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Scandinavian Forest Economics
No. 44, 2012

Proceedings of the Biennial Meeting of the Scandinavian Society of Forest Economics Hyytiälä, Finland, May 2012

Anne Toppinen, Heimo Karppinen & Kati Kleemola (eds.)

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Scandinavian Forest Economics

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Preface

The Scandinavian Society of Forest Economics held its Biennial Conference 2012 during four sunny and warm days of May 23-26. As a conference venue we had an opportunity to visit premises of University of Helsinki Forestry Field Station in Hyytiälä by Kuivajärvi lake, a place with over one hundred years of traditions in teaching and practicing forest sciences in Finland.

Altogether 70 participants from over 10 countries gathered together over 3 three keynote and 64 parallel session presentations. The keynote presentations were held by professor Richard Vlosky (Louisiana State University, USA), adjunct professor Jari Kuuluvainen (University of Helsinki, Finland) and professor and dean Jaana Sandström (School of Business, Lappeenranta University of Technology, Finland). During conference a lunch excursion was provided to SMEAR II research station and Siikaneva peatland reserve close to Hyytiälä. On May 24, international guests were entertained by "Logger's life" show by Jyri Makkonen and his team. After conference tour excursion was hosted on May 26 by Metsä Goup in Mänttä and Vilppula region, with since sincere thanks going to environmental manager Janne Soimasuo.

This conference could not have become possible without voluntary help from several institutions and individuals. At University of Helsinki particularly the help of Henna Hurttala, Heimo Karppinen, Sami Niinimäki, Lauri Valsta and Lei Wang should be mentioned. At the Finnish Forest Research Institute, Riitta Hänninen and Jussi Leppänen, at Metsäteho Marketta Gustafsson and Heikki Pajuoja, and last but not least, at Finnish Environment Institute (SYKE) Katja Lähtinen are sincerely acknowledged.

Finally, we would like to extend our thanks to SNS Norden, Metsämiesten Säätiö, Metla and Metsäteho for providing funding for the organization of the SSFE 2012 conference. The next conference will be organized by SLU in Sweden in 2014 as professor Anders Roos as a conference chair.

Long live the spirit of Scandinavian forest economists!

Anne Toppinen

November 2012, Helsinki

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Full Papers

Evaluation of the economic impact of Flora Fauna Habitat -management plans in forest enterprises in Germany

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Abstract

In Germany approximately 17 % of the total forest area is part of the European Natura 2000 nature conservation network and designated under the FFH-Directive or the Birds Directive. The objective is ”to maintain or restore, at favorable conservation status, natural habitats and species of wild fauna and flora of Community interest”. While FFH-areas have been designated by the Bundesländer for several years, management plans have only recently been formulated. Within the research program”FFH-Impact” [2] several FFH-management plans from different Bundesländer in Germany were analyzed with regard to the economic outcome of forest enterprises. The most relevant restrictions on forest utilization that occur are: the conservation of habitat trees, restrictions in the change of tree species and the preservation of mature stands. This paper describes an approach to appraise the financial losses of forest-land owners caused by the requirements of FFH-management plans by means of an exemplary forest enterprise and discusses the consequences with respect to financial compensations from contract based nature conservation. The economic valuation of the different FFH-measures was conducted according to the capitalized earning value concept. For this an Excel-based calculation-program was further developed. The model determines yield differentials between a reference development and the development due to the FFH-management plan for affected areas by calculation annuities based on a wide variety of natural and economic variables.

1 Introduction

The Fauna-Flora-Habitats Directive (FFH) (92/43/EEC, ”habitats directive”) as part of the European Natura 2000 nature conservation network was introduced in the EU in 1992. It aims ”to maintain or restore, at favorable conservation status, natural habitats and species of wild fauna and flora of Community interest”. To ensure the required conservation measures, EU Member States are obliged to designate Special Areas of Conservation (SAC) and Sites of Community Importance (SCI) under the FFH-Directive and Special Protection Areas (SPAs) under the Birds Directive (79/409/EEC), hereinafter collectively referred to as ”FFH-areas”, for the protection of natural habitat types and species listed in the annexes of the directive (Rosenkranz and Möhring. 2011). The FFH-directive mainly focuses on protection objectives and hardly any requirements for forest management can be drawn from it (Winkel et al. 2009). The Member States are, by

[2]”Economic analyses for implementing the FFH-directive in forests” is one of two sub-projects of the joint research project ”Impacts of nature protection requirements on forestry and the forest sector” and is carried out together with the Johann Heinrich von Thuenen Institute, Institute of Forest Based Sector Economics (OEF), Hamburg in close cooperation with bbw-consult, Freiburg and is kindly supported by the Agency for Renewable Resources (FNR) as project executing organization of the German Federal Ministry of Food, Agriculture and Consumer Protection (BMELV).

means of Art. 6 of the directive, obliged to put these conservation objectives and measures into practice by way of so-called ”management” or ”maintenance and development” plans for each of the respective FFH-areas.

In Germany approximately 17% (1.9 Mill. ha) of the total forest area is located within FFH-areas, amongst these forest habitat types there are to a large extent Beech forests which were not subject to a special protection status before (Rosenkranz and Möhring. 2011).The sustainable and multifunctional use of German forests is explicitly stated in German forest law. Forest management fulfills these statutory provisions by joining utilization, protection and recreation largely on the same ground. Therefore these forests are not only of great importance for nature protection goals but also for forest utilization and the achievement of policy aims e.g. in the fields of economics, energy policy and climate protection. While FFH-areas have been designated by the Bundesländer for several years, management plans have only recently been formulated. Thus a systematic evaluation of the impacts on forest utilization is only now possible.

Against this background, the research project ”Economic analyses for implementing the FFH-directive in forests” aims to analyze natural and economic impacts of FFH-implementation. Furthermore recommendations for the efficient implementation of the FFH-directive for forest enterprises, administration and politics shall be derived (Rosenkranz and Möhring. 2011). As 9110 woodrush beech forest (luzulo-fagetum) and 9130 woodruff beech forest (asperulo-fagetum) account for the largest shares of FFH-protected beech area (Bundesamt für Naturschutz. 2008; Forstliche Versuchs- und Forschungsanstalt Baden Württemberg. 2007) the study is focused on these two habitat types.

This paper describes how an approach by Möhring and Rüping (2007) was further developed and used to appraise the financial losses of forest-land owners caused by intensified nature conservation requirements through FFH-management plans.

2 Methodology and data

2.1 FFH-management plans in Germany

The responsibility for designating FFH-areas and implementing the FFH-management plans in Germany primarily lies with the Bundeslaender. Within the project structure legal commitment and typical conservation and development measures of FFH-management plans from all Bundeslaender (except city states) have been analyzed.

The scope of the management plans (without annex) ranges from 8-20 pages up to 200-300 pages (Rosenkranz and Möhring. 2011). The most important section of each management plan for the evaluation of the economic impact of FFH-management plans on forest enterprises is the chapter of objectives and measures: Conservation measures encompass all actions necessary to maintain or restore natural habitats and wild species at a favorable conservation status. Furthermore they can include activities to further enhance this conservation status. In the annex of management plans of some Bundeslaender measures are concretized to the level of specific forest stands (Rosenkranz and Möhring. 2011).

The most important conservation measures for Beech forest habitat types and protected animal and plant species were found to be the conservation and/or the increase of habitat trees, dead wood and old growth forest as well as the protection of habitat-specific natural species composition including the promotion (and/or the natural regeneration) of habitat-specific native

species, the conservation of rare native tree species (e.g. sorbus spec.) and the removal of non-native tree species (e.g. Douglas fir, Norway spruce) (Rosenkranz and Möhring. 2011).

These findings fit to the results of a nationwide online survey, that has been conducted during the study in order to get an overview of current expectation trends of forest owners in the FFH-implementation process (Wippel et al. 2010). About 340 mainly medium- and large-scale private and communal forest owners were asked which FFH-measures in their view would cause the biggest restrictions on forest management. The conservation of dead-wood, habitat-trees and old-growth trees (chosen by 53% of the respondents) or of areas of old-growth (chosen by 33%) as well as limitations in the choice of tree species and regeneration practices (chosen by 67%) were found to be the main measures expected to constrict forest management (Rosenkranz and Möhring. 2011).

2.2 Evaluation of FFH-measures

In order to evaluate the economic impacts of FFH-measures on forest management, ten selected private-, communal- and state-run forest enterprises in six different Bundeslaender were examined in more detail.

Reference data, i.e. objectives, management practices and key figures, without the influence of FFH were raised in each enterprise. In addition the natural impacts of FFH-measures (e.g. loss of management area by designating habitat trees) were derived from the respective management plans together with the forest managers. FFH-measures were only considered if they lead to new restrictions for the forest enterprise.

The evaluation of the different FFH-measures was conducted according to the capitalized earning value concept by calculating the yield differentials between the reference development and the development due to the FFH-management plan for the affected areas.

For these economic assessments an Excel-based calculation-model by Möhring and Rüping (2007) was further developed. The model is based on a valuation concept by Möhring and Rüping (2006). It allows the input of a wide variety of natural and economic variables and shows the results in a compressed and clearly arranged form. The basic functions of the calculation-model are described in the following:

Using yield- and assortment-models, inputs and outputs over time for both, reference data and FFH-influenced management, are estimated in physical quantities for five-year intervals until the end of rotation. These natural inputs and outputs are priced to generate cash flows for both alternatives. Therefore the model uses a stands thinning volumes and associated quadratic mean diameters (D_q) at the time of use and volume and D_q for final felling at the end of rotation. After converting standing gross volumes (over bark) into commercial volumes these quantities are valuated with net proceeds as a function of the tree species, wood quality, expense level and D_q.

Finally the model determines annuities from the cash flows by using dynamic investment calculations:

$$a = \sum_{t=0}^{n} \frac{(R_t - E_t)}{(1+i)^t} \times \frac{i \times (1+i)^n}{(1+i)^n - 1} \qquad \textbf{(1)}$$

a = Annuity (equal annual payments)
t = Point in time (years since beginning of the accounting period)
n = Length of accounting period (years)
R_t = Revenues at t
E_t = Expenditure at t
i = interest rate

In doing so the net present value of the cash flow is transferred in a yearly constant amount with the annuity- or recovery-factor. The annuity corresponds with the yearly constant amount of money which can be removed from the forest enterprise as silvicultural profit contribution during a period under ”capital maintenance”. Möhring and Rüping (2007) refer to this amount as ”annual timber production value”. This term expresses that the cash flow is distributed mathematically equal over the rotation period, also it points out that the value is directly connected with the forest wood production (planting, tending and harvesting of trees). Other costs and revenues as, for example, annual fixed administration costs or income from hunting are not taken into consideration. In that sense, the ”annual timber production value” equates to a yearly contribution margin from silvicultural (biological) production including cost of capital before deducting annual fixed costs.

By applying the annuity to the entire forest rotation length (u) the formula gets following notation:

$$a_u = \left(\frac{A_u}{(1+i)^u} + \sum_{a=1}^{u} \frac{(D_a)}{(1+i)^a} - c\right) \times \frac{i \times (1+i)^u}{(1+i)^u - 1} \qquad \textbf{(2)}$$

u = rotation length
A_u = Clear-cut revenue net of harvesting cost in year u
D_a = Thinning revenue net of harvesting cost in year t
c = Plantation costs

The ”annual timber production value” can also be calculated for periods shorter than an entire rotation. For a time period of n years, the annual timber production value can be determined by the following equation:

$$a_n = \left(\frac{A_{x+n}}{(1+i)^n} + \sum_{a=x}^{x+n} \frac{(D_a)}{(1+i)^{a-x}} - A_x\right) \times \frac{i \times (1+i)^n}{(1+i)^n - 1} \qquad \textbf{(3)}$$

A_x = Clear-cut revenue net of harvesting cost in year x
A_{x+n} = Clear-cut revenue net of harvesting cost in year $x+n$
D_a = Thinning revenue net of harvesting cost in year t

The difference between the annual timber production values of both alternatives is considered as monetary loss to the forest-land owner.

2.3 Data base for the valuation

The calculations were based on a data pool which reflects growing conditions in Northern Germany:
With respect to existing forest valuation directives, standard yield tables (Schober 1987) are the basis for modeling the natural production process;

Oak	Jüttner 1955 (m. Df.)
Beech	Schober 1967 (m. Df.)
Douglas fir	Bergel 1985 (st. Df.)
Spruce	Wiedemann 1936/42 (m. Df.)
Pine	Wiedemann 1943 (m. Df.)

Since todays silviculture differs from the types of thinning schemes underlying those yield tables, the average stand diameter is adjusted to the present silvicultural situations by using a Richards-Function (Wollborn and Böckmann 1998).

Timber prices are derived from the forest valuation directive of North-Rhine-Westphalia (Ministerium für Umwelt und Naturschutz, Landwirtschaft und Verbraucherschutz des Landes Nordrhein-Westfalen. 2009).

Costs for mechanized timber harvesting and skidding are taken from Arbeitsgemeinschaft forstlicher Lohnunternehmer Niedersachsen e.V. (2010).

Manual harvesting is assumed from a diameter of 45 cm upwards in softwood and 25 cm in hardwood. Cutting cost are then calculated according to the ”Erweiterter Sortentarif 2007” (Kuratorium für Waldarbeit und Forsttechnik e.V. 2012), a remuneration model for forest workers.

Planting costs were fixed at 7000 EUR/ha for Oak, 5000 EUR/ha for Beech, 2250 EUR/ha for Norway Spruce, 3300 EUR/ha for Douglas fir and 2000 EUR/ha for Pine (Niedersächsisches Ministerium für Ernährung, Landwirtschaft, Verbraucherschutz und Landesentwicklung. 2008). Silvicultural treatments are assumed at the age of 20 with costs of 250 EUR/ha in hardwood- and 500 EUR/ha in softwood-stands.

All other costs are considered as fixed costs and omitted based on the assumption that they occur independently from management regime.

Following (Möhring 2001) a real interest of 1.5 % was used for the calculations.
All these data are assumed to be constant over time.

3 Appraising the financial losses when changing the forest management regime

The following sections will show how timber production values were used to appraise the financial losses in forest enterprises in Germany through the three typical FFH-measures in woodrush Beech forests (luzulo-fagetum) and woodruff Beech forests (asperulo-fagetum).
The different measures have different effective periods, that can vary between a few years, e.g. in the case of an extension of the rotation period, and whole rotation periods, e.g. in the case of limitations in the choice of tree species. To be able to evaluate the overall effect of (medium-term) FFH-management plans on forest enterprises the economic or financial disadvantages of the different measures over periods of varying lengths are converted to an annual amount over 30 years based on financial principles [3].

Furthermore the measures affect different areas within a designated FFH-area. Financial disadvantages are calculated in relation to the measure area directly affected by a measure itself at first. In a second step the results are described and summarized in respect to the area of a habitat type.

The economic impacts of the selected typical FFH-measures shall be shown by example of a ”fictional forest enterprise”. The area of this fictional forest holding amounts to 280 ha of European Beech forest with a rotation cycle of 140 years.

3.1 Conservation of habitat trees

Mature old broadleaf trees and dead wood are of great importance for the biodiversity of flora and fauna in forest habitats. To appraise the financial loss of the conservation of habitat trees until the natural old growth and decomposition phase it is assumed, that the habitat trees to be protected are allocated in groups. Each tree has a standing area of $100\ m^2$. The groups are treated as stands that should be preserved.

In the example the FFH management plan states, that the forest enterprise has to maintain five habitat trees per hectare natural habitat type. The trees have to be older than 120 years. This results in 1400 habitat trees, which add up to an area of 14 ha (5% of the enterprises forest land). The enterprise has an reserve of old stands, so the medium age of the trees is 140 years.

Reference: Under normal conditions, the affected area of mature European Beech would be harvested an regenerated. The objective of the fictional forest owner is to convert 20% of Beech area to Douglas fir with a rotation cycle of 70 years in the future. On basis of the used models, a forest management regime with 80% European Beech from natural regeneration and 20% planted Douglas fir would achieve an annual timber production value of $139, -EUR\ ha^{-1}a^{-1}$.

[3]FFH-measures, as phrased in the FFH-management plans, are not legally binding for communal and private forestry. For these types of ownership the safeguarding of FFH-areas and measures can be achieved by market instruments such as e.g. environmental contracting. Contract durations of 30 years are common in environmental contracting in Germany.

Alternative*:* The mature European Beeches remain. The net revenue from clearcutting a Beech stand of the second yield and fifth value class in the age of 140 would be $18.720, -EUR\ ha^{-1}$. The forest enterprise loses this value which can be converted toannual amounts of $-779, -EUR\ ha^{-1}a^{-1}$ over 30 years. This "depreciation" reflects, that the loss in value does not occure immediately but over a longer period of time.

Financial loss: For the next 30 years, the financial loss is the difference between the annual timber production value of the reference and the loss of value of the abandoned trees. It totals $918, -EUR\ ha^{-1}a^{-1}$. If a total area of 14 ha is affected by this measure, the financial loss for the forest enterprise equals $12.852, -EUR\ a^{-1}$.

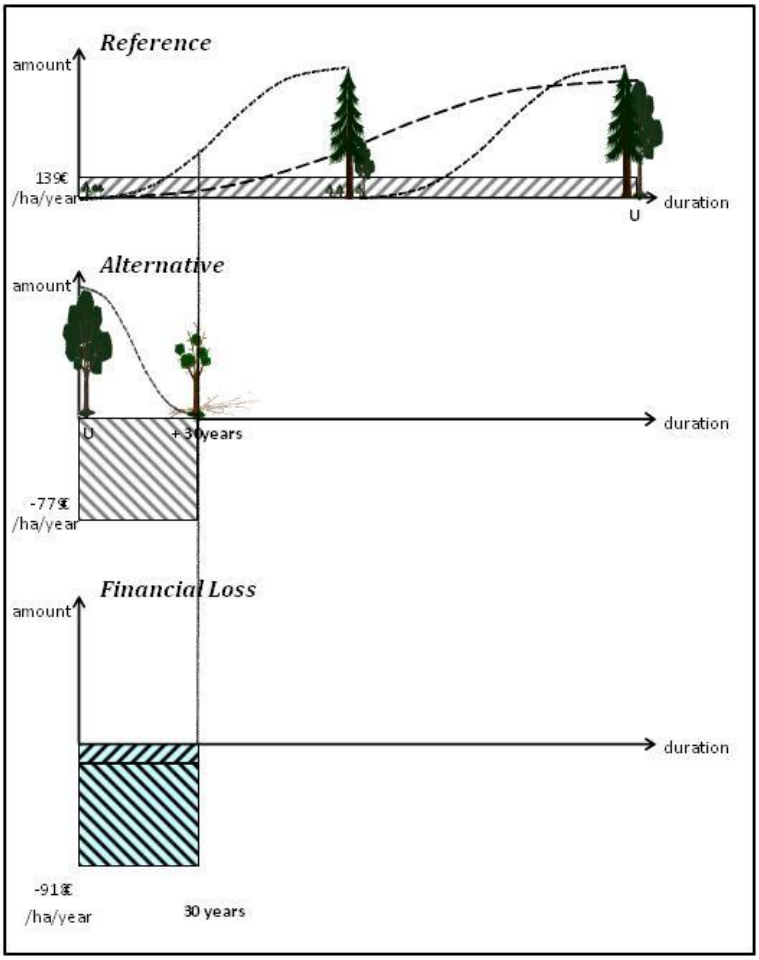

Fig.1. Conservation of habitat trees

3.2 Change of tree species

Management plans allow cultivation of non-native tree species only to a limited extent or exclude it completely. This denies forest owners the opportunity to optimize their tree species portfolio and results in losses in yield and revenue. It particularly pertains the growing, harvesting and utilization of fast growing coniferous species as, for example, Douglas fir.

The owner of the fictional forest enterprise is going to regenerate 40 ha of his forest land in the next 30 years. According to the management plan, the plantation of Douglas fir is prohibited in his forests. The resulting profit loss is calculated as follows:

Reference: A forest management regime with 80% European beech from natural regeneration and 20% planted Douglas fir would achieve an annual timber production value of $139,-EUR\ ha^{-1}a^{-1}$.

Alternative*:* Under the given conditions (with natural regeneration and no plantig costs) a forest management regime with European beech would gain an annual timber production value of $84,-0,-EUR\ ha^{-1}a^{-1}$, considering the optimal rotation length of 140 years.

Financial loss: The difference between the annual timber production value of the two species amounts to $55,-EUR\ ha^{-1}a^{-1}$ during the entire production length of European Beech.
Taking this extreme long time span into account, a different approach seems to be more suitable for practical purposes. This approach is based on the consideration that it is advantageous to continue an existing production process, despite the higher average productivity of the reference, when the existing stand has already reached a certain age. We assume that the annual timber production value of Beech is equivalent to the average annual timber production value of Douglas fir by the age of 30. Beyond this age, the Beech stand does not cause any financial disadvantage anymore, so that only the losses up to this age have to be determined. Fig. 3 illustrates this approach.

Reference: The forest management regime with 80% European Beech from natural regeneration and 20% planted Douglas fir would achieve an annual timber production value of $139,-\text{EUR ha}^{-1}\text{a}^{-1}$.

Alternative: Once a European beech stand reaches the age of 30, the average annual timber production value is $143,-\text{EUR ha}^{-1}\text{a}^{-1}$ until its optimal rotation length of 140 years. It is thereby almost equivalent to annuity of the reference. However, up to this age (the first 30 years), European Beech has a negative timber production value of $-9,-\text{EUR ha}^{-1}\text{a}^{-1}$.
Financial loss: For the first three decades, the difference of the annual timber production value between the two species amounts to 148,- $\text{EUR ha}^{-1}\text{a}^{-1}$. From 30 years of age onwards the European Beech stand is no longer disadvantageous when compared to a newly established mixed stand. In relation to the affected area of 40 ha this means a financial loss of $5560,-\text{EUR a}^{-1}$ for the forest enterprises.

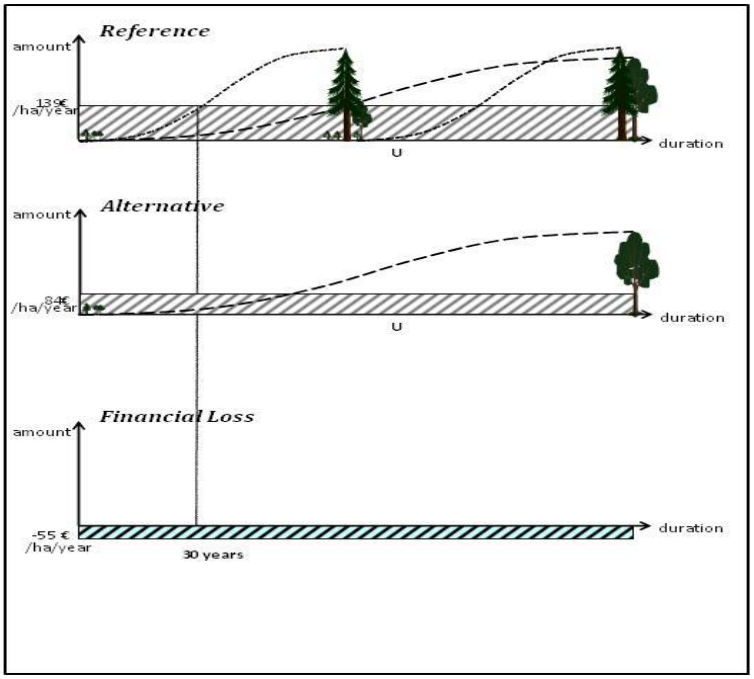

Fig. 2. Change of tree species

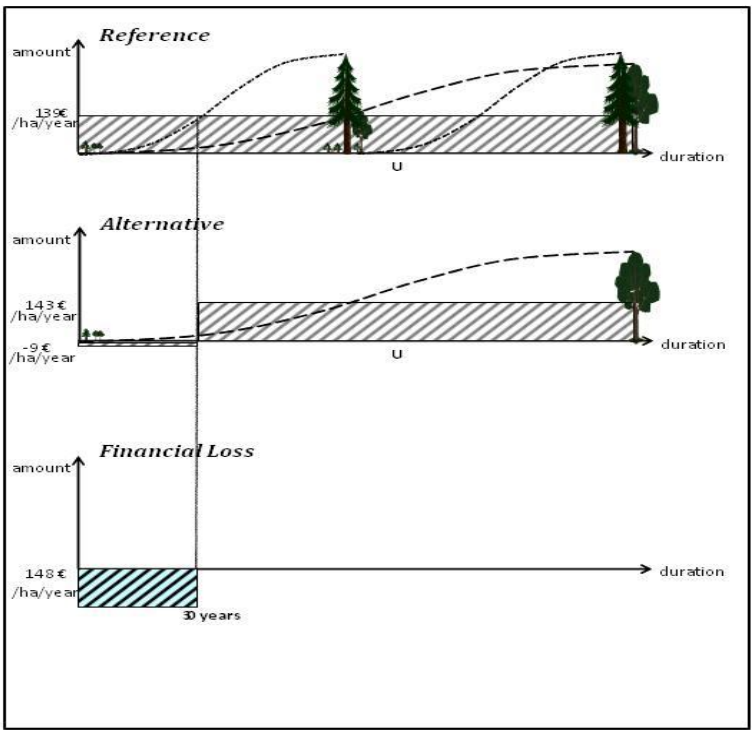

Fig. 3. Change of tree species

3.3 Preservation of a mature stand

The Fauna-Flora-Habitats Directive classifies natural habitat types in three categories depending on their conservation status. (A=Favourable condition, B=Unfavourable-inadequate, C=Unfavourable-bad). One important parameter for the classification is the proportion of old growth forests (older than 100 years) in a habitat type. To sustain this proportion, it may be necessary to maintain old growth stands beyond their scheduled rotation age. For forest enterprises with a certain forest age-class structure this can effect the potential area of final harvesting and increase the target rotation period. Financial losses can arise especially in tree species with risks of deterioration of quality in old ages as, for example, Beech due to red heart. In the fictional forest enterprise 10 ha of 140 year old mature European beech have to be maintained for three additional decades to uphold the share of old growth stands over the next 30 years. The valuation comprises two aspects:

Reference: Having harvested the mature European beech, the stands would be regenerated, 20% of Beech area would be converted to Douglas fir. The annual timber production value of such a mixed stand is $139,-\mathrm{EUR\,ha^{-1}a^{-1}}$ under the given conditions.

