

Economic impacts of increasing forest biodiversity conservation on the Finnish forest sector

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Decisions of further conservation in South Finland needs information on the economical effects

Current conservation level

- 2.2 % protected from the forest area in Southern Finland

Several action- and research programs in recent years

- The Forest Biodiversity Program for Southern Finland (METSO 2003-2007)

Aim of the study:

- to assess the magnitude of the economic impacts of 0.5-5% additional conservation of private forests on:
 - timber prices and harvests
 - the forest industry production quantities
 - forest owners' stumpage income

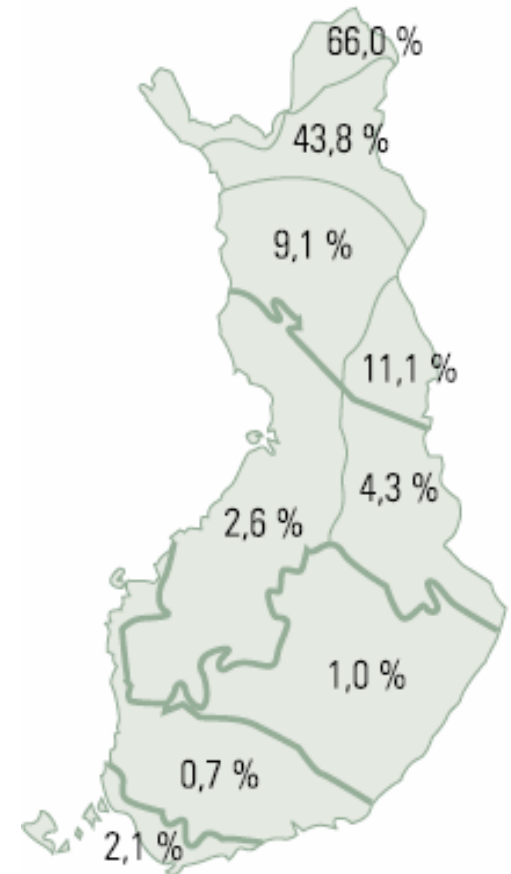


Figure. % of protected areas in forest vegetation zones.

Source:SYKE

Conservation reduces growing stock available for commercial wood production

Earlier economic studies:

e.g., Leppänen et al. 2000, Linden & Uusivuori 2002, Mäki-Hakola 2004, Perez-Garzia & Lippke 1993, Sedjo et al. 1994, Bolkesjo et al. 2005, Kallio et al. 2006.

Conservation increase::

- (-) supply of wood (if prices unchanged)
- (+) prices of wood & production costs of forest industry
- (-) profitability & production of the forest industries
- (-) harvests
- (+ -) forest owners' stumpage income
- (+) roundwood trade between regions

Research method and model

Scenario analysis (2005-2015):

- BASE alternative, effects of other factors than conservation
- conservation alternatives (0.5, 1.0, ...5%) & compared to BASE alternative

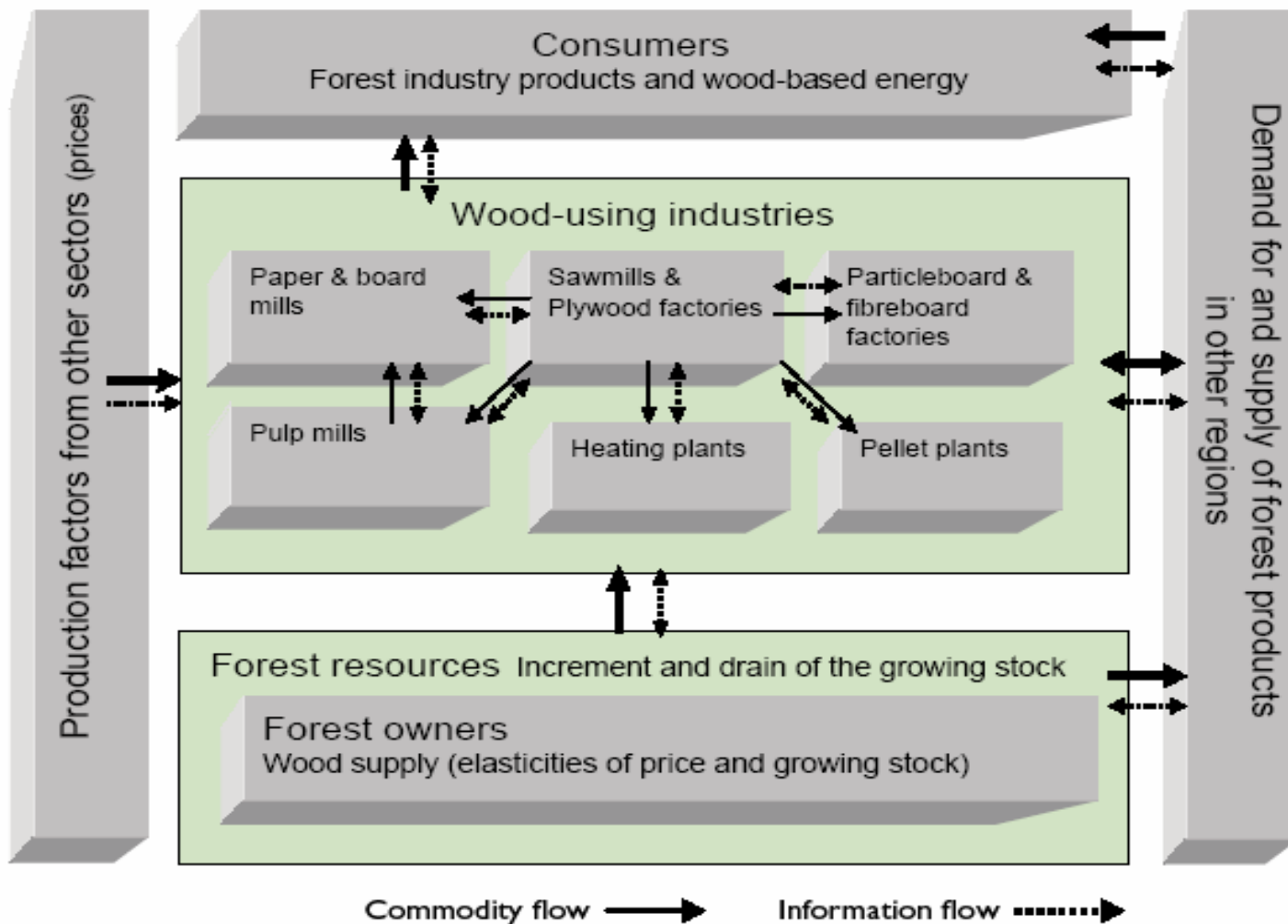
Conservation:

