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Future Forests Scenarios 2050
Possible Futures, Future Possibilities

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Purpose

This foresight brief summarises the findings of a scenario process on possible futures for Sweden's forests and forest sector. The purpose of the process was to build interdisciplinary skills within the research programme *Future Forests* and to initiate discussions about the future with our stakeholders. A group of 21 researchers from different disciplines, ranging from the natural and social sciences to the humanities, took part in the process. Stakeholders and interest groups were involved in the initial steps and in discussions of the final scenarios. The process involved four steps: identifying external drivers, defining critical uncertainties to be discussed, developing the scenarios, and discussing implications with interest groups.

New Demands on Forests

Forests provide many ecosystem services to society, ranging from wood-based products to recreational value. Forest management has to take all of these services into account and must be able to deal with trade-offs between the different ecosystem services. This is a difficult task that requires a holistic approach to forest management, which includes not only knowledge of silviculture but also an understanding of, for instance, attitudes and values among different groups of stakeholders and of the conflicts between opposing goals. In addition, large-scale challenges and trends, such as climate change and globalisation, pose new and increasing demands on the services that forests produce. In other words, management of multi-use forests falls into the realm of so-called "wicked problems" where optimum solutions are difficult to find and an interdisciplinary approach is necessary to provide a basis for decisions.

The research programme *Future Forests* attempts to form a scientific basis for managing trade-offs between conflicting interests in boreal forests. Thus, *Future Forests* faces a challenge common to all applied, user-oriented research: reconciling the supply and demand of scientific information between scientists and decision-makers.

We believe that an interdisciplinary research approach is absolutely necessary to address these complex research questions within natural resource management and that stakeholders need to participate to ensure that research questions are grounded in real-world problems and help bridge the gap between science and action. We recognise, however, that conducting interdisciplinary research involving stakeholders is not without its own problems. For instance, difficulties in understanding and trust among different disciplines and differences in commitment between team members may cause interdisciplinary processes to come to a halt.

The scenario process that we describe in this brief was intended to act as a 'nucleus' around which we could hone our interdisciplinary skills, on the one hand, while it served the purpose of inspiring discussions with stakeholders about forest futures, on the other.

Confronting Renewable Energy with Strong Political Institutions

Our scenarios were developed as qualitative narratives of possible futures (see, e.g., the European Environmental Agency's Environmental Issue Report no. 24 for a general description). The process was run as a series of workshops where we included stakeholders at certain steps. The scenario team consisted of 21 researchers from different disciplines, ranging from the natural sciences (forest management, ecology) to the social sciences (political science, social geography, forest economy) and the humanities (history). The 15 stakeholders who participated in the first step (see below) were from private and public forest companies, government agencies and NGOs (conservation and reindeer husbandry).

In short, we first listed a number of external drivers and trends that could affect the Swedish forest sector. This was done using both an expert panel approach and a participatory process with stakeholders (see the respective sections below for details). The research team then analysed the external drivers based on literature reviews. In the next step, we subjectively chose two major uncertainties that we wanted to explore using our scenarios. These were (1) the role of renewable energy sources and bioenergy, and (2) the role of strong political institutions and transnational agreements on climate mitigation and forest use. These two axes were placed orthogonally, resulting in four different scenarios (Fig. 1). These scenarios were then fleshed out into narratives using information from the literature reviews and in discussions among the research team. These narratives were described to our stakeholders in the form of bullet point lists, key sentences and fictional letters from the future.

How Climate Change and Other Variables Affect the Forest Eco-System

Extracting External Trends and Drivers

The process was started by identifying external trends and drivers that could affect the Swedish forest sector. *External* in this case refers to processes, events, trends etc. that the forest sector itself cannot influence. *Internal* structural changes, on the other hand, are, for instance, responses to these external drivers. We listed possible trends and drivers in two different brainstorming workshops: one where the research team acted as an expert panel and one with our group of stakeholders. The workshops produced 81 different suggestions, many of which were similar to each other. In a later meeting with the research team, these 81 drivers were aggregated into 11 themes (in no particular order):

- Climate change
- Climate change politics
- Alternative land use
- Demography and migration patterns
- Energy and bioenergy
- Environmental disasters
- Markets for forest products
- Geopolitics
- Forest governance
- Scientific and technological developments
- Attitudes and values

These themes were analysed and developed through literature reviews by the research team members, except in a few instances where the group lacked sufficient expertise (for instance, in the field of geopolitics and demography/migration). These literature reviews constituted the empirical basis for the scenarios. A few

of the literature reviews were later developed into published papers (e.g. Egnell et al. 2011 and Jonsson 2011).

