EUROPEAN FOREST INSTITUTE

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Options for adaptation of EU forests

Green Week 2010 – Side session on Forest Protection
Brussels, 3rd of June, 2010

EUROPEAN FOREST INSTITUTE

Outline

- Facing Climate Change Impacts
- Adaptive Capacity
- Overview of Adaptation Options
- Choices and Challenges of Adaptation

Facing Climate Change Impacts

Increased growth rates in the North

Shifting species suitability

Higher risk of storm and insect damages

More intense and frequent forest fires

Adaptive Capacity (1)

Changes in distribution of sessile oak, climatic envelope 2080 (**Thuiller et al.** PNAS 2005)

- leading edge (gain of envelope)
- central range
- rear edge (loss of envelope)

Adaptive capacity has two components:

1. Inherent adaptive capacity of trees and forest ecosystems
   - Evolutionary mechanisms and processes that permit tree species to adjust to new conditions

Adaptive Capacity (2)

2. Socioeconomic factors determining the ability to implement adaptation measures
   - Includes
     - economic development
     - technology and infrastructure
     - information, knowledge and skills
     - Institutions, equity, social capital
   - Regional differences influenced by management intensity and ownership structures

Differences in adaptive capacity between regions are significant

- Northern Europe: intensive forest management
  - ➢ innovative technology documents high adaptive capacity
- Southern Europe: low potential for sustainable wood production
  - ➢ adaptation to secure ecosystem services needs to be implemented top down (forest owners and forest sector less active)

Adaptation strategies

- should aim to increase the flexibility in management of vulnerable ecosystems
- enhance the inherent adaptability of the species and ecosystem processes

(Hulme, P.E. 2005, J. Appl. Ecology 42, 784-794)

Adaptation measures review

(Study commissioned by DG Agri 2008: ”Impacts of climate change on EU forests and options for adaptation”)

Scientific perspective

- expert assessment based on literature review

Survey of ongoing and planned measures in EU member states

- Questionnaire to Ministeries and national research institutes

Adaptation strategies at different levels

Level of action	Adaptation actions
Stand level	• forest regeneration • tending and thinning of stands • harvesting
Forest management	• management planning • forest protection
Policy level	• infrastructure and transport • nurseries and forest tree breeding • further adaptation options in risk management and policy

Adaptation measures – Stand level

- In **regeneration** species and genetic composition of the stand gets established, diversity builds up and can be manipulated
- **Tending and thinning** improves stand structure to reduce stand susceptibility to disturbances
- **Harvesting** activites at smaller scales; development of machinery is important to secure accessibility on wet soils

Photo University of Tuscia

Photo North Karelia Collage, Valtimo

Adaptation measures – Forest management level

- **Forest management planning** should be flexible and adaptive; high need for monitoring, co-operation, decision support systems

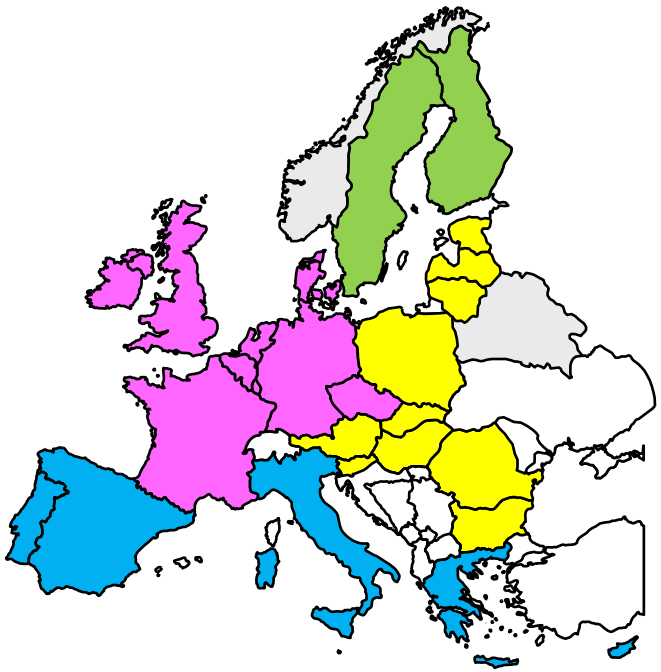
- **Forest protection** benefits from establishing and sustaining forest ecosystems highly diverse in tree composition, age and structure