Alternative: The mature European Beech stands remain. The average annual timber production value of a 140 year old Beech stand for the next 30 years is $-126,-\mathrm{EUR\,ha^{-1}a^{-1}}$. This negative amount reflects the assumption of falling prices as a consequence of red heart in old growth stands.

Financial loss: For the next 30 years, the financial loss is the difference between the annual timber production values of the two land uses and totals $265,-\mathrm{EUR\,ha^{-1}a^{-1}}$. On the total area of 10 ha, this means a financial loss of $2650,-\mathrm{EUR\,a^{-1}}$ for the forest owner.

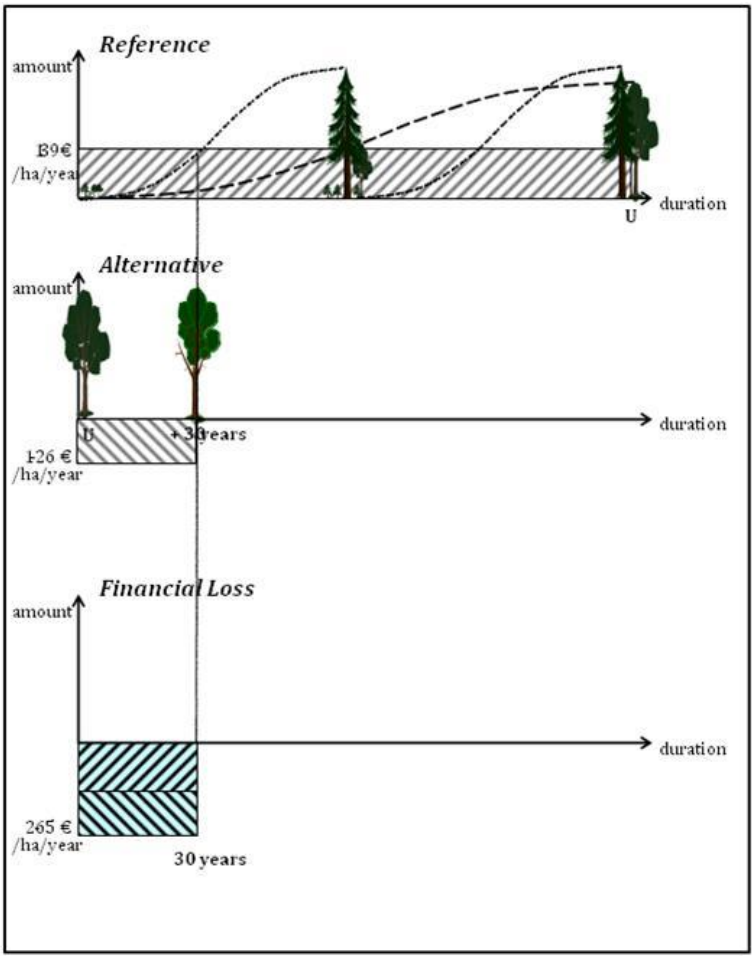

Fig. 4. Preservation of a mature stand

Table 1. Evaluation of the FFH-measures in the fictional forest enterprises

Measure	**Area [ha]**		**Financial loss [EUR/a]**		
	affected	total	per ha affected	per ha	total
Conservation of habitat trees	14		918	46	12852
Change of tree species	40		139	20	5560
Preservation of mature stands	10		269	10	2690
Total	64	280	330	76	21102

4 Evaluation of the overall effect of FFH-management plans on forest enterprises

To get an integrated view of the financial burdens a forest enterprise suffers from FFH-determined management, measure based assessments can be summed up over the total area of a habitat type.
The resulting values for the fictional forest enterprise are shown in Table 1.

The exemplary results show that FFH-management plans can have a significant impact on the financial situation of a forest enterprise. In this context, the conservation of habitat trees plays the most important role. Restrictions in the choice of tree species are particularly important, because they usually concern large areas. The financial repercussions of the preservation of mature stands are closely related to the measure area. Here they occur on a comparatively small area, so that the measure type has a lower impact in the showcase.

5 Conlusions

The concept to determine annual timber production values, developed by Möhring and Rüping (2007), is a feasible, consistent approach to provide a transparent basis for the appraisal of financial losses caused by intensified nature conservation requirements through FFH-management plans. The recent adjustments of the calculation program allow its application in a wide context.
The presented model calculations show that forest enterprises can be affected by the tightened nature conservation requirements through the NATURA 2000 network to a considerable extent. Economic effects will depend very much on the conditions of the natural environment of a forest enterprise or habitat type.
The annual timber production value can be easily interpreted as annual gross margin of the timber production (Möhring and Rüping. 2007). This offers advantages in the upcoming discussions; the annual figures can easily be supplemented by other annual expenses, for example additional administrative expenses. This is especially helpful for determine a minimum level of annual compensation payments.
However, some disadvantages remain which deserve further comment: The valuation only covers the objective of economic success as far as it results from timber production. Other objectives and non-timber outputs are not taken into account. Also risk is not included in the calculations.
The calculations presented are based on traditional yield tables for even-aged pure stands. The natural conditions of the forest enterprise should comply with these conditions. In a multi-storied, mixed permanent forest the model basis reaches its limits. The same applies to the timber assortment. Here too the grading rules should represent the actual conditions. However, traditional yield tables can be replaced by modern growth simulators that are able to depict modern management regimes (Möhring and Rüping. 2007).
Furthermore the model uses timber prices of the past three years. It can be assumed that revenues and costs change over the period under consideration. Annual payments in a specific agreement require a price escalation clause.
It should be underlined, that the financial loss calculated here conceptually represents a ”minimum price” and should not be mistaken as a ”fair price”. A fair price has to be higher than the actual financial loss to encourage a forest owner to enter into a voluntary agreement. For deviation of a fair compensation price an extra award, based on the minimum price, would be appropriate (Möhring and Rüping. 2007).

References

Arbeitsgemeinschaft forstlicher Lohnunternehmer Niedersachsen e.V. 2010. Aflinfo 2010 / 2011: Richtpreise, Tarife, Kalkulationen, Adressen.

Bundesamt für Naturschutz. 2008. Bonner Thesen zum "Naturerbe Buchenwälder". Bonn. URL http://www.bfn.de/fileadmin/MDB/documents/themen/landwirtschaft/buchenwaldthesen.pdf

Forstliche Versuchs- und Forschungsanstalt Baden Württemberg. 2007. Forstliche Nutzung in FFH-Gebieten. Situationsanalyse und Perspektiven: Fachstudie im Auftrag der Bundesforschungsanstalt für Forst- und Holzwirtschaft. Freiburg.

Kuratorium für Waldarbeit und Forsttechnik e.V. 2012. Tarifvertrag über die Entlohnung von Holzerntearbeiten nach dem Erweiterten Sortentarif (EST) vom 3. Mai 1979 in der Fassung des Änderungs-TV Nr. 17 vom 19. September 2000. URL http://www.kwf-online.org/mensch-und-arbeit/tdl/lohnmodelle/est.html

Ministerium für Umwelt und Naturschutz, Landwirtschaft und Verbraucherschutz des Landes Nordrhein-Westfalen. 2009. Richtlinien zur Waldbewertung im Lande Nordrhein-Westfalen: WBR 2009.

Möhring, B. 2001. Nachhaltige Forstwirtschaft und Rentabilitätsrechnung– ein Widerspruch? Allgemeine Forst und Jagdzeitung 172 (4), 61–66.

Möhring, B. and Rüping, U. 2006. Bewertungskonzept für forstliche Nutzungsbeschränkungen. Sauerländer, Frankfurt am Main.

Möhring, B. and Rüping, U. 2007. A concept for the calculation of financial losses when changing the forest management strategy. Forest Policy and Economics 10 (3), 98–107.

Niedersächsisches Ministerium für Ernährung, Landwirtschaft, Verbraucherschutz und Landesentwicklung. 2008. Waldbewertungsrichtlinien: WBR 2008.

Rosenkranz, L. and Möhring, B., 2011. Economic analyses for implementing the FFH-directive in forests.

Schober, R. 1987. Ertragstafeln wichtiger Baumarten bei verschiedener Durchforstung, 3rd Edition. Sauerländer, Frankfurt am Main.

Winkel, G., Kaphengst, T., Herbert, S., Robaey, Z., Rosenkranz, L. and Sotirov, M., 2009. Eu policy options for the protection of european forests against harmful impacts: Final report to the tender: Env.b.1/etu/2008/0049: Oj 2008/s 112 – 149606. URL http://ec.europa.eu/environment/forests/pdf/ifp_ecologic_report.pdf

Wippel, B., Rosenkranz, L. and Seintsch, B., 2010. Zwei Drittel erwarten negative wirtschaftliche Folgen: Betroffenheit von Waldbesitzern durch Natura 2000: Forschungsprojekt FFH-Impact mit einem bundesweiten Überblick. Holz-Zentralblatt 136 (29), 718.

Wollborn, P. and Böckmann, T. 1998. Ein praktikables Modell zur Strukturierung des Vorrates aus Ertragstafelschätzungen. Forst und Holz 53 (18), 547–550.

Integrated, Participatory Sustainability Management in the Context of Functional Subsystems of Forest Enterprises

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Abstract

The sustainability issue has gained importance during the last two and a half decades, starting with the UN Report "Our Common Future". As the transformation to a sustainable economy is far from being an automatism, instruments to foster sustainable development are required. This demand has lead to a frighteningly high number of instruments. This paper introduces firstly, the concept of a comprehensive management system of sustainability in larger forest enterprises. After an introduction of the normative framework, the need for a participatory approach is described. The need for the use of different instruments is derived from the existence of various subsystems (Manufacturing / provision of services, Management, Communication and Information) in almost all kind of institutions and enterprises. A short overview about the general role of evaluation and former findings leads to the depiction of the two case study regions, from where the empirical results have been gathered. The specific concept of the integrated particpatory sustainability managementsystem (IPSUSMAN) is then introduced. Secondly an advanced perspective on process of evaluation is introduced. It can be shown that the success of a management system is dependent on different influencing factors. From this it follows that a multi-perspective has to be used. A first outline of such an approach is given, the sub-methods are sketched and the complementary role of direct and indirect evidence in process evaluation is described. A small and therefore exemplary insight into some key findings from different surveys is illustrated. It can be shown that the acceptance of the Sustainability Balanced Scorecard (SBSC) is high amongst employees and when participation is encouraged it leads to a satisfying appraisal of the implementation process. With regard to sustainability reporting, it becomes evident that basic assuring technologies (e.g. certification) used in sustainability reports meet, at least partially, the expectations of readers that belong to different stakeholder groups. Strategic goals, based on participatory processes, reach a positive and mostly stable rating in the three pillars of sustainability (economic, ecological and social). Regional differences are of a lesser importance. In both case studies we find similar messages from indirect evidence (qualitative findings). The paper ends with a positive statement on the feasibility of the IPSUSMAN but also with a cautionary comment on the relative effort of time and money it takes to run such sophisticated systems.

Keywords: Sustainability, Sustainability Management Instruments, Sustainability Balanced Scorecard, Sustainability reporting, indicators for sustainable development, multi-perspective evaluation

1 Introduction

Three hundred years after its first appearance in the forest context (Carlowitz,H.C. 1713.)(the term sustainability is used and partially misused today in almost all contexts and sectors. 25 years after the UN Report "Our Common Future" (UN 1987) and increasingly after the Rio World Summit in 1992, the need to transfer our economy and society to a sustainable system is seen as a major challenge. However, the real world seems to be far away from a turning point whilst the demand for energy and all kind of raw materials continues unabated. The world's increasing population level can also be seen as a strong constraint for sustainability. The transformation is obviously not an automatism. Thus, a need for systems which are suited to foster sustainable development are basically required.

This need leads to various considerations of which management instruments are potentially suited to support sustainable development. As frequently observed in dynamic fields many new instrumental approaches have been introduced to the sustainability debate or traditional methods have been linked to sustainability. This results in a frighteningly high number of concepts and / or instruments related to sustainability-management. Schaltegger et al. (2002) gave one systematic overview and listed 9 concepts and 46 instruments which have been proposed as suited for the management of sustainable development. Their list of concepts and instruments (presented in Annex 1) is only a short excerpt of instruments that have been discussed during the last two decades.

They (ibid.) point out that even professionals tend to lose sight of the overall picture. This high number evenly shows that it seems to be attractive to develop new, or relabel old instruments, in order to make a mark as a sustainability professional. In many cases new instruments are especially, and frequently, introduced as unique and comprehensive instruments. It can be doubted that all these instruments are able to make substantial contributions to the sustainability movement in general or indeed to any situation. Schaltegger et al. (2002) confirm that the individual methods have to be selected properly for use in individual departments. But it can be assumed that the need for the adaption of sustainability management systems goes beyond a specific design if the system is used in individual divisions. Kopfmüller et al. (2001) emphasise the need for a so-called contextualisation in which a system has to be developed that puts the requirements of sustainability into the context of the individual organisation. Thus, it seems worthwhile to scrutinise which requirements can be used to analyse the feasibility of single instruments and the need for integrating approaches respectively.

The sustainability-management concept, formulated by the Helmholtz-Gesellschaft, which is a cooperation of 15 of the largest research organisations in Germany, lists four structural components that can be seen as essential parts of a sufficient sustainability management system. They are:

- Mission statement about the idea of sustainability
- Rules and concepts
- Constitutive elements
- Instruments

Of special relevance for the issue discussed in this paper are the constitutive elements and the choice of instruments applied.

2.1 Constitutive Elements

There is a wide consensus that a reliable sustainability concept is based on extensive internal and external participation. In combination with the sustainability debate, the gaining importance

of the role of stakeholder involvement increased rapidly from the middle of the 1980s (UN 1987). The agenda 21 concept (Agenda 21. 1993) has highlighted participation as a key concept on the way to sustainable development under chapter 23: “One of the fundamental prerequisites for the achievement of sustainable development is broad public participation in decision-making” (Agenda 21. 1993). Since then, a wealth of literature can be found about participatory processes in and outside of the forest sector (e.g. Forestry Commission, 2011; Smith and McDonough, 2001).

Another key issue is the demand for an integrated approach. However, it has to be kept in mind that the term integration in the context of SUSMAN is used in various ways. Despite various opinions as to how to manage sustainability, it can be said that a multidimensional approach, for instance in the form of the three-pillar approach, and multi-instrumental practices are frequently seen as best-practices.

2.2 Instruments in the Context of Functional Subsystems

One requirement that results from integration is that management systems should cover the whole enterprise and its activities. This leads to the question, what are the relevant components of entrepreneurial or institutional activities? Besides other concepts the approach of functional subsystems can be seen as an appropriate way to provide a structure for these activities (Oesten and Roeder, 2008). There are different structures but the following option, which defines four functional subsystems, can be seen as a synopsis of different structures. It consists of four subsystems: 1) the production / delivery of services; 2) the management system; 3) a system for information provision; and 4) a system for internal and external communication. The latter three can be seen as preconditions for an on-going business (Fig. 1).

Manufacturing / Delivery of services: Manufacturing or the delivery-of-services are the core-objectives of most enterprises or institutions in the world and in the profit or non-profit sector. Except for one-man or very small businesses these processes are not conducted by the owners themselves. Depending on the size of the enterprise, they will be embedded in a management system.

Management / Strategy: Every institution requires basic management processes, rules and a set of (strategic) objectives. Depending, for example, on the sector, the size of the organisation and the management philosophy, various management systems can be applied.

Information: One the one hand, all kind of management and productive activities rely on information. On the other hand, the relevant quantity of information results from the operative processes and has to be saved and used for different operative processes, e.g. managerial accounting and communication purposes. A sizeable share of this information is quantitative data, however progressively qualitative information ought to be used.

Communication: For internal an external communication, communicative processes and rules have to be defined and abided by. The larger the institution is the more important professional external communication becomes. The increasing societal control of entrepreneurial activities in the context of the sustainability debate creates, increasingly, a need for specialized instruments for communication.

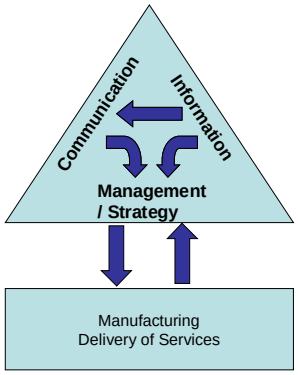


Fig. 1. Functional subsystems

2.3 Evaluation of SUSMAN Instruments

Evaluation of the instruments and their outcomes is seen as a part of sustainability management. With regard to different instruments, in general several evaluations have taken place during the last few years. Sustainability reporting was especially a subject of various research activities (e.g. Pleon, 2005., KPMG 2005). Cavalluzo and Ittner (2004) performed the first study to evaluate performance measurement systems, which can be seen as the basis for the SBSC approach. However, it has to be stated that an evaluation of specific systems or instruments is widely missing or has not yet been published. Thus, an estimate about the strengths or weaknesses of operating sustainability systems could not be identified before the case studies and related systematic research in this paper had started.

Moreover, the recent research focused on the instruments as such, highlighting technical or structural issues and the goals which are pursued with the individual instrument. With regards to communication theory, this approach must be seen as imperfect; because the success of such instruments is composed of more than just instrumental aspects. Of particular relevance are:

- Perception of the institution
- Development and implementation process
- Functionality of instruments
- Contents

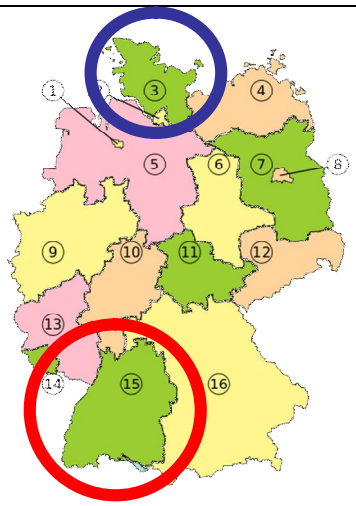
Perception: The perception of an institution (or a person) influences the appraisal of the management systems applied. A substantial sustainability management system used by an institution that is seen as sustainable, according to Küpper (2008), is seen as better than the same system used by a non-sustainable entity or person. Thus, one part of the evaluation must include a consideration of the institution as such.

Processes: Together with the term, sustainable development, it can be seen clearly that processes play a predominant role in SUSMAN. Therefore a part of the evaluation should focus on the development and implementation processes.

Functionality of instruments: The evaluation of the instrument should focus on the instrument and its topical design and functionality.

Contents: The fourth component consists of the contents, targets and indicators respectively. Even a perfect system where the goals are not designed to lead to a sustainable system will for obvious reasons not be accepted in the eyes of the public and by the employees. Thus, an evaluation of this aspect has to be integrated too.

Table 1. Core data of the case study regions

 Germany	State	**Schleswig-Holstein (3)**	**Baden-Württemberg (15)**
	Forest coverage	ca. 12 %	ca. 40 %
	Implementation	2008	2011
	Employees	< 200	ca. 2500
	Dominant Forest function	Recreation	Multipurpose Forestry with regional variations
	System structure	SBSC Business Reporting with SBSC No Sustainability Indicators	SBSC Sustainability-Reporting. Sustainability-Indicators

3 Case Study Regions

The findings are derived from the case study regions, where the development and implementation were intensively supervised. The core data are described in Table 1.

4 Concept of IPSUSMAN

4.1 Overview

The concept of the integrated sustainability management system consists of three components.

For strategic orientation and control (Functional subsystem: Management and Strategy) the Sustainability Balanced Scorecard is used. The number of strategic goals is 17 and 18 respectively and does not exceed the recommendations' of Kaplan and Norton (2001). In S-H the review of the goals was executed after three years, in B-W an amendment is planned for 2015, after a five year period of use of the IPSUSMAN.

The basis for the data is a set of 70 to 100 sustainability indicators, which has to be developed consecutively during the next few years (Functional subsystem: Information). The sustainability indicators will be made available on the internet and displayed mostly as annual values.

For the internal and external communication of sustainability issues a sustainability report was used and these topics are addressed respectively as a part of the annual business reporting (Functional subsystem: Communication). In B-W the decision was made to issue this sustainability report every three years due to the high cost and the expectation that the sustainability situation is not expected to change very soon.

Table 2 gives an overview of the different components with a special emphasis on the number of topics addressed, the scope of the main viewing direction, frequency of actualisation and the degree of annotation in the system.

Table 2. Overview of system components

Instrument	SBSC		Sust.-Report		Sust. Key-Figures	
N of topics	high	low	high	low	high	low
Main viewing direction	internal	external	internal	external	internal	external
Frequency of actualisation	frequent	seldom	frequent	seldom	frequent	seldom
Degree of annotation	high	low	high	low	high	low

4.2 Integration

The requirement of integration was covered through the use of the three pillar approach. In both cases, the whole institution was covered and the application of different instruments, covering the main functional subsystems of the respective institutions, was used.

4.3 Participation

Diverse methods of participation were applied. Table 3 subsumes the different ways of internal an external participation.

5 Methodology

The methodological setting was derived from communication theory. Thus, a multi-perspective approach was developed in which individual studies have been carried out. Table 4 gives an overview of the different sub-methods that were integrated into the overall evaluation scheme. As the research is based on case studies, a second pillar of evaluation can be used. Also, as the implementation takes place in a real world scenario, reactions from the different groups involved can be taken into account. Thus, the studies which provide results from direct evidence were combined with a constant monitoring of the reactions of various stakeholder groups. As a result of this, we received additional results which can be characterized as indirect evidence.

Table 3. Participation in different instruments

SBSC	Sust. Report	Sust. Key-Figures
System Structure: **IWG** Proposal goals: **I+E WS** Ranking of preselected goals (all employees): **I+(E*) S** Proposed final set of goals: **IWG**	Report Structure: **I+E WS** Report Contents: **I+E S** Assuring Tech's: **I+E S** and **I+E WS** (planned)	Selection of a set of key figures: **I+ E S** and **I+E WS** (planned)

IWG = Internal working group; I+E WS: Internal and external workshops; I+E S: Internal and external survey; * (external S-H)

Table 4. Overview of the methodological setting

Evaluation Perspectives	Direct evidence	Indirect evidence
Institution	Outcome analysis. Questioning of stakeholder perceptions, e. g. ecological image, strategic targets (in progress)	- / -
Processes	Continuous monitoring. Long term (repeated) opinion polls on acceptance of employees and stakeholder-groups.	Comments of stakeholder involved.
Instruments	Continuous monitoring. Long term (repeated) opinion polls on the system and instruments.	System stability in times of political change
Contents	Questioning the acceptance of goals selected and choice of topics in reports.	Involvement of political decision makers. Acceptance of contents in times of change.