The space in this brief does not allow for a thorough description of these reviews, but we will mention some of the key issues discussed. The *climate change* models from the IPCC all predict a similar climate development by 2050, but potentially taking different paths towards the end of the century. We thus assumed a similar global climate warming of about $1^{\circ}C$ in all our scenarios. However, *climate change politics* may change much faster, for instance depending on the development of the Kyoto protocol or EU common forest politics. This is a key feature in our scenarios. *Alternative land use* (e.g. agriculture, protected areas or recreation) may strongly influence forest use. *Demography and migration* may also have strong effects (for instance climate refugees from Mediterranean areas). *Energy and bioenergy* is, of course, a key issue, especially if, and if so how, renewable energy sources and bioenergy are able to take a large market role. The *environmental disasters* paper discusses risks of windstorms, insect outbreaks and nuclear power disasters. *Markets for wood products* discusses trends in demands, while the *geopolitics* paper discusses the political stability of the EU and adjoining areas (e.g. Russia and the Arctic). *Forest governance* describes the international and national legislative, regulative and normative framework that can be seen as affecting forest use. *Scientific and technological development* discusses the construction of scientific facts and technological artefacts, and also the problem of implementing technological breakthroughs in a society that needs to accept, use and validate them. Finally, the *attitudes and values* paper concentrates on attitudinal factors about forests, which is comprised of values, environmental attitudes and beliefs, and personal norms.

Identifying Critical Uncertainties

Based on the literature reviews on drivers, we identified critical uncertainties that we wanted to investigate using our scenarios. This was done in a workshop with the research team in an iterative process where smaller

groups produced suggestions, which were discussed among the entire team until consensus was reached. This step is by definition a very subjective one where the uncertainties chosen reflect the interests of a particular group of people at a particular period in time. Our research team agreed on the following two uncertainties, which by themselves are aggregates of several drivers: 1) the role that strong political institutions could have in achieving transnational agreements on forest use, and 2) the role that renewable energy, and bioenergy in particular, could have in society. These uncertainties served to construct our scenario cross (Fig. 1).
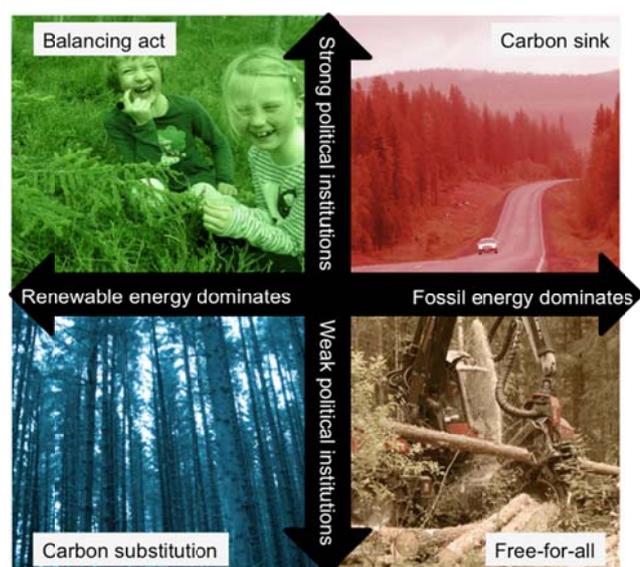

Figure 1: The Four Scenarios

Constructing Scenario Narratives

The two uncertainties defined four different possible futures (Fig. 1): *Balancing Act*, *Carbon Sink*, *Carbon Substitution* and *Free-for-all*. These futures were fleshed out in several ways. In the first step, we extracted relevant information from our literature reviews. Secondly, the research team, acting as an expert group, commented on, added or changed the information to better suit the different futures. Finally, we gathered and organised the information into bullet point lists and also constructed a fictional letter from the future for each scenario. The bullet point lists and the fictional letter together served as a narrative that could be used as a basis for discussions. In the following, we give a short description of each scenario.

Balancing Act describes a stable world with a strong global economy and strong political institutions (such as the UN and EU) that can achieve international agreements (on climate mitigation, for example). Breakthrough innovations have led to reduced energy consumption, and both renewable sources of energy and nuclear power play an important role. The high demand for bioenergy has resulted in substantial land conflicts. The rural economy in Sweden is experienc-ing a favourable development thanks to more job opportunities in the forests. A strong demand for forest products has led to intensive forestry with short rotation periods. As a result of political decisions, efforts are being made to also take other forest uses into consideration, leading to a mosaic landscape where intensively cultivated forests are interspersed with protected areas, resulting in positive effects on biodiversity.

