

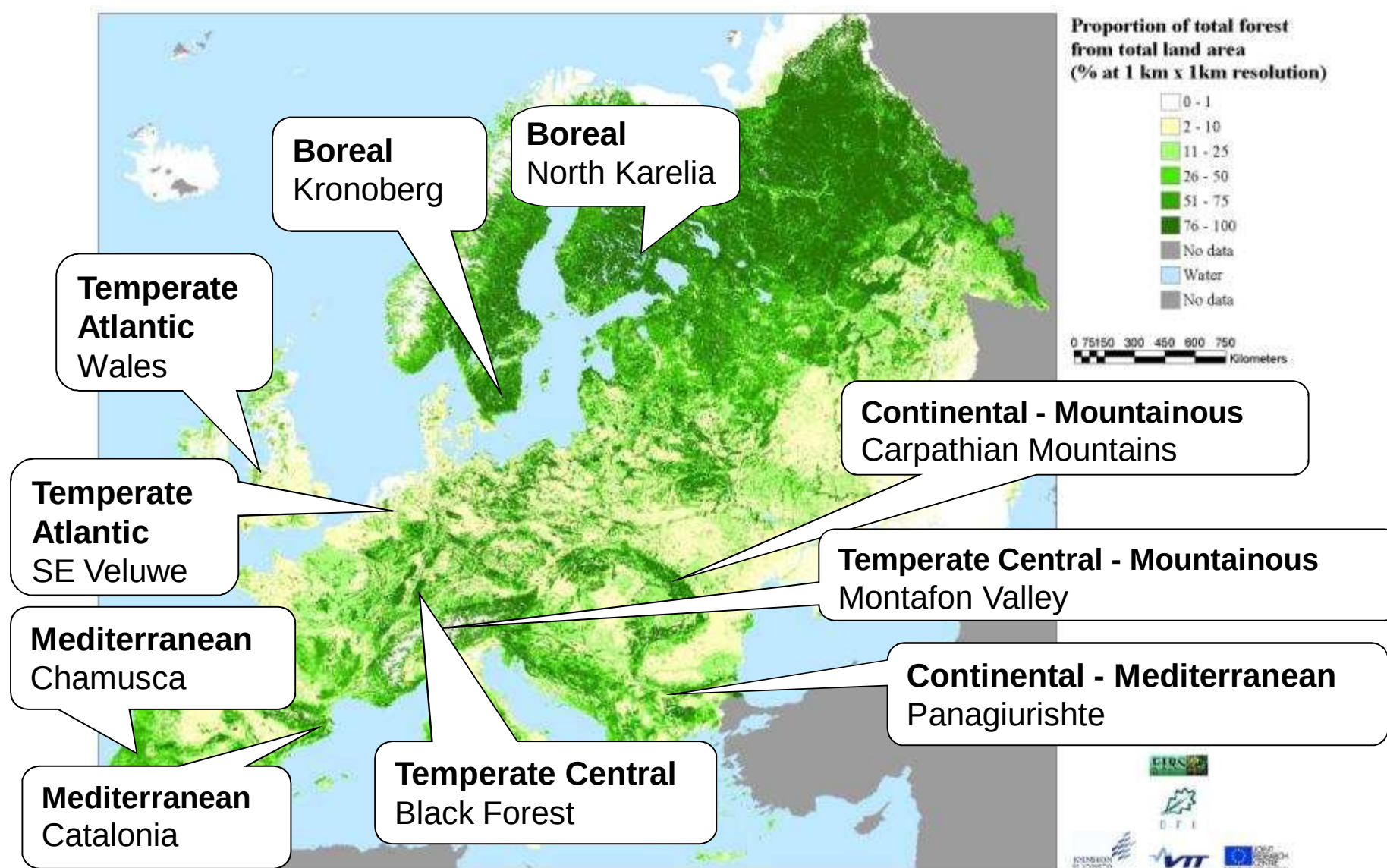


Marc Hanewinkel

MOTIVE – Models for Adaptive Forest Management

Introduction Final meeting – scientific workshop – 10th April 2013 - Freiburg

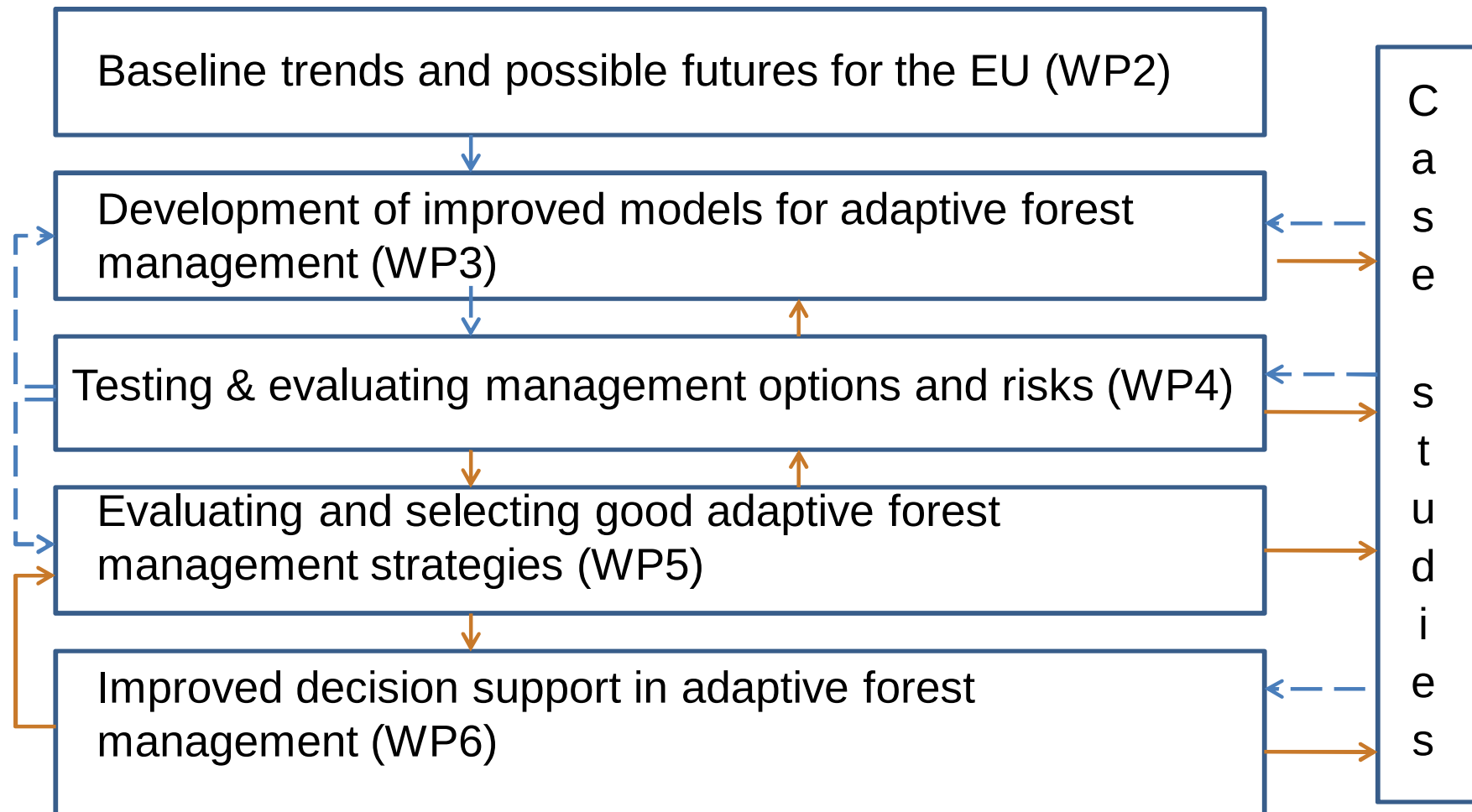






Work packages

— — — — — data — — — — — methods





Wednesday, 10 April	
09.00 – 09.15	Welcome and Introduction <i>Prof. Dr. Marc Hanewinkel, Swiss Federal Institute for Forest, Snow and Landscape Research WSL</i>
09.15 – 09.45	Adaptive forest management in Central Europe - options and limitations <i>Prof. Dr. Andreas Bolte, Thünen Institute of Forest Ecosystems, Eberswalde, Germany</i>
09.45 – 10.05	Climate and land use change scenarios, impact and uncertainties. <i>Dr. Marcus Lindner, European Forest Institute</i> <i>Dr. Niklaus Zimmermann, Swiss Federal Institute for Forest, Snow and Landscape Research WSL</i>
10.05 – 10.30	
	The cascade of uncertainty in modeling forest ecosystem responses to environmental change <i>Christopher Reyer, Potsdam Institute for Climate Impact Research</i>
10.30 – 11:00	Coffee break
11.00 – 11.10	Improved models for adaptive forest management “Lessons learned” <i>Prof. Dr. Harald Bugmann, Swiss Federal Institute of Technology, Zurich</i>