6 Results

6.1 Direct evidence

Table 5 reveals the level of acceptance of the preselected and final goals that were set in different stages of the strategy-process. The three dimensions are equally ranked with regard to their importance. A revision of the final set of goals in S-H provides evidence that the preference for goals remains stable. The slightly better evaluation in the second column is the result of the fact that most of the preferred goals of the preselection are included in the final set.

The SBSC was widely accepted by the employees (Fig. 2). In general more than two thirds agree with the statement "The SBSC is an appropriate instrument for managing the [name of case study institution]" (+, ++). Employees accepted their extensive involvement. The long-term evaluation of S-H shows that the level of acceptance decreases slowly. However negative statements (-; --) remain very seldom (< 10 %). The implementation process was also evaluated positively (Fig. 3).

Table 5. Acceptance of participatory derived goal sets

Dimension	S-H Preselection during strategy development	S-H final goal set after three years use	B-W preselection during strategy development
Economy	*1.89	1.68	1.97
Ecology	2.02	1.77	1.63
Social	1.91	1.66	1.68

*Goals is esteemed being: 1.0 = important to 4.0 = unimportant
More information is provided in Hartebrodt and Scherer (2009).

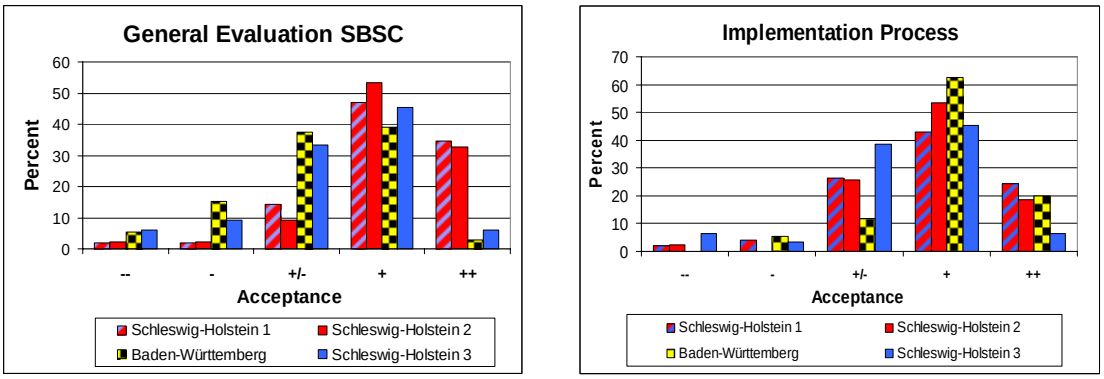
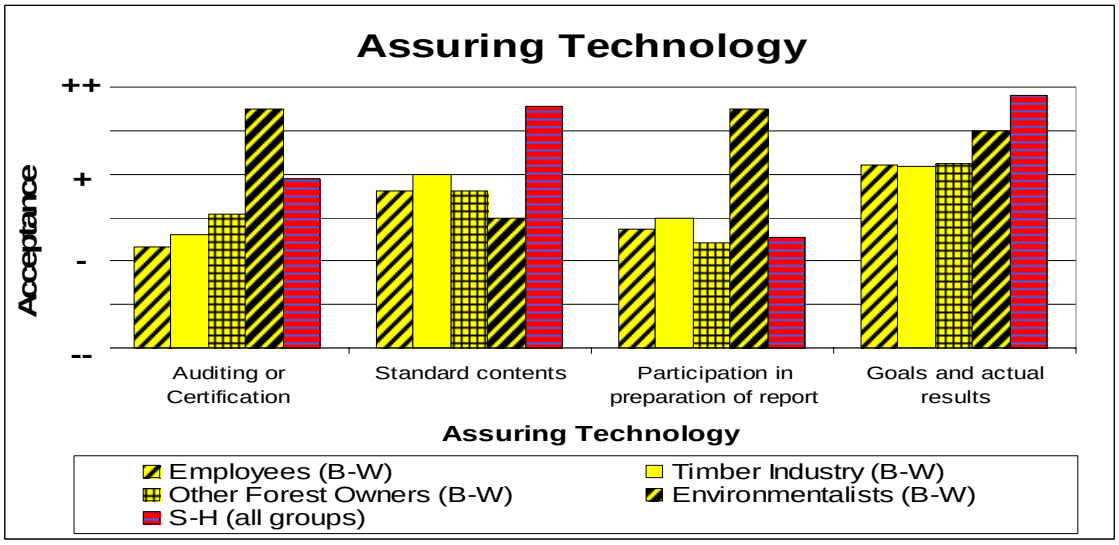


Fig. 2. and 3. General evaluation of SBSC and Implementation process

In depth information about the implementation of SBSC's in forest enterprises can be found in Hartebrodt et al. (2009 a, b, c).

In preparation for the development and introduction of the IPSUSMAN, an in-depth analysis of recent reports and their concepts was carried out. The readers of the reports of the case studies were, in addition to other questions, asked about their preferences with respect to assuring technologies (this means: auditing / certification of reports; use of standardized contents [e.g. GRI]; participation in preparation of reports; visibility and comparability of goals and actual results) which are applied frequently in sustainability reports. It can be shown that the acceptance of individual technology differs between various stakeholder groups. However, a report design that allows for a comparison of the enterprise objectives and the present situation on the one hand, and the use of standardized report contents on the other, reveals that these structural components of sustainability reporting meet the expectations of different stakeholder groups. (Fig 4). More information is given in Hartebrodt et al. (2009d, 2013).



(1.0 = agree definitively to 4.0 disagree definitively)

Fig. 4. Acceptance of different assuring techniques

6.2 Indirect evidence

Indirect evidence about the strength and weaknesses of the IPSUSMAN are up to now threefold. Although the strategic goals and situation became much more visible compared to past studies, there was almost no criticism about the set of selected and operationalized goals. Furthermore, it can be said that there was a lot of positive interest from different stakeholder groups. In B-W employees arguably widely accepted the system, but there was some remaining scepticism as to whether it will be successfully applied in the future.

It can be shown that it is possible to have a comparatively high involvement of political decision makers compared to other management approaches. In S-H a state board (including a state-secretary) approved the SBSC. In B-W it became possible to get the formal acceptance for the system, and the strategic goals, by the state cabinet, which is unique for German speaking countries (Germany, Switzerland, Austria).

Forest policy is frequently a target for budget cuts, as it does not affect many people. This has led to different reforms after regional elections in both states. Thus, it is more or less astounding that the SBSC and the IPSUSMAN remained stable after severe changes to the governing-majorities of both states (from conservative/liberal to socialist/green governments). In B-W the IPSUSMAN is seen as the most relevant pillar of sustainable development in the state forest by the new government.

7 Conclusion and outlook

Internal and external participation has proved successful in developing sustainability management systems. Integrated systems have met with wide acceptance. It can be easily explained how the instruments are in accordance with the functional subsystems of the enterprise / institution and that this bridges the gaps with the single instruments. Thus, an integrated approach, in terms of the use of different instruments, can be seen as a precondition for successful and publicly visible sustainability management.

A permanent evaluation of the different processes and outcomes during the implementation of IPSUSMAN proved successful. Based on explicit findings, it seems to be possible to optimize the functionality of these kinds of systems in the long run. It has to be kept in mind that this success is driven by different influencing factors. First, approaches that focus mainly on the instruments can be seen as fragmentary, due to that fact multiple methods are needed to assess effectiveness. In-depth research, providing detailed and quantified information about opportunities and threats from individual perspectives, allows for purposeful further development of instruments, processes, actors and institutions (direct evidence). This does not conflict with the experience that implicit findings (indirect evidence) can be used in addition to explicit ones. Up until now we have found a wide overlap between direct and indirect evidence.

The major constraint remains the amount of effort and money needed to develop and maintain these kinds of management systems. Participation and the use of a set of integrated instruments enhance the outlay for management. Thus, the trade-off between the outlay and the expected outcomes, which are only partially monetary, has to be discussed before implementing the IPSUSMAN concept.

In summary, such a kind of IPSUSMAN is a promising but challenging approach for larger, especially publicly owned, forest enterprises.

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References

Agenda 21. 1993. Agenda 21 – The United Nations Programme of Action from Rio. Ed. by UN,300 pp.

Carlowitz, H. C. 1713. Sylvicultura oeconomica oder Hauswirthliche Nachricht und Naturgemäße Anweisung zur Wilden Baum-Zucht

Cavalluzzo, K.S. and Ittner, C.D. 2004. Implementing performance measurement innovations: Evidence from government, Accounting, Organizations and Society, 29: p 243-267.

Hartebrodt C., Scherer, T. 2009. Sustainability Balanced Scorecard – Partizipative Einführung in den Schleswig Holsteinischen Landesforsten. AFZ-DerWald 3/2009: p. 128-130

Hartebrodt C., Herbohn K., Herbohn, J. 2009a. Mehrdimensionale Steuerungsverfahren – ein erfolgversprechender Ansatz für die Verwaltungs und Unternehmenssteuerung im Forstsektor- Analyse einer Fallstudie mit Bezügen zu Ergebnissen in US Amerikanischen Behöden. Allgemeine Forst- und Jagdzeitung ½ 2009: p. 22-34

Hartebrodt, C., Aichholz, R., Scherer, T., Sandrock, M. 2009b. Partizipation in Strategieprozessen – Chance oder unkalkulierbares Risiko?, AFZ-Der Wald 24/2009: p 1297-1299

Hartebrodt, C., Aichholz, R., Scherer, T., Sandrock, M. 2009c. Benefits of internal and external Participation during implementation of a Sustainability Balanced Scorecard in a public Forest Enterprise. Proccedings der PMA Conference Otag0 2009. (published online).

Hartebrodt, C., von Wedel, K., Bitz, S. 2009d. Forest enterprises' perceptions about multidimensional reporting-systems. Managerial Economics and Accounting as an Evolving Paradigm of Forest Management (pp. 209-224). Vienna: IUFRO.

Hartebrodt, C., Howard, K., Kenntner, C. expec. 2013. Long and Winding Road from Report-Publishers to Readers (in process)

Kaplan, R. S. and Norton, D.P. 2001. The Strategy-Focused Organization: How Balanced Scorecard Companies Thrive in the New Business Environment. Boston, MA: Harvard Business School Press.

Kopfmüller, J., Brandl, V., Jörissen, J., Paetau, M., Banse, G., Coenen, R., Grunwald, A., 2001. Nachhaltige Entwicklung integrativ betrachtet. Konstitutive Elemente, Regeln, Indikatoren. Berlin: Edition Sigma.

KPMG 2005. KPMG International Survey of Corporate Responsibility Reporting 2005. Rotterdam: KPMG / Universität Amsterdam, Eigenverlag. 52 p.

Küpper, H-U. 2008:Controlling -Konzeption, Aufgaben, Instrumente 5., überarbeitete Auflage, Schäffer Poeschel, 634 p.

Oesten, G., Roeder, A. 2008. Management von Forstbetrieben, Bd. I; Grundlagen, Betriebspolitik. 2. 2. Aufl. Eigenverlag Institut für Forstökonomie: 408 p.

Pleon, 2005. Global Stakeholder Report – Die zweite Stakeholder-Befragung zur Nachhaltigkeitsberichterstattung von Unternehmen. Pleon, Eigenverlag, Bonn:. 83 p.

Schaltegger, S., Herzig, C., Kleiber, O., Müller, J. 2002. Nachhaltigkeitsmanagement in Unternehmen – Konzepte und Instrumente zur Nachhaltigen Unternehmensentwicklung. Ed by: Federal Ministry for Nature-Protection and reactor safety, Berlin. 123 p.

Smith, P., M.McDonough. 2001. Beyond public participation: Fairness in natural resourcedecision-making. Soc. Nat. Resour. 14: 239–249.

UN 1987: Our Common Future / Brundtland Report (1987) ; UN World Commission on Environment and Development.

Annex 1. List of concepts and instruments after Schaltegger et al. (2002)

Concepts	Instruments		
Environmental Information System	Incentive systems	Information-Systems	Project Management
Controlling	Worktime concepts	Investment appraisal	Public Private Partnership (PPP)
Marketing	Auditing	Sustainability Compass	Pilot-Projects
Accounting	Task reviews	Compensatory payments	Quality Management
Social management Systems	Open competitive bidding	Cost-benefit analysis	Strategic environmental assessments
Sustainability Balanced Scorecard	Balanced Scorecard	Cost-accounting	Sustainability Balanced Scorecard
Environmental Total Quality Management	Benchmarking	Loan-policy	Scenario-analysis
Environmental Management System	Reporting	Sustainability labelling	Assessment of techno-logical risks of new tech's
	Balancing	Code of best practice	Environmental compatibility test
	Checklists	Supply chain management	Negotiations
	Controlling / internal Reporting	Material end energy flow accounting	Suggestion schemes
	Cross-Impact-Analyse	Participation of staff	Administrational processes
	Budgeting	Monitoring	Training
	Stakeholder-Involvement	Networking	Whistleblowing
	Efficiency-Analysis	Mission statements	Contract Management
	Evaluation	Sustainability management systems	Working Groups.
	Evaluation of new legislation	Sustainability Check	
	Indicators	Marketing	

Market Creation for Certified Forest Products - Literature Review

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Abstract

The global environmental awareness has become the most important driver for sustainable development also in the forestry sector, which has reproduced interest in Sustainable Forest Management (SFM) and Certified Forest Products (CFPs). However, the initial objectives set for the forest certification have not been met on a large-scale and markets for CFPs have developed unequally in different countries, as will become apparent in this review. As the underlying assumption behind the forest certification is that consumers are concerned about the state of forests and that such attitudes are reflected in their purchase decisions, it is reasonable to concentrate on consumer behaviour when examining the market creation for CFPs. The review shows that even though more elaborate consumer research methods have been applied recently, many of the empirical results are from the 1990s and up-to-date comprehensive results do not exist. Furthermore, the existing literate on consumer research on CFPs offer widely conflicting results. This review tries to build understanding on the fundaments in the market creation for CFPs and to include some new dimensions to existing consumer surveys from other disciplines in order to find missing factors determining consumer behaviour and purchase of CFPs. Based on this review, some of the factors that could be better incorporated in the consumer research on CFPs include 1) competitive product characteristics from consumer perspective, 2) consumer awareness over the forest certification and sustainable forest management, and 3) consumer perceptions on the different institutions and actors involved in forest certification including supplier characteristics. In order to make more realistic comparisons between the different market areas also 4) country-wise economic and social indicators and 5) cultural factors could be better incorporated in the future research on consumer preferences and dissemination of forest certification. Further knowledge about the consumers' preferences and perceptions on CFPs in Scandinavian markets and on forest certification in general could be utilised to develop the attributes of certified products and services of forest certification associations. Furthermore, an in-depth knowledge about the nature of consumer preferences could be used in marketing CFPs.

Keywords: forest certification, certified forest products, market creation, consumer analysis

1 Introduction

The global environmental awareness has become the most important driver for sustainable development also in the forestry sector, which has reproduced interest in Sustainable Forest Management (SFM) and Certified Forest Products (CFPs). During the last past decades, the forest certification programmes have created private regulations and standards which have emerged to be significant governance tools on the global markets. Forest operators' and firms' compliance with these regulations is assessed by a third party and compliant products are granted with a certificate and/or label. Besides promoting sustainable forest management, the core element of forest certification is to provide additional information for the consumers for their purchasing decisions and to empower consumers to buy products that come from sustainable sources. Therefore, the underlying assumption behind the adoption of forest certification is that consumers are concerned about the impacts of forest management and that such attitudes are translated into their behaviour to purchase environmentally certified wood products.

The initial objectives set for the forest certification have not been met on a large-scale and markets for CFPs have developed unequally in different countries, as will become apparent in this review. The reality in the field of forest products markets shows that production and trade of CFPs has increased but without substantial price premiums, and the demand is largely from retailers, not from final consumers. This finding is also supported by many academic papers. In a review of European consumer surveys on wood products, Rametsteiner et al (2007) concluded that with current levels of knowledge among consumers, the forest certification alone is not able to guarantee higher prices nor improved demand and image for forest products. Rametsteiner et al (2007) also found that most European consumers are not familiar with the term " sustainable forest management", and therefore consumers cannot make distinction between sustainably produced or eco-labelled forest products and forest products in general. However, a larger majority of consumers prefer certified products over non-certified ones when all other products attributes are equal (Rametsteiner et al 2007).

In addition to the consumers' adoption and willingness-to-pay premiums for CFPs, social and governmental differences have been under investigation in order to explain the market formation for CFPs. For example, economic sociology approaches have been applied in attempts to build understanding over companies preferences to adopt CFPs (e.g. McNichol 2000, Bartley 2003, Overdevest 2010). In addition, economic theories and approaches have been applied to examine government's roles (Rametsteiner 2002) and national conditions supporting forest certification (van Kooten et al. 2005).

The core of this review concentrates on consumer surveys on CFPs applying contingent valuation (i.e. stated preference method) and conjoint analysis (price-based revealed preference method). In addition, this review introduces some central findings from the economics and sociology in order to build understanding on the fundaments in the market creation for CFPs and to find missing or common factors in the current consumer research, as these consumer studies offer widely conflicting results at the moment.

2 Initial emergence of forest certification and the roles of governments and NGOs

Several articles describe in narrative detailed way the development and early stages of forest certification occurred in 1990s (e.g. McNichol 2000, Bartley 2003), and processes behind the forest certification (e.g. Nussbaum & Simula 2005). These studies help find and explain the fundamental functions and definitions of forest certification and associations involved, and furthermore to understand the market creation for CFPs.

The political framework for the forest certification was created in the Rio Declaration on Environment and Development in 1992 recognising environmental labelling and ecolabelling as good means to encourage consumers to make environmentally sound purchasing decisions (United Nations Department of Economic & Social Affairs 1992). The summit directed governments to promote expansion of environmental labelling and educate consumer public about the environmental impacts of consumption choices through such means as consumer legislation and environmental labelling.

The non-governmental certification association namely Forest Stewardship Council (FSC) with the support of the World Wildlife Fund (WWF) took the initiative in the UK and also other voluntary private certification schemes started to emerge in 1990s. The FSC formed alliances with NGOs, governments and retailers, while subsequent so-called industry-sponsored schemes such as Programme for the Endorsement of Forest Certification (PEFC), Sustainable Forestry Initiative (SFI) and Canadian Standards Association (CSA) made alliances with the landowner associations and forest industries. Overall, FSC and PEFC were set up on a quite different concept in forest certification (Cashore 2002). FSC received even financial support from some governments, while private standard-setting bodies under the PEFC have used government references in their standard-setting processes in order to enhance the legitimacy of PEFC – certification (Rametsteiner 2002). Therefore, in the PEFC standard-setting processes NGOs and governments are rather having advisory and consultative roles (Cashore 2002).

Initially, the private certification schemes (FSC) were set to take direct actions to solve public policy problems stemming from social, environment and economic complexities in global supply chains (Bartley 2003). The private regulation was intended to give consumers the power to choose to buy products from sustainable sources. However, as Bartley (2003) noted, stable markets with consumer demand for certified products rarely existed before the programmes were initiated. Image and consumer awareness over the labels and certification are often built by both certification associations and certified companies (Bartley 2003). According to McNichol (2000), from the beginning, there was a little faith among the retailers that consumers would pay more for certified products. In fact, the goal for the UK retailers involved in the establishment of forest certification was to reach a point where the eco-labeling disappears, because everything would be certified and consumers would not have another choice.

Nevertheless the public demand was not the principal driver for the rise of private certification, public sentiments created the environment for the emergence of the forest certification. Also in the case of UK, relatively small share of domestic wood underpinned demand for imported certified wood products[1] (McNichol 2000). Numerous actors were involved in the emergence of forest certification including states, social movements and campaigns, NGOs, companies, and in

[1] The original aim of the introduction of forest certification emerged in the UK was to conserve diversity of tropical rainforests, but although 8 % of global forests are already under certification, 95 % of certified forest area is based outside tropics mainly in the product exporting boreal countries.

the labor standards case, trade unions (Bartley 2003). The alliance between large retailers and resource-rich NGOs such as FSC – WWF was found to be the key for successful establishment of markets for CFPs in the UK, which was established to avoid bad corporation publicity related to environment issues (McNichol 2000). Corporations' policies and responses to certification programmes have found to be dependent on enforcement and adoption among external actors, like consumers, investors, suppliers, etc. (Barleay 2003).

The results of existing sociological analyses are unanimous identifying two main factors that explained the rise of private certification schemes during 1990s in the US and UK (1) social movement campaigns targeting companies and (2) globalisation and free trade (Barleay 2003). The emergence of free trade rules limited direct state action, thus governments allocated more financial resources into private programmes that were immune to international trade rules and political tensions. McNichol (2000) found that the UK government had a significant role in successful introduction of private forest certification in the UK, while the reception of markets remained poor in the US. McNichol (2000) also demonstrated that countries such as UK and Sweden having attempts to synchronise legislation with the dominant international NGO programme (FSC) have been more successful in creating demand among retailers and consumers for CFPs than countries without consistent government sanction programmes. In addition, the European governments showed leadership in the early development of forest certification, as both the European Commission and UK government bodies actively launched consultative sessions and recommendations for the legislation to enforce and standardise environmental claims. Overall, in sociological analyses, the forest certification is considered to address multi-issue public concerns and the operation of entire industry, unlike quality and technical certificates designating only the minimum requirements for the private consumers (de Boear 2003).

2.1 Dissemination of forest certification

As the governments support was found to be a key for the initial emergence of forest certification, governments have also played significant role in the development of certification standards and dissemination of forest certification schemes (McNichol 2000, Overdevest 2010). Governments' roles in forest certification have been varying across the globe ranging from passing laws, setting up governmental certification systems, financing or co-financing activities, or not getting involved at all (Rametsteiner 2002).

With a comparative analysis over the competing schemes Overdevest (2010) found public comparison and environmental benchmarking to be the major contributors to dissemination and evolution of forest certification standards. For example, national or international environmental NGOs have been launching public information campaigns and publications to criticise the legitimacy of FSC competitor schemes such as PEFC and FSI.

Overdevest (2010) introduces different cases where supply chain actors may prefer or require one certification standard over another, while consumer groups, NGOs, governments or international organisations may endorse one scheme in contrast to another. According to Overdevest (2010), this is because different market areas have different perceptions due to different range of actors involved in endorsement of private regulation, including competing standard schemes, firms, consumer groups, purchasers, international financial institutions, charitable foundations and academic institutions. Overdevest (2010) came to a conclusion that competition has had a significant role in the dissemination and development of forest certification: "The increased acreage of the PEFC might be a result, among other factors, of ratcheting up the standards and of gaining legitimacy in the forest certification community and

in the forest industry. At the same time, increasing acreages might also make it more difficult for the FSC to enrol more forests and develop market power for its own label."

Emergence and dissemination of forest certification has also been studied from the viewpoint of national conditions promoting the growth of private forest certification (Van Kooten et. all 2004). The study applied a regression model consisting of economic, institutional and social capital variables for 117 countries to determine the factors leveraging forest certification schemes including FSC and other national schemes.

The factors such as GDP, forest exports, structure of the economy and literacy were found to be important in explaining the likelihood for certification in different countries. The GDP was found to be inversely correlated with the countries' proportion of FSC certified forests. Van Kooten et. all (2004) explained the finding with the high number of competing national schemes implemented only in high GDP countries, while poorer countries rely only on FSC certification. Countries exporting high proportion of wood products seemed to be more eager to seek certification, especially the national schemes at the expense of the FSC. Van Kooten et. all (2004) concludes that concerns about consumer behavior and perceptions in export markets are in a major role in explaining why firms and/or landowners certify their products.

In van Kooten et. all (2004), the "size of government" indexes representing the governments' participation in the economy, seemed to support the statement that governmental institutions are needed to facilitate forest certification. The finding was statistically significant among the developed countries with higher proportions of forests certified with the national schemes. The indexes explaining "structure of the economy" and "freedom to trade" showed that mature economic institutions promoting markets and free-trade had an influence on the countries' tendencies to certify their forest practices, both in increasing and decreasing terms. In addition, social capital as literacy and citizens' ability to influence on the political process, e.g. women's right to vote, had significant roles increasing the countries' tendencies to certify their forests, especially in the case of the FSC.

