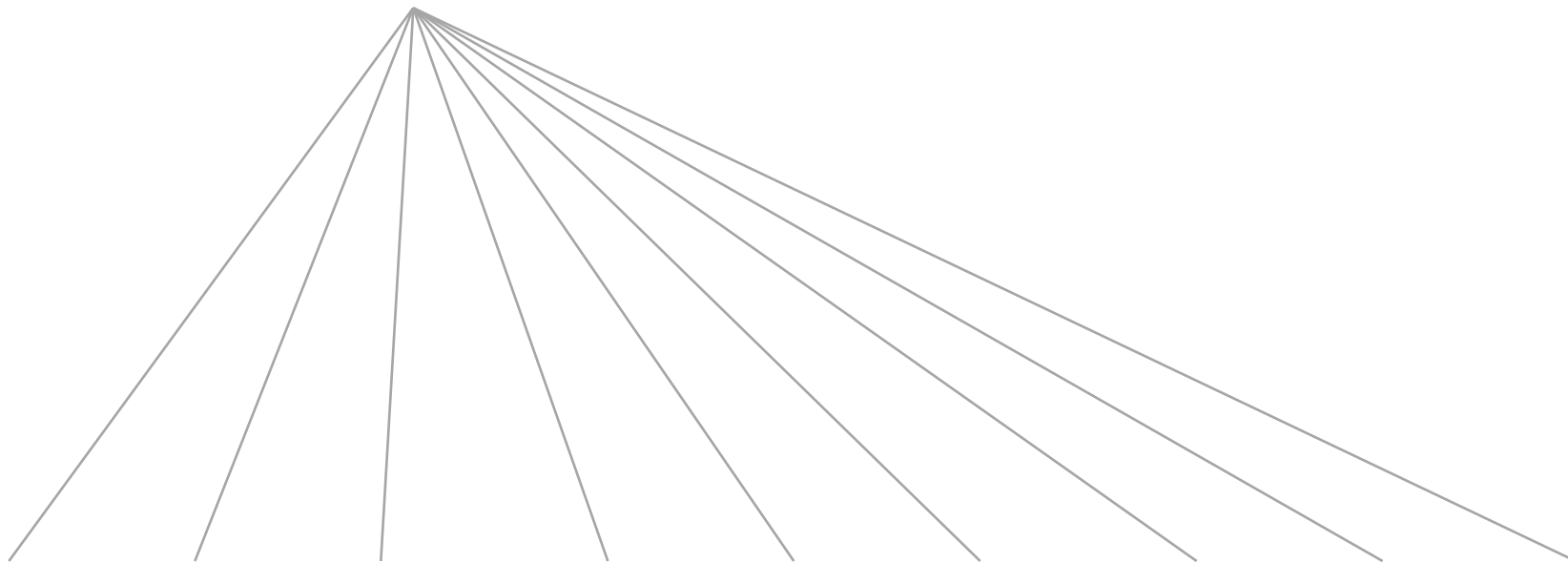
**Transport  
Infrastructure**



**Energy**



**Tourism**



**Social**



**Economic**



**Environment**



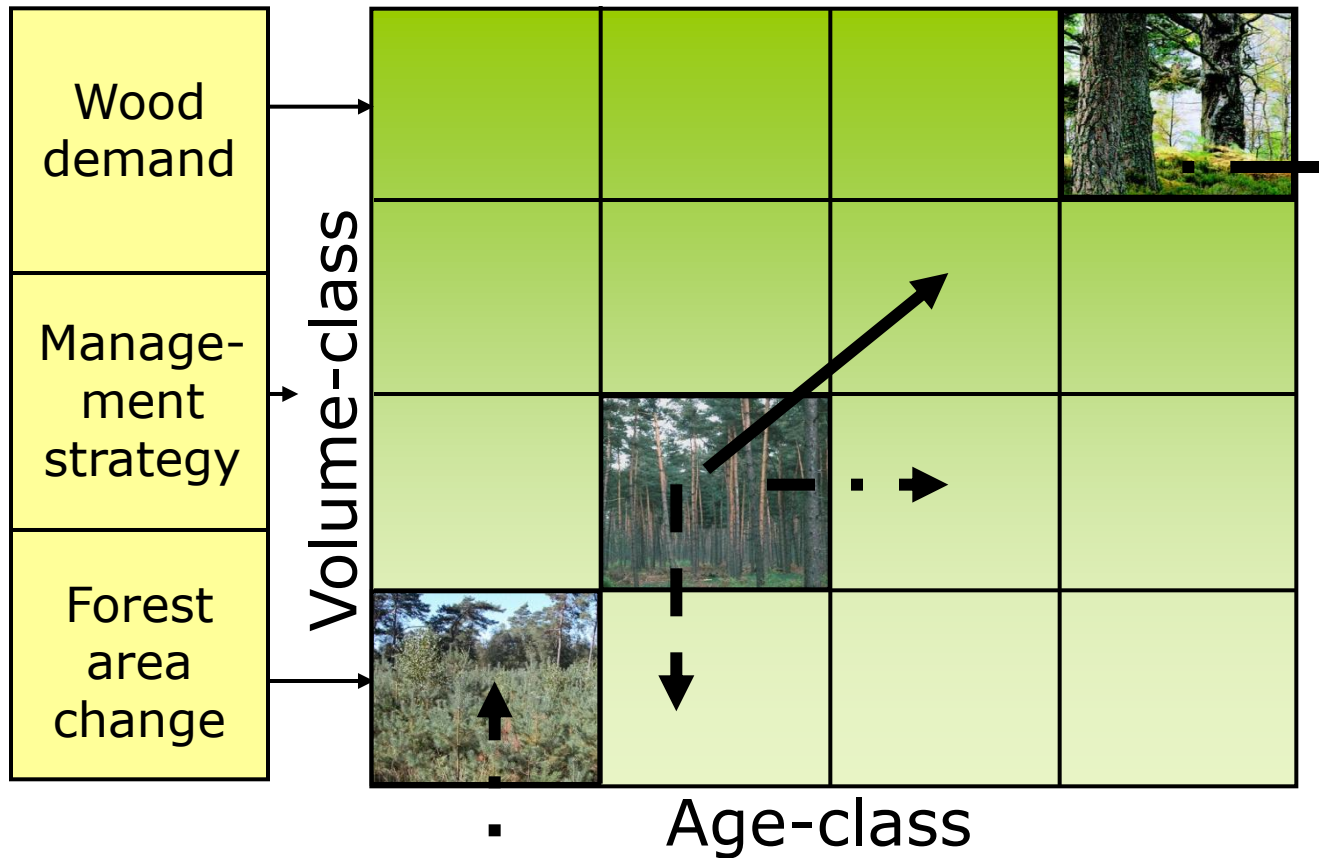


## Objective

- to include all three dimensions of sustainability into the European Forest Information SCENario model (EFISCEN)

- to analyse sustainability impacts of policies focusing on
  - 1) bio-energy production from forest biomass and
  - 2) increased forest biodiversity protection

