Managing Forest Ecosystems

Volume 34

Aims & Scope

Well-managed forests and woodlands are a renewable resource, producing essential raw material with minimum waste and energy use. Rich in habitat and species diversity, forests may contribute to increased ecosystem stability. They can absorb the effects of unwanted deposition and other disturbances and protect neighbouring ecosystems by maintaining stable nutrient and energy cycles and by preventing soil degradation and erosion. They provide much-needed recreation and their continued existence contributes to stabilizing rural communities.

Forests are managed for timber production and species, habitat and process conservation. A subtle shift from multiple-use management to ecosystems management is being observed and the new ecological perspective of multi-functional forest management is based on the principles of ecosystem diversity, stability and elasticity, and the dynamic equilibrium of primary and secondary production.

Making full use of new technology is one of the challenges facing forest management today. Resource information must be obtained with a limited budget. This requires better timing of resource assessment activities and improved use of multiple data sources. Sound ecosystems management, like any other management activity, relies on effective forecasting and operational control.

The aim of the book series Managing Forest Ecosystems is to present state-of-the-art research results relating to the practice of forest management. Contributions are solicited from prominent authors. Each reference book, monograph or proceedings volume will be focused to deal with a specific context. Typical issues of the series are: resource assessment techniques, evaluating sustainability for even-aged and uneven-aged forests, multi-objective management, predicting forest development, optimizing forest management, biodiversity management and monitoring, risk assessment and economic analysis.

More information about this series at http://www.springer.com/series/6247

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Managing Forest Ecosystems: The Challenge of Climate Change

Second Edition

Springer

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Foreword

During the last decades, climate changes, particularly warming trends, have been recorded around the globe. For many countries, these changes in climate have become evident through insect epidemics (e.g., mountain pine beetle epidemic in Western Canada or bark beetle in secondary spruce forests in Central Europe), drought episodes and intense forest fires in the Mediterranean countries and SW United States, and unusual storm activities in SE Asia. Climate changes are expected to impact vegetation manifesting as changes in vegetation extents, tree species compositions, growth rates, and mortality rates and also as species migrations. Over a number of sessions, the International Panel on Climate Change (IPCC) has discussed how forests may be impacted and also how forests and forest management practices may be used to mitigate the impacts of changes in climate, particularly to possibly reduce the rate of change. The second edition of this volume, which forms part of Springer's book series *Managing Forest Ecosystems*, presents an update on state-of-the-art research results, visions, and theories, as well as specific methods for sustainable forest management under changing climatic conditions. The book contains a wealth of information which may be useful to foresters and forest managers, politicians, and the legal and policy environment and forestry administrators. Case studies from a wide geographic range are presented on the impacts of climate changes on forest environments and economic activities and, also, possible mechanisms for ameliorating climate changes through forest management activities. As in the first edition, the volume is subdivided into five sections.

The first section presents an introduction which clarifies the context and sets the scene, in particular focusing on climatic change and its impact on forest management, the mitigation potential of sustainable forestry, and the role of adaptive management and research. The second section titled "Overview of Climate Change and Forest Reponses" provides a general overview, including information about greenhouse gas emissions from mountain forests, the capacity of forests to cope with climate change, and the role of dead trees in carbon sequestration. The third section presents monitoring and modeling approaches. This includes methods to estimate carbon stocks and stock changes in forests at different scales of resolution, methods to estimate climate change impacts on forest health, an overview of forest

ecophysiological models, and recent advancements in techniques for assessing and monitoring carbon stocks. In the fourth section, several approaches for economic analyses of different management scenarios are presented, including optimizing carbon sequestration in coppice rotations, estimating carbon in forests and wood products, and examining climatic impacts on forest economies, including changes in harvest cycles and uses of wood. Finally, a range of case studies on climate change impacts and mitigation activities in different ecosystems across Africa, Asia, Europe, and America is presented in the fifth section. The case studies include both natural and planted forests in temperate and tropical biomes.

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