2.2 Government initiatives supporting forest certification

There are several other environmental developments alongside the forest certification such as corporate social responsibility, public–private partnerships, corporate codes of conduct, sustainability reporting, eco-labelling, social auditing, independent monitoring, and fair trade products. One apparent initiative in the global governance scene having a great impact also on the CFP market is the governments' public procurement policies promoting sourcing and use of green products including CFPs. More specific interlinkages and synergies between these developments and the forest certification have not been studied, but as Bartley (2003) notes, the variety of initiatives developed alongside the third-party certification indicates that larger political dynamics have been involved in the emergence and development of these programmes.

As for an example of government initiatives, in 2008 the US Lacey Act Amendment was expanded to prohibit trade of illegally harvested wood and wood products (United States Department of Agriculture 2008). In Europe, as part of the Forest Law Enforcement, Governance and Trade (FLEGT) Action Plan released in 2003, the Union has been negotiating Voluntary Partnership Agreements (FLEGT VPAs) with timber-producing countries in order to create a legally binding obligation to produce and trade only legal timber. In addition, as part of the FLEGT Action Plan, the EU Timber Regulation (No 995/2010) is coming into effect on 3rd March 2013 setting similar requirements for traded timber products as the US Lacey Act. Also the Australian Government has introduced the Illegal Logging Prohibition Bill 2011 similar to the US Lacey Act and EU Timber Regulation.

In addition to the regional and national laws to prevent imports of illegal wood, there are currently 175 member countries to the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES) cooperating to regulate the trade in endangered tree species (CITES 2012). However, the laws like the US Lacey etc. apply to the full range of traded wood products and species, thus far more species than listed as endangered under the CITES (Gregg and Porges, 2008).

Basically, all these wood product trade regulations introduced above require greater information disclosure. To the author's knowledge, there are no existing studies on the impacts of governmental initiatives on the forest certification, but most likely they will have significant implications on the CFP markets. Aguilar & Cai (2010) suggest that the disclosure of information on the origin of wood products could result in lower market shares for tropical wood products at least in the countries including Canada, US and UK where consumers have been surveyed to have negative perceptions on wood products from tropical countries (Kozak et al. 2004, Aguilar & Cai 2010). However, Aguilar & Cai (2010) points out that differences may occur between the exporting tropical countries due to the country-specific features and consumers' perceptions on the state forests in a particular country.

3 Forest certification from consumer perspective

There are large differences between consumers' strength and motivation to make environmental purchasing decisions and thus the decisions may vary on product classes (Browne et al. 2000). On certain products, consumer's loyalty on some characteristics of product is the principal driver for the purchase decision, when the environmental or ethical values are secondary (Newholm 2000). Besides consumers' willingness-to-pay, purchasing decisions on CFPs seem to depend on various factors as will become apparent in this section of the review. In addition, sociological studies point out that consumers are motivated by a mix of concerns including human health, environment, animal welfare, social values and moreover, each consumer has different stress on concerns (Newholm 2000). Peattie (2001) demonstrated that even consumers who claim to concern about the environment make purchases disregarding the environment and sustainability issues. For example, negligible price premiums charged for the green products is one of the factors for this kind of consumer behaviour.

3.1 Consumers' willingness-to-pay premiums for certified forest products

Willingness-to-pay (WTP) premiums and market shares of CFPs have been surveyed in the US (Ozanne & Vlosky 1997, Ozanne & Smith 1998, Grönroos & Bowyer 1999, Aguilar & Vlosky 2007), Canada (Kozak et al. 2004), the UK and Norway (Veisten 2002, Veisten 2007). The results of these contingent valuations indicate that a little less than one third of consumers in the US were ready to pay more for eco-friendly wood products, while the share was somewhat higher in Europe. However, consumer survey results from 1997 analysed by Rametsteiner et al. (1998) show that only about 6 % of the respondents to the survey conducted in the four largest European markets including Germany, France, Italy and UK were willing to pay more for wood products from sustainable sources, while 40% refused to pay more. Overall, estimates of consumer's willingness-to-pay premiums for certified wood products reported in the literature range from 1.0% to 39.3% over non-certified options (Cai & Aguilar 2012).

Consumer and retailer preferences on price premiums on certified wood products have been searched by using revealed preference methods including conjoint analysis, Anderson and Hansen (2004a), Anderson and Hansen (2004b), Anderson et al. (2005), Veisten (2007). Anderson and Hansen (2004a) detected over a 30% drop in market share when a certified

product was offered at a 2% premium over a non-certified option. By comparing a certified versus non-certified product, Anderson and Hansen (2004b) found that the both retailers and consumers cut down their supplies and consumption of certified products when the price premiums were introduced. However, price premiums may exist if a direct relation between certification and legality is established and communicated to consumers as shows the field experiment in Guatemala (Van Kempen et al., 2009). Also Aguilar & Cai (2010) demonstrated that various levels of price premiums may exist, but the consequence of higher premium is decreased market share, suggesting that a segment of consumers might remain indifferent to greater price changes and would continue to prefer certified products (e.g. 3% of consumers when certified option is priced at a 50% premium) (Aguilar & Cai 2010).

When only the willingness-to-pay for premiums is considered, consumer reactions and market shares of certified products seem to vary on wood product type and end-use which was also concluded in a sociological analysis by Browne et al. (2000) and in consumer surveys by Ozanne & Vlosky (2003), Grönroos & Bowyer (1999) and Aguilar & Cai (2010). In a meta-analysis of previous studies on consumer's willingness-to-pay premiums for certified wood products, Cai & Aguilar (2012) also found that frequently purchased wood products and wood products with lower base prices tend to capture higher percentage premiums.

3.2 Other factors affecting consumer preferences

Besides the price, surveys have found that consumers consider the label information and credibility of certification organisation as well as the origin of the wood product in their purchasing decisions (Teisl et al. 2002, Leire & Thidell 2005, O'Brien & Teisl 2004, Basu et al. 2003). Also environmental attributes in outdoor wooden deckings were valued very high among Norwegian consumers according to the results of conjoint analysis by Nyrud & Roos (2006).

Studies about the consumers' perceptions on the credibility of certification organisations suggest that consumers perceive private NGOs to be more trustable entities issuing forest certificates than governments (Rametsteiner et al., 1998), (Ozanne & Vlosky, 1997) and (Ozanne & Vlosky, 2003). However, some later studies among the US and UK consumers show no statistically significant differences between the credibility of governments and NGOs as certifying entities (O'Brien and Teisl's 2004), Aguilar & Cai 2010). There are also some conflicting results demonstrating that among the US consumers a federal agency is the most trustable entity for a certifier, followed by environmental groups, and independent certifiers leaving industry groups to be the least trustable among consumers (Teisl et al. 2002).

The wood origin is also one of the key attributes for consumers when making the purchase decision (Aguilar and Vlosky, 2007). Studies in the US show consumer preference for wood products sourced from the US (O'Brien and Teisl's 2004). In addition, wood products from temperate forests are preferred over the tropical products, for example Kozak et al. (2004) reported negative consumer preferences toward tropical hardwoods in Canada based on a qualitative study. This finding was in align with the results of Aguilar & Cai (2010) for the US and UK markets. However, the results of Aguilar & Cai (2010) suggest that a forest certification label could partly offset the negative consumer perceptions on tropical wood products.

Overall, environmental certification can be a major factor behind consumer preferences when other product attributes (e.g. price or origin) are held constant. In addition, Aguilar & Cai (2010) demonstrated that in the US younger consumers are more sensitive to price changes while older respondents have stronger preferences for certified products. In contrast, younger respondents in the UK were less price sensitive, while older respondents in the UK had a stronger preference for government agency-issued labels. Both in the US and UK, consumers

with higher incomes preferred certified products over products with no labelling. However, in a meta-analysis Cai & Aguilar (2012) found the income-level to be insignificant in terms of consumer preferences for forest certification.

Interestingly, in contrast with the general consumer preferences, architects considered price and wood source to be the most important factors when specifying hardwood flooring, leaving the environmental certification to be the least important factor (Macias & Knowles 2011). In the group of environmental-minded architects, wood source was favoured over price and environmental certification.

Considering the country specific characteristics in consumer behaviour, the survey by Rametsteiner et al. (1998) showed that the UK market is clearly the most aware consumer market in Europe regarding the forest certification and sustainability issues. Also Veisten (2002) found that UK consumers were more environmentally concerned compared to consumers in Norway. Similar results were found by Aguilar & Cai (2010) when making the comparison between the UK and US consumers. Out of the respondents to the survey, UK consumers bought more certified products and their attitudes were stronger towards the need for environmental certification of temperate and tropical forests compared to US consumers. Aguilar & Cai (2010) also showed that attitudes among US consumers have not changed over the last decade when comparing to the very similar results of Ozanne and Vlosky (2003).

4 Discussion and conclusions

As the underlying assumption behind the forest certification is that consumers are concerned about the state of forests and that such attitudes are reflected in their purchase decisions, it is reasonable to concentrate on consumer behaviour when examining the market creation for CFPs. In addition, this review tries to include some new dimensions to existing consumer surveys from other disciplines in order to find missing factors determining consumer behaviour and purchase of CFPs. The found factors are numbered from 1 to 5, and these factors are suggested to be better incorporated in the future research on consumer preferences and market formation for forest certification.

Evolution over time of environmental consciousness and concerns among consumers can be found at least in European markets by comparing results of surveys on consumers' willingness-to-pay for eco-friendly wood products (e.g. Rametsteiner et al. (1998) Veisten 2002, Veisten 2007), while attitudes among US consumers have not changed over the last decade (Aguilar & Cai 2010). The example shows that the grown awareness and exposure to forestry based environmental issues can increase the market share of CFPs from niche-scale towards more mainstream markets at least in Europe.

The existing consumer studies show great variance in results of consumers' willingness-to-pay premiums and market shares of certified wood products. The reality in the field of forest products markets shows that the price premiums are often overestimated in the existing literature as there are no actual price changes resulting from certification (Rametsteiner et al. 2007). Moreover, different methods seem to lead to different results in consumer analysis, e.g. with the conjoint analysis consumers' willingness-to-pay premiums are higher than survey results conducted with contingent valuation methods, a finding that is supported by Veisten (2007), Cai & Aguilar (2012) and many other studies in environmental economics.

Despite of the widely conflicting results and no common conceptual ground, the current consumer research on CFPs has been able to address some determinants for consumer

preferences and purchase of CFPs. For example, the variance in results have been explained by the fact that consumer reactions and market shares of certified products seem to vary on wood product type and end-use, making frequently purchased wood products and wood products with lower base prices more sensitive to capture higher percentage premiums. In addition, the label information and credibility of certification organisation as well as the origin of the wood product seem to be significant factors determining consumer preferences and purchase of CFPs.

Overall, environmental certification itself is a major factor behind consumers' preferences to purchase CFPs, especially when other product attributes (e.g. price or origin) are held constant. In order to better understand the factors behind consumers' preferences for environmental certification, sociological approaches are needed to be incorporated. First of all, an individual consumer's preferences and concerns over environment may vary on product classes, because on certain products consumer's loyalty on some characteristics of product is the principal driver for the purchase decision. Second of all, sociology studies suggest that an individual consumer is motivated by a mix of concerns including human health, environment, animal welfare, social values and different consumers stresses these concerns at different extents. This is a crucial finding concerning the forest certification which attempts to solve not only the environmental problems, but also problems related to human health, animal welfare and social values. Based on these two points from the sociological analyses, factors affecting consumer preferences, and that may also promote the uptake of CFPs, are 1) competitive product characteristics from consumer perspective and 2) consumer awareness over the forest certification and sustainable forest management. These are also factors that could be better incorporated in the consumer research on CFPs.

In addition, the sociological analyses raised strong alliances between NGOs, governments and retailers to be the key for successful establishment of markets for CFPs, as well as public comparison and environmental benchmarking to be the major contributors to dissemination and evolution of forest certification. However, 3) consumer perceptions on the different institutions and actors involved in forest certification or supplier characteristics have not been fully incorporated in the existing consumer research. On the other hand, the existing literature provides some indications on consumers' perceptions on the credibility of certification organisations, however, these studies offer widely conflicting results.

Van Kooten et. all (2004) demonstrated that many economic and social indicators are significant explaining dissemination of forest certification. These country-wise indicators are widely omitted by the current consumer research on CFPs. By considering also 4) country-wise economic and social indicators, more realistic comparisons between the different market areas could become possible. In addition, 5) cultural factors introduced by Hofstede (1980) may have a significant role in the market creation for CFPs, and these factors could be included in both research on consumer preferences and dissemination of forest certification.

Even though more elaborate consumer research methods have been applied recently, many of the empirical results are from the 1990s and up-to-date comprehensive results do not exist. Further knowledge about the consumers' preferences and perceptions on CFPs in Scandinavian markets and on forest certification in general could be utilised to develop the attributes of certified products and services of forest certification associations. Furthermore, an in-depth knowledge about the nature of consumer preferences could be used in marketing CFPs.

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References

Aguilar, F.X. Vlosky, R.P. 2007. Consumer willingness to pay price premiums for environmentally certified wood products in the U.S. Forest Policy Econ. 9 (8): 1100-1112

Anderson, R.C. Hansen, E.N. 2004a. Determining consumer preferences for ecolabeled forest products: an experimental approach. J. Forest. 102 (4): 28-32

Anderson, R.C. Hansen, E.N. 2004b. The impact of environmental certification on preferences for wood furniture: a conjoint analysis approach. Forest Prod. J. 54 (3): 42-51

Anderson, R.C. Laband, D.N. Hansen, E.N. Knowles, C.D. 2005. Price premiums in the mist. Forest Prod. J. 55 (6): 19-22

Bartley, T. 2003. Certifying Forests and Factories: States, Social Movements, and the Rise of Private Regulation in the Apparel and Forest Products Fields. Politics and Society 31: 433-464

Basu, A.K. Chau, N.H. Grote, U. 2003. Ecolabeling and stages of development. Rev. Dev. Econ. 7: 228-247

Browne, A.W. Harris, P.J.C. Hofny-Collins, A.H. Pasiecznik, N. Wallace, R.R. 2000. Organic production and ethical trade: definition, practice and links. Food Policy 25: 69-89

Cai, Z. Aguilar, F.X. 2012. Meta-analysis of consumer's willingness-to-pay premiums for certified wood products. Journal of Forest Economics. Available online 21 July 2012: http://dx.doi.org/10.1016/j.jfe.2012.06.007

CITES. 2012. Convention on International Trade in Endangered Species of Wild Fauna and Flora. URL: http://www.cites.org/eng/disc/text.php. Last accessed: August 24, 2012

de Boear, J. 2003. Sustainability labelling schemes: the logic of their claims and their functions for stakeholders. Business Strategy and the Environment Special Issue: Corporate Social Responsibility & Governance for Sustainability 12: 254-264

Gregg, R.J. Porges A. 2008. Amendment to the U.S. Lacey Act: Implications for exporters of Indonesian forest products. URL: http://www.illegal-logging.info/uploads/LaceyActBriefIndoEN.pdf. Last accessed: August 23, 2012

Grönroos, J. Bowyer, J. 1999. Assessment of the market potential for environmentally certified wood products in new homes in Minneapolis/St. Paul and Chicago. Forest Prod. J. 49: 28-34

Gulbrandsen, L. H. (2005) 'Sustainable Forestry in Sweden: The Effect of Competition Among Private Certification Schemes', The Journal of Environment and Development,
14, 338–355.

Hofstede, G. 1980. Culture's Consequences: International Differences in Work-Related Values. Cross-Cultural Research and Methodology Series Volume 5.

Kozak, R.A. Cohen, D.H. Lerner, J.L. Bull, G.O. 2004. Western Canadian consumer attitudes toward certified value-added wood products: an exploratory assessment. Forest Prod. J. 54: 21–24

Leire, C. Thidell, A. 2005. Product-related environmental information to guide consumer purchases - a review and analysis of research on perceptions, understanding and use among Nordic consumers. J. Cleaner Prod., 13 (10/11): 1061-1070

Macias, N. Knowles, C. 2011. Examining the Effect of Environmental Certification, Wood Source, and Price on Architects' Preferences of Hardwood Flooring. Silva Fennica 45(1): 97-109

McNichol, J. H. 2002. Contesting Governance in the Global Marketplace: A Sociological Assessment of Business-NGO Partnerships to Build Markets for Certified Wood. PhD Dissertation, Department of Sociology Berkeley, CA, University of California.

Newholm, T. 2000. Consumer Exit, Voice, and Loyalty: Indicative, Legitimation, and Regulatory Role in Agricultural and Food Ethics. Journal of Agricultural and Environmental Ethics 12: 153-164

Nussbaum, R. Simula, M. 2005. The Forest Certification Handbook. Earthscan Publications Ltd.

O'Brien, K.A. Teisl, M. 2004. Eco-information and its effect on consumer values for environmentally certified forest products. J. Forest Econ. 10 (2): 75-96

Overdevest, C. 2010. Comparing forest certification schemes: the case of ratcheting standards in the forest sector. Socio-Economic Review 8: 47-76

Ozanne, L.K. Vlosky, R.P. 1997. Willingness to pay for environmentally certified wood products: the consumer perspective. Forest Prod. J. 47: 39-48

Ozanne, L.K. Smith, P.M. 1998. Segmenting the market for environmentally certified wood products, Forest Science 44: 379-389

Ozanne, L.K. Vlosky, R.P. 2003. Certification from the U.S. consumer perspective: a comparison from 1995 and 2000. Forest Prod. J. 53: 13-21

Peattie, K. 2001. Golden goose or wild goose? The hunt for the green consumer. Business Strategy and the Environment 10: 187-199

Rametsteiner, E. Schwarzbauer, P. Juslin, H. Karna, J. Cooper, R. Samuel, J. Becker, M. Kuhn, T.1998. Potential markets for certified forest products in Europe. European Forest Institute, Joensuu, Finland URL: http://www.gtz.de/de/dokumente/en-d14-potential-markets-certified-forest-products-europe.pdf. Last accessed: August 23, 2012

Rametsteiner, E. 2002. The role of governments in forest certification - a normative analysis based on new institutional economics theories. Forest Policy and Economics 4: 163–173

Rametsteiner, E. Oberwimmer; R. Gschwandtl, I. 2007. Europeans and wood : what do Europeans think about wood and its uses : a review of consumer and business surveys in Europe. Warsaw : Ministerial Conference on the Protection of Forests in Europe, Liaison Unit Warsaw, 2007.

Roos, A. Nyrud, A. Q. 2006. Consumer research and attribute elicitation for the development of outdoor wooden decking. Lars Lönnstedt, L. Rosenquist, B. (eds.). Scandinavian Forest Economics 41, Proceedings of the Biennial Meeting of the Scandinavian Society of Forest Economics Uppsala, Sweden.

Teisl, M.F. Peavey, S. Newman, F. Buono, J. Hermann, M. 2002. Consumer reactions to environmental labels for forest products: a preliminary look. Forest Prod. J. 52 (1): 44-50

The EU Timber Regulation (No 995/2010) URL: http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=CELEX:32010R0995:EN:NOT. Last accessed: August 23, 2012

United Nations Department of Economic & Social Affairs. 1992. URL: http://www.un.org/esa/dsd/agenda21/. Last accessed: August 24, 2012

United States Department of Agriculture. 2008. URL: http://www.usda.gov/wps/portal/usda/farmbill2008?navid=FARMBILL2008. Last accessed: August 23, 2012

van Kempen, R. Muradian, R. Sandóval, C. Castañeda, J.P. 2009. Too poor to be green consumers? A field experiment on revealed preferences for firewood in rural Guatemala. Ecol. Econ. 68 (7): 2160-2167

van Kooten, G.C. Nelson, H.W. Vertinsky, I. 2005. Certification of sustainable forest management practises: a global perspective on why countries certify. Forest Policy and Economics 7: 857-867

Veisten, K. 2002. Potential demand for certified wood products in the United Kingdom and Norway. Forest Sci. 48: 767-778

Veisten, K. 2007. Willingness to pay for eco-labelled wood furniture: Choice-based conjoint analysis versus open-ended contingent valuation. Journal of Forest Economics 13: 29-48

Appendix. Key studies related to market creation for certified forest products in chronological order.

No.	Study	Author(s)	Publication year (data)	Scale	Countries surveyed	Level	Type of study	Analysis method	Sample size
1.	Potential demand for certified wood products in the United Kingdom and Norway	Veisten	2002 (1997, 1998)	country-wide	UK and Norway	consumers	actual purchasing situation	contingent valuation	258
2.	Contesting Governance in the Global Marketplace: A Sociological Assessment of British Efforts to Build New Marketsfor NGO-Certified Sustainable Wood Products	McNichol	2002 (1998)	country-wide	US and UK	goverments /NGOs/firms /public	personal interviews	sociological analysis	12 stakeholder gorups, 260 news articles
3.	Certifying Forests and Factories: States, Social Movements, and the Rise of Private Regulation in the Apparel and Forest Products Fields	Bartley	2003	country-wide	US and UK	goverments /NGOs/firms	personal interviews	sociological analysis	37
4.	Determining consumer preferences for ecolabeled forest products: an experimental approach	Anderson & Hansen	2004	country-wide	US	consumers	actual sales		682
5.	The impact of environmental certification on preferences for wood furniture: a conjoint analysis approach	Anderson & Hansen	2004	country-wide	US	consumers	question-naires	conjoint analysis	265
6.	Certification of sustainable forest management practices: a global perspective on why countries certify	van Kooten et. all	2005	interna-tional	117 countries	goverments /society	regression model	regression analysis	11 variables
7.	Consumer research and attribute elicitation for the development of outdoor wooden decking	Roos & Nyrud	2006 (?)	country-wide	Norway	consumers	question-naires	conjoint analysis	294
8.	Comparing forest certification schemes: the case of ratcheting standards in the forest sector	Overdevest	2010	country-wide	US, Sweden, Finland	goverments /NGOs/firms	personal interviews	sociological analysis	75
9.	Conjoint effect of environmental labeling, disclosure of forest of origin and price on consumer preferences for wood products in the US and UK	Aguilar & Cai	2010 (2010)	country-wide	US and UK	consumers	online survey	conjoint analysis	1142
10.	Examining the Effect of Environmental Certification, Wood Source, and Price on Architects' Preferences of Hardwood Flooring	Macias & Knowles	2011 (2011)	local	US (Oregon, Washington)	architects	mail survey	conjoint analysis	402
11.	Meta-analysis of consumer's willingness-to-pay premiums for certified wood products	Cai & Aguilar	2012	interna-tional	13 countries	consumers	meta-analysis	meta-analysis	59 observations

The role of concepts in reforming practical forestry in Finland - from social sustainability to ecosystem approach

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Abstract

The social dimension of sustainable forestry has repeatedly been regarded as difficult to comprehend. However, the social and societal considerations within forestry have been steadily evolving during the past decades intertwined as well with the overall global social development efforts as with the innovations produced by various practical grassroots forestry actors. The recent new concepts of ecosystem approach and ecosystem services provide new insights into the social complexity of forestry. The main part of the article describes recent developments related to the above mentioned concepts in Finland both nationally and in state-owned and private forests. The article is finalised by conclusions concerning the role of concepts as tools for promoting forestry's contribution to sustainable development.

Keywords: sustainable forestry, social dimension, forestry organisations, forest policy

1 From social sustainability to ecosystem approach

1.1 Evolvement of social considerations in forestry internationally

The report of the World Commission on Sustainable Development (WCED) from 1987 opened the global discussion on sustainable development. It is also commonly mentioned as the most significant starting point for social sustainability strategies in forestry. However, only the resolutions and documents of the United Nations Conference on Environment and Development (UNCED) in 1992, which dealt more thoroughly with social issues in general and also within forestry, led to concrete changes in forestry policies and practices in many countries. The adaptation of the globally agreed forestry principles into European and Finnish conditions was speeded up by the second Ministerial Conference on the Protection of Forests in Europe held in Helsinki 1993 and further elaborated in the following ministerial conferences.

The WCED and UNCED resolutions contain statements emphasising the equal rights of all people to satisfy their needs within the limits of ecosystems. The WCED report included the ideas of "social equity between generations" and "equality within each generation". Concerning forestry, the WCED discussed mainly environmental problems connected to forest degradation and deforestation. Protection and sustainable use of forest resources were seen in the report as prerequisites for economic and social development. The most significant forestry documents produced by the UNCED are the Forest Principles and the chapter on deforestion in Agenda 21. The social elements in these agreements include the principle of multiple use, the right of people to participate in decision-making affecting forest resources and their own living conditions, and the recognition of cultural aspect of forests.

