TARGETS AND TOOLS FOR THE MAINTENANCE OF
FOREST BIODIVERSITY

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Targets and tools for the maintenance of forest biodiversity

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A summary

Maintaining forest biodiversity by combining protection, management and restoration of forest and woodland landscapes is a central component of sustainable development in northern countries. Succeeding with this can even be viewed as an acid test of sustainability as such. This issue of the Ecological Bulletins is an independent further development of the previous issue entitled “Biodiversity evaluation tools for European forests” (Vol. 50), and focuses on biodiversity maintenance in northern forests at the scale of actual landscapes. The forests dealt with in this volume represent reasonably well-studied systems, a fact that we hope will inspire others to explore ways in which targets and tools for the management of biodiversity in actual landscapes of other ecoregions can be developed.

The readers whom we aim at include not only scientists, but also various actors in the forest sector ranging from the policy level to those dealing with the different elements of forest biodiversity by managing actual landscapes in forests and woodlands globally. To mirror this diversity, the different papers composing this book have been written by a large variety of authors from a range of stakeholder groups. Thus the style varies considerably among the papers, ranging from presentation of original data and reviews synthesising many studies to presentations of ideas and even pleas for transdisciplinary and international collaboration.

The papers in this book are divided into five main sections, each starting with an introducing article. We begin with the views of policy-makers, businesses and managers who all pose questions about the balance between use of renewable forest resources and conservation of biodiversity. Second, the human footprint on northern forests is illustrated. Third, a wide range of animal species are used to test the hypothesis that there are limits to how large the anthropogenic footprint can be without species disappearing locally, regionally or ultimately going extinct. Fourth, different tools for monitoring of the elements of biodiversity within a landscape are presented. Fifth, examples are presented on how biodiversity assessments can be made at multiple spatial scales by combining quantitative targets and measurements of habitat elements.

Finally, a concluding paper proposes how the critical knowledge gaps identified throughout the book could be filled through macroecological research and international co-operation.
A. A wide range of actors pose questions

The new paradigm of sustainable forest management is in the process of being operationally defined. The international and national forest policy level, scientists trying to interpret policies and the whole forest sector, ranging from the buyers of forest products to forest owners and managers, are three major groups of actors involved in defining criteria and indicators, and translating them into operational terms. The papers of this section reflect this process.

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forest enterprise

B. Understanding the human footprint of forests

As a renewable resource, forests have been traditionally measured using tree growth and volume of produced and harvested timber and pulpwood. From the point of view of biodiversity, however, forests are a diverse group of vegetation types representing different natural and cultural disturbance regimes, but also with different negative impact caused by unsustainable very intensive use. In the first paper of this section the diversity of forest types that this volume focuses on is presented. The other papers report on the effects of the human footprint at different spatial scales on forest structures important for the maintenance of biodiversity.

Boreal forest disturbance regimes, successional dynamics and — 117
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and coarse woody debris in the forests of Novgorod Region, Russia
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matter for biodiversity conservation planning?

C. How much habitat is enough?

To make the principle of sustainable forest management more concrete, a large number of criteria and indicators have been presented. However, to achieve environmental sustainability, it is vital that the monitored indicators are compared with scientifically founded targets to assess both status and, if repeated, trends in the level of sustainability. But forests are different, and there are different components of biodiversity at different spatial scales. In this section, animal species with a wide range of life history traits are used to study relationships between presence and fitness of species’ populations and different levels of anthropogenic change in their respective habitats.

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Large woody debris and brown trout in small forest streams – towards targets for assessment and management of riparian landscapes

Occurrence of Siberian jay *Perisoreus infaustus* in relation to amount of old forest at landscape and home range scales

Old-growth boreal forests, three-toed woodpecker and saproxylic beetles – the importance of landscape management history on local consumer-resource dynamics

Management targets for the conservation of hazel grouse in boreal landscapes

Occurrence of mammals and birds with different ecological characteristics in relation to forest cover in Europe – do macroecological data make sense?

Assessing landscape thresholds for the Siberian flying squirrel

Habitat requirements of the pine wood-living beetle *Tragosoma depsarium* (Coleoptera: Cerambycidae) at log, stand, and landscape scale

D. Monitoring elements of biodiversity

The principle of sustainable forest management is associated with a large number of criteria and indicators. Apart from relevant policy level indicators, a prerequisite for applying active adaptive management within an actual landscape is continuous effective and relevant monitoring of relevant indicators covering the different elements of biodiversity at the scale of forest management units. Field inventories, landscapes scale proxy data, remote sensing and sustainable local human societies are four tools for monitoring which are presented here. Finally, the issue of communication to allow feedback to managers is discussed.

Monitoring forest biodiversity – from the policy level to the management unit

Measuring forest biodiversity at the stand scale – an evaluation of indicators in European forest history gradients

Land management data and terrestrial vertebrates as indicators of forest biodiversity at the landscape scale

Identifying high conservation value forests in the Baltic States from forest databases

The role of Geographical Information Systems and Optical Remote Sensing in monitoring boreal ecosystems

Indicator species and biodiversity monitoring systems for non-industrial private forest owners – is there a communication problem?
E. Assessing status and trends

With the results from monitoring and relevant targets for a range of indicators it is possible to make assessments of the status of a certain criterion. In this section, examples of practical assessment methods are presented both for strategic and tactic planning of operational management for protection, management and re-creation of the structural and functional aspects of biodiversity. The need to evaluate the policy implementation and the barriers that need to be bridged is discussed and the concept of “two-dimensional gap analysis” is proposed as an hierarchichal assessment tool to improve the mutual communication between policy, science and management needed to achieve active adaptive management.

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F. Research and development towards active adaptive management

The articles in the previous sections provide knowledge, which is relevant to the development of environmentally sustainable forests and woodlands in boreal and mountain ecoregions. However, critical knowledge gaps remain. In the final section it is proposed how these gaps could be filled by international co-operation in the fields of policy, management and science.

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