Adaptation measures – Policy level

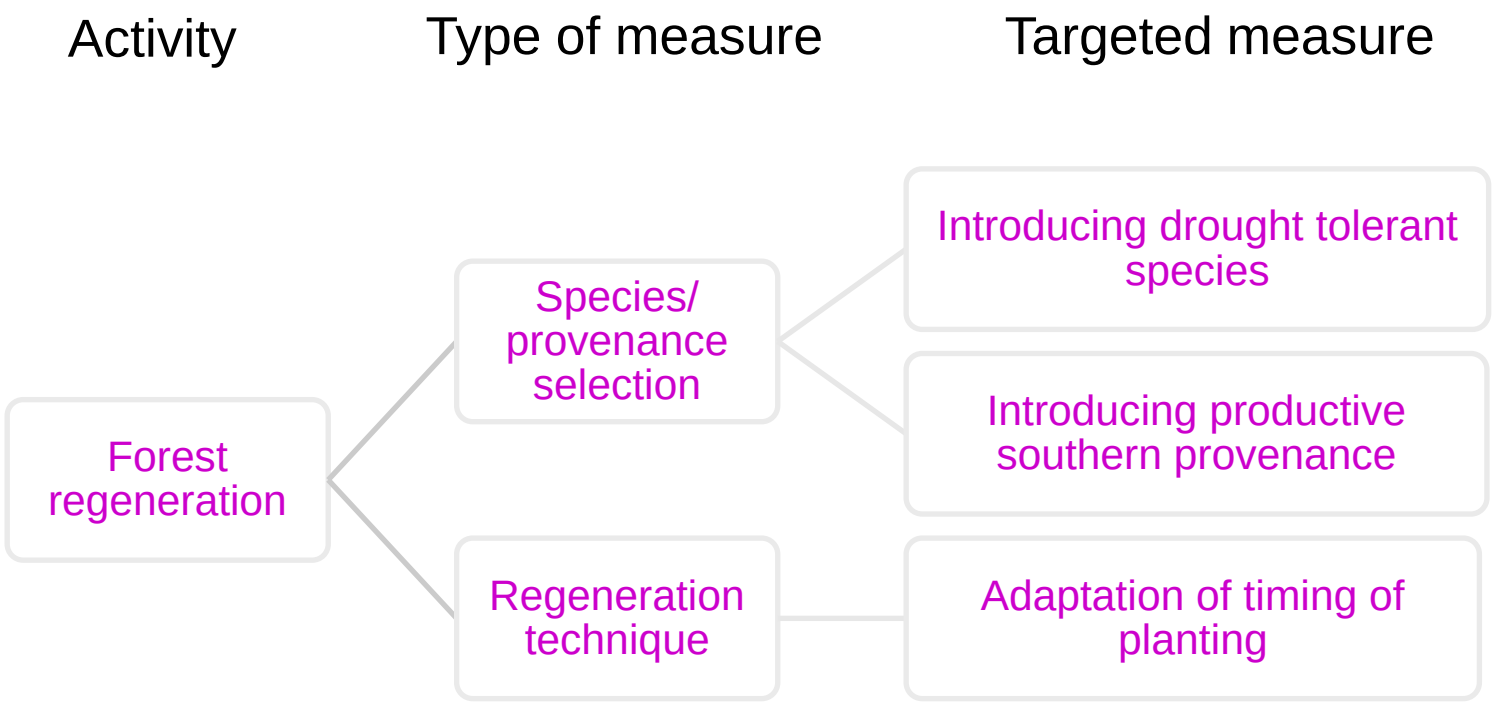
- **Infrastructure and transporting**; restoring groundwater regimes, improving irrigation systems and road network
- **Nurseries and tree breeding** should produce well-adapted material for regeneration
- **Participative process** needed in development and evaluation of adaptation strategies
- More **research** is needed to expand the knowledge base related to adaptive forest management strategies

Quercus ilex, photo T. La Mantia

Survey of on-going and planned adaptation measures in EU countries



Analysis of questionnaire answers



Number of measures at different action levels

Level of action	Adaptation actions	Number of measures
Stand level	Forest regeneration	22
	Tending and thinning of stands	9
	Harvesting	17
Forest management	Management planning	20
	Forest protection	14
Policy level	Infrastructure and transport	14
	Nurseries and forest tree breeding	16
	Further adaptation integration in risk management and policy	71
TOTAL		183

Boreal region

- Earlier and stronger thinnings
- Shorter rotation periods
- Better harvesting techniques on non-frozen soils

Photo: K. Sjoberg

Temperate Oceanic region

- Adapt management to increased disturbance risk
- Choose better adapted species and provenances
- Close-to-nature forestry vs. exotic plantation species

Photo: T. Standovar

Temperate Continental region

- Afforestation facing new difficulties
- Choose drought tolerant species and provenances
- Close-to-nature forestry, more stable stand structures

Photo: A. Barbati

Mediterranean region

- Coordinated response to increased fire risk
- Management for better drought tolerance
- Research on genetic diversity

Photo: A. Barbati

Photo:
P. Corona

Mountainous regions

- Promote small scale management
- Increase stability of stands against stressors and disturbances
- Maintain forest cover to secure protective function against natural hazards and erosion

Key findings from adaptation measure survey

- Many ongoing and planned measures are focusing on reducing disturbance risks
- Very little attention on potential benefits
- More research is needed
- Dissemination of information is important (Foresters, forest owners, decision makers)

Preparedness to the CC challenge

Main motive of adaptation	Measure available?	Preparedness
Minimize impacts of disturbances	☑ ☑	+
Ensure wood production	☑	+ / –
Ensure ecosystem services	?	–

Choices and Challenges of Adaptation (1)