# EFISCEN modelling framework

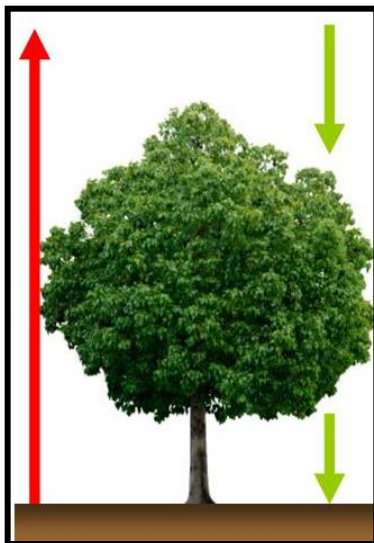


# Indicators

- Indicator selection criteria
  - Relevant indicators (e.g. MCPFE)
  - Compatible with EFISCEN structure
- Selected indicators:



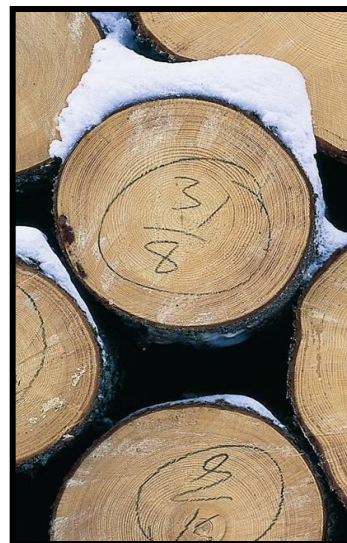
Deadwood



Carbon  
stock



Fellings and  
increment



Biomass  
revenue



Workforce

# Scenarios

■ **Baseline:** historical wood removals until 2000, EFSOS projections thereafter (Kangas and Baudin 2003)

■ **Biodiversity:** set aside 5% of forest area and apply management restrictions to protected area (baseline demand)



■ **Bio-energy:** residue removal and complementary fellings after 2010 (cf. EEA 2006)

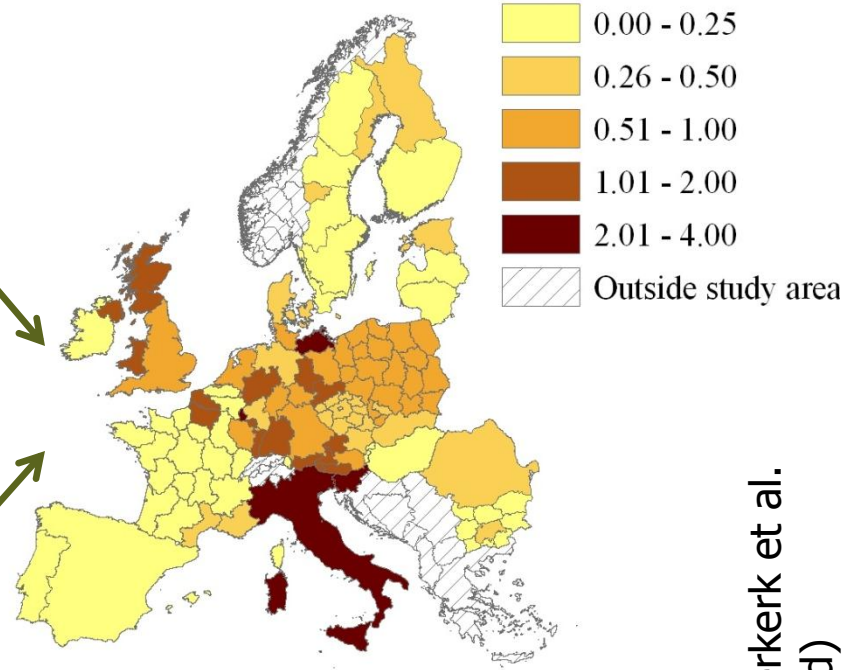
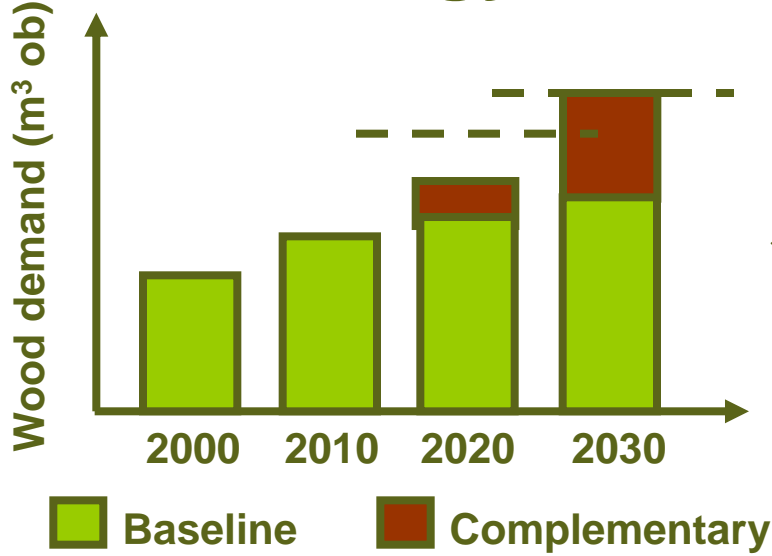




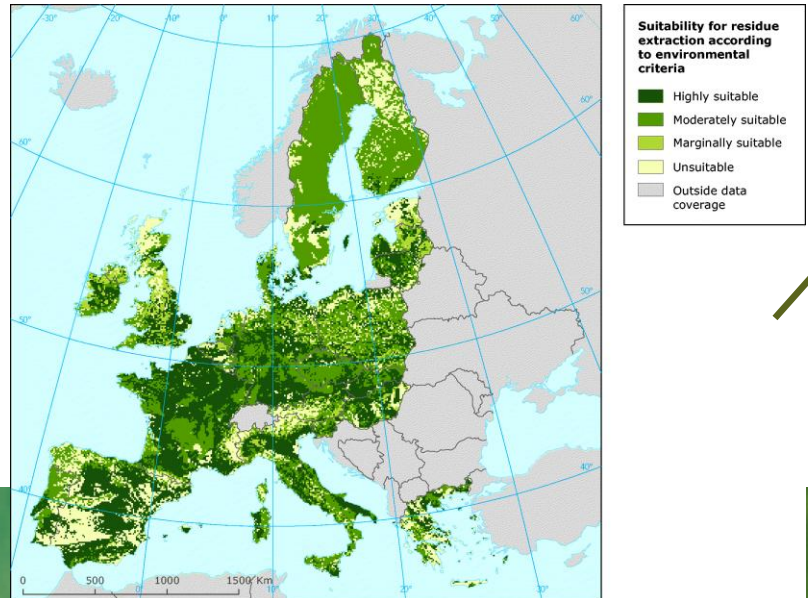


# Bio-energy scenario

Stem biomass potential (ton ha<sup>-1</sup>) from residues and complementary fellings in 2030