11.10 – 11.30	
11.30 – 12.15	
12.15 – 12.30	
	Climate change, large-scale disturbances and adaptive forest management in Central Europe <i>Christian Temperli, Swiss Federal Institute of Technology, Zurich</i>
	Management options and risks: Selected case study results from Austria, Bulgaria and Finland <i>N.N.</i>
	Integration of the European Level <i>Dr. Gert-Jan Nabuurs and Dr. Mart Jan Scheelhass, Alterra, Wageningen, Netherlands</i>
12.30 – 13.30	Lunch



13.30 – 13.50	Climate change: Believing and seeing implies adapting <i>Dr. Kristina Blennow - Swedish University of Agricultural Sciences</i>
13.50 – 14.10	Decision-making in adaptive forest management <i>Prof. Dr. Bo Jellesmark Thorsen and Dr. Rasoul Yousefpour, University of Copenhagen, Denmark</i>
14.10 – 14.30	Demonstration of the AFM Tool Box <i>Dr. Manfred Lexer and Werner Rammer, University of Natural Resources and Life Sciences, Vienna, Austria</i>
14.30 – 15.00	International view on climate change adaptation and MOTIVE <i>Dr. Mark Johnston - Saskatchewan Research Council, Canada</i>
15.00 – 15.45	Discussion and outlook