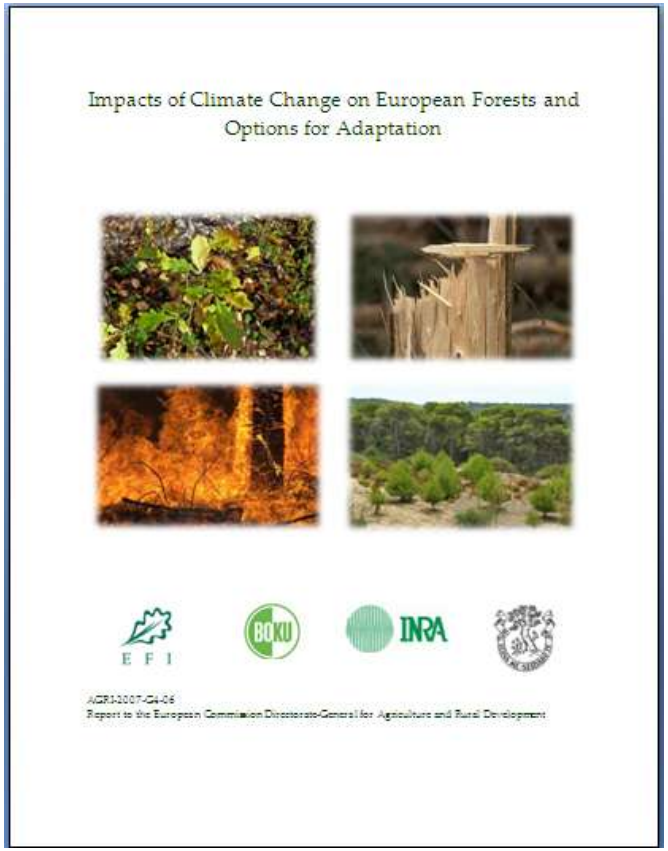
- Choices are to be made between alternative measures
- Some measures can be combined
- Measures can be mutually exclusive at stand level
- Diversifying strategies at landscape level adds a lot of flexibility and allows dealing with uncertainty

Choices and Challenges of Adaptation (2)

- Adapting to the unknown remains a challenge: when to take action?
  - Choosing suitable species/provenances for the current or for the future expected climate?
  - Flexible adaptive management is crucial (e.g. following disturbances)
- A lot of gaps in knowledge need further research

Further Reading

Study commissioned by DG Agri (2008)



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Climate change impacts, adaptive capacity, and vulnerability of European forest ecosystems

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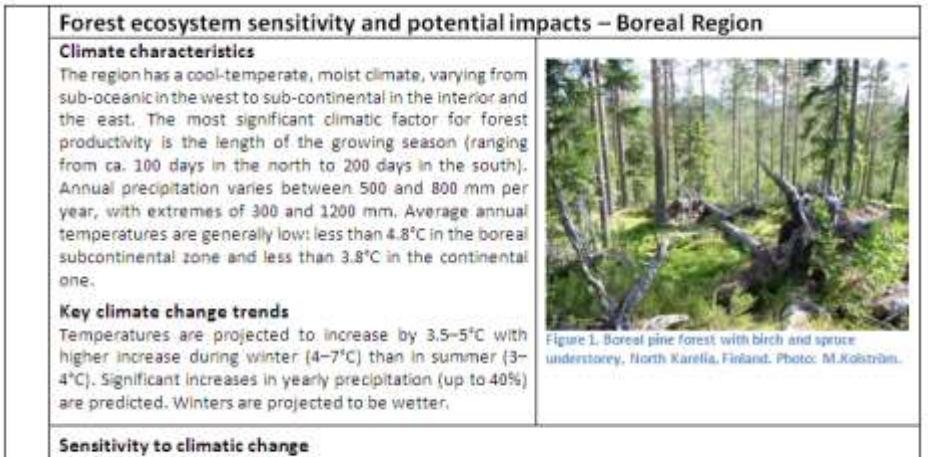
Factsheets



Forest ecosystem sensitivity and potential impacts – Boreal Region

Climate characteristics

The region has a cool-temperate, moist climate, varying from sub-oceanic in the west to sub-continental in the interior and the east. The most significant climatic factor for forest productivity is the length of the growing season (ranging from ca. 100 days in the north to 200 days in the south). Annual precipitation varies between 500 and 800 mm per year, with extremes of 300 and 1200 mm. Average annual temperatures are generally low: less than 4.8°C in the boreal subcontinental zone and less than 3.8°C in the continental one.

Key climate change trends

Temperatures are projected to increase by 3.5–5°C with higher increase during winter (4–7°C) than in summer (3–4°C). Significant increases in yearly precipitation (up to 40%) are predicted. Winters are projected to be wetter.

Figure 1. Boreal pine forest with birch and spruce understorey, North Karelia, Finland. Photo: M.Kolström.

Sensitivity to climatic change

Continuation of this work is on the way

COST ACTION FP 0703

Echoes: Expected Climate cHange and Options for European Silviculture (www.gip-ecofor.org/echoes)

FP7 Project MOTIVE: MOdelling adapTIVE forest management (www.motive-project.net)

Thanks!

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http://ec.europa.eu/agriculture/analysis/external/euro_forests/index_en.htm