Social dimensions of forestry have been elaborated also within the Ministerial conferences on the Protection of Forests in Europe (MCPFE). The most socially oriented resolutions produced in the conferences are resolution L1 "People, Forests and Forestry - Enhancement of Socio-Economic Aspects of Sustainable Forest Management" agreed on in Lissabon 1998 and

resolution V3 “Preserving and Enhancing the Social and Cultural Dimensions of Sustainable Forest Management in Europe" agreed on in Vienna 2003. The Lissabon resolution deals, inter alia, with rural development, recreation, non-wood forest products, participation, safety and gender issues. The Vienna resolution promotes the material and non-material cultural heritage benefits based on forests and wood. Also many other MCPFE agreements include social aspects. For example, Vienna resolution V1 "Strengthen synergies for sustainable forest management in Europe through cross-sectoral co-operation and National Forest Programme" emphasises social and political issues such as participation and partnerships for implementation.

1.2 International social agreements

Simultaneously with the entrance of social concerns into forestry there has been parallel international processes dealing with socially sustainable development. A prominent global event dealing with social sustainability was the World Summit for Social Development, held in March 1995 in Copenhagen. The main goals set in the Summit were eradication of poverty, promotion of productive employment and social integration. A defininition of social development was presented in the Summit according to which "The ultimate goal of social development is to improve and enhance the quality of life of all people. It requires democratic institutions, respect for all human rights and fundamental freedoms, increased and equal economic opportunities, the rule of law, the promotion of respect for cultural diversity and rights of persons belonging to minorities and an active involvement of the civil society." (Report of the World... 2005.) This definition includes ideas which have been promoted even earlier, for example, in the Universal Declaration of Human Rights (United Nations… 1948), the International Covenant on Economic, Social and Cultural Rights (United Nations… 1966) and various other agreements and declarations concerning i.a. children, women, labour and cultural diversity.

Global social challenges were again defined internationally at the Millenium Summit in 2000. At the meeting, 189 countries signed the United Nations Millenium Declaration, on the basis of which eight Millenium Development Goals (MDGs) were developed (United Nations… 2009). Many problems behind the millenium goals are most acute in developing countries, but for example environmental challenges are nowadays increasingly global. The MDGs most closely related to forestry are eradication of extreme poverty and hunger, promotion of gender equality and empowering women, ensuring environmental sustainability and developing global partnerships for development.

1.3 Origins of the ecosystem approach

Recent new contexts for social forestry considerations are the ecosystem approach developed within the follow-up of the UN Convention on Biological Diversity (CBD) during the period 1995-2004 and the ecosystem services -classification brought up by the UN Millennium Ecosystem Assessment (MEA), which was carried out 2001-2005. The CBD ecosystem approach emphasises integrated management of land, water and living resources in a sustainable and equitable way (Ecosystem Approach. 2012). The MEA aims to enhance the conservation and sustainable use of ecosystems and their contribution to human well-being (Millennium Ecosystem... 2010). The MEA has led to extensive elaboration of the contents of ecosystem services. The analytically and practically oriented ecosystem services thinking has become a part of the broader and more societally oriented ecosystem approach.
According to the MEA, ecosystem services can be classified into four groups: provisioning, regulating, cultural and supporting services. For example in Finland the forest-based provisioning services include wood, bioenergy, genes, food, water, game, berries and mushrooms, decorative greenery and peat. Regulating services include flood control, climate

regulation, carbon sequestration, erosion control, protection of water quality, noise reduction and pollination. Cultural services refer to landscapes, recreation areas, aesthetics, rural livelihoods, folklore, hunting and spiritual experiences. Supporting services are necessary for the production of all other ecosystem services. They include soil formation, nutrient cycling and primary production. (Ecosystems and human well-being - A framework... 2003, 56-60; Matero & Saastamoinen 2007, Hytönen 2009.)

Both the ecosystem approach developed within the CBD and the MEA include social concerns. The ecosystem approach emphasises that humans, with their cultural diversity, are an integral component of ecosystems. Most of the principles of ecosystem approach are social or require societal arrangements. The MEA elaborates the human dimension further by stating that "changes in ecosystem services affect human well-being through impacts on security, the necessary material for a good life, health and social and cultural relations. These constituents of well-being are in turn influenced by and have an influence on the freedoms and choices available to people" (Ecosystems and human well-being - A Framework... 2005, 78). The emphasis on fairness and cultural diversity in the ecosystem approach and the elaboration of human well-being in the MEA are in line with the global strategies to promote socially sustainable development. The practical tools recommended by the ecosystem approach include socially sensitive adaptive management and multisectoral cooperation. The MEA urges public administrations to reform organisational structures to respond better to the new challenges. According to MEA, the empowerment of communities, women and youth can play an essential role in responding to the problem of environmental degradation. (Ecosystems and human well-being - Synthesis... 2005, 18-25)

2 Examples of practical implementation of social concerns and the ecosystem approach

2.1 National forest policy

As a consequence of the international inter-governmental forestry processes, most of the Finnish forestry legislation was reformed and updated during the 1990s, and the idea of sustainability was included in various laws affecting forestry. As a result of the international agreements new forest policy tools such as national forest programmes were adopted. In addition, sustainability issues were included in the guidelines and action plans published by various actors in the field of forestry.

At the moment (2012), both the forestry legislation and the tasks of the publicly funded forestry organisations are again under revision. According to the Government Programme, the reform aims to promote increasingly diversified forest management. Another socially significant objective is to provide equitable opportunities for various operators in the forest services markets. (Programme of... 2011.)

National forest programmes are an important forest policy tool for the public admininistration. The rest of this sub-chapter deals only with social issues expressed in these programmes, although there exists a lot of other important policy tools, many of which are economic or regulatory instruments. One reason for the essentiality of the programmes is the participatory drafting process, involving various ministries, civil society actors and representatives of both large forest industry enterprises as well as smaller entrepreneurs.

The first Finnish National Forest Programme (NFP) stated that it will support social sustainability by strengthening the preconditions for family forestry, by slowing down the decrease in rural employment and by supporting the creation of new occupations based on value added wood products and energy production. In addition, social and cultural sustainability was recommended to be supported by coordinating timber production with the traditional forms of forest use, i.e. hunting, berry and mushroom picking and reindeer husbandry. Securing the public right of access was set as an objective, and forest-based outdoor recreation was considered as a precondition for social sustainability because of its great importance for physical and mental health. As a new element in Finnish forest policy programmes, the first NFP underlined the importance to expand and diversify business activities and employment connected to forests by supporting enterprises specialising, for example, in tourism and various forms of recreational services, and in processing of non-wood forest products. (Finland's National… 1999.)

The second NFP for the years 2008-2015 does not make explicit statements concerning social sustainability. However, the programme emphasises various social aspects of forestry. According to the programme, forest-related welfare consists of many material and immaterial factors, such as health, employment, livelihood, recreation as well as a clean, healthy and vigorous environment. The programme also states that both material and immaterial commodities of forests could be utilised to create new opportunities for various types of livelihoods. New issues brought into discussion by the programme include protecting biodiversity by voluntary means, trade of recreational values and diversification of services for forest owners. The role of regional forest programmes, natural resource plans for state-owned areas and provincial land-use plans is emphasised as a means to harmonise the interests of the various stakeholders, and the idea of acceptability has for the first time been included as a criterion for developing forest policy. (Finland's National... 2008.)

The implemention of the NFP is based on the cooperation of public and private actors. The private actors include forest industry, small and medium-size enterprises, forest owners and representatives of various interest groups. The regional administrations, forestry organisations and rural development organisations also play an important role in the implementation. Furthermore, the programme is developed, and up-dated if needed, on the basis of evaluations, development projects and annual progress reports. (Finland's National... 2008.)

The original and revised versions of the second NFP include a definition of ecosystem approach. They do not elaborate the utilisation of the approach further, but the revised version uses the concept of ecosystem services in various contexts. (Finland's National... 2008, Finland's National... 2011.)

The second NFP was evaluated simultaneously with the preparation process. The evaluation makes critical remarks. For example, the report states that except general level statements the programme is insensitive to gender issues. Also questions concerning regional development were found to be inadequately covered. (Kansallisen metsäohjelman ennakkoarviointi - Loppuraportti metsäneuvostolle. 2007.)

2.2 Publicly owned forests

About 35 % of Finland's forestry land are owned by the state and 2 % by municipalities. Although the share of municipal ownership is small, the influence of municipal decision making is growing, for example, through land-use planning, establishing and maintaining areas for amenity purposes, providing forest-related information and education, and by creating favorable

conditions for private nature-based enterprises. Despite the increasing role of municipalities, the rest of this sub-chapter will concentrate on state-owned forests.

Most of the state-owned land is taken care by Metsähallitus, which is a state enterprise administering 9 million hectares of land and 3 million hectares of water areas. Metsähallitus carries out both business activities and public administration duties. About 5 million hectares forest land is managed for timber production with attention to nature protection and multiple use and 4 million hectares are covered with nature conservation, recreation and other special-purpose nature areas. The timber production activities are financed by income from the operations, and a part of the profit is channeled to the state budget. The public duties are carried out by the Natural Heritage Services and financed by the state budget.

Traditionally the main law-based social duties of Metsähallitus have been the provision of employment and recreation opportunities for citizens. From 1990s, social sustainability issues have been discussed and developed also in the context of public participation in the planning systems. A handbook for organising public participation was published by the agency in Finnish in 1997 and in English 1999 (Loikkanen et al. 1999).

According to the public participation guidelines, a precondition for social sustainability is locally and regionally accepted use of forest resources. Because of this Metsähallitus uses various participation methods to determine the different implications of alternative plans and their acceptability. The agency aims to provide an opportunity for every interested person to participate in the planning processes at all levels. The development work of the participatory systems has led to many procedural changes and innovations in the planning systems, and it has even been supported by independent critical research (e.g. Raitio 2008).

Since 2005, the Natural Heritage Services of Metsähallitus has measured and monitored the fulfilment of its social obligations in the follow-up reports to the Ministry of Agriculture, the Ministry of the Environment and the Government. The reports contain information on nature protection, nature management, recreation, nature tourism and the welfare of the workers of the Natural Heritage Services.

There are also other concrete measures within Metsähallitus which are socially significant. These include the principles for sustainable tourism in nature protection areas published in 2004, and partnerships with local entrepreneurs and cultural organisations. Recently the agency has started to compile customer surveys and studies on the economic significance of national parks to local people. Monitoring of the environmental, social and economic impacts of tourism with the help of concrete indicators has also been developed in connection to the management of national parks (e.g. Sarlin 2009).

In 2009-2010 Metsähallitus updated the planning and management procedures of nature protection and recreation areas according to the ideas of ecosystem approach. The guiding principle for the future activities is adaptive management. The new approach is very socially oriented and emphasises the importance of cooperation with local communities in protecting the environment simultaneously with promoting nature-based livelihoods. (Suojelualueiden hoidon ja käytön periaatteet 2010) .

So far the inclusion of social aspects and monitoring has been more extensive and pronounced in the work of Natural Heritage Services than in the commercial timber production activities coordinated by the Metsähallitus' Forestry Unit. However, in natural resource plans which cover both timber production, recreation and nature protection areas, social impacts are

described concerning employment, recreation and landscape, non-wood forest livelihoods and cultural heritage. The plans also contain information on various forest uses such as hiking, picking of berries and mushrooms, hunting, reindeer herding, mining, timber production, tourism and cultural values.

The handbook of environmental issues in forestry compiled by the Forestry Unit is another important guidelines affecting the concrete measures taken in timber production forests. This guidebook, which contains information on biological diversity, protection of endangered species, protection of soil and waterways, landscape management, game management, cultural heritage and non-wood forest uses was first published in 1993, and has been updated in 1997, 2004 and 2011. The contents of the handbook have evolved along the years, the latest version includes increased attention, for example, to wood production for energy and climate change. The new handbook is based on ecosystem approach and applies the concept of ecosystem services extensively (Metsätalouden ympäristöopas. 2011).

2.3 Private forests

The largest owner group of forests is private individuals and families. They are often called non-industrial private forest owners (NIPFs), however Finnish forest industries are highly dependent on private timber supply. About 52 % of the forestry land are owned by the NIPFs. Some 11 % is taken care by various other owner groups, the biggest of which are forest industry companies, common forests (jointly-owned forests) and parishes. The rest of this sub-chapter deals only with the NIPFs.

Income from roundwood sales for private forest owners is often mentioned as the most socio-economically significant forest benefit because most of it goes to rural areas and is received by a large number of households. Farmers and other rural residents often get income from many sources and forest work, and timber revenue form an important share in the totality.

Private forest owners are assisted by state-subsidised organisations. These organisations have defined their relationship to social sustainability. The local Forest Management Associations and the Finnish Forestry Centre with its regional districts provide mainly timber-production oriented assistance to private forest owners. The national Forestry Development Centre Tapio produces broad-scale information services for private forestry organisations. Recently also the big forest industry enterprises and private forest consultanst have increased their services to private forest owners.

The Forest Management Associations have a law-based duty to promote social sustainability of forestry. In practice, the Associations have not elaborated the contents of their social obligations, apart from a few development projects. Their main field of work is silviculture and timber trade.

The regional forest programmes compiled by the districts of the Finnish Forestry Centre in cooperation with local interest groups are essential forest policy tools which can be used to promote social sustainability in private forests. These programmes define the needs and objectives for the management of forests, forest-based business, multiple use and protection of forests, and propose the measures and necessary funding to reach the objectives.

According to the majority of regional forest programmes, the social objective of sustainable forestry is to manage and utilise forests so that their ability to provide livelihoods, recreation and cultural values is maintained. Some plans include more elaborated statements concerning,

for example, welfare and acceptability. Social elements and processes described in the programmes include employment, entrepreneurship, culture, landscape, quality of life, occupational well-being and traditional multiple use. Social processes which are most often discussed in the programmes are cooperation with stakeholder groups, multi-objective planning methods, diversified silvicultural methods, and support to private entrepreneurs by economic, informative and educational means (Huhtala et al. 2007) However, it has been repeatedly stated that both the regional forest programmes and the follow-up reporting cover inadequately multiple use, small-scale business and other socio-economic aspects of forestry.

The Forestry Development Centre Tapio has a long history in promoting multiple use and social sustainability. Since 1990s, Tapio has published information and guidelines for management of cultural heritage, forest tourism, urban silviculture, rural development, landscape and special wood production. The general guidelines for good silviculture include practical advice, in addition to timber production, dealing with urban forests, landscape, game management, cultural areas and non-wood forest products. The social themes discussed in the guidelines include well-being of forest owners, forest workers and forestry entrepreneurs, forestry's role in rural economies, the diversity of forest owners' values, participatory decision-making practices, the public right of access, recreation, picking of wild berries and mushrooms and hunting (Hyvän metsänhoidon suositukset 2006). At the moment (2012), the recommendations are being up-dated in a process involving experts from the fields of forestry, energy and environmental protection.

As a consequence of the recent changes in the structure of forest ownership, the diversity of objectives of forest owners has increased. The appreciation of other forest values than timber production is growing. This trend is likely to continue because the amount of urban, female, wealthy and non-farmer forest owners is getting bigger (Leppänen 2010). This change requires reforms in the publicly-supported information services as well as opening up of the markets for private forest planning and management services. The need of these reforms has recently been acknowledged in the Government Programme and in the proposal for the new Forest Act (Programme of Prime… 2011, Metsänkäsittelymenetelmien –jatkotyöryhmän muistio 2012). Also researchers have argued for more adaptive and cooperative communication culture between forest owners and forestry professionals (e.g. Tikkanen et al. 2010).

The concept of ecosystem approach has been seldom used in private forestry, although many trends and activities in the sector conform to it, for example in connection to nature tourism and cultural heritage. The concept of ecosystem services is used to some extent, and an EU - supported project has been started to generate income from non-wood forest-based ecosystem services to private forest owners and other rural dwellers in south-western Finland.

3 Concepts as tools

Finnish forestry has been affected by high-powered socially-oriented concepts since the 1950s. They include “multiple-use forestry”, “sustainable forestry”, “ecosystem approach” and “ecosystem services”. A remarkable social innovation has been the idea to clarify the concept of “sustainable development” by ecological, economic and social dimensions. These three viewpoints remind forestry actors about the need to understand interactions and to create balance between the three dimensions. This division has helped to promote social concerns which are otherwise easily disregarded as too difficult, political or abstract.

The examples presented in this article show that practical actors find ways to apply and utilise the innovative ideas brought up by the internationally developed concepts. Generally, concepts can

- bring new socially-accepted ideas, viewpoints and objectives into development efforts
- help to implement research-based ideas into practice
- provide systematic frameworks for both theoretical considerations and practical activities
- create coherence and continuity to development efforts – people come and go
- provide inspiration for innovations
- give guidance to public administrators, business ideas for market actors and benchmarks for civil society activities
- show direction to better future.

The concepts of social sustainability and ecosystem approach discussed in this article are important phases in adapting to the socio-economic and ecological challenges facing forestry. New conceptual contexts for social considerations in forestry are provided by the concepts of green economy, bioeconomy and dematerialisation (decoupling). The social dimension needs to be included also into these new approaches.

References

Ecosystem Approach. 2012. Available at: Http://www.cbd.int/ecosystem/. Cited 28.8.2012.

Ecosystems and Human Well-Being - A Framework for Assessment. 2003. World Resources Institute, Washington DC/Island Press. 245 p. Available at: Http://pdf.wri.org/ecosystems_human_wellbeing.pdf. Cited 28.8.2012.
Ecosystems and Human Well-Being - Synthesis. 2005. World Resources Institute/Island Press, Washington DC. 155 p. Available at: Http://www.maweb.org/documents/document.356.aspx.pdf. Cited 28.8.2012.

Finland's National Forest Programme 2010. 1999. Ministry of Agriculture and Forestry, Publications 2/1999. 40 p. Available at: Http://www.mmm.fi/attachments/metsat/kmo/5fY3aDJ21/Kansallinen_metsaohjelma.pdf. Cited 28.8.2012.

Finland's National Forest Programme 2015 - More Welfare from Diverse Forests - Government Resolution. 2008. Ministry of Agriculture and Forestry, Publications 3b/2008. 50 p. Available at: Http://www.mmm.fi/attachments/metsat/kmo/5Ad5R83tH/KMO2015engl.pdf. Cited 28.8.2012.

Finland's National Forest Programme 2015 – Turning the Finnish forest sector into a pioneer in bioeconomy - Government Resolution 16 December 2010. 2011. Ministry of Agriculture and Forestry, Helsinki. 52 p. Available at: Http://www.mmm.fi/attachments/metsat/kmo/64ytYHceF/NFP_2015_Turning_the_Finnish_forest_sector_into.pdf. Cited 28.8.2012.

Huhtala, M., Hytönen, M., Sievänen T. & Wallenius, P. 2007. Metsäsektorin sosiaalisen kestävyyden mittarit taustaselvitys. Metlan työraportteja 44. 87 s. Available at: Http://www.metla.fi/julkaisut/workingpapers/2007/mwp044.pdf. Cited 28.8.2012.

Hytönen, M. 2009. Ekosysteemilähestymistapa metsien hoidossa ja käytössä – kirjallisuusselvitys. Metlan työraportteja 139. 132 s. Available at: Http://www.metla.fi/julkaisut/workingpapers/2009/mwp139.pdf. Cited 28.8.2012.

Hyvän metsänhoidon suositukset. 2006. Metsätalouden kehittämiskeskus Tapio, Julkaisusarja 22/2006. 100 s.

Kansallisen metsäohjelman ennakkoarviointi - Loppuraportti metsäneuvostolle. 2007. Maa- ja metsätalousministeriön julkaisu 12/2007. 56 s. Available at: Http://www.mmm.fi/attachments/metsat/kmo/5A5qxeaKk/KMO2015ennakkoarv_FI.pdf. Cited 28.8.2012.

Loikkanen, T., Simojoki, T. & Wallenius, P. 1999. Participatory approach to natural resource management: a guide book. Metsähallitus, Vantaa. 96 p.

Matero, J. & Saastamoinen, O. 2007. In search of marginal environmental valuations - ecosystem services in Finnish forest accounting. Ecological Economics 61(1): 101-114.

Metsänkäsittelymenetelmien –jatkotyöryhmän muistio. 2012 .Työryhmämuistio mmm 2012:7. Available at: Http://www.mmm.fi/attachments/mmm/julkaisut/tyoryhmamuistiot/2012/69ykIGifb/Lopullinen_MEMO-jatkotyoryhma_muistio_16082012.pdf. Cited 28.8.2012.

Metsätalouden ympäristöopas. 2011. Metsähallituksen metsätalouden julkaisuja 67. 162 s. Available at: Http://julkaisut.metsa.fi/julkaisut/pdf/mta/ymparistoopas2011.pdf. Cited 28.8.2012.

Millenium Ecosystem Assessment. 2005. Available at: Http://www.maweb.org/en/index.aspx. Cited 28.8.2012.

Programme of Prime Minister Jyrki Katainen's Government, 22 June 2011. 2011. Finnish Government, Helsinki. 160 p. Available at: Http://valtioneuvosto.fi/hallitus/hallitusohjelma/pdf/en334743.pdf. Cited 28.8.2012.

Raitio, K. 2008. "You can't please everyone" - conflict management practice, frames and institutions in Finnish state forests. Joensuun yliopiston yhteiskuntatieteellisiä julkaisuja N:o 86. 271 p. Available at: Http://joypub.joensuu.fi/publications/dissertations/raitio_conflict/raitio.pdf. Cited 28.8.2012.

Report of the World Summit for Social Development, Copenhagen, 6-12 March 1995. A/Conf.166/9. Available at: Http://www.un.org/documents/ga/conf166/aconf166-9.htm. Cited 28.8.2012.

Sarlin, A. 2009. Strategy for Nature Tourism in the Archipelago Sea. Nature Protection Publications of Metsähallitus, Series C 66. 66 p. Available at: Http://julkaisut.metsa.fi/julkaisut/pdf/luo/c66.pdf. Cited 28.8.2012.

Suojelualueiden hoidon ja käytön periaatteet. 2010. Metsähallituksen luonnonsuojelujulkaisuja, Sarja B 127. 93 s. Available at: Http://julkaisut.metsa.fi/julkaisut/pdf/luo/b127.pdf. Cited 28.8.2012.

Tikkanen, J., Hokajärvi, R. & Hujala, T. 2010. Development Phases of Forest Planning on Non-Industrial Private Lands in Finland: Perspectives of Planners' Work. Small-scale Forestry (2010) 9:331-347. Available at: Http://www.springerlink.com/content/v05n0m5l7w314741/fulltext.pdf. Cited 28.8.2012.

United Nations 1948; Declaration of Human Rights

United Nations 1966; International Covenant on Economic, Social and Cultural Rights

United Nations 2009; Millenium Development Goals

Forest owners' decision support for voluntary conservation – the present state and tensions among purposeful action models in Finland

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Abstract

The ongoing Forest Biodiversity Programme METSO largely relies on voluntary participation of family forest owners. In the METSO programme, forest owners have the power to decide upon conservation, in contrast to traditional top-down programmes. Forest owners can get advice and information about conservation practices from a wide range of forestry and environmental professionals, who should help owners to make decisions that respond to their values and needs. The study at hand examines the present situation of how the nature values are taken into account in advisory services in Finland. It was designed based on soft systems methodology (SSM). Semi-structured interviews and observations of actual service encounters in forest were conducted in seven practical organizations. Qualitative analyses of the material helped to compile and combine conceptual models of the present state and observe tensions between actors' purposeful action models. METSO programme's voluntary-based conservation agreements and forest owners' ability to make initiative about conservation, has been accepted positively among forest owners and authorities. Nevertheless, nature values planning and conservation depends a lot on the actors' and organizations' worldviews and operational practices, which could lead to a situation where forest owners get different kind of information and guidance depending on organizations they were contacted with. Nature values conservation is not yet fully internalized and knowledge about different voluntary conservation alternatives varies among actors. There is an obvious need for trainings, guiding material and practical decision-support tools for introducing nature values conservation alternatives.

