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Special issue: Climate resilient and sustainable forest management

From the Editor

Forest management is rocket science

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There are no simple solutions to complex problems. Climate is warming, and changes will occur in the amount and distribution of rainfall. In forests, these changes will gradually affect ecosystem processes from the scale of molecules and cells to trees, stands, landscapes, and continents. Increased intensity and frequency of disturbances, such as wind damages and bark beetle outbreaks challenge future forest management. In society, these changes will further reflect on individual persons, local communities, municipalities, nations and international economic systems. Forest management has a special role in the game of mitigation of and adaptation to climate change.

Forest management refers to changing or modifying ecosystem component, e.g. stand structure, tree species, nutrient or water supply, in a way that the change steers the system to produce a desired combination of economic, environmental and/or social benefits. In addition to the primary change, the management onsets multiple feedbacks and interactions between ecosystem components so that eventually the single change may affect all the ecosystem services at the same time. Successful steering of the forest ecosystem into predefined targets requires application of modern inventory methods, up-to-date fine resolution data, in-depth process understanding, mastering the societal and economic dimensions of forests, fluent use of mathematical and optimization methods and good skills in science communication. Forest management has become rocket science.

International Boreal Forest Research Association conference gathered forest scientists to Helsinki in 2023 to discuss the future climate resilient and sustainable forest management. In this special issue, Silva Fennica publishes a selection of studies presented in the conference. Methodologically the articles cover a wide range of research from field studies to remote-sensing inventory of stand and ground vegetation, analysis of management statistics, and nation-wide simulation studies. The scale extends from a single stand to landscape and national level. Developing new climate-resilient forest management challenges us all to widen our thinking and improve our methodological skills. Every day we must become better scientists than we were yesterday - problems of tomorrow are going to be ever harder to solve.

Scientific process with a high-quality peer-review is a cornerstone of producing reliable information and understanding. However, the peer-review is only the first step in the pressure-testing of new ideas and results. The next phase is the scientific debate. In-depth critical discussion, so to say intellectual tomography or scientific obduction of the results and ideas is an imperative especially when the studies deal with widely important questions. Open science with open data and open computation codes considerably improves the possibilities for constructive criticism and has a great potential to improve the whole scientific process. This said, let us remember that giving

criticism, and being under criticism, may expose scientists to considerable stress and anxiety. Also in science everyone has a right to be wrong. Therefore, good practice in open science means also providing a safe platform for unconventional viewpoints, opposite approaches and intellectual scientific debate without a fear.

Annamari Laurén
Editor-in-chief