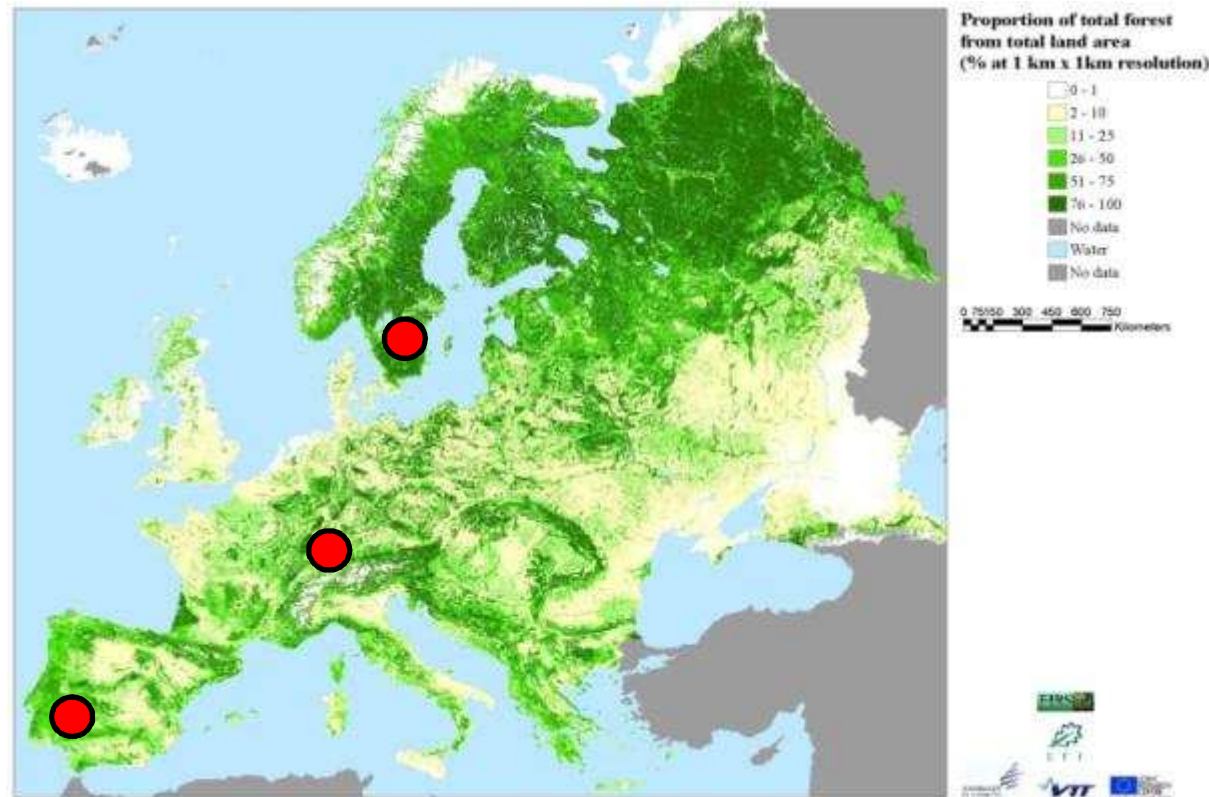
MOTIVE Objectives – what have we achieved?

To provide insights, data and tools to improve policymaking and adaptive forest resource management under climate change

- **Integrated assessment** of forest management strategies
- A comparative assessment across **a wide range of** climatic and socio-economic **conditions**
- Influence of **feedback loops** from socio-economy and policy making on resource management
- Translate scientific state of knowledge into **decision support** for policy makers and forest practitioners
 - European scale analyses as well as 10 landscape level cases
 - Stakeholder involvement and a tool box for adaptive management



Data collection – mail surveys



Case study areas (March-April 2010)

- Sweden, Kronobergs län (3000 – 50% replies)
- Germany, Schwarzwald (650 – 65% replies)
- Portugal, Chamusca (<100 replies)



Climate Change: Believing and Seeing Implies Adapting

Kristina Blennow^{1*}, Johannes Persson², Margarida Tomé³, Marc Hanewinkel^{4,5}

1 Faculty of Landscape Planning, Horticulture, and Agricultural Science, Swedish University of Agricultural Sciences, Alnarp, Sweden, **2** Department of Philosophy, Lund University, Kungshuset, Lundagård, Lund, Sweden, **3** Centro de Estudos Florestais, Technical University of Lisbon, Tapada da Ajuda, Lisboa, Portugal, **4** Research Unit Forest Resources and Management, Swiss Federal Institute for Forest Snow and Landscape Research, Birmensdorf, Switzerland, **5** Institute of Forestry Economics, University of Freiburg, Freiburg, Germany

