Report on BUS-ticket\(^1\) C12
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Date: November 9, 2005

<table>
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<th>Mobilizing extra wood in Europe: Getting harvest closer to growth</th>
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<td>The aims of this BUS quick-scan were:</td>
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<td>• What are the differences between harvest and growth in Europe?</td>
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<td>• Is a harvest increase realistic?</td>
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<td>• What are the risks for loss of sustainability of forest management?</td>
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*Background*

In this paper, we will consider the state of the forests in 30 European countries with 175 million ha of forest, which grows 750 million m\(^3\) increment per year, and has 400 million m\(^3\) of annual fellings. The forest consists of a growing stock of 25 billion m\(^3\), and this is increasing. The demand for wood products is expected to continue to rise with 0.7 to 2% per year. This is derived from Historic fellings. The EU white paper on bioenergy may cause an extra demand increase of 164 million m\(^3\) y\(^{-1}\) by the year 2010! The wood products trade takes place, mainly within Europe. Europe is approximately self sufficient. (Data from COMTRADE Data, Michie, EFI).

There are conflicts over forest management, as we live in an urbanized society, where most people have lost the relation to the base of our natural resources. At the same time, society (and thus policy) wants closer to nature forestry, limiting harvest levels in a period of 40 to 50 years (Ph.D. Thesis Nabuurs, 2001). In the 30 countries, there are 10.7 million private forest owners, who own 96 Mha of forest. They have a (very limited) gross income of 65 Euro/ha.yr from the forest and are a very small economic factor in society in most countries.

A forest is a very inert system, so a tree species change takes a long time. As an example: when 10 Central European countries would convert 50% of all coniferous stands at clear-cut into deciduous stands, the percentage of coniferous stands would decrease by only 10% in 100 years time!

*European Forest Information Scenario Model (EFISCEN)*

The EFISCEN model is the only dynamic European forest resource model, that is jointly developed at EFI and Alterra. It aims to make European wide (harmonised) forest resource projections, based on a detailed forest resource database with all the 30 countries with 140 Million hectares of forest. The model largely depends on the EFISCEN’s European Forest Resource Database (EEFR). This database contains descriptions of 2689 forest types within 140.4 Mha, with data from 30 forest inventory institutes. Included are the age class distributions of these European forests per country between 1985 and 1995. This ranges from “young” forest countries, like Ireland or Portugal, with mainly young stands, to established forestry nations, like Central Europe with more evenly distributed forest ages. For each of the forest types, a simple growth model is described, where growth with increasing age depends on tree species, site quality, ownership, and region (in large countries). Each forest type with age is attributed to a specific surface area.

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**EFISCEN model runs**

The EFISCEN model was used to predict the harvest levels in Europe in 2010, 2020 and in 2060. We used a base line scenario, with a small steady increase in demand, and aiming at a larger harvest in 2060. We could calculate the differences between harvest and growth in Europe in 2010, 2020 and in 2060 (see Table 1 for the total results for all 30 country countries). See Figure 1 and 2 for the situation per country in 2010 and Figure 3 and 4 for the situation in 2060 (N.B. Because of the jagged coast line of Norway, the colour locally seems almost black).

<table>
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<th>Year</th>
<th>Harvest</th>
<th>Growth</th>
<th>Ratio</th>
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<tr>
<td>2010</td>
<td>515000</td>
<td>810000</td>
<td>0.63</td>
</tr>
<tr>
<td>2020</td>
<td>610000</td>
<td>850000</td>
<td>0.72</td>
</tr>
<tr>
<td>2060</td>
<td>1080000</td>
<td>1005000</td>
<td>1.07</td>
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</tbody>
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Many countries harvest between 5 and 7.5 m$^3$/ha.yr (Figure 1). Some countries harvest over 12.5 m$^3$/ha.yr. The total forested area in each region cannot be seen in these pictures. Sometimes forest occupies only a small percentage in the region. With the forested area, the total harvest can be calculated per area or country. Figure 2 shows what part of the increment is harvested. When the colour is green, the harvest to increment ratio is below 1 (harvest is less than increment). When the colour is red, the harvest is calculated to be larger than the increment at that time. When there has been a period of low harvest levels, a temporary high harvest level should not cause damage to the forest.
Figure 2: Harvest increment ratio.

Figure 3: Harvest from forests in 2060.
EFISCEN results
Figure 3 and 4 show the result of the calculations for 2060. There is a slow increase of the harvest to increment ratio to above 1 (see Table 1.). In the model this harvest level is forced on the forest. EFISCEN tries to allocate this harvest, based on trade relations and forest conditions at that time. The number of countries with a ratio above 1 (red colours) is still limited. With other scenario's, the harvest to increment ratio would vary considerably (see e.g. Nabuurs et al., 2003b).

Is a harvest increase realistic?
There are many reasons to be pessimistic. When thinning, many of the professional foresters are too careful in the volume they are marking, even if they would like to harvest the total growth. Some owners do not want to harvest at all because of aesthetics reasons: the forest looks damaged. Roads are damaged by the timber transport, and they need more maintenance. In addition to this there are nature reserves without any harvest. In total, Wiesenthal et al. (2005) estimate that 15% of the forest surface in Europe is not available for harvest (see also Lindner et al., 2005). Because of these effects, CEPI (the European paper industry) expects that even a rise in price will not result in a larger harvest level (Nabuurs et al., 2003a).

How high does the price need to be to increase the harvest? It is difficult to estimate this. Because of the lack of (real) economic reasoning with forest owners, the principle of price elasticity “cannot” be used for the timber trade within Europe (Slangen, 1987). Also, the contact between the forest owners and the timber trade has become less direct, as forest cooperatives take over the contacts. They stimulate the forest owners to aim for other goals, such as higher nature value because of local subsidies for this, etc.. So even at higher prices, professional foresters might still stick to the normal marking (See also De Baaij et al., 2004). When prices would double (this is still not very high), a low percentage of forest owners might consider harvest: those who have no harvest now.

There is reason to expect a harvest increase when the level of expertise of the owners would go up (confirmed by several sources, pers. comm.). They will try to aim at harvest levels
closer to the increment level. The aspect of increasing timber trade with higher prices needs more work for better insight.

**What are the risks for loss of sustainability of forest management?**

We can only give a general answer, from experience in our National forest reserves (Bijlsma, 2005). An undisturbed forest limits the possibilities for forest undergrowth species because of a high competition level (for light, water, nutrients). It appears that some disturbance is positive for biodiversity. Thinning can be seen as mimicking disturbance. The Dutch forest has always had some kind of disturbance in the last millennium, up to overexploitation and degradation. However, it is difficult to establish a tolerance level for this disturbance. More study is needed, e.g. in relation with site quality.

**Conclusions**

- The harvest to growth ratio has been calculated for countries in Europe, based on a scenario with slowly increasing demand. In 2060 the harvest levels would need to be higher than growth, to meet this increasing demand.
- Levels of harvest are only indirectly connected to price level, so this outcome is probably not realistic.
- More study is needed to define tolerance levels of biodiversity with higher harvest levels. A small increase in harvest level seems no risk.

**References:**