- South Finland (Finland excluding 3 northern forestry centers)
- old growth mature forests (aver. dens. 234 m³/ha, 75% sawlogs-25% pulpwood)

SF-GTM forest sector model (updated from Ronnila 1995)

- an application of GTM (Kallio et al. 1987)
- partial equilibrium model (only forest sector endogenous)
- perfect competition:
 - price taking forest owners and the forest industry maximize their profits
 - price taking consumers maximize their welfare
- recursive model (one period market equilibrium is calculated at a time)
- data updated for the next period, e.g. growing forest stock
- mathematical programming

The SF-GTM forest sector model dimensions



MODEL INPUT

- **Large amount of data:**
final consumption, production of different end-products in wood using industries, forest resources by wood categories and species, forest owner groups, & assumptions on e.g., elasticities, etc.
- **Roundwood supply:**
Supply of roundwood by 6 categories, and by 13 forestry centers + imports
 - increasing function of timber price, price elasticity 1.0
 - growing stock & growth (from NFI9 data) by forestry centers
 - change in the growing stock shifts supply, inventory elasticity 0.5, sensitivity analysis for inv. $e = 1.0$
- **Roundwood imports:**
import supply exogenous in the model

Scenario analysis

- **BASE:**
market changes 2005-2020 with no additional conservation (not presented)
- **Conservation scenarios:**
0.5, 1.0,4.5, 5.0 % from mature forest hectares in South Finland (5% case presented)
- **Resulting consevation impacts**
are compared to the BASE, i.e. the impacts are separated from the other changes in the operation environment

Impacts of 5 % additional conservation, set-aside in 2008, on selected variables in 2015

Variables	1. wood imports 2005 level inv.e= 0.5	2. wood imports substitute for 30% of harvest change	Sensitivity analysis: inv.e= 1.0	Sensitivity: a fall in imports: -logs: 21 to 15 mill.m3 -chips: + 20%
<i>Roundwood , coniferous</i>	Changes vs. bases, %			
Sawlog price	3.5	3.1	6.0	3.9
Pulpwood price	5.1	3.7	9.9	4.4
Sawlog harvest	-6.2	-6.5	-12.3	-4.8
Pulpwood harvest	2	0.8	3.2	1.6
<i>Forest industry</i>				
Sawnwood production	-5.1	-3.8	-10.2	-4.2
Paper production	+-0	+-0	-0.4	-0.6
<i>Forest owners: Stump. income</i>	+-0	-1.4	-1.5	1.0

Final remarks

- the results are broadly in line with earlier studies
- forest industry suffers, relatively small impacts at national level on forest owners' stumpage income
- conserving younger age classes probably gives smaller effects – all the forests, rich in valuable biotopes, are not necessarily commercially valuable
- limitations, e.g.:
 - exogenous roundwood imports
 - ecosystem service values excluded (no market price)
 - regional conservation impacts may be large
- future research:
 - impacts of roundwood imports
 - inclusion of ecological indicators by forestry centers
 - model endogenous conservation decision:
How to allocate conservation by forestry centers to minimize the economic impacts on forestry and forest industry ?
(in referee process: Kallio & Hänninen & Vainikainen & Luque)