Source: EEA (2006)



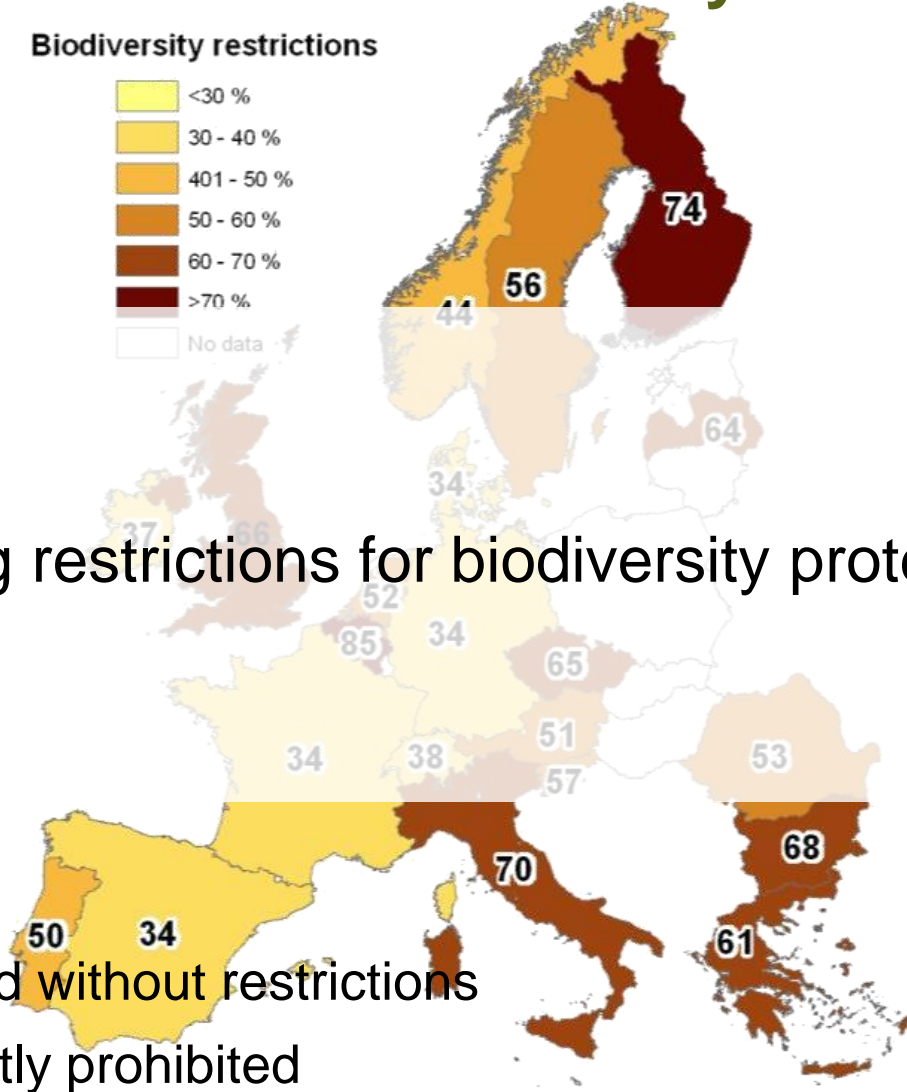
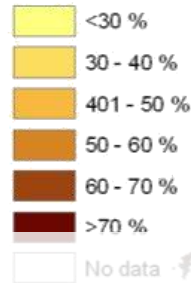
Source: Verkerk et al. (submitted)





# Felling restrictions biodiversity scenario

Biodiversity restrictions



Felling restrictions for biodiversity protection: 48%

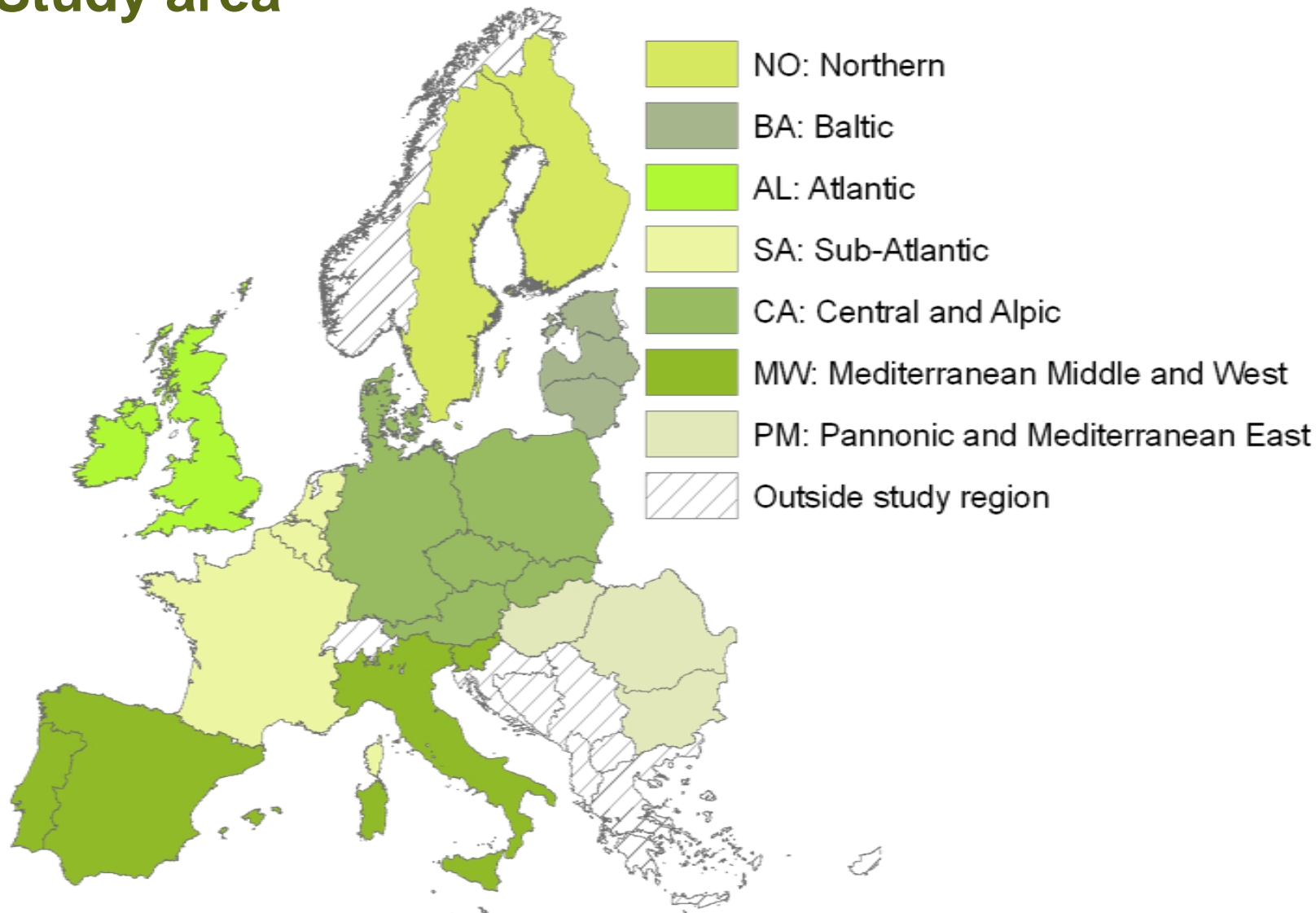
0%: fellings allowed without restrictions