Keywords: biodiversity, decision support, family forest owners, forest planning, soft systems methodology

1 Introduction

Since 1950s, forestry in Finland has been based on the commercial forestry management with even-aged stands concentrating on wood production, aiming at successful forest industry and thus social well-being (Kotilainen & Rytteri 2011). Forest legislation and silvicultural guidelines have mainly focused on supporting sustainable timber growing activity.

In recent decades, however, the climate in forest policy has become more compliant with different forest use opportunities. This is due to international agreements of safeguarding biodiversity but also due to both citizens' and forest owners' attitudes moving towards multi-objective values. The importance of cutting incomes to forest owners' family economy is decreasing (Wiersum et al. 2005, Ní Dhubháin 2011) and interest in softer forest use has been increasing (Hallikainen et al. 2010). In these circumstances, forest owners are increasingly facing new kind of decision situations. In Finland, there is a notable segment of forest owners who are potentially interested in biodiversity-friendly actions in their forests (Hujala et al. 2010).

One accelerator for changing attitudes and practices has been The Forest Biodiversity Action Programme for Southern Finland 2008–2020 (METSO). METSO programme offers new ways to manage forest owners' different worldviews. It combines biodiversity protection and the commercial use of forests. METSO's aim is to halt the decline in forest habitats and species in southern Finland (Government Resolution… 2008). While biodiversity conservation is the main target of METSO, social acceptability is also considered to be of great importance (e.g. Horne 2006, Horne et al. 2009). The Government believes that the ecological objectives can be reached in a socially acceptable manner through voluntary-based instruments instead of traditional top-down protection programmes (Government Resolution… 2008). As METSO programme relies on voluntariness, forest owners have the power to decide upon conservation. Forest owners can voluntarily participate in the programme by making permanent or temporary conservation contracts in their forests. For making conservation contracts, forest owners are given monetary compensation, which is based on the growing stock in the protected area.
Forestry Centre (later referred to as FC) and Centre for Economic Development, Transport and the Environment (later referred to as ELY-centre) and professional forest advisers (forest management associations, forest industry, forestry service enterprises) provide information to forest owners on how to assess the biodiversity of different sites. The regional forest and environmental authorities decide whether a certain site is suitable to be included in the conservation programme. The conservation agreements signed to protect these sites can be permanent or set for a specific time period of 10-20 years, according to a forest owner's preference.

In addition to the above-mentioned policy climate changes, the ongoing changes in forest organizations' set-ups and the renewal of the Finnish forest legislation challenges forestry practices towards providing forest owners with more alternatives to forest use. Another ongoing reform is the Finnish forest planning system from state-subsidized activity to market-driven services. It provides an opportunity to start pursuing a co-configuration of decision-aid services between forestry experts (service providers) and forest owners (customers) (Tikkanen et al. 2010).

All the factors described above mean a requirement for new practices and action models to serve forest owners in their voluntary biodiversity conservation decisions. To be able to make conservation contracts that respond to forest owners' objectives, forest and environmental

professionals in different organizations should help owners and give information and advice about the benefits of conservation, and details of different conservation and contract alternatives. For example, forest planners can apply various data and communication forms to make owners' decision making easier.

Forest-biodiversity-related service is however an evolving domain having various actors with multiple motivations and different worldviews. This is concretized by different attitudes towards nature values conservation and also by diverse practices to do things. This complexity of conserving nature values creates a need to develop interorganizational action models and service components that streamline the service experience of forest owners. Such development is impossible within a single organization; rather, an initial analysis of the overall situation should be conducted to frame, inform and inspire further development.

Objectives of the study are:

1. Examine the present situation of how the nature values are taken into account in advisory services in Finland.
2. Describe and illustrate tensions in forest biodiversity conservation among purposeful action models in Finland.
3. Lay the grounds for visioning and taking action in the development work of biodiversity conservation services, which are offered for private forest owners.

2 Methodology and data collection

2.1 Methodology

Soft systems methodology (SSM) is an approach for tackling problematical situations of all kinds. It can be applied for real-world systems that have characteristics of "soft", i.e. such open systems, which operate in continuous interaction with the operating environment or systems, whose definition is inaccurate. SSM is an action-oriented process of inquiry into problematical situations and it forms a flexible and versatile framework for human activity systems and practical problem solving. (Checkland 1999)

The baseline of SSM is the tension between the present situation and the future vision and the interplay between actors' perceptions and models of purposeful activity. The SSM process takes the form of a learning cycle, which goes from identifying and assessing a problematical situation (1) to taking action to improve it (see Fig. 1). SSM recognizes that people have different worldviews and that there are always people who are trying to act purposefully. To take action, some purposeful activity models should be made and judged to be relevant to the situation; each model is an intellectual device, being built based on a particular pure worldview, which each individual will bring to the study (2). These models are used to question the real situation. This brings structure to a discussion about the situation, the aim of the discussion being to find changes, which are both arguably desirable and also culturally feasible in this particular situation (3). Taking action as a result of the study (4) will of course change the starting situation into a new situation, so that in principle the cycle could begin again. SSM is not a sequence of steps but an iterative process of moving back and forth while assessing the system and its components. (Macadam et al. 1990, Checkland & Poulter 2010, Cundill et al. 2012).

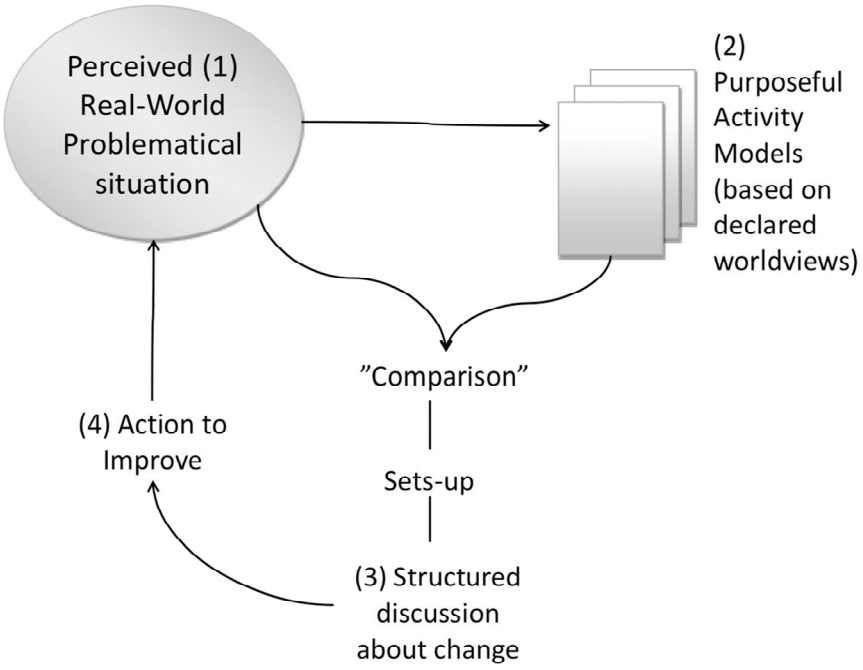


Figure 1. SSM's learning cycle (Checkland & Poulter 2010).

2.2 Present state

The SSM process begins with defining the present situation and identifying actors' different worldviews and perceptions. Therefore, to study the present situation of nature values conservation and planning in forest and environmental organizations, seven semi-structured in-depth interviews were conducted. In this kind of interviews, the interviewee rather freely talks about different themes and the interviewer makes supplementary questions or reverts to a previous theme (Wengraf 2001).

The interviewee selection method was subjective; more precisely, stratified purposeful sampling (Wengraf 2001), aiming to gather all subgroups of interest among METSO professionals. The organizations were thus selected in order to capture a variety of organizations' procedures and policies in nature values planning. The interviewees from these organizations were selected among forest and environmental professionals who accomplish nature values planning in practice. The interviews were conducted personally as group interviews, only one of them was made via phone. In-group interviews 2−6 persons attended.

In addition to the interviews, five observations of practical nature values planning encounters were made. Observation provides information on whether the people act as they say (see Patton 2002). Observation also produces spontaneous information, in this case, from a real nature values planning situation and the interplay between forest or environmental professional and the forest owner at hand.

2.3 Analyses

Interviews were planned and analyzed by using SSM's CATWOE process, which means decomposing the system into elements and building up a core definition that reflects the operation of the system as such. CATWOE helps to identify the individual subsystems, systemic processes and factors that in one way or another affect the overall operation of the system. In

practice analyses were carried out as a table in Excel-format, where interviews were divided into CATWOE elements. These elements and an example of an analyzed interview are shown in Table 1. Based on this division we built up models of the present state of nature values conservation and planning practices in Finland. Narrative models of purposeful action were identified by comparing the different CATWOE synopses and reflecting them with the challenges presented in introduction. After that, tensions inside the overall system were observed and highlighted.

Table 1. Elements of CATWOE and an example from CATWOE-analyses.

CATWOE element	Example of an analyzed interview
C = Customer/ client (people who are affected by the process)	Forest owner
A = Actors (people who do the activities)	- Forest owner - Forest advisor - Forest planner - Timber buyer
T = Transformation process (the transformation process itself, which may change the system resource to future product)	- No real nature value products (like nature oriented forest plan) - Nature values considered as normal work - No nature management projects - In practice work for nature values is making METSO contracts - Usually special habitats are identified during field visit and reported to forest owners - When forest owner is interested, contracts are taken forward
W = Worldview	Environmental compensation is a way to earn money from the habitat, which will be left aside anyway Both forest owners and forest advisors attitudes toward permanent conservation contracts are negative on the other hand attitudes toward temporary contracts are positive
O = Owners (people, who could stop or change the process)	Forest owner Forest planner and advisor Regional forest centers Ely-centers
E = Environmental constraints (Various constraints from the environment outside itself which are taken as given (such as body of law, or a finite budget)	- Laws - Certification - Official instructions - Official directions

3 Results

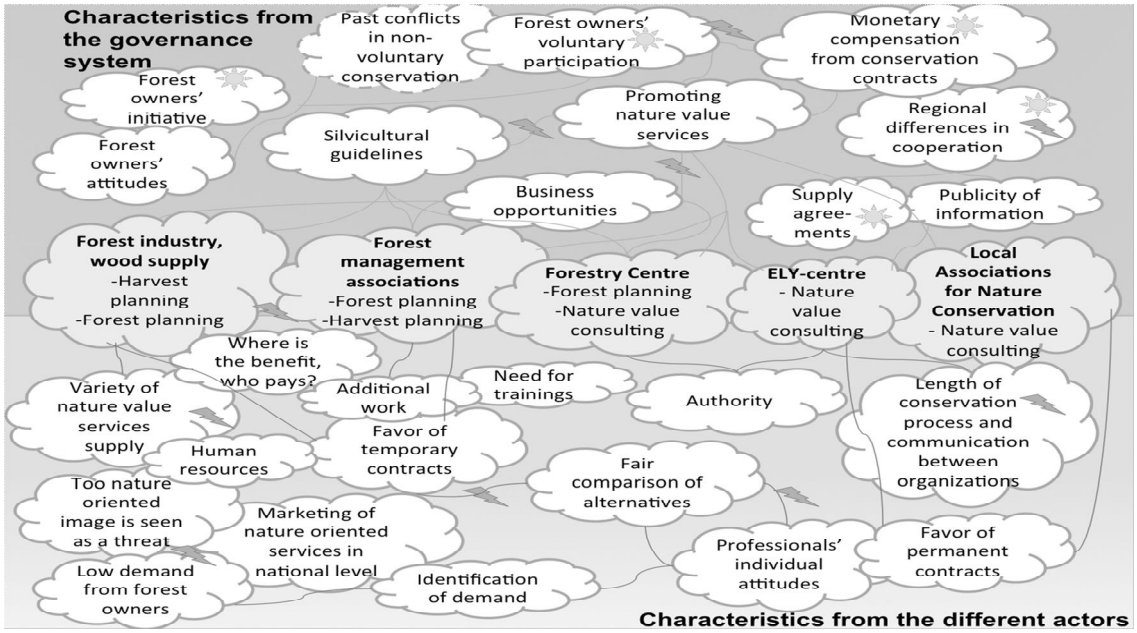
3.1 Present state

In general, the METSO programme's model of voluntary operation has started well. Actors' experiences about forest owners' initiatives, monetary compensation of conservation as well as the supply of agreements have been positive. As the CATWOE analyses revealed, the temporary or permanent conservation contracts have had the greatest role in nature values conservation. Usually nature values were recognized and taken into account in organizations' normal practices and the actual nature value services were only seldom used. Often legislation and certification, for example, set the limits how nature values were taken into account and the operation as a target-oriented nature values planning were found only randomly and especially in environmental organizations.

In addition to conservation contracts, nature management was an important part on safeguarding nature values. Nature management projects were carried out in the FC as well as in ELY-centres. Projects had included, among other things, water protection activities, spring, small water habitat and watershed rehabilitation, improving herb-rich forests and safeguarding carnivore birds.

Based on the analyses it can be stated that different actors' worldviews affected their behavior. How thoroughly rationales for conservation and different alternatives were presented to the forest owner, depended a lot on forest and environmental professionals' knowledge but also on their attitudes toward nature values conservation. Expertise in planning nature values conservation differed between organizations and personnel. Some professionals had great expertise in nature values, for example, skills of identifying different species but others had only basic knowledge about nature values conservation. How conservation contracts were taken forward, depended on forest owners' own interests and worldviews.

Fig. 2. Soft-systemic illustration of the themes emerged in the interviews; actors in the middle, general themes on top and actor-specific themes at the bottom. Positive and tensious features marked with suns and lightning, respectively.



Usually these organizations did not have any special tools for planning nature values conservation and the instructions how the nature values should be taken care of varied a lot and they were only seldom implemented. Information about nature values were experienced to be adequately available even though the level of information varied a lot between organizations.

3.2 Observed tension and challenges

Based on the CATWOE analyses the tensions and developing needs and their connections are gathered to the Fig. 2. Clouds in the middle of the picture present the different organizations and their operations on the field of nature values conservation. Characteristics coming from the governance system are gathered in the top of the picture, while characteristics from the different actors are in the bottom of the picture. Suns represent the characters experienced positively and lightnings experienced tensions.

The CATWOE analyses revealed a need for a fair comparison of nature values conservation alternatives. This need was taken up especially in environmental organizations. It was noted that often forest owners got different kind of information and guidance depending on the organizations they were contacted with. This could lead to a situation where certain conservation alternatives are emphasized more than others.

Cooperation between organizations varied a lot. Both organizations' and individuals' attitudes toward nature values conservation were still complicated. In general, however, nature values were considered positively and attitudes had changed over the past decade to more positive. Also, forest owners were assumed to consider nature values and conservation mainly positive. Lack of resources, including financial, personnel and time resources, had been a challenge in many organizations. In some organizations, especially in forest industry companies and Forest Management Association, nature conservation planning was considered as an additional work apart from organizations' normal practices.

4 Discussion

Safeguarding forest biodiversity by means of private forest land owners' voluntary actions has taken its first steps in Finland. The interorganizational activity model to support forest owners' biodiversity-related decision making is being adjusted basing on traditional forestry organizations. The soft systems methodology framework enabled analyzing institutional actors' roles and perceptions in the currently evolving circumstances. In the present analysis, we acquired a rich picture of the overall situation with its strengths and inherent tensions.

The fact that voluntary conservation agreements are constantly being made can be seen as a positive sign of actors' learning to apply the METSO approach. While different participating institutions have their own service models to take care of forest owners' conservation-related and other motives, the results underline the well-functioning co-operation between organizations in biodiversity conservation matters. This feature of the current situation offers a promising base for further enhancing the actors' roles and responsibilities as well as general information logistics of METSO means.

However, the observations that attention paid to biodiversity aspects varies and information delivered to forest owners may be biased to one or another direction indicate a clear challenge. It is natural that timber buying companies cannot act similarly compared to nature conservation agencies, but to avoid misunderstandings the factual information about METSO alternatives should be congruent regardless of the information source. To appreciate forest owners'

voluntary action and the power to decide, the owners should be given simple guidelines of what the alternatives, their grounds and expected effects are. A reasoned recommendation is to continue efforts aiming at improving professional actors' knowledge levels of METSO means. More trainings, field guides and thematic workshops are needed.

The interconnectedness of public and private interests as well as policy and commercial motivations makes biodiversity conservation a contradictory action. This was reflected in the interviews so that in general voluntary conservation still appeared as an exception, not an equal alternative for forest use. Biodiversity conservation could be turned from constraint to goal, which would then be pursued along with wood production, and other goals that the forest owner might have. Considering developing natural values as a goal in private forest ownership would allow establishing new practices in which the nature values of forests are continuously assessed and monitored within ordinary forest advisory. In this action, the expertise of nature-specified NGOs should be acknowledged and utilized. Currently however, there are no market payers to biodiversity, and natural values trade is missing from the action palette. It is insufficient to only have taxpayers paying compensation for monetary losses of conservation: roles of public and market services in biodiversity conservation need clarification and new market players are needed e.g. to plan and conduct nature management projects.

One goal of this study was to lay grounds for visioning and taking action in biodiversity conservation services which are offered for private forest owners. This goal was quite well achieved; several tensions between different models of purposeful actions and needs for decision support tools were recognized. However, the results of the interviews might still mainly correspond to the present situation of the METSO programme and the forestry organizations; not very many alternative futures could be recognized in the interview results. However, the changes in the operational environment of forestry call for changes in the biodiversity protection services offered for the forest owners. For example, the public funding paid to forestry organizations is already more clearly separated from the services offered for the forest owners. In general, the state funding for forestry organizations may decrease, and the funding for voluntary biodiversity protection may be more directly paid to the forest owners. In one future vision, the forest owner could use a part of the biodiversity protection subsidy for buying advisory services. This, in turn, might actually change the models of purposeful actions in the organizations who offer biodiversity protection services.

References

Checkland, P. 1999, Systems Thinking, Systems Practice: includes a 30-year retrospective, John Wiley and Sons Ltd, Chichester. 416 p.

Checkland, P. & Poulter, J. 2010. Soft Systems Methodology. In: M. Reynolds and S. Howell (eds.), Systems Approaches to Managing Change. Open University, Springer-Verland, London. pp. 191–242.

Cundill, G., Cumming, G.S., Biggs, D. & Fabricius, C. 2012. Soft Systems Thinking and Social Learning for Adaptive Management. Conservation Biology 26(1): 13–20.

Government Resolution on the Forest Biodiversity Programme for Southern Finland 2008–2016 (METSO). 2008. 13 p.

Hallikainen, V., Hyppönen, M., Pernu, L. & Puoskari, J. 2010. Family forest owners' opinions about forest management in northern Finland. Silva Fennica 44(2): 363–384.

Horne, P. 2006. Forest owners' acceptance of incentive based policy instruments in forest biodiversity conservation – a choice experiment based approach. Silva Fennica 40(1): 169–178.

Horne, P., Koskela, T., Ovaskainen, V. & Horne, T. (eds.) 2009. Safeguarding forest biodiversity in Finland: citizens' and non-industrial private forest owners' views. Working Papers of the Finnish Forest Research Institute 119.

Hujala, T., Kurttila, M., Korhonen, K. & Pykäläinen, J. 2010. Reasoning of family forest owners - survey of forest management and biodiversity protection problems. Scandinavian Forest Economics 43: 146–160.

Kotilainen, J. & Rytteri, T. 2011. Transformation of forest policy regimes in Finland since the 19th century. Journal of Historical Geography 37(4): 429–439.

Macadam, R., Britton, I., Russell, D. & Potts, W. 1990. The use of soft systems methodology to improve the adoption by Australian cotton growers of the siratac computer-based crop management system. Agricultural Systems 34(1): 1–14.

Ní Dhubháin, A. 2011. New Forest Owners – Small-Scale Forestry and Changes in Forest Ownership. In: E. Ritter and D. Dauksta (eds), New Perspectives on People and Forests. World Forests, 2011, Volume 9, Part 2, pp. 75–86.

Patton, M.Q. 2002. Qualitative Research & Evaluation Methods, 3rd ed. Sage, Thousand Oaks. 688 p.

Tikkanen, J., Hokajärvi, R. & Hujala, T. 2010. Development phases of forest planning on non-industrial private lands in Finland: Perspective of planners' work. Small-scale Forestry 9(3): 331–347.

Wengraf, T. 2001. Qualitative Research Interviewing. Biographic Narrative and Semi-Structured Methods. Sage Publications, London. 398 p.

Wiersum, K.F., Elands, B.H.M. & Hoogstra, M.A. 2005. Small-scale forest ownership across Europe: Characteristics and future potential. Small-Scale Forestry 4(1): 1−19.

Performance Bonds in Tropical Timber Concessions: Encouraging the Adoption of Reduced Impact Logging Techniques

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Abstract

We examine the use of performance bonds in tropical forest concessions. Bonds are a promising new policy instrument that have been discussed in several articles and used in some cases as a way of encouraging adoption of sustainable forest management practices, including reduced impact logging methods, and have been proposed due to apparent failures of traditional Pigouvian instruments. Our research examines the impact of three practical complications hindering the effective adoption of bonding schemes: harvester participation constraints, government repayment risk, and imperfect enforcement. By building a simple two-stage analytical model, we first highlight the role of participation constraints in the concession bond design problem. Model simulations are used to examine policy implications such as potential for REDD+ payments in improving the bonding outcomes, and how high these payments should be in order to guarantee full compliance with reduced impact logging.

Keywords: Environmental Bonds, Capital Constraints, Sustainable Forest Management, RIL, REDD+

1 Introduction

Poor design and harvesting practices in industrial timber concessions are commonly identified as significant, albeit indirect, causes of tropical deforestation. High grading, illegal logging, and collateral stand damages have led to forest degradation, whereas roads have provided access routes to slash-and-burn agriculture and ensuing deforestation. The standard way governments have regulated these actions is through taxes, or royalties, for harvesting either based on volume or area, with the idea of seeking a first best Pigouvian solution. Many, including Ruzicka (2010) recently, have argued for a better evaluation of the obstacles hindering the use of non-tax market alternatives such as bonding in concession design.

Forest concessions typically involve the government allocating the forest use rights to a private concessionaire or contracting with a firm for forest management services, all of which require firms to fulfill a wide range of contract clauses (Gray 2002, Karsenty et al. 2008). The main challenge facing the government is how to guarantee concessionaires' adherence to contract rules in an institutional setting characterized by imperfect enforcement and omnipresent corruption, all of which impede tropical developing governments from managing concession design (e.g., Amacher et al. 2007). Environmental performance bonds have received some attention in the literature as a

promising complement to royalties for governments seeking to both capture rents and ensure harvesters follow concessions rules (e.g., Ruzicka 2010, Macpherson et al. 2010, Leruth et al. 2001, Boscolo and Vincent 2000, Paris et al. 1994). The idea is that performance bonds create a stronger incentive for harvesters to comply with concession rules and at the same time provide the government with critical funds to compensate for environmental damages when they occur.[1] Bonds have not, however, gained much traction in practice for a wide variety of reasons. At the most basic level, setting "the right" bond payment has been difficult. In developing countries frequently listed obstacles to bonding include bond repayment risk and concessionaires' liquidity constraints.

The purpose of our research is to examine the properties of performance bond schemes and to identify their potential shortcomings in the context of Reduced Impact Logging (RIL) standards for forest concessions. Previously, Boscolo and Vincent (2000) and Macpherson et al. (2010) have examined the effectiveness of bonds in enforcing RIL standards, whereas Boltz et al. (2003) conclude that the harvesters may not fully implement RIL techniques without additional incentives. Our novel contribution is to concentrate on three well-identified complications: liquidity (credit) constraints on the part of the harvester, imperfect enforcement, and repayment risk stemming from the government's potential inability to pay back the bond at the end of the concession.[2]

Credit constraints are caused by "thin" financial markets, a condition prevalent in many tropical countries, that prevents smaller scale concessionaires from sufficient collateral needed to obtain credit in the first place (Simula et al. 2002; Canby and Raditz 2006; Pescott et al. 2010; Grossheim 2011). Imperfect enforcement has been frequently identified as one of the most problematic features of tropical timber concessions, either due to poor monitoring, inadequate judicial systems, corrupt governments, and vast land areas provide a suitable environment for low enforcement, contract violations and illegal logging (Callister 1999; Hardner and Rice 2000; Contreras-Hermosilla 2002; Amacher et al 2012). Repayment risk stems partly from unpredictable institutional arrangements typical of many of the tropical countries. Governments may not be able honor promises to repay the bond at the end of the concession contract, or bureaucratic red tape may make repayment time unreasonably long. Institutional uncertainty causes skepticism especially with respect to the transparency and fairness of the final assessment method (Merry and Amacher 2005). Credit constraints are further exacerbated by the presence of such concerns since creditors may require a higher risk premium, or they will simply refuse to extend credit.

