

Preface

Throughout the world, forests and forest ecosystems provide timber, other raw materials, non-timber benefits, and protection against natural and human-induced threats. Forests are also an important energy source, providing fuel wood and energy biomass. In industrialized countries, fossil fuels have, however, replaced wood and become the dominant source of energy. Currently, coal, oil and natural gas provide cheap options for most human energy needs. Use of fossil fuels is increasing atmospheric concentrations of greenhouse gases (GHGs), especially carbon dioxide (CO₂), with the consequent warming of global climate and changes in precipitation. Global efforts are needed to mitigate the climate change and minimize the impacts of climate change. In this respect, the substitution of fossil fuels with renewable energy sources like forest biomass is among the ways to mitigate climate change. This option is attractive, because it has a direct effect on the global carbon cycle and allows it to be controlled through proper management of forest resources and forest ecosystems. Mitigating climate change through substituting fossil fuels is a new dimension of sustainable forestry and forest management.

This book summarizes recent experiences on how to manage forest land to produce woody biomass for energy use and what are the potentials to mitigate climate change by substituting fossil fuels in energy production. A key question is whether the energy based on forest biomass is carbon-neutral or not and what the possibilities are to reduce CO₂ emissions through proper management integrating timber and energy biomass in forestry. The book outlines the close interaction between the ecological systems and industrial systems, which controls the carbon cycle between the atmosphere and biosphere. In this respect, sustainable forest management is a key to understand and control carbon emissions due to the utilization of forest biomass (e.g. from management, harvesting and logistics, and ecosystem processes), which are often omitted from assessments of the carbon neutrality of energy systems based on forest biomass.

The focus in this book is on forests and forestry in the boreal and temperate zones, particularly in Northern Europe, where the use of woody biomass in the energy industry has increased rapidly in recent years. However, the global dimensions of forests and forestry place local findings in larger perspectives. This concerns especially the questions of the role of forest-based bioenergy in controlling the warming of global

climate. Among many things, the book addresses how management can affect the supply of energy biomass using short-rotation forestry and the conventional forestry applying long rotations. In the latter case, there are many links between timber production and the supply of energy biomass, which require careful consideration in the management of forest resources.

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