100%: fellings strictly prohibited

Verkerk et al., 2008



# Study area

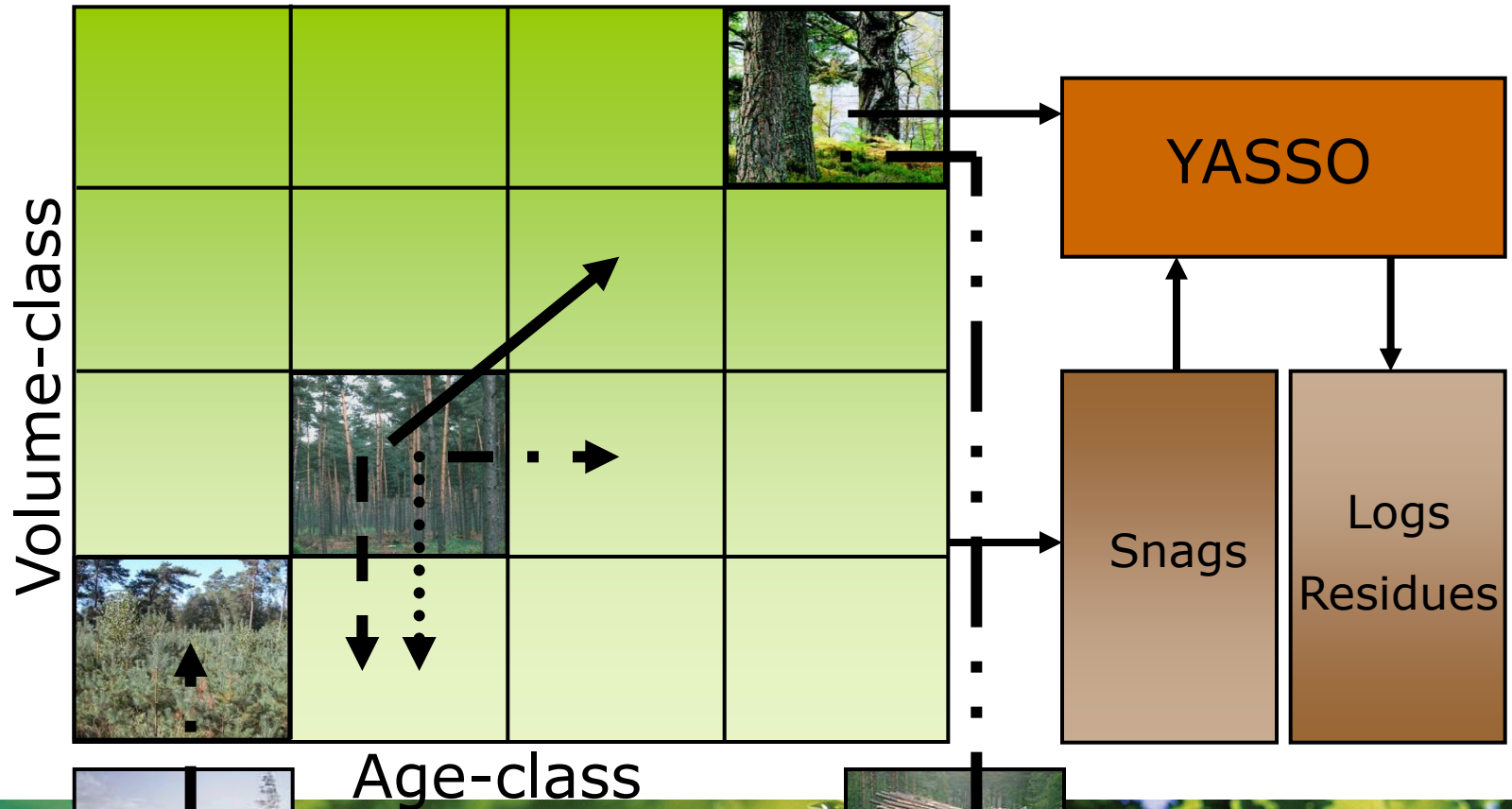


Source: Kuusela (1994)