[1] Leruth et al. (2001) advocate the use of performance bonding arguing that they reduce public monitoring costs by relying mainly on a final inspection. Mathis and Baker (2002) track the fundamental concept of "assurance" schemes to "materials-use fees" originating from Solow (1971) and Mills (1972). Other examples come from refundable deposit schemes in beverage industry (Sterner 2003) and mine reclamation in the U.S. and Australia (Sullivan and Amacher 2009).

[2] Shogren et al. (1993) list moral hazard, liquidity constraints, and legal restrictions on contracts as potential disadvantages associated with performance bonds in environmental regulation.

[2] See for example Karsenty (2010), Merry and Amacher (2005), Paris et al. (1994), Leruth et al. (2001) and Macpherson et al. (2010). Particularly relevant for our study, Leruth et al. (2001) show that royalty rates may fail to encourage the adoption of environmentally less harmful logging practices pointing out that the negative externality is only weakly related to the quantity harvested, thus rendering the classical Pigouvian solution ineffective. Instead of improving the harvest method, the concessionaire may simply cut costs by adopting an even more harmful harvest technology.

In the context of industrial logging concessions, performance bonds have been actively discussed for the past two decades as an alternative to poorly designed royalty systems that are not effective at capturing rents or creating incentives for sustainable harvesting, at least since Paris et al. (1994).[3] While there have been some actual experiments with forest concession performance bonds in The Philippines and Malaysia during the 1990's, the policy outcomes were disappointing. Too low of an initial bond payment has been faulted as the main cause for policy failure (Moura Costa, 1999). Ruzicka (2010), however, argues that performance bonding schemes have never really been tried properly and calls for further investigation of their potential for concessions. Boscolo and Vincent (2000) and more recently Macpherson et al. (2010) investigate the effectiveness of performance bonding schemes and renewability audits in industrial forest concessions using simulation studies which link their analytical model to practical data. Both studies find that performance bonding schemes can be successfully used to enforce reduced impact logging practices in forest management. Based on their simulation analysis, Macpherson et al. (2012) conjecture that although RIL is found to be superior in comparison to conventional logging methods in net present value terms, concession loggers may still choose to only partially adopt RIL and instead use harvest practices that directly improve profitability. For example, Putz et al (2008) observe that logging companies employ few forest engineers and few foresters and thus have insufficient competency in RIL techniques.

2 Concessions Bond Model with Participation Constraint

We next proceed by setting up the simplest analytical model where the government owns a forest stand, the concessionaire is a privately-owned firm, henceforth called the concession harvester, and there are reduced impact logging (RIL) standards within the concession contract that specify a list of preharvest procedures and harvesting techniques required of the firm.[4] The goal of the government is to achieve the highest possible level of compliance with the RIL standards.[5] Following Boscolo and Vincent (2000) and Macpherson et al. (2010), we define a continuous index variable $x \in [0,1]$ that represents the exact extent of RIL compliance by the harvester. The lower bound, $\underline{x} = 0$, means zero compliance, and the upper bound, $\overline{x} = 1$, means full compliance. Hence, the index variable x can be thought of as simply the percentage of compliance with RIL standards. Conversely, $1 - x$ denotes the extent of noncompliance with the contract rules governing the concession.

[4] For a fully detailed model, see Kuusela et al. (2012).

[5] Putz et al (2008) define reduced impact logging as "intensively planned and carefully controlled timber harvesting conducted by trained workers in ways that minimize the deleterious impacts of logging." De Blas and Pérez (2008) provide the following list defining RIL requirements: the delimitation of protected forests within concessions; the determination and use of minimum tree diameter at breast height (dbh); the development of a management plan and a logging inventory; minimizing the width and density of the logging roads network; planning of logging roads; setting a maximum ceiling on number of trees felled by hectare; use of directional felling; optimizing timber transport roads network; and planning of timber yards.

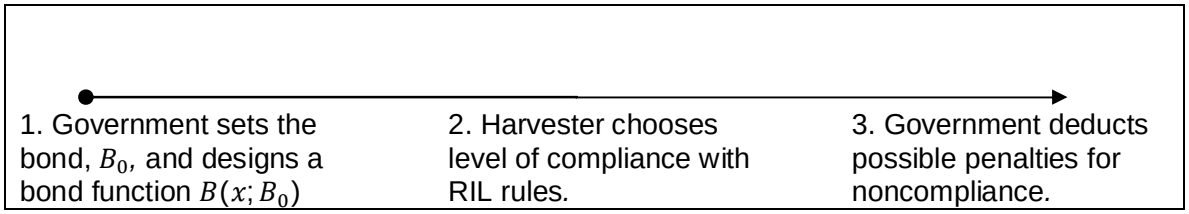

Fig. 1. Timing of effects in the concession model

The concession harvester's goal is to minimize its compliance costs. The harvester's convex RIL cost function is defined as $c(x)$ which is increasing and continuously differentiable over a convex and closed set $[0,1]$. Private RIL costs include capital and labor related costs as well as any other related opportunity cost (these may include forgone profits from not engaging in illegal activity).[6] We assume that $c(0) = 0$ holds, although this is not critical. The interpretation for the convex cost function is that the final RIL activities, such as retaining some of the most valuable species standing in the forest, are much costlier to the harvester than initial site preparation work such as road building and mapping. Finally, we assume the information on the shape of the cost function, $c(x)$, is symmetric knowledge (Amacher and Malik, 1998). This assumption is realistic as RIL requirements are usually designed by NGOs, are typically known and common knowledge, and the information on the costs of compliance is often readily accessible and part of extension activities in tropical concession countries.

To enforce RIL standards, the government requires a bond deposit, B_0, from the concession harvester at the beginning of the contract. To make the bond payment operational, the government devises a bond penalty function $B: [0,1] \rightarrow \mathbb{R}^+$ that maps the harvester's level of compliance to corresponding penalties. This function may in principle take any monotone decreasing form, although we rule out "all-or-nothing" bonds. Figure 1 illustrates the timing of events in our concession model. First, the harvester pays the initial bond payment, B_0, and then takes this entry decision and the penalty mapping, $B(x; B_0)$, as given when deciding the level of RIL compliance based on a cost minimization problem. Based on the harvester's RIL decision, the government proceeds to deduct any penalties from the bond as dictated by the penalty mapping.

For any target compliance level $x_0 \in (0,1]$, where $x_0 = 1$ means full compliance, we require the penalty function $B(x)$ to satisfy the compliance based conditions $B(x_0) = 0$ and $B(0) = B_0$. In other words, target compliance results in no penalties and zero compliance results in full initial bond confiscation. The harvester receives back any amount that is left over from the original bond deposit after deducting for penalties. We can therefore think of the bond penalty function explicitly laying out the liability rules imposed on the harvester for all possible concession outcomes. Unlike in our paper, Boscolo and Vincent (2000) and Macpherson et al. (2010) both define a linear bond function $B(x) = B_0 - xB_0$, or simply $B(x) = B_0(1 - x)$. This type of bond function, however, uses only the bond payment as an instrument but does not utilize the information about the harvester's cost structure.

[6] Although the literature provides mixed evidence on the relative profitability of RIL over conventional logging practices (Medjibe and Putz 2012), our analysis will take it as given that switching to RIL methods means real costs for the harvester, in one form or another. Boltz et al. (2003) find that RIL techniques may incur much higher opportunity costs than conventional logging.

Entering a bond scheme is costly for the harvester. This is captured by a convex bond cost function $F = F(B)$ that is increasing in the level of required bond deposit, *B*. This function captures the harvester's borrowing costs, including transaction costs related to liquidity constraints, or alternatively the opportunity cost of using its own capital.[7] For example, as is the case in many tropical countries, concessionaires must resort to external funding for the bond payment as they lack sufficient funds prior to the concession. The bigger the bond the more expensive it is to borrow funds, that is, $F_B > 0$ holds (e.g., interest payments are increasing in *B*). Most importantly, when the harvester enters the concession contract, the bond cost is sunk and does not enter the harvester's cost minimization problem.

The harvester participates as long as bond costs do not exceed some threshold level, defined here as $\bar{F}$. That is, the harvester enters the concession bond scheme if and only if $F(B) \leq \bar{F}$. We assume that this parameter $\bar{F}$ is exogenously given, but conceivably, it could be a function of such things as timber prices, availability of competing investment opportunities, and the harvester's liquidity in financial markets. Naturally, bigger concession harvesters have better access to capital than smaller ones, which means that $\bar{F}$ is likely to be higher for big, multinational firms than for local harvesters. The maximum bond payment, denoted by $\bar{B}$, is given by the inverse mapping of the participation cost function: $\bar{B} = F^{-1}(\bar{F})$. This simply means that when access to funds or availability of capital is better, the harvester is able to post a larger bond at the limit as $\bar{F}$ is higher. Next we describe concession bond outcomes conditional on the harvester's participation costs. We call the full compliance case as "first best", and any other outcome as "second best".

First Best: If the harvester's participation constraint is such that the maximum bond payment satisfies $\bar{B} > c(1)$, then achieving full RIL compliance is feasible. In this case, any bond payment B_0 such that $B_0 \in (c(1), \bar{B}]$ is possible.

Second Best: If $\bar{B} \leq c(1)$, then the government chooses $\bar{B}$ as a second best bond. This guarantees the highest possible RIL compliance that is feasible given the harvester's participation constraint.

Proposition 1: Given a target RIL level $x_0 < \bar{x}$, where $\bar{x}$ defines the upper bound for second best targets, the simplest continuous and non-negative bond function $B(x; \bar{B})$ that is feasible under the binding participation constraint is given by

$$B(x; \bar{B}) = \begin{cases} \bar{B} - c(x) - \dfrac{a}{x_0}x, & x < x_0 \\ 0, & x \geq x_0 \end{cases}$$

where $\bar{B} \equiv F^{-1}(\bar{F})$ and $a = \bar{B} - c(x_0)$. For proof, see Kuusela et al. (2012).

[7] Even if the government offered to pay interest on the bond payment during the holding period, it is very unlikely that this interest rate would coincide with the harvester's private discount rate that may potentially be much higher.

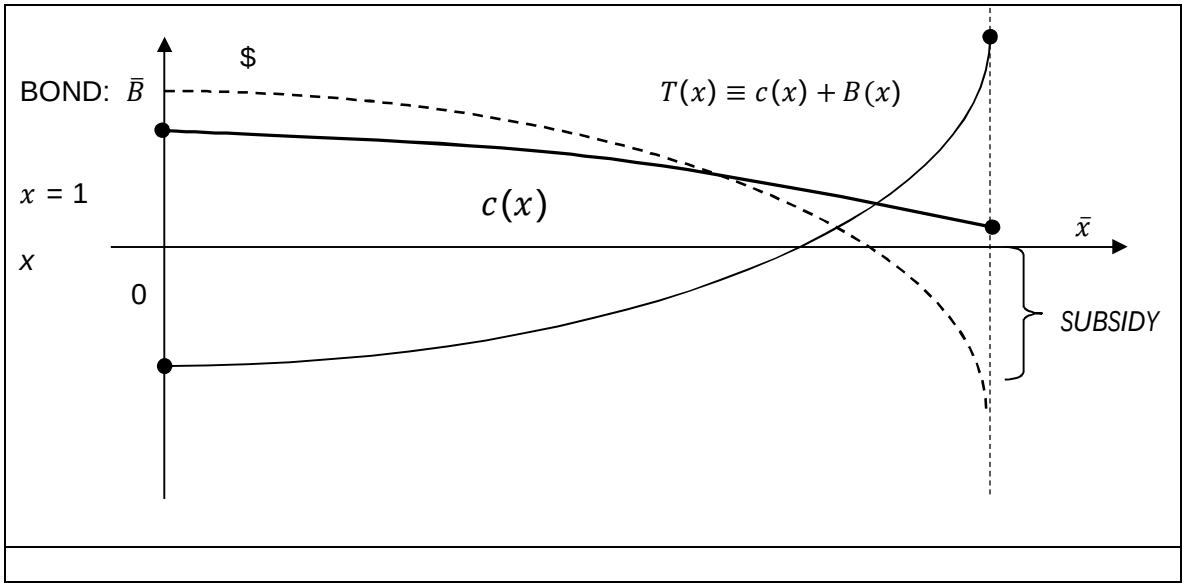

Fig. 2. An example of the second.best bonde.

In the second best case, the government's problem has become one of simply choosing some target RIL level $x_0 < \bar{x}$ since the maximum bond payment $\bar{B}$ is exogenously given. The government does not have an incentive to ask for any smaller bond payment $B_0 < \bar{B}$ as the harvester's participation decision would be unchanged and smaller bond payments would decrease the upper bound $\bar{x}$. Note in this case that by providing a subsidy the government could potentially improve the concession outcome. Figure 2 illustrates an example where the harvester has been unable to post a first-best bond and therefore the government has asked for a second-best bond $\bar{B}$. In order to move the concession outcome to full RIL compliance the government must subsidize the harvester by the amount shown in the figure as the segment below the x axis. As a result, the total cost of compliance, $T(x)$, has its minimum point at $x = 1$ and this is the point the harvester then chooses.

3 Model Simulations

To gain better understanding of how performance bonds work in practice, we use a simulation model built on the analytical framework laid out in the above discussion. Holmes et al. (2001) and Medjibe and Putz (2012) list RIL related costs by each component and each task has a differing cost. Opportunity cost of RIL compliance may become even higher than the actual technical costs. To keep the analysis tractable, we propose the following functional forms the RIL cost function and harvester participation:

$$c(x) = Kx^2$$
$$F(B) = d_1 B + d_2$$

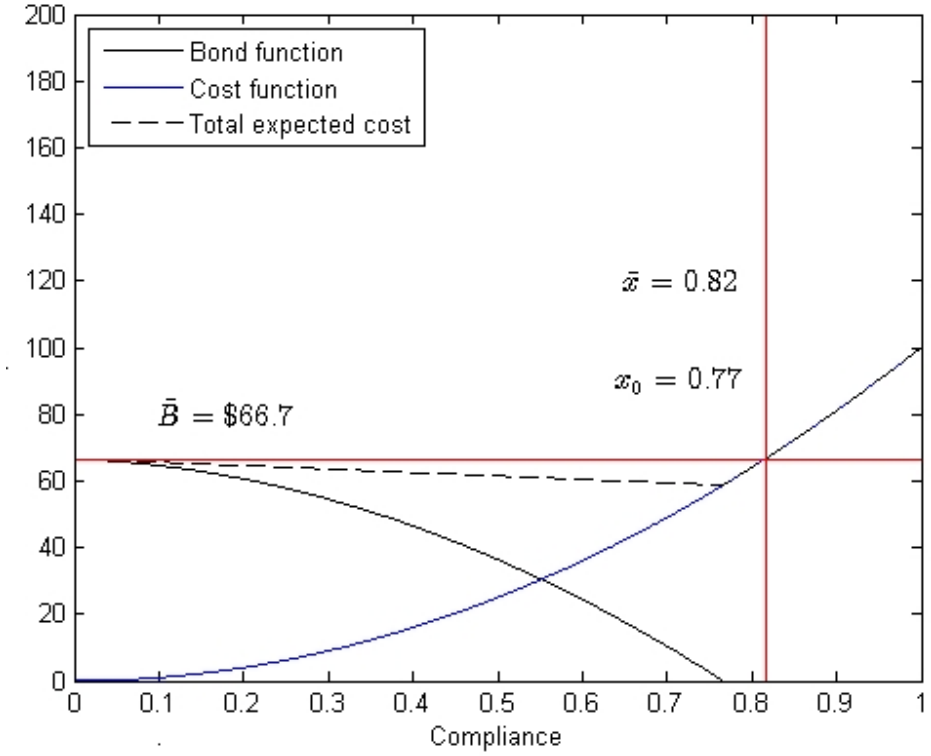

Fig. 3. a second-best RIL compliance scenario

where k, d_1, d_2 are parameters that we choose to calibrate the model to fit real world data. The RIL cost function takes a simple quadratic form to capture the increasing costs implementation and the participation cost function is simply a linear function in bond size. Parameters d_1 and d_2 can be thought of as the interest rate and fixed borrowing cost, respectively. Table 1 lists the parameter values we have chosen for the simulation study. We assume in this study that full implementation of RIL costs an additional $ 100 per hectare and use this value to pin down the parameter *k* by using the condition *c*(1) = *k* from our cost function specification. [8]

Table 1. Parameter values used in simulation.

Parameter	Value	Description
K	100	Cost function parameter
d_1	0.15	Participation cost function
d_2	5	Participation cost function
$c(1)$	$100	Cost of full RIL per hectare
$\bar{F}$	$15	Maximum bond cost per hectare

[8] See Kuusela et al. (2012) for further discussion. There we develop a more nuanced bond-subsidy scheme.

Figure 3 presents a second-best RIL compliance scenario. The participation constraint, $\bar{F}$, is set at \$15 and the maximum target level and maximum bond payment are therefore $\bar{x} = 0.82$ and $\bar{B} = 66.7$, respectively. We assume that the government sets a RIL target level of $x_0 = 0.77$. In the figure, this and bond payment are both encircled with red dashed line. Notice that the RIL target level is also the resulting compliance level since it is the point that minimizes the total cost of compliance, $T(x) = c(x) + B(x; B_0)$, given the bond function in Proposition 1. In order to move this concession bond outcome to the first best, the government would need to devise a bond-subsidy scheme given by function

$$B(x; \bar{B}) = \bar{B} - c(x) - a/\bar{x}\ x$$

where negative values signify a subsidy payment to the harvester. Using the above parameter values, we compute the total required subsidy to be \$43. Alternatively, the government can also directly subsidize the harvester's bond related costs.[9]

4 Conclusions

Application of environmentally sensitive logging practices in tropical concessions continues to pose a policy challenge. Despite the evidence that RIL may actually reduce operational costs in some instances, harvesters have remained reluctant to invest in RIL capacity. Performance bonds have been suggested as an additional policy instrument in enforcing concession management practices. They have not, however, gained much traction for various reasons as outlined in the above discussion. In this paper, we highlighted the role of binding credit constraints using a simple model of RIL compliance, and showed potential for government subsidies or REDD+ payments in improving the bonding outcomes. In a closely related work (Kuusela et al. 2012), we extend this model to incorporate repayment risk and imperfect enforcement, and find new and interesting results. These more realistic concession features enable us to derive concession bond function properties and required subsidies that are more aligned with the realities facing many tropical countries.

References

Amacher, G.S., Koskela, E. and Ollikainen, M. 2007. Royalty Reform and Illegal Reporting of Harvest Volumes under Alternative Penalty Schemes. Environmental and Resource Economics 38(2): 189-211.

Amacher, G.S. and Malik, A.S. 1998. Instrument Choice when Regulators and Firms Bargain. Journal of Environmental Economics and Management 35(3): 225-241.

Amacher, G.S., Ollikainen, M. & Koskela, E. 2012. Corruption and Forest Concessions. Journal of Environmental Economics and Management 63: 92-104.

Boltz, F., Holmes, T.P. and Carter, D.R. 2003. Economic and Environmental Impacts of Conventional and Reduced-Impact Logging in Tropical South America: a Comparative Review. Forest Policy and Economics 5: 69-81.

Boscolo, M. and Vincent J.R. 2000. Promoting Better Logging Practices in Tropical Forests: a Simulation Analysis of Alternative Regulations. Land Economics 76(1): 1-14.

[9] See Kuusela et al. (2012) for further discussion. There we develop a more nuanced bond-subsidy scheme.

Callister , D.J. 1999. Corrupt and Illegal Activities in the Forestry Sector: Current Understandings and Implications for World Bank Forest Policy. Working Paper, World Bank, Washington DC.

Canby, K. and Raditz, K. 2006. Opportunities and Constraints to Investment: Natural Tropical Forest Industries. Forest Trends, ITTO.

Contreras-Hermosilla, A. 2002. The Underlying Causes of Forest Decline. Occasional Paper No. 30, Center for International Forestry Research (CIFOR), Bogor, Indonesia.

De Blas, D.E. and Pérez, M.R. 2008. Prospects of Reduced Impact Logging in Central African Logging Concessions. Forest Ecology and Management 256(7): 1509-1516.

Gray, J.A. 2002. Forest Concession Policies and Revenue Systems: Country Experience and Policy Changes for Sustainable Tropical Forestry. World Bank Technical Paper, Forest Series, Washington DC.

Grossheim, C. 2011. Forest Concessions in Peru. In Gunter S., M. Weber, B. Stimm and R. Mosandi (eds.). Silviculture in the Tropics. Tropical Forestry 8: 53-60.

Hardner, J. and Rice, R. 2000. Rethinking Forest Use Contracts in Latin America. Environmental Division Working Paper, Inter-American Development Bank, Washington DC.

Karsenty, A. 2010. Forest Taxation Regime for Tropical Forests: Lessons from Central Africa. International Forestry Review, 12(2), 121-129.

Karsenty, A., Drigo, I.G., Piketty, M.G. and Singer, B. 2008. Regulating Industrial Forest Concessions in Central Africa and South America. Forest Ecology and Management 256(7): 1498-1508.

Kuusela, O.P., Amacher, G.S. and Moeltner, K. 2012. Performance Bonds in Timber Concessions. FREC Working Paper, Virginia Tech.

Leruth, L., Paris, R. and Ruzicka, I. 2001. The Complier Pays Principle: the Limits of Fiscal Approaches toward Sustainable Forest Management. IMF Staff Papers 48(2): 397-423.

Macpherson, A.J., Carter, D.R., Lentini, M.W., and Schulze, M.D. 2010. Following the Rules: Brazilian Logging Concessions under Imperfect Enforcement and Royalties. Land Economics, 86(3), 493-513.

Mathis, M.L. and Baker. P.B. 2002. Assurance Bonds: a Tool for Managing Environmental Costs in Aquaculture. Aquaculture Economics and Management 6(1-2): 1-17.

Medjibe, V.P. and Putz, F.E. 2012. Cost Comparisons of Reduced-Impact and Conventional Logging in the Tropics. Journal of Forest Economics 18(3): 242-256.

Merry, F.D. and Amacher, G.S. 2005. Forest Taxes, Timber Concessions, and Policy Choices in the Amazon," Journal of Sustainable Forestry 20(2): 15-44.

Mills, E.S. 1972. Urban Economics. Scott, Foresman and Company, Glenview, Illinois.

Paris, R., Ruzicka, I. and Speechly, H. 1994. Performance Guarantee Bonds for Commercial Management of Natural Forests - Early Experience from the Philippines. Commonwealth Forestry Review 73(2): 106-112.

Pescott M., Durst, P.B. and Leslie, R.N. 2010. Growing Green Assets: Removing Constraints to Private Sector Investment in Forestry in Asia and the Pacific. RAP Publication 18, FAO, Bangkok

Putz, F.E., Sist, P., Fredericksen, T. & Dykstra, D. 2008. Reduced-Impact Logging: Challenges and Opportunities. Forest Ecology and Management 256: 1427-1433.

Ruzicka, I. 2010. Taxation of Tropical Forests: Search for Generalizations after Half a Century of Trying. International Forestry Review 12(2): 181-186.

Shogren, J.F., Herriges, J.A., and Govindasamy, R. 1993. Limits to Environmental Bonds. Ecological Economics 8(2): 109-133.

Simula M., Salmi, J. and Puustajarvi, E. 2002. Forest Financing in Latin America: The Role of the Inter-American Development Bank. Best Practices Series, Sustainable Development Department, IDB, Washington DC.

Solow, R.M. 1971. The Economist's Approach to Pollution and Its Control. Science 173: 502.

Sterner, T. 2003. Policy Instruments for Environmental and Natural Resource Management. RFF Press.

Sullivan, J. and Amacher, G.S. 2009. The Social Cost of Mineland -Restoration. Land Economics 85(4): 712-726.

