

# Effects of plantation production scenarios on future forest biodiversity and carbon retention

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## Set-up of Scenario exercise

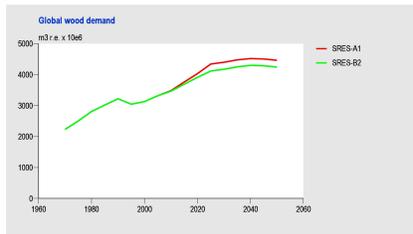
Using the **EFI-GTM Trade model (Kallio 2004)** and the **IMAGE-GLOBIO integrated environmental assessment model framework (Bouwman, 2006)**, we explored the impact of different wood production scenarios on forest biodiversity and carbon retention on a global scale.

The explored scenarios differ in the relative contribution of wood production systems:

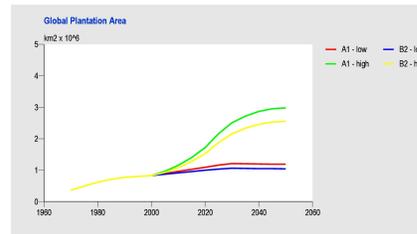
- clear felling in semi-natural forests
- selective logging in primary or secondary forests
- production from forest plantations

Model parameters are taken from a literature review (Arets, 2009) for 24 geographical regions, 14 biomes and 3 production type). Scenarios were derived from the SRES set and combined with FAO plantation outlook scenarios (Brown, 2000).

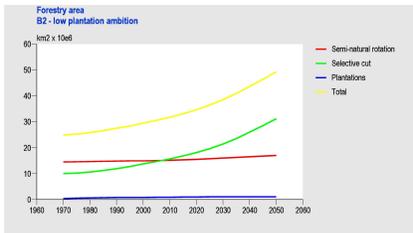
## Preliminary Results



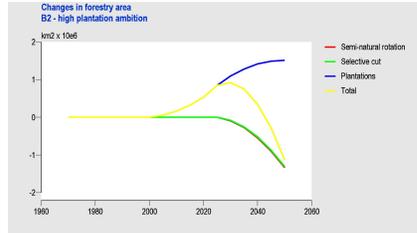
Global demand is projected rise to 4.2 and 4.5 billion m3 r.e. in 2050 (A1 - high growth resp B2 - regional development).



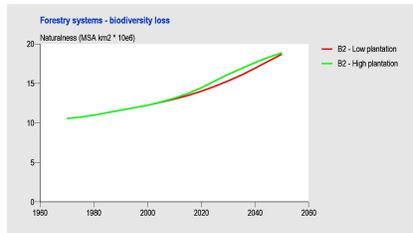
Global wood supply from plantations rises from 16% in 2000 to about 40% in 2050 for scenarios with a high ambition in plantation establishment.



In the B2 scenario, most of the increasing is delivered from selective logging systems that requires more land. Plantations supply around 16% of global demand.



Increasing the share of global production from plantations to 40% in 2050 (B2-high), makes it possible to release semi-natural forest from production purposes. Only after 2030 the total required area is decreasing as it takes decades before plantations have matured.



Only around 2050 this higher loss from plantation establishment will be counterbalanced by semi-natural forests that are no longer required for production. However, it will take several decades for the biodiversity in the formerly used forests to recover. The full effects will only appear in the period after 2050.

**Photographic impression of mean species abundance indicator at landscape level**

Forest	Mean abundance of original species	Grassland

The MSA biodiversity value decreases from pristine to intensively managed forestry systems.

The biodiversity indicator MSA (Mean Species Abundance) gives an impression of the "naturalness" of an area. It is determined by taking the occurrence and abundance of originally present species into account. A literature database was used to derive parameters per management system.

In the GLOBIO model, the effects of infrastructure and climate change are also taken into account (Alkemada 2009).

## Conclusions and discussion

Plantations can help to reduce biodiversity loss by offering an efficient intensive production system. This may take the pressure of semi-natural forests. On the short to medium term however (up to 2050), more loss has to be accepted for plantation establishment. It is also required to put policies in place to protect the semi-natural forests and let them recover to more natural, bio-diverse states.

Plausibility of an ambitious plantation establishment scenarios is a major point of discussion. In the light of sustainable forest management (i.e. FSC-Principle 10), these should not replace existing (semi-)natural forests. This limits the potential available room for plantation establishment.

Looking for synergy with climate change measures can raise more commitment for biodiversity measures. Carbon sequestration may benefit from the above shown developments, as through global sustainable forest management the ongoing deforestation can be avoided. On a global scale, this also depends on developments in the food-agricultural sector and consequently forest conversion. Analyses are on-going on this issue.

### References:

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