Abstract

Knowledge of factors that trigger human response to climate change is crucial for effective climate change policy communication. Climate change has been claimed to have low salience as a risk issue because it cannot be directly experienced. Still, personal factors such as strength of belief in local effects of climate change have been shown to correlate strongly with responses to climate change and there is a growing literature on the hypothesis that personal experience of climate change (and/or its effects) explains responses to climate change. Here we provide, using survey data from 845 private forest owners operating in a wide range of bio-climatic as well as economic-social-political structures in a latitudinal gradient across Europe, the first evidence that the personal strength of belief and perception of local effects of climate change, highly significantly explain human responses to climate change. A logistic regression model was fitted to the two variables, estimating expected probabilities ranging from 0.07 (SD ± 0.01) to 0.81 (SD ± 0.03) for self-reported adaptive measures taken. Adding socio-demographic variables improved the fit, estimating expected probabilities ranging from 0.022 (SD ± 0.008) to 0.91 (SD ± 0.02). We conclude that to explain and predict adaptation to climate change, the combination of personal experience and belief must be considered.



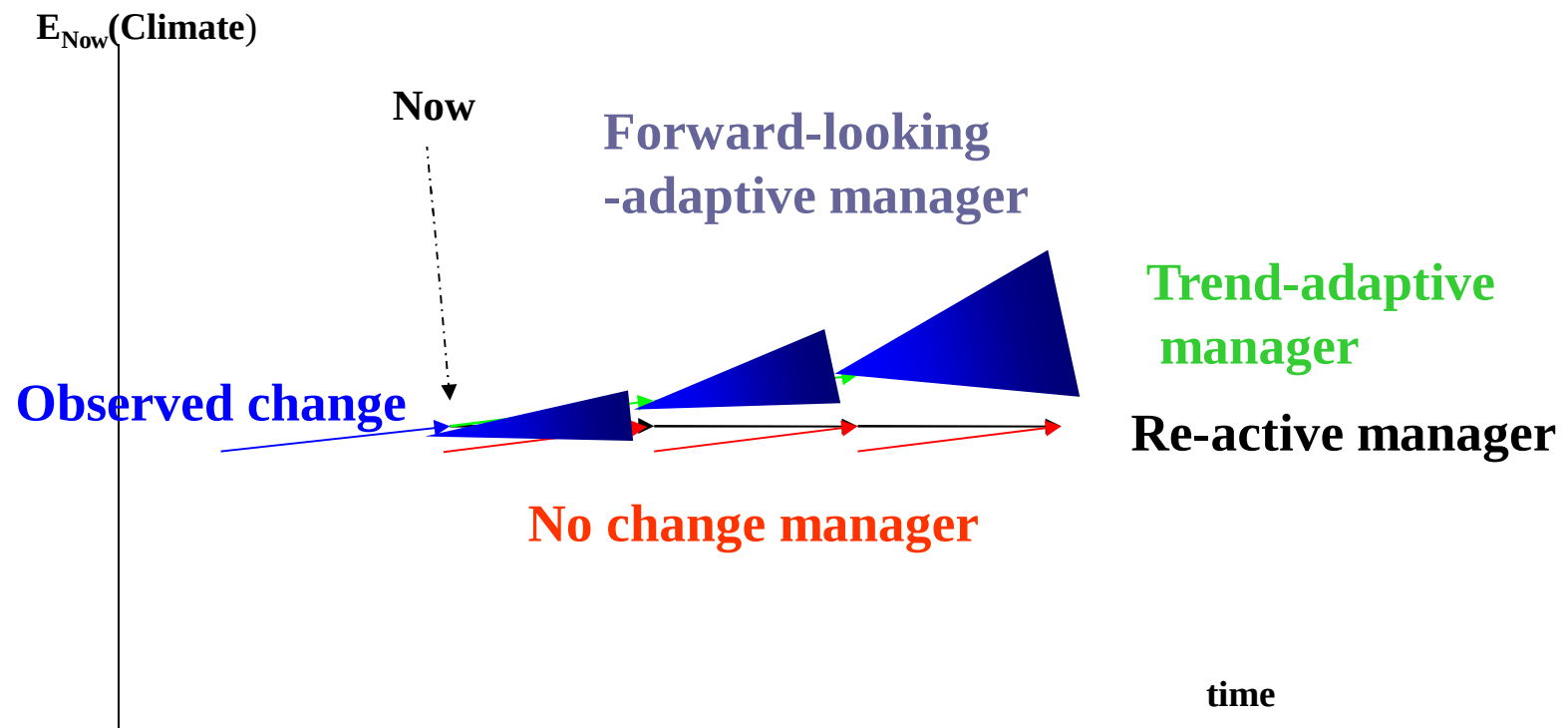
MOTIVE Objectives – what have we achieved?