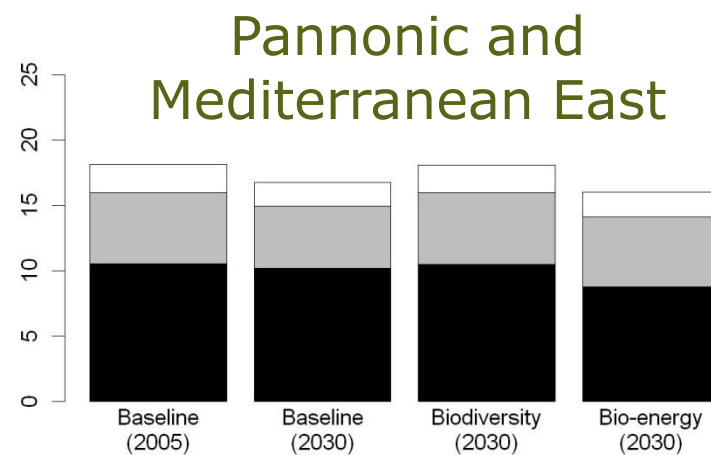
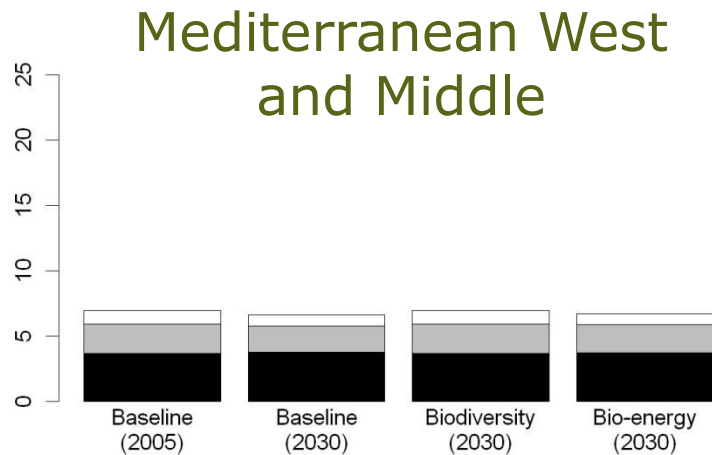
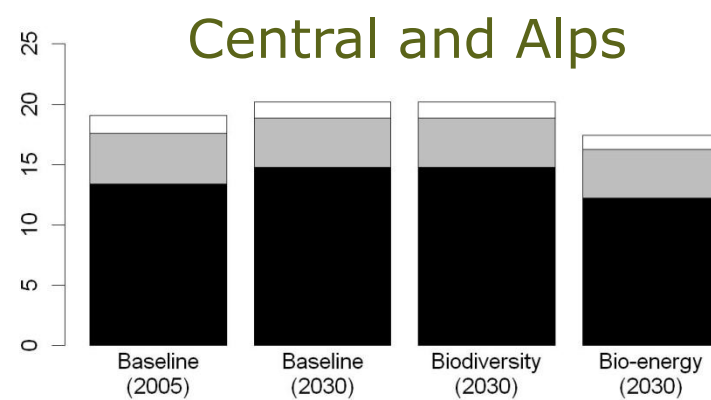
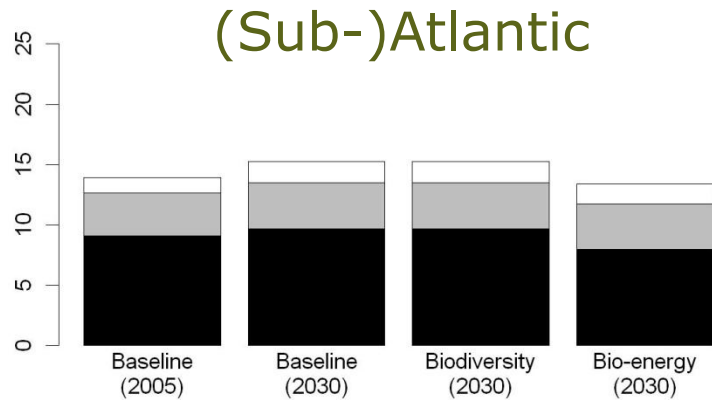
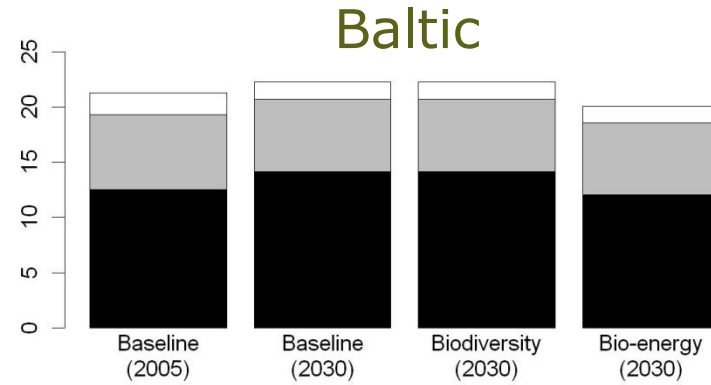
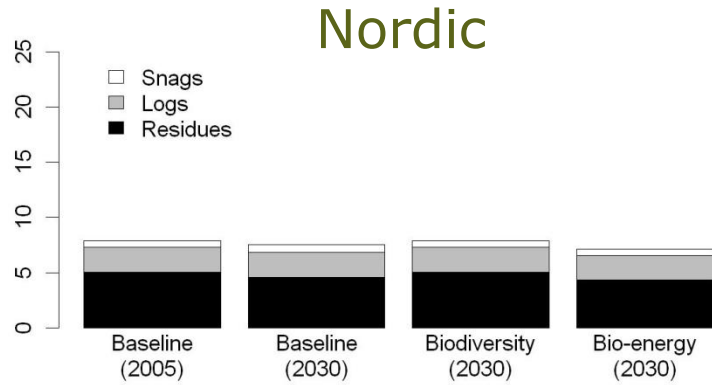
# Methods: deadwood

- Methods described in Verkerk et al. (submitted)
- Results: ton deadwood mass ha<sup>-1</sup>





Deadwood (ton ha<sup>-1</sup>)



Scenario



# Methods: carbon stock

- Method developed by Karjalainen et al. (2003). Improvements: ATEAM (Eggers et al. 2008), CarboInvent, CarboEurope

- Results: average carbon stock change over 2005-2030 in  $\text{ton C ha}^{-1} \text{ yr}^{-1}$

