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Forest Ecology and Management 162 (2002) 1–2

Forest Ecology and Management

www.elsevier.com/locate/foreco

Editorial

National and regional climate change impact assessments in the forestry sector

The possible impacts of climate change on forests have been a major focus of research since the mid-1980s. Different processes in forest ecosystems and the forest sector are sensitive to climate. Recently, interest has increased in linking impact assessment models (e.g. for ecological and socio-economic impacts), and to integrate them in national or regional climate impact assessment studies. As a response to this interest, the Potsdam Institute for Climate Impact Research and the European Forest Institute organized, from 10 to 13 November 1999, a workshop on "National and Regional Climate Change Impact Assessments (NIMA) in the forestry sector" in Wenddoche near Belzig (Germany), bringing together individuals and research groups from this growing research community. The workshop aimed at providing a forum for the exchange of experience, and to stimulate further research collaboration. It attracted 31 scientists from 12 countries, representing a wide range of disciplines covering tree physiology, soils, forest ecology, growth and yield, silviculture, remote sensing, forest policy, and forest economics. Presentations investigated possible impacts of climate change on forest growth and development, the carbon budget and the possible contribution of forestry to carbon dioxide mitigation, the application of economic models to estimate socio-economic consequences of changes in forest productivity, and the linkage of ecological and economic models. This special feature of Forest Ecology and Management presents selected papers based on the workshop presentations and working group discussions.

Yield tables and the first generation of forest growth models (e.g. Ek and Monserud, 1974; Belcher et al., 1982) were important tools in forest science of the 20th century, but they are not suitable for forest growth projections under changing climatic conditions. Advances in forest modeling over the last 10 years resulted in more general modeling approaches, which are no longer restricted to the application under present environmental conditions (cf. Mäkelä et al., 2000; Johnsen et al., 2001). Pretzsch et al. (this issue) present the site and climate sensitive growth simulator SILVA 2.2, which has been applied in a national climate impact assessment study for Germany (Lindner and Cramer, 2002). Sabaté et al. (this issue) used a process-based forest growth model to investigate likely effects of climate change on Mediterranean forests of southern Europe. Van der Meer et al. (this issue) linked output from a process-based model to a gap model to investigate effects of climate change on forest development in forests of different successional stages in The Netherlands.

Two regional climate impact assessment studies are included in this special feature. Lexer et al. (this issue) studied the sensitivity of alpine forests to climate change using the gap model Picus, which was applied to a large number of forest inventory plots in Austria. The focus of their study was a risk assessment that aims to provide decision support for forest management. Lasch et al. (this issue) investigated changes in forest growth as well as indicators of non-timber forest services in their climate impact assessment for a region in northeastern Germany.

Carbon sequestration and carbon sinks of forests are also increasingly recognized as an important forest service. Karjalainen et al. present a methodology for analyzing effects of forest management and climate change on the European forest sector carbon budget. They linked output from process-based models to a large-scale forest resource database to incorporate the effects of climate change on forest growth, and to estimate soil carbon budgets which were not included in the forest inventory data. Their model EFISCEN also includes a wood product module to calculate a

0378-1127/02/$ – see front matter
PII: S0378-1127(02)00045-2

comprehensive carbon balance of the forest sector. The study of Perez-Garcia et al. (this issue) links ecological and economic models and underlines the importance of incorporating transient climate changes in integrated climate impact assessment studies.

The final paper in this special feature is synthesizing the experiences with integrated climate impact assessment studies to date (Lindner et al., this issue). It is based on three working group discussions at the NIMA workshop, which were tasked with discussing the state of knowledge, the currently available methodology, and the remaining uncertainties regarding (i) scaling up impact assessments from stand to regional and national scale, (ii) integrating cross-disciplinary impact assessments and (iii) climate impact assessments and policy making.

We would like to acknowledge the funding that we received from the Deutsche Forschungsgemeinschaft for the NIMA workshop. We thank all authors and external reviewers for their valuable contribution to this special feature.

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