Carbon Sink describes a less stable world with a weak economy. Strong political institutions have some influence, however, and they have agreed on mitigating climate through carbon sequestration. No major innovations have taken place in the energy sector, and fossil fuels (predominantly coal) dominate. Rural development in Sweden is weak. There is a relatively weak demand for forest products, and forest management focuses on carbon storage. Forests are not managed intensively but in many cases as closed-canopy forests with long rotation periods. Biodiversity is doing well and the risk of infestations by pests and diseases is relatively low. However, the risk of storm damage has increased.

The Carbon Substitution scenario describes a world with growing tensions between states and weak political institutions. However, the economy is fairly strong since green economy has made a breakthrough in step with new innovations focussing on renewable energy and reduced energy consumption. A strong demand for bioenergy has resulted in severe land conflicts and resultant land grabbing. Rural Sweden is experiencing a favourable economic development. Demand for forest products is strong, with a focus on bioenergy and bio-materials to replace fossil energy sources and materials. Forestry is intensive with short rotation periods. Market-driven certification schemes have resulted in voluntary set-aside forests, and these are the only areas where any form of old-growth forests remains. Landowner's rights have been strengthened and the right of public access weakened. Biodiversity is not developing well, and the risk of pests and diseases has increased.

The Free-for-all scenario describes a highly regionalised world with a high risk of conflicts (e.g. trade blockades and currency wars). There are weak political institutions and a weak global economy. There have been no major innovations in the energy sector, and nuclear power and coal are the dominant sources of energy. There are serious land conflicts due to a strong demand for traditional forest products in local markets in northwestern Europe. Rural development in Sweden is advancing in regions with an active forest industry. A high demand for timber and pulpwood creates an intensive forestry with short rotation periods. Biodiversity is developing in very unfavourable directions.

Discussing Implications with Stakeholders

So far, the scenario narratives have been used as starting points for discussions with government officials from the National Forest Agency, the management group for SCA Skog (one of the largest private forestry compa-

nies in Sweden), and with representatives from several different forest companies. One common thread in those discussions was a tendency among the participants to rank the scenarios according to the group's specific interests, i.e. to move from possible futures to what the respective group considers a desirable future. Another, somewhat surprising, outcome was the marked ability of the groups to identify aspects of the

narratives where the scenario teams producing the scenarios had failed to agree on the consequences, probably because the logic behind that particular aspect of the scenarios was not clearly described. However, we can conclude that, even though the scenarios were primarily intended for internal use within the research programme, they are also very well suited to stimulate discussions about the future with stakeholders.

Trying to Think in New Ways

Lessons Learned

In the following, we outline some of the lessons learned from our scenario exercise.

- Foresight studies are powerful tools to deal with complex issues. As we were working with narratives rather than with quantitative simulations, it was quite easy to discuss complex relationships without getting bogged down in details. This makes it possible for researchers from different disciplines (both natural and social sciences) to contribute to the process. This kind of scenario exercise can thus be an important tool for building interdisciplinary skills.

- A scenario exercise is more important as a process than as an end product. The most important aspect is the collaborative learning that takes place in the group that constructs the scenarios. This also means that scenarios can be difficult to communicate as they are always a result of many explicit and implicit assumptions and simplifications, which are difficult to describe to non-participants.

- Collaborative learning means that if stakeholders are an important audience, they have to be involved in the whole process. Otherwise, they may find it hard to understand the logic behind the narratives.

- Future scenarios are very much about the views of the future that we have today. They thus have a short 'shelf-life'. For example, our scenarios were created just before the COP15 meeting in Copenhagen. At this time, the possibilities of achieving international agreements or not was an obvious topic to explore. On the other hand, the scenarios were created before the tsunami in Japan and the subsequent decision by Germany to phase out nuclear power. Prior to this event, nuclear power was a logical alternative to reduce the dependence on fossil fuels and was thus included in scenario-building.

- Although scenarios are sometimes discussed as a tool to examine the consequences of surprising events, it is very difficult to think in new ways. Unconsciously we have a tendency to think in linear developments and along business-as-usual lines. This contributes to the short 'shelf-life' of the scenarios.

- Since an important aspect of the exercise is the process itself and the learning that takes place in the scenario group, it takes time and money.

- Our scenarios were intended as possible futures, i.e. no probabilities were attached to the scenarios and they can all be seen as equally probable (or improbable). However, it was a challenge in both the scenario team and in discussions with our stakeholders to stop thinking in terms of forecasts.

Sources and References

More information and contact addresses can be found at www.futureforests.se.

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