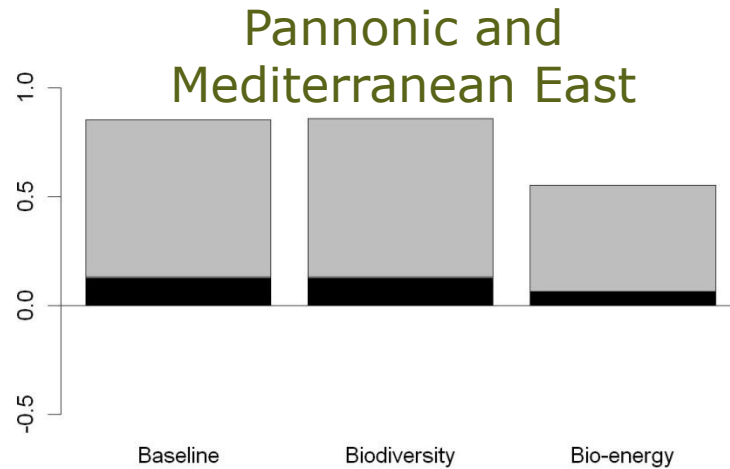
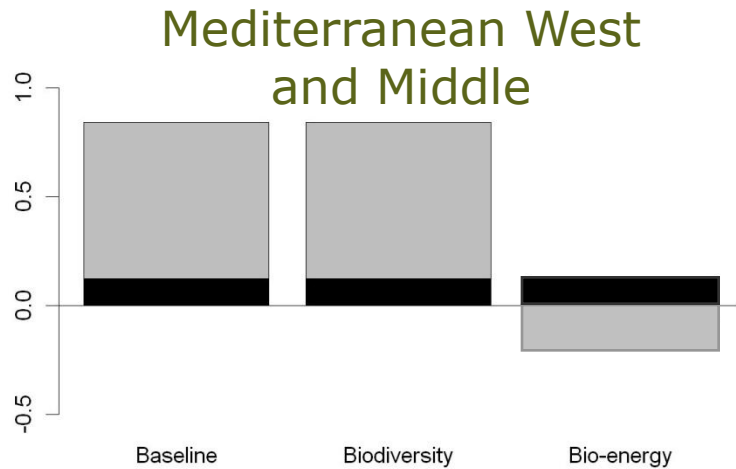
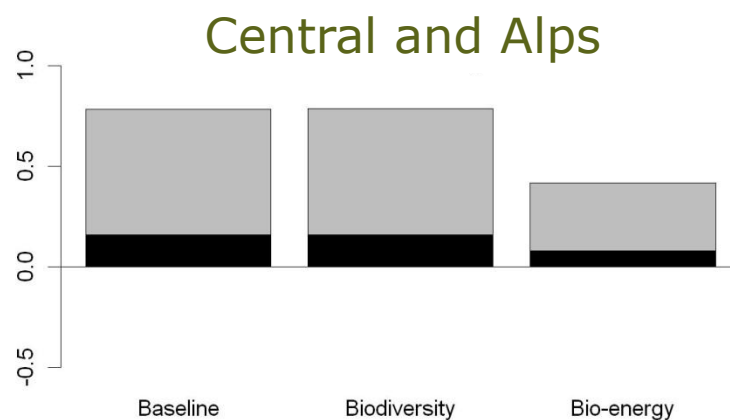
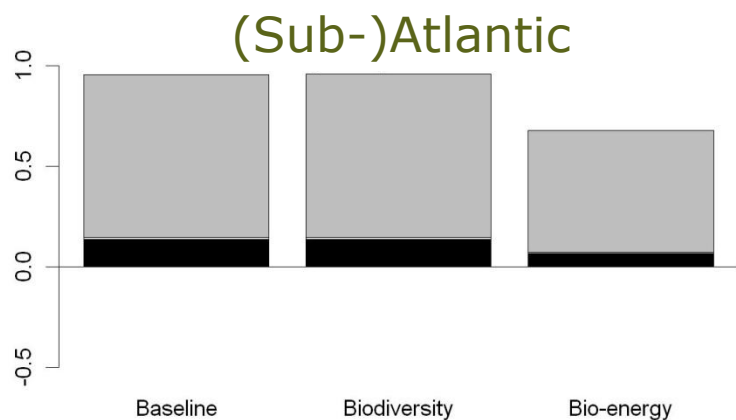
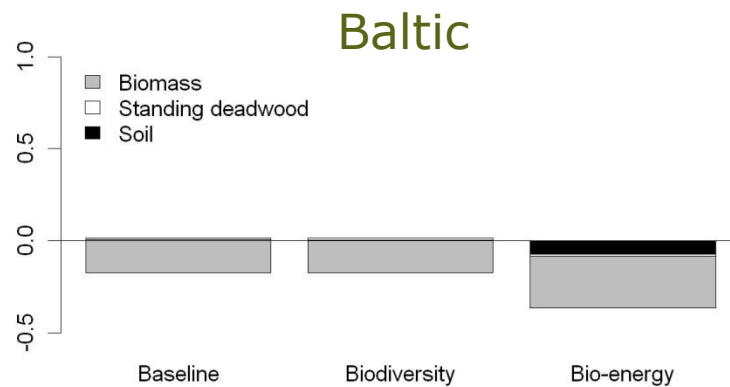
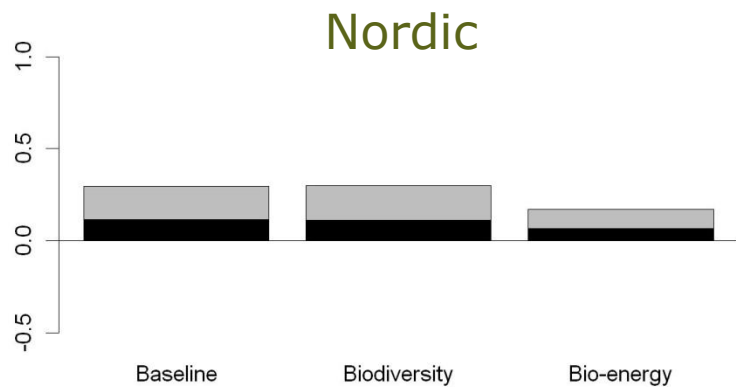


EFISCEN

YASSO



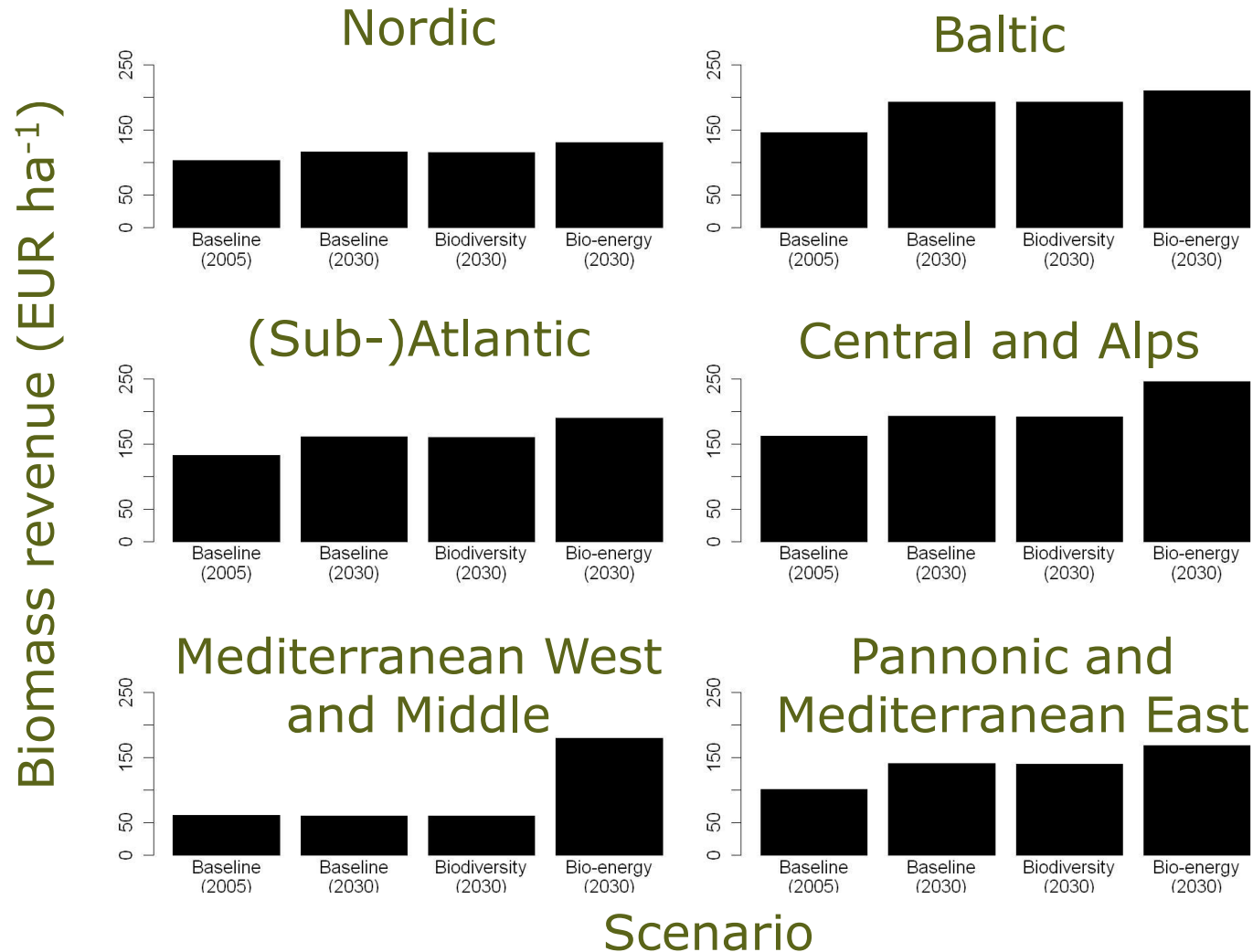
Average carbon stock change (ton ha<sup>-1</sup> yr<sup>-1</sup>)