To provide insights, data and tools to improve policymaking and adaptive forest resource management under climate change

- **Integrated assessment** of forest management strategies
- A comparative assessment across **a wide range of** climatic and socio-economic **conditions**
- Influence of **feedback loops** from socio-economy and policy making on resource management
- Translate scientific state of knowledge into **decision support** for policy makers and forest practitioners
 - European scale analyses as well as 10 landscape level cases
 - Stakeholder involvement and a tool box for adaptive management



Approach in adaptive management: Look ahead in uncertain and dynamic times



Bredahl-Jacobsen et al. 2010



Journal of Environmental Management 122 (2013) 56–64



Contents lists available at [SciVerse ScienceDirect](#)

Journal of Environmental Management

journal homepage: www.elsevier.com/locate/jenvman



Updating beliefs and combining evidence in adaptive forest management under climate change: A case study of Norway spruce (*Picea abies* L. Karst) in the Black Forest, Germany

Rasoul Yousefpour^{a,*}, Christian Temperli^b, Harald Bugmann^b, Che Elkin^b, Marc Hanewinkel^c, Henrik Meilby^a, Jette Bredahl Jacobsen^{a,d}, Bo Jellesmark Thorsen^{a,d}

^a Department of Food and Resource Economics, University of Copenhagen, Rolighedsvej 23, DK-1958 Frederiksberg C, Denmark

^b Forest Ecology, Institute of Terrestrial Ecosystems, Department of Environmental Systems Science, ETH Zürich, Universitätsstrasse 16, CH-8092 Zurich, Switzerland

^c Swiss Federal Institute for Forest, Snow & Landscape Research WSL, Zürcherstrasse 111, CH-8903 Birmensdorf, Switzerland

^d Centre for Macroecology, Evolution and Climate, University of Copenhagen, Rolighedsvej 23, DK-1958 Frederiksberg C, Denmark



MOTIVE Objectives – what have we achieved?

To provide insights, data and tools to improve policymaking and adaptive forest resource management under climate change

- **Integrated assessment** of forest management strategies
- A comparative assessment across **a wide range of** climatic and socio-economic **conditions**
- Influence of **feedback loops** from socio-economy and policy making on resource management
- Translate scientific state of knowledge into **decision support** for policy makers and forest practitioners
 - European scale analyses as well as 10 landscape level cases
 - Stakeholder involvement and a tool box for adaptive management

