

## PREFACE

### Research for a bio-based economy in the forest sector – a Nordic example

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The global population continues to increase, and estimates suggest it will reach some nine billion people in 2050. An anticipated substantial rise in consumption will put further stress on the Earth's ecological production systems. According to the Millennium Ecosystem Assessment, some planetary thresholds have already been passed, e.g. as regards climate change, eutrophication and biodiversity.

The challenge is to produce more consumables for the growing population, but with a lower environmental impact. One constraint is that there is limited land to cultivate, meaning that production has to increase per unit land area. This is particularly the case for agricultural land, but in many parts of the world also applies to forest land.

Part of the global solution is to replace fossil-based energy and products with renewable and environmentally friendly bio-based alternatives. Forest-related examples include biomass-based fuel replacing oil or coal and wood-based materials replacing oil-based plastics, concrete and steel in products and structures. This intention behind replacement or substitution is, in part, to drive a societal shift into a bio-based economy.

The Nordic countries are rich in the natural resources that are prerequisites for this shift. Sweden, Norway and Finland together have over 60 million hectares of forest. Denmark and Iceland historically have lower forest acreage, but are taking actions to increase their production of wood. The Nordic Council of Ministers has taken several initiatives to strengthen the Nordic bioeconomy, as stressed in the Nidaros Declaration for green growth, adopted in 2012. The ongoing three-year programme NordBio is one example. This programme aims to improve the way we use our resources and minimise our generation of waste.

Nordic Forest Research (SNS) is a collaborative body, financed with Nordic funds under the auspices of the Nordic Council of Ministers. SNS supports several co-operating networks and projects intended to strengthen the bio-based economy. The organisation initiated

arranging a seminar on bioeconomy to be held at the IUFRO World Congress 2014 in Salt Lake City, USA. The seminar will give a broad overview of research in bioeconomy and will also be supported by a special issue of *Scandinavian Journal of Forest Research*.

This issue is one outcome of the initiative from SNS. The articles span a broad range of topics from social science and biomass production to technological innovations.

Two guest editors, alongside the chief editor, have taken part in the job of selecting and developing the papers. Anders Roos has been responsible for articles related to social science and economics. The articles have been selected from contributions to the SNS-funded conference “The forest sector in the biobased economy: perspectives from policy and economic sciences”, which took place in Uppsala, Sweden, in August 2013. Hans-Örjan Nohrstedt is the editor of four invited articles reviewing methods to increase biomass production. Finally, two review articles giving examples of industrial innovations and the role of the wood mechanical industry have been commissioned.

Together, the articles provide a broad overview of the concept of bioeconomy, mainly from a Nordic perspective.

Biomass production is the foundation for the forest-based bioeconomy. Hedwall et al. (2014) present a review of fertiliser application and its constraints and opportunities from a biological, economic and environmental perspective. Helmisaari et al. (2014) summarise the current and future use of forest biomass for energy. Dahl Kjær et al. (2014) discuss the option of introduced tree species in relation to past, present and future situations. Native tree species could also be utilised more efficiently by means of genetic tree improvement. Ruotsalainen (2014) gives an overview of the history, methods and results of forest tree breeding worldwide.

Technological advances open up new markets based on renewable resources from the forest. Lindström and Aulin (2014) review the major market and technical challenges and opportunities for using nanocellulosic materials. Sandberg et al. (2014) describe the importance

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of the wood mechanical industry, both for the forest owner and society, and discuss how increased upgrading of sawn timber could increase the value within the overall economy.

Finally, the transition towards a bio-based economy involves economic and policy challenges for the forest sector: in designing appropriate regulations and incentives and in stimulating green forest business development. This requires a better understanding of how policies and markets shape the conditions for the bio-based economy in the forest sector.

Based on an analysis of the key policy document, the European Union's Bioeconomy Action Plan (European Commission 2012), Ollikainen (2014) argues that the document fails to link the bioeconomy to green growth and to consider the role of forests in this process correctly. Riala and Ilola (2014) investigate the different non-technical barriers to the increased acceptance and use of timber in multi-storey construction, whilst Holopainen et al. (2014) focus on the role of the end consumer for the transition to a bioeconomy by investigating the dimensionality of the sustainability concept. Pülzl et al. (2014) discuss the bioeconomy discourse and how it relates to the other ongoing forest policy concepts and discussions. In Roos et al. (2014), the process between new forest-based innovations and market launch is investigated. Kleinschmit et al. (2014) finally provide an overview of how social sciences, mainly within economics, political science and business administration, can contribute to the transition to a bioeconomy in the forest sector.

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