Scenario

# Methods and results: biomass revenue

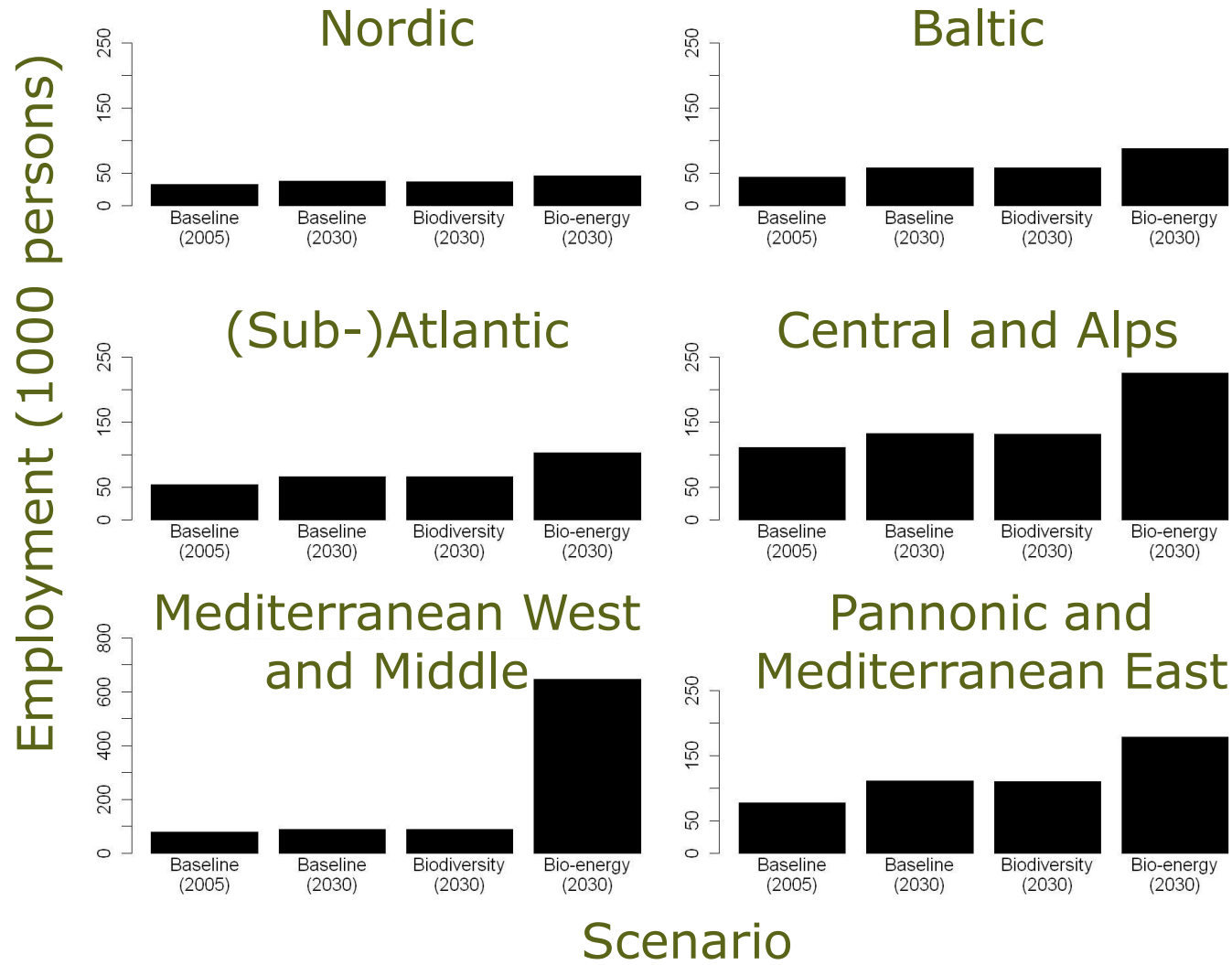
- Roadside timber and residue prices (nat. reports; EUBIONET-II)
- Unit: € m<sup>-3</sup> wood overbark and € ton<sup>-1</sup> harvest residues





# Methods and results: sector workforce

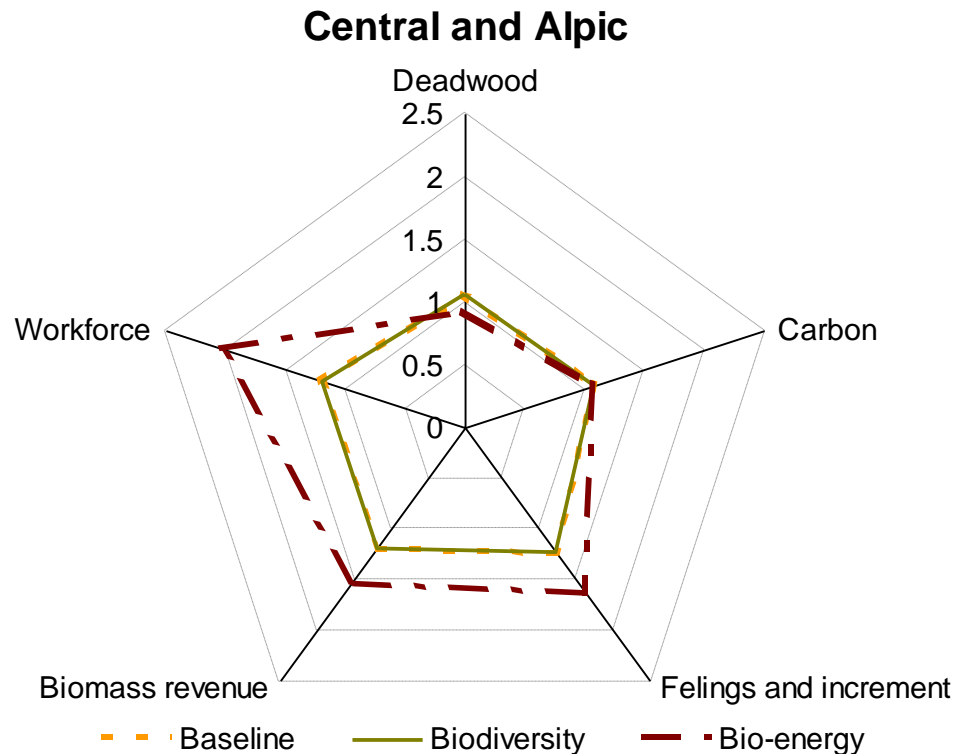
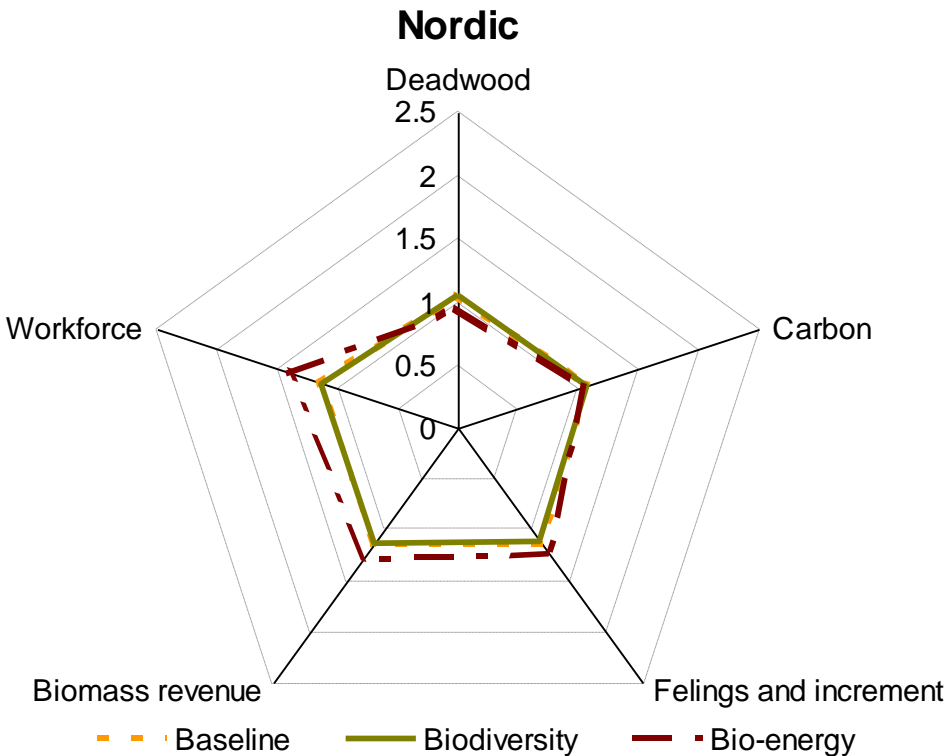
- Employment in forestry and logging (MCPFE 2007)
- Unit: persons per 1000 m<sup>3</sup> harvested wood or residues