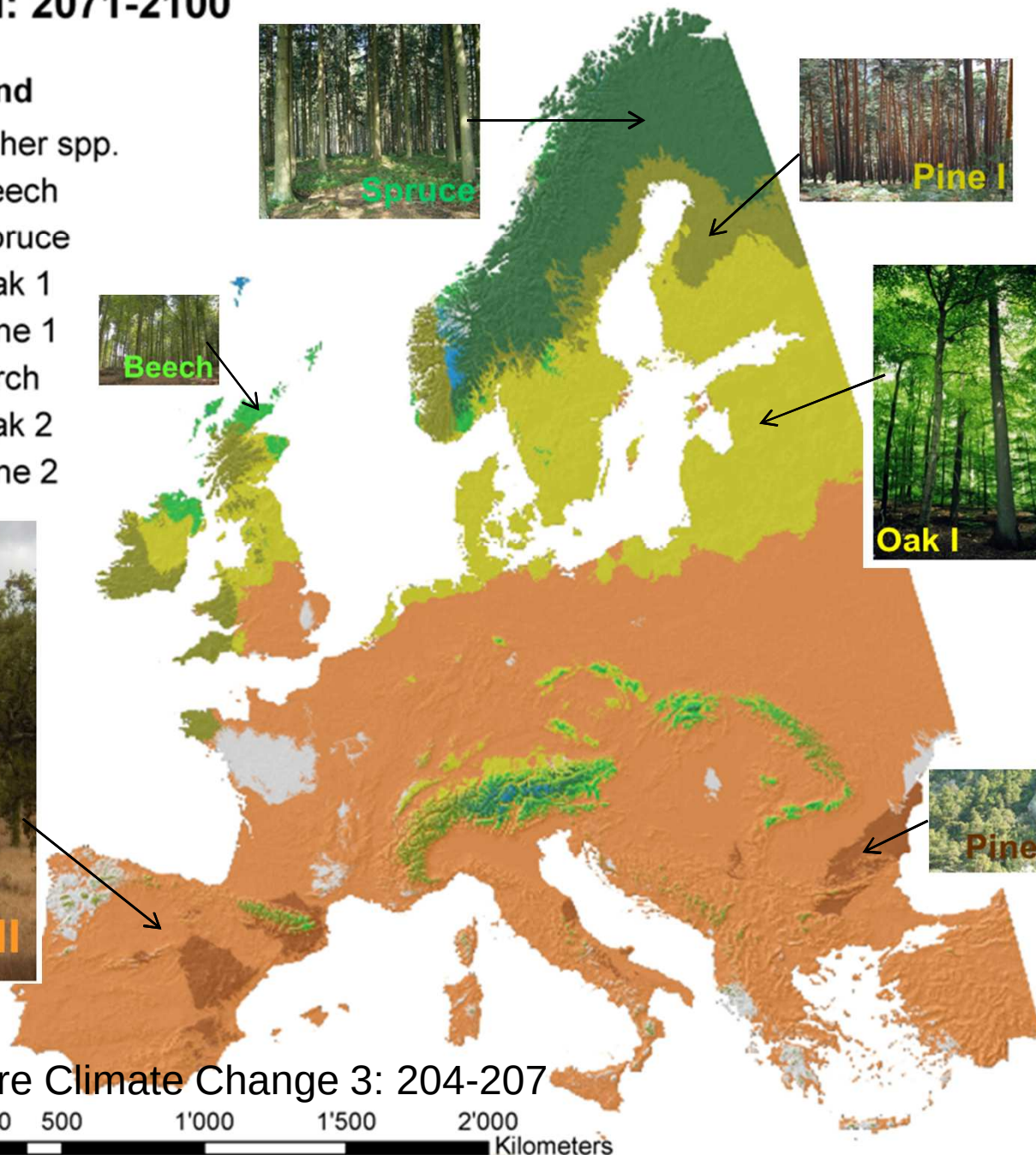


trends: biome shifts- „extremes“

A1FI: 2071-2100

Legend

- Other spp.
- Beech
- Spruce
- Oak 1
- Pine 1
- Birch
- Oak 2
- Pine 2



Hanewinkel et al. 2013. Nature Climate Change 3: 204-207



Climate change may cause severe loss in the economic value of European forest land

Marc Hanewinkel^{1,2*}, Dominik A. Cullmann³, Mart-Jan Schelhaas⁴, Gert-Jan Nabuurs⁵
and Niklaus E. Zimmermann⁶

European forests, covering more than 2 million km² or 32% of the land surface¹, are to a large extent intensively managed and support an important timber industry. Climate change is expected to strongly affect tree species distribution within these forests^{2,3}. Climate and land use are undergoing rapid changes at present⁴, with initial range shifts already visible⁵. However, discussions on the consequences of biome shifts have concentrated on ecological issues⁶. Here we show that forecasted changes in temperature and precipitation may have severe economic consequences. On the basis of our model results, the expected value of European forest land will decrease owing to the decline of economically valuable species in the absence of effective countermeasures. We found that by 2100—depending on the interest rate and climate scenario applied—this loss varies between 14 and 50% (mean: 28% for an interest rate of 2%) of the present value of forest land

The projections were conducted for the Intergovernmental Panel on Climate Change (IPCC) climate scenarios B2 and A1FI (ref. 9) by downscaling the output (temperature and precipitation) of four general circulation models and for A1B by downscaling the same variables of four regional circulation models (RCM) in combination with WorldClim¹⁰ present climate data from a coarse (10') to a fine (1 km) resolution (Supplementary Table S1). We expressed future climate as anomalies of three time periods (2011–2040, 2041–2070, 2071–2100) relative to a climate normal period (1950–2000). The projections reveal a temperature increase in northern Europe in winter and in the Mediterranean and eastern Europe in summer. Precipitation is expected to increase in central and northern Europe in winter and to decrease in central and (south-) western Europe in summer. Trends are similar for all scenarios, but larger and more distinct, with more extreme values, in the A1FI scenario.



