

## **ENVIRONMENTAL MANAGEMENT TARGETS AND POLICY INSTRUMENTS - POTENTIAL SYNERGIES FOR BIODIVERSITY AND CARBON STORAGE IN FORESTS**

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Abstract:

Norway presented last year a national biodiversity index - the Nature Index (NI) (Nybø ed. 2010, Certain and Skarpaas et al. 2011). This describes the state and development of biodiversity in the major ecosystems. As part of the circumpolar boreal forests, the forest areas of Norway represent a major ecosystem with a rich biodiversity relative to its northern latitude. Of the 307 biodiversity indicators of the Nature Index as many as 87 belong to the forest. These comprise species of plants, animals and fungi, as well as indices for habitat-forming forest environments, such as dead wood, with a key role in forest ecosystems.

The environmental debates on the value of forests for recreation, biodiversity, and carbon storage are crucial policy issues, in Norway as elsewhere. The policy-relevant question addressed in this paper is: In what ways may the Nature Index be applied as a source of policy-relevant information about biodiversity in Norwegian forests, and how can it be used to enhance communication and improve the knowledge basis for decision making and politics?

A central question for the debate on protection vs. sustainable use is to what extent critical levels for the NI indicators can be identified. How sensitive are these indicators to natural and anthropogenic pressures? Can the natural variability of the indicators be quantified as a basis for identifying lower bounds of natural variation? To what extent will the indicators be susceptible to irreversible changes below specific level? What will be robust management targets for the forest indicators to ensure adequate sustainability of the relevant ecosystems? These questions will be examined more closely by linking the biological monitoring data employed in nature index to data from the environmental classification used in the forestry sector for certifying the timber.

Alternative policy objectives and managements targets for forest biodiversity may be met in different ways specified as different policies and different policy instruments. One policy option may be to increase forest conservation substantially. Along with biodiversity protection, the possible carbon sequestration may prove to be the most important of the ecosystem services, but also the importance of other ecosystem services like water management, disposal services and recreation and hunting will be taken into account.

Both within the research community and among policy makers it has been common to assume that wood from Boreal forests is a carbon neutral energy source, at least if the forest considered is a net sink for carbon. For example, on the web site of IEA we find the following statement: "Biomass combustion is a carbon-free process because the resulting CO<sub>2</sub> was previously captured by the plants being combusted." The carbon neutrality assumption is also found in scientific literature, for example Bright and Strømman, 2009, Petersen and Solberg, 2005, Raymer 2006, Sjølie et al. 2010, Sjølie and Solberg 2009, Zhang et al. 2010. In practical terms the carbon neutrality assumption implies that when the costs and benefits of projects for application of wood for

bioenergy are estimated, emissions from combustion of wood are simply assumed to be zero. However, the carbon neutrality assumption might be misleading, not least when we are dealing with wood from Boreal forests (Searchinger et al. 2009). When wood in a slow-growing Boreal forest is harvested and combusted, we have to wait almost a century before the released amount of carbon again is stored in the forest (Holtmark 2011). As underlined in Luyssaert et al. (2008) forests continue to accumulate carbon even for centuries without harvest.

It follows that the traditional assumption within forest policy design; that there is a trade off

between care for climate concerns and biodiversity concerns, might be misleading. Taking the capacity of the forest as carbon storage into consideration, might lead to the conclusion that these two concerns both provide arguments for increased forest conservation.

In this paper, firstly, we will try to clarify whether there is a trade-off between climate concerns and biodiversity concerns in forest policy, or whether these concerns are complementary. Second, we will analyse how to design policies that take care of both these two concerns. The analysis will be based on the carbon storage model developed in Holtmark (2011), and the policy discussion will be supplemented with data on forest biodiversity from the Nature Index.