# Results and discussion

■ Indicator impacts in 2030 (baseline 2005 = 1)





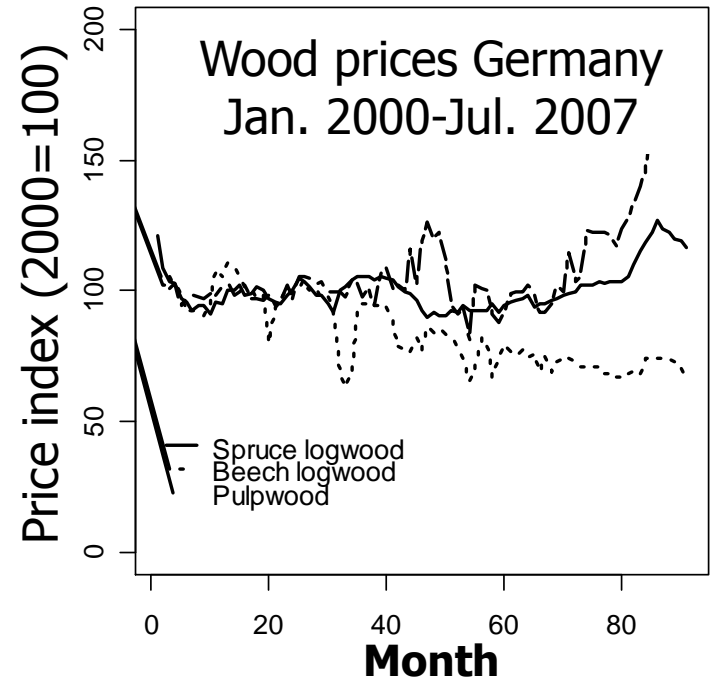
# Simplifications

■ Bio-energy scenario represents potentials

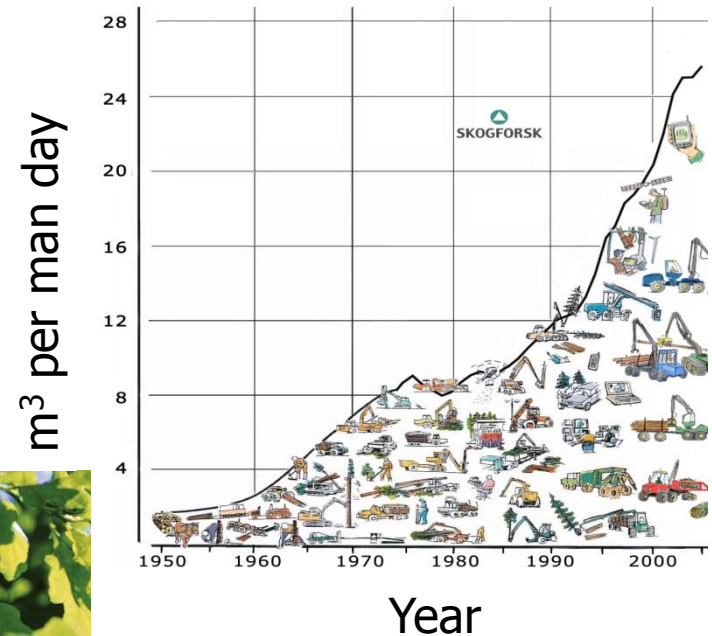
■ Costs not yet estimated

■ Wood revenues: no changes in unit prices of timber and residues (cf. Kallio et al. 2006)

■ Sectoral workforce: increasing productivity (Blombäck et al. 2003; Junginger et al. 2005)



Source: UNECE



Source: Skogforsk



# Interpretation of Results

## Biodiversity Policy

- Management restrictions on 5% of productive forest area does not affect sustainability at aggregate level
- management restrictions balanced by increased intensity in unprotected forests

## Bio-energy Policy

- Increasing biomass removals for bio-energy production is beneficial for employment and revenues, but negatively affects deadwood and carbon stocks in forests



# Importance of Decision Support Tools

Policy  
↓  
Resource  
Projection

- To assess impacts of proposed policies we first need to translate them into resource use projections
- Multiple scenario options needed

Resource  
Projection  
↓  
Sustainability  
Impact  
Assessment

- Transparent tools needed to assess sustainability impacts
- Scenario options need to be evaluated e.g. with Multi-Criteria Analysis methods
- Stakeholder involvement crucial



# Conclusions

- Changing needs from forest's goods and services are challenging forest resource use
- Improved ex-ante policy evaluation requires new tools and methods
- There are obvious trade-offs between different policy targets
- Transparent decision support tools are needed, their application requires participatory stakeholder involvement