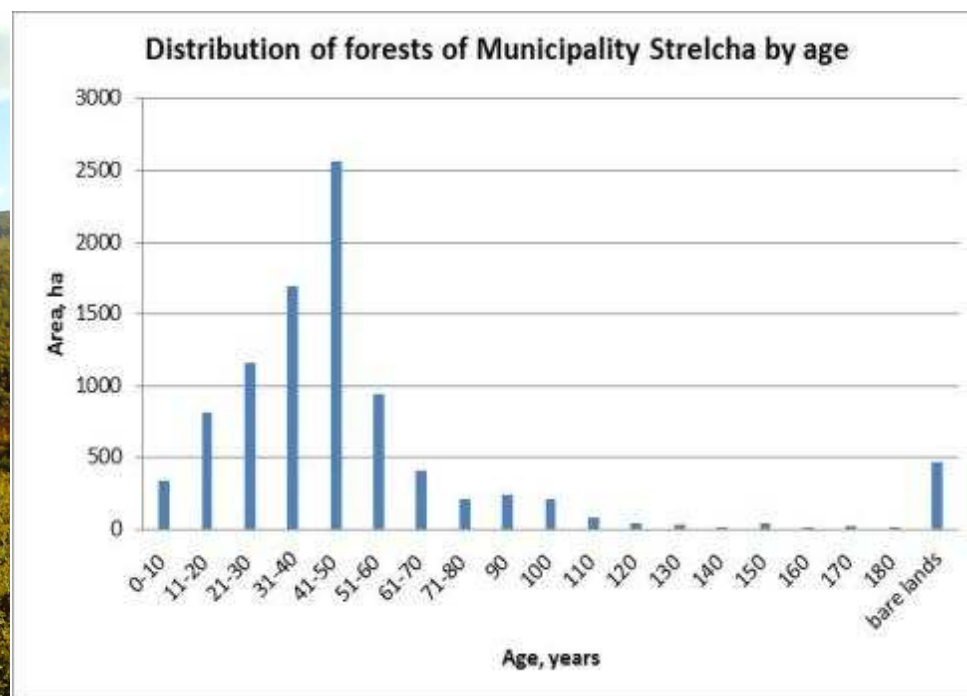
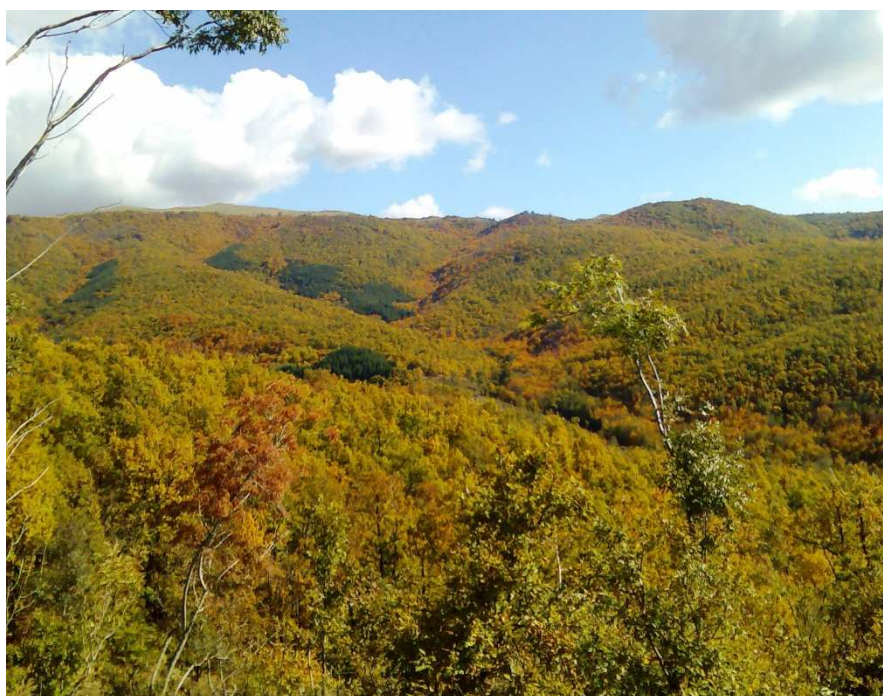
MOTIVE Objectives – what have we achieved?

To provide insights, data and tools to improve policymaking and adaptive forest resource management under climate change

- **Integrated assessment** of forest management strategies
- A comparative assessment across **a wide range of** climatic and socio-economic **conditions**
- Influence of **feedback loops** from socio-economy and policy making on resource management
- Translate scientific state of knowledge into **decision support** for policy makers and forest practitioners
 - European scale analyses as well as 10 landscape level cases
 - Stakeholder involvement and a tool box for adaptive management

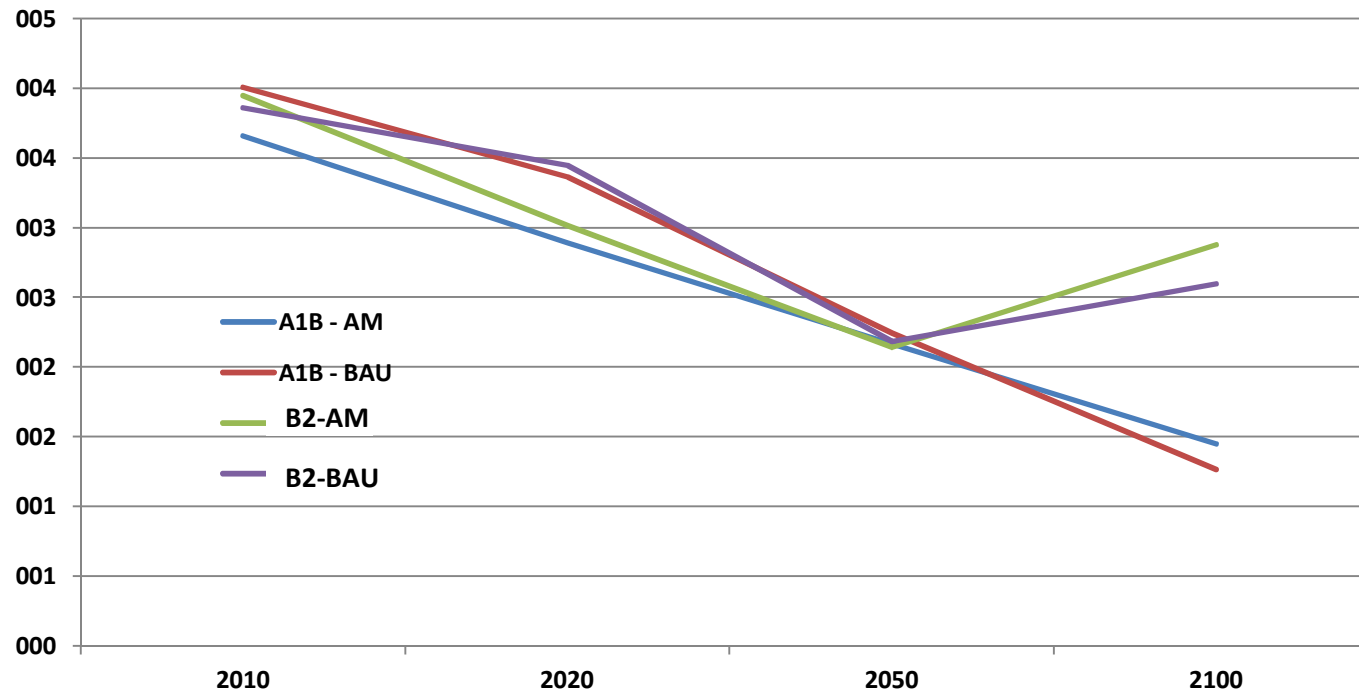


Case study Panagyuriste Bulgaria - Continental - Mediterranean





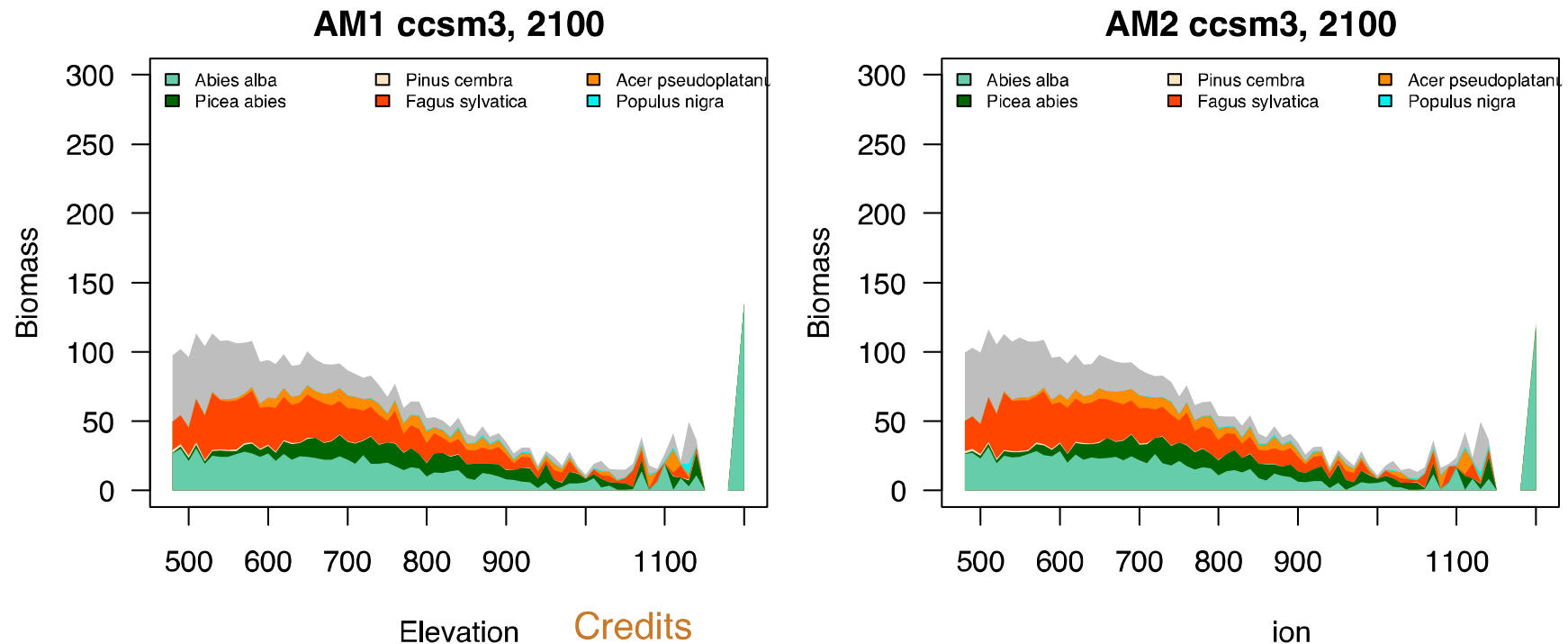
Application of PICUS in Bulgaria



Average annual increment (m³/ha/year) simulation data for the forest case-study area Panagyuriste, for two climate scenarios (A1B & B2) and both BAU and AM scenarios



Application of LandClim in Romania



Credits

ETH teams

Ché Elkin, Christian Temperli, Harald Bugmann

Achilleas Psomas, Niklaus Zimmermann

USV team

Gabriel Duduman, Ionut Barnoaiea, Liviu Nichiforel,
Olivier & Laura Bouriaud



MOTIVE – what have we achieved – and what maybe not?

- 1. Case-studies – did we cover all possible goods and services ?**
- 2. European risk modelling – too ambitious?**
- 3. Integration of genetic aspects in decision making?**
- 4. How to use the toolbox?**
- 5. Decision support for adaptation in the case-studies - how far did we get?**