Incorporating Climate Change Impacts in Forest Market Models

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Abstract

Climate change induced by anthropogenic greenhouse gas (GHG) emissions such as fossil fuel combustion, conversion of forest land, agriculture, and industry has emerged as one of the most compelling issues of our time. Forests can play a central role in emissions abatement efforts through afforestation, improved forest management, and utilization of biomass for energy production. Identifying effective mitigation opportunities is difficult in that it involves a complex interaction between shifts in forest investment, harvest rates, and utilization as well as the associated market responses via prices and trade levels. Forest sector models are being increasingly utilized to identify efficient policy signals that reduce GHG emissions levels to meet both domestic and international climate change goals. Their ability to simulate climate change policies vary as they differ in geographic scope, intertemporal dynamics, product incorporation, and forest growth representation. First, we summarize an array of studies linking commonly applied forest sector models with vegetation models projections of climate change impacts. We then discuss issues that may influence a model's ability to simulate a policy or impact of a changing climate on forests. We conclude with suggestions for future modeling research challenges and opportunities.

Keywords: Forest Sector Model, Climate Change

1 Introduction

The interaction of human and ecological systems is the primary determinant of global sustainability. With population expected to grow from its present 7.0 to 9.3 billion by 2050 (FAO, 2012) analyses of the complex linkages and feedback loops within these systems are in great demand. This complex interrelationship is further exacerbated as changes in future climatic conditions affect forest productivity and disturbance patterns. Some of the expected changes to forest ecosystems ability to supply goods and services include productivity changes, species migration, and disturbance patterns while demand for agricultural products and housing may lead to land use change and energy policy may place an increased burden on forest to produce biomass for feedstocks for energy production. Researchers were quick to respond with analyses and models in an attempt to identifying and quantifying these changes, but were hampered by this problem that crosses political boundaries as readily as it crosses those of scientific disciplines.

The Intergovernmental Panel on Climate Change (IPCC) was the United Nation's response to this complex need for information regarding climate change. Aside from issuing periodic assessment reports on the state of research and understanding of climate change, a primary impact of the IPCC has been its development and specification of scenarios to be utilized in research endeavors. These scenarios have specific underlying socioeconomic drivers such as population and income growth, which then have a corresponding level of emissions and radiative forcing. These scenarios allow for better comparison and contrasting of studies of

different scopes and frames of reference, as well as studies with the same scopes and frames of reference, but different methodologies. IPCC has also been instrumental in providing fundamental climatic output data from large scale general circulation models (GCMs) for each of the scenarios which can then be utilized by researchers in various disciplines.

These GCMs and coarse scale socioeconomically driven scenarios have their place in providing the general framework from which smaller scale detailed analyses of the interaction of human and ecosystem processes can then be performed and compared. For human systems, partial equilibrium models narrow the focus to a specific economic sector and thereby allow much greater detail in sector specific policy instruments and impacts. By utilizing the IPCC common scenarios of climatic and socioeconomic drivers it is possible to compare results and sensitivities from fundamentally different forest sector models. Likewise, GCM output serves as input to vegetation models such as biogeography models in deriving maps of future vegetation types as well as biogeochemistry models that simulate altered rates of photosynthesis and thus Net Primary Productivity (NPP) within these vegetation types.

Attempts to utilize the vegetation model output in partial equilibrium models have led to substantial revisions and enhancements in forest sector models [1] and modeling. This paper summarizes the key features, assumptions, and recent developments of prominent economic models of the forest sector that have or could potentially be used by decision makers for policy analyses on climate change mitigation.

2 Literature Review

Over the last decade and a half there has been a number of global and regional efforts to develop linkages between vegetation models that integrate radiation, hydrology, and nutrient cycling creating a dynamic vegetation response consistent with fluctuations in climatic patterns and forest sector models that balance forest product supply with demand to create an economic equilibrium consistent with a changing society. By utilizing an equilibrium of the supply and demand of forest products, forest sector models inherently produce results consistent with basic economic theory. As they are partial equilibrium models, they cannot fully capture inter-industry and macro-economic implications of a policy as an economy-wide, or general equilibrium model can. The advantage of the partial equilibrium framework is its ability to provide more detailed analyses of the sectors included because their focus on these sectors enables inclusion of more finely disaggregated information and spatial scale than models representing the overall economy.

For this report these models into two categories based on the geographic frame of reference: (i) global models, and (ii) regional models. Table 1 presents some basic information about the models that have used to quantify the impacts of climate change on the forest sector. It further differentiates the models by the solution technique where the recursive dynamic models solve the equilibrium problem independently in each time period while the intertemporal optimization solution solves all time period equilibriums simultaneously. The final category is that of forest products considered.

[1] Here a forest sector model is defined as a model in which the equilibrium price of at least one forest product is determined endogenously through the model solution technique (usually intersection of upward sloping supply and downward sloping demand relations) which may contain one or many regions as well as one or many commodities.

Table 1. Forest Sector Partial Equilibrium Models Utilized in Climate Change Analyses

Model	Geographic Scope	Solution Technique	Vegetation Model
CGTM	Global	Recursive Dynamic	TEM
EFI-GTM	Global	Recursive Dynamic	EFISCEN
TSM	Global	Intertemporal Optimization	DOLY, BIOME, MAPPS, TEM, CENTURY
RPA	North America	Recursive Dynamic	TEM
FASOM	North America	Intertemporal Optimization	TEM, CENTURY

CGTM CINTRAFOR Global Trade Model
EFI-GTM European Forest Institute Global Trade Model
TSM Timber Supply Model
RPA Resource Planning Act Models
FASOM Forest and Agriculture Sector Optimization Model
TEM Terrestrial Ecosystem Model
EFISCEN European Forest Information Scenario Model
DOLY Dynamic Global Phytogeography Model
BIOME Equilibrium Terrestrial Biosphere Model
MAPPS Mapped Atmosphere-Plant-Soil System
CENTURY A hundred years

2.1 Global Models

One of the first attempts to incorporate vegetation model results in a forest sector model is that of the Timber Supply Model (TSM) of Sohngen et al. (2001). They utilize output from two GCMs and the vegetation model BIOME3 (Haxeltine and Prentice, 1996) to analyze the impact of climate change on global timber markets for the 150-year period 1995 - 2145. BIOME3 alters NPP, accounts for species migration, and allows for changes in forest area such as expansion into grassland. Sohngen et al. (2001) also remain the only study to this day that evaluate adaption through planting different species outside of their native regions as well as simulating forest dieback[2] in which portions of the timber inventory are removed with assumptions on the rates of salvage. The intertemporal optimization framework allows both the long time horizon and the ability to endogenously determine forest management decisions making the regeneration species choice an option. One noted issue is that BIOME3 simulates future vegetation dynamics in the absence of human intervention. This exclusion is at odds with the goals of the study and therefore sensitivities related to forestland expansion are explored. The changes in forest growth are all positive using one GCM and only negative in Oceana and the first 50-year period in North America. When averaged across GCM models, the net welfare impacts are positive in all cases with the exception of Oceana in the regeneration scenario. It is likely that this negative value would be positive if the model accounted for trade. The results could also be impacted by the inclusion of only stumpage markets. The TSM has also been used to evaluate the United States in more detail with 2 GCMs, 3 biogeographical, and 3 biogeochemical models (Sohngen and Mendelsohn, 1998) with discussion of both global and regional application in (Sohngen and Sedjo, 2005).

(Perez-Garcia et al., 2002)use the CINTRAFOR Global Trade Model (CGTM) to evaluate the impacts of climate change on the forest products sector. The CGTM accounts for manufactured products and trade, but the dynamic recursive solution technique of solving each year's equilibrium independently lacks the potential for forest investment adaption as seen in Sohngen

[2] Note that the dieback would be based on BIOME3 and thus based on no human activity resulting in an inconsistency with how they are used in the economic model particularly in later years in the modeling time horizon.

et al. (2001). Three different GCM derived scenarios from the 1995 IPCC Second Assessment Report were used as input for the Terrestrial Ecosystem Model (TEM) version 4.1 (Tian et al., 1999) to generate maps of global vegetative carbon in 2040 relative to 1985 and these values were then used to change the growth stock over region and time from 1994 – 2039. Like Sohngen et al. (2001) they find that regional surplus changes could vary with both positive and negative effects, but they also find that trade has an important role in dampening them.

The European Forest Institute's Global Trade Model (EFI-GTM) is another global forest sector model that descended from the pioneering work at the International Institute for Applied Systems Analysis (Kallio et al., 1987) in the 1980s, focuses on accelerated European forest growth (Solberg et al. 2003). They utilize baseline, medium and high levels of growth increases based on the European Forest Information Scenario (EFISCEN) model (Nabuurs et al., 2002). Like Sohngen et al. (2001) and Perez-Garcia et al. (2002) they found increases in consumer surplus in all cases. Unlike those studies, Solberg et al. (2003) found increases in producer surplus in all cases. This is most likely a result of not only demand elasticity differences, but also manufactured forest product detail for which CGTM has a limited set and TSM lacks, but EFI-GTM maintains in detail.

2.2 Regional-North America

The United States first included climate change impacts of forest productivity as part of its periodic assessment of the renewable resources assessments required by the Resources Planning Act (RPA) as part of its 1993 analysis (Adams and Haynes, 1996). Joyce et al. (1995) describes how four GCM model output was used as input to TEM to determine productivity changes. The values were then averaged for each region as well as across the 1990 – 2065 time periods and used as a simple linear multiplier for the timber growth functions. The projected changes led to a modest increase in growth and accompanying harvest and processing levels. The largest market segment, softwood lumber, shifted more of its sources to domestic logs resulting in a decrease in Canadian softwood lumber imports.

The 2005 update (Haynes et al., 2007) used derived similar process to estimate vegetative growth impacts of climate change, but with an updated TEM model, GCM inputs, and abandonment of the averaging of the growth changes over time. This resulted in lower growth multiplier in nearly all region and forest type combinations. These smaller changes result in similar, but lower, forest products market responses. They emphasize that the gradual rate of forest growth change leads to small changes in near term forest products markets. They also differentiate between the growth response due to climate change and the much larger growth change due to the "fertilization" effects of elevated CO_2 levels.

The Forest Sector Optimization Model (FASOM) has also been used to evaluate climate change impacts on the North American forest sector. Mccarl et al. (2000), like Solberg et al. (2003) do not use a vegetation model, but use a series of decadal growth multipliers instead. They evaluate growth rate multipliers of 0, 5, 10, and 15% for differentiated by species (hardwoods and softwoods) and region (North and South). They evaluate all 361 unique combinations for growth rate, species and region and supplement that with 120 random perturbations. They then estimate a response surface to evaluate the potential impacts of a 1% increase in yield on welfare differentiated by producers surplus, consumers surplus, and trade (see Mccarl et al. 2000, Table 3). They find forest agents mitigate not just by intra-regional shifts in manufacturing and product substitution, but also through changes in forest management regimes and investment. The agricultural sector part of FASOM was not used in this analysis

Irland et al. (2001) and Alig et al. (2002) utilize both the forest and agriculture market components of FASOM in an update to the McCarl et al. (2000) analysis. They use two GCMs as well as the TEM and CENTURY (Parton et al. 1993) vegetation models to represent changes in forest growth rates. While Irland et al. (2001) focuses more on the issues related to modeling market impacts of climate induced forest productivity changes, Alig et al. (2002) presents specific impacts to welfare, land use change, and stumpage prices. They find positive consumer surplus impacts larger than the negative producer surplus impacts leading to a net improvement in welfare for each combination of GCM and vegetation model. In addition to manufacturing, product substitution, and forest investment changes they also find less land coming from agriculture into forestry.

3 Discussion[3]

A number of journal articles have attempted to synthesize climate change research using forest sector models. The report of Working Group II on impacts, adaption and vulnerability to the IPCC (Easterling et al., 2007) includes a concise presentation (Table 5.4) of production and economic impacts of a set of forest sector analyses within the larger scope of studies from all forestry disciplines. Kirilenko and Sedjo (2007)[4] also do an excellent job of taking that IPCC information and focusing on just forest sector models in more detail. Lindner et al. (2010) maintain the broad impacts, adaptive capacity, and vulnerability focus yet narrow the geographic range of interest to Europe, and stay away from market impacts. Joyce (2007) presents a synthesis of studies with a focus on the RPA studies and a decidedly North American focus as did Alig et al. (2004). For a synthesis of the state of vegetation models available for integration with economic models, Aaheim et al. (2010) is an up to date resource giving the data inputs and outputs of seven models. Aber et al. (2001) presents the background for the Vegetation/Ecosystem Modeling and Analysis Project (VEMAP) which in its two incarnations (VEMAP1 and VEMAP2) brought simulations from multiple vegetation models (biogeography and biogeochemistry) into a common repository for North America to facilitate their use in climate change analyses. These efforts explain in some part the rapid expansion in regional forest sector models ability to incorporate vegetation model information in their analyses.

3.1 Forest Productivity Changes

While all studies summarized here included some sort of representation of future growth changes resulting from climate change, there are a number of issues with how they accomplished the task. First and foremost, in order to be able to more adequately represent the forest industry it becomes necessary to simplify the timber supply relationship. In CGTM and EFI-GTM the nature of the timber supply function necessitates a fairly simple climate change multiplier. Thus, even though CGTM utilized a vegetative model, the impacts would still have to be simplified down to a single multiplier per region. The TAMM/ATLAS combination of the RPA analyses allows the multipliers to be applied to the ATLAS forest strata before entering the TAMM market model through the inventory parameter. Finally, even with the strata based harvest scheduling approach of TSM and FASOM, the assumption of homogeneity of climate change impacts across fairly large regions has to be assumed, yet studies have shown that the

[3] To aid in readability forest sector model acronyms will be used in place of citations for each individual study presented in the literature review.

[4] Kirilenko is coauthor and Sedjo is contributing author of the IPCC report (Easterling et al. 2007) and this paper most likely represents their original contribution before it was summarized.

effects can be very localized even within specific regions due to topography induced climate patterns.

3.2 Species Migration

The same issues that apply to the forest productivity changes apply here. Most timber supply relations are based on past data and even the models such as TSM and FASOM that do have species as part of their forest stratification may not have potential future species represented. An example would be the projection that warmer climates in the United States will allow pine species currently grown on plantations in the South to be planted in northern forests. The current FASOM forest stratification would not have the ability to utilize such information as it only has native hardwood and native softwood classification. The current approach is that the effects of species migration are captured in the growth multiplier which is a marked simplification.

3.3 Stochastic Events

A changing climate has the potential to bring with it new insects and diseases to regions that had not developed a tolerance. An example is the massive mountain pine beetle mortality in the North American west. While most of the studies above include some sort of mortality representation implicit in the vegetative models, only the TSM studies provided scenarios in which these mortality events, or dieback, were modeled explicitly.

3.4 Land Use Change

The underlying socioeconomic and energy policy changes associated with each climate change scenario will lead to potentially large differences in land use patterns. Housing and feeding a future population will place an additional burden on a finite level of available land and will result in changes in land use shifts from forestry to development uses and agriculture. Renewable energy policy will lead to either increases or decreases in forest land dependent both on the required proportion of energy to be supplied by biomass as well as the extent to which agricultural or forest biomass sources are utilized to fulfill that demand. Most forest sector models have some sort of land use response based on levels of demand and commodity prices, but only FASOM endogenously captures the land use change between the forest and agricultural sector leading to a much more consistent representation of land use change with other forestry impacts.

3.5 Adaptive Management

Forest sector models have the potential to provide meaningful insights on the adoption of adaptive management strategies to mitigate climate change impacts in forests. The recursive dynamic solution technique requires a priori specifications regarding forest investment and management strategy limiting their ability to evaluate its potential. Intertemporal optimization techniques, however, look forward to the future as they determine the optimal activities of today. This coupled with their ability to evaluate long-term impacts of forest conditions and policies outside of those present in the recent past make them a particularly suitable model form for climate change analyses. As noted before with forest productivity and species migration, the models cannot evaluate solutions outside of the input data so forest modelers need to foresee potential mitigation techniques and incorporate them when possible.

3.6 Trade

The climate change issue is truly a global issue requiring a global strategy for solution. The EFI-GTM analysis came to this conclusion when they determined trade to be a large factor in determining climate change market impacts. Being global in nature is not enough as the TSM which represents the global forest sector in substantial regional detail fails to include trade to ameliorate regionally constraining supply and demand issues. Regional models such as the RPA models or FASOM incorporate foreign trade, but only in aggregate. They can still capture changes in foreign forest sectors as a result of climate change, but the impacts would have to be aggregated into an average and be specified exogenously. None of the regional analyses conducted so far have made an attempt to portray changes to the rest of the world in this way.

4 Suggestions for Future Research

While there have been a number of efforts to incorporate climate change impacts into forest sector models making significant progress there are three potential improvements worth consideration. First, true integration of the vegetation model of forest growth response to a changing climate in a forest sector model has yet to be attempted. Second, with the exception of the TSM analyses, the prior studies have focused solely on projecting the market equilibrium response to different climate change scenarios and have yet to look at adaption strategies to mitigate the impacts. Finally, while it is agreed that human activity is what differentiates the climate change scenarios, there has yet to be an attempt to model mitigation and adaption policies and feed the results back to the GCM creating a different climate future.

Future work integrating vegetation models directly into forest sector models as the supply function should be explored. Due to differences in geographic scale it can be difficult to interpret the output of a grid cell based vegetation model in the context of a forest sector model where political boundaries may define the regions. Forest sector models also require traditional forest products such as sawlogs, pulplogs and fuelwood as inputs to the manufacturing process while vegetation models typically provide vegetative biomass only. Methods will have to be developed to take region, age, and forest type characteristics and convert biomass into traditional forest products inputs and then aggregate the grid cells into regions to be utilized by the forest sector model. Efforts to make vegetative model output more accessible such as VEMAP were met with increases in North American analyses using that data. Since the conclusion of VEMAP there hasn't been a single climate change analysis that used vegetation models. This occurred even though IPCC makes GCM output readily available because vegetation model output is harder to come by in any sort of standardized output. This means that forest sector models were not utilized to evaluate the forest market impacts of any of the IPCC SRES scenarios.

Another potential research area is the application of policies aimed at mitigating climate change within the forest sector model framework. Forest sector modelers should not be content to merely project market impacts of varying climate scenarios, but also evaluate the effectiveness of various mitigation strategies. Climate change mitigation strategies from carbon taxes to bioenergy subsidies have been evaluated yet this has only been done in a constant climate scheme. It is unlikely that any one mitigation technique would be equally effective under all potential future climate regimes and sensitivity analysis could aid in identifying more robust policy strategies.

One of the foundations of climate change theory and research is that these changes are either influenced or exacerbated by humans. Indeed the different scenarios considered in the IPCC's fourth assessment report all have some sort of socioeconomic backdrop in which the population and economic growth characteristics have altered the future climate conditions. While it is unlikely that any emissions information from a partial equilibrium analysis would interact with a GCM, examples exist in which computable general equilibrium (CGE) models have been integrated with vegetation and GCM models. Reilly et al. (2007) apply the MIT Integrated Global Systems Model (IGSM) coupling a CGE and vegetation model with a GCM of sorts to evaluate scenarios capping either GHG emissions, pollution levels, or both. Partial equilibrium analyses could be used to determine if the CGE aggregate accounts for the sector are adequately reflected.

In conclusion, forest sector models are remarkably flexible in their ability to adapt to data inputs and appropriately incorporate them into the market solution metric. They are but one in a suite of policy analysis tools and future success in utilizing them for evaluating climate change mitigation possibilities depends on researchers maintain and updating the models to keep them current as well as being able to adapt them to relevant issues and climate tools in use.

References

Aaheim, A., Chaturvedi, R.K., Sagadevan, A.A., 2010. Integrated modelling approaches to analysis of climate change impacts on forests and forest management. Mitigation and Adaptation Strategies for Global Change 16, 247–266.

Aber, J., Neilson, R.P., McNulty, S., Lenihan, J.M., Bachelet, D., Drapek, R.J. 2001. Forest processes and global environmental change: predicting the effects of individual and multiple stressors. BioScience 51, 735–751.

Adams, D.M. and Haynes, R.W., 1996. The 1993 timber assessment market model: structure, projections, and policy simulations.

Alig, R.J., Adams, D.M., McCarl, B.A. 2002. Projecting impacts of global climate change on the US forest and agriculture sectors and carbon budgets. Forest Ecology and Management 169, 3–14.

Easterling, W., Aggarwal, P., Batima, P., Brander, K., Erda, L., Howden, S., Kirilenko, A., Morton, J., Soussana, J., Schmidhuber, J., Tubiello, F. 2007. Food, fibre and forest products. Climate Change 2007: Impacts, Adaptation and Vulnerability, in: Working Group II to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change. Cambridge University Press, Cambridge, UK, pp. 273–313.

FAO, 2012. Fao Statistical Yearbook 2012: World Food and Agriculture. Food & Agriculture Organization of the United Nations (FAO).

Haynes, R.W., Adams, D.M., Alig, R.J., Ince, P.J., Mills, J.R., Zhou, X., 2007. The 2005 RPA timber assessment update.

Irland, L., Adams, D., Alig, R., Betz, C., Chen, C., Hutchins, M., Mccarl, B., Skog, K., Sohngen, B. 2001. Assessing socioeconomic impacts of climate change on US forests, wood-product markets, and forest recreation.

Joyce, L.A., 2007. Chapter 14: The impacts of climate change on forestry, in: Resource and Market Projections for Forest Policy Development: Twenty-five Years of Experience with the US RPA Timber Assessment. Springer, Dordrecht, The Netherlands, pp. 449–188.

Joyce, L.A., Mills, J.R., Heath, L.S., McGuire, A.D., Haynes, R.W., Birdsey, R.A. 1995. Forest Sector Impacts from Changes in Forest Productivity Under Climate Change. Journal of Biogeography 22, 703–713.

Kallio, M., Dykstra, D.P., Binkley, C.S., 1987. The global forest sector: an analytical perspective.

Kirilenko, A.P., Sedjo, R.A., 2007. Climate Change Impacts on Forestry. PNAS 104, 19697–19702.

Lindner, M., Maroschek, M., Netherer, S., Kremer, A., Barbati, A., Garcia-Gonzalo, J., Seidl, R., Delzon, S., Corona, P., Kolström, M., Lexer, M.J., Marchetti, M., 2010. Climate change impacts, adaptive capacity, and vulnerability of European forest ecosystems. Forest Ecology and Management 259, 698–709.

Mccarl, B., Adams, D., Alig, R., Burton, D., Chen, C., 2000. Effects of global climate change on the US forest sector: Response functions derived from a dynamic resource and market simulator.

Nabuurs, G.-J., Pussinen, A., Karjalainen, T., Erhard, M., Kramer, K., 2002. Stemwood volume increment changes in European forests due to climate change—a simulation study with the EFISCEN model. Global Change Biology 8, 304–316.

Parton, W.J., Scurlock, J.M.O., Ojima, D.S., Gilmanov, T.G., Scholes, R.J., Schimel, D.S., Kirchner, T., Menaut, J.-C., Seastedt, T., Moya, E.G., Kamnalrut, A., Kinyamario, J.I., 1993. Observations and modeling of biomass and soil organic matter dynamics for the grassland biome worldwide. Global Biogeochem. Cycles 7, PP. 785–809.

Perez-Garcia, J., Joyce, L.A., Mcguire, A.D., Xiao, X., 2002. Impacts of Climate Change on the Global Forest Sector. Climatic Change 54, 439–461.

Reilly, J., Paltsev, S., Felzer, B., Wang, X., Kicklighter, D., Melillo, J., Prinn, R., Sarofim, M., Sokolov, A., Wang, C. 2007. Global economic effects of changes in crops, pasture, and forests due to changing climate, carbon dioxide, and ozone. Energy Policy 35, 5370–5383.

Sohngen, B. and Mendelsohn, R. 1998. Valuing the Impact of Large-Scale Ecological Change in a Market: The Effect of Climate Change on U.S. Timber. The American Economic Review 88, 686–710.

Sohngen, B., Mendelsohn, R., Sedjo, R. 2001. A global model of climate change impacts on timber markets. Journal of Agricultural and Resource Economics 26, 326–343.

Sohngen, B. and Sedjo, R., 2005. Impacts of climate change on forest product markets: Implications for North American producers. The Forestry Chronicle 81, 669–674.

Solberg, Moiseyev, A., Kallio, A.M.I. 2003. Economic impacts of accelerating forest growth in Europe. Forest Policy and Economics 5, 157–171.

Tian, H., Melillo, J.M., Kicklighter, D.W., McGuire, A.D., Helfrich, J. 1999. The sensitivity of terrestrial carbon storage to historical climate variability and atmospheric CO 2 in the United States. Tellus B 51.

Swedish Forest Owners' Associations - Development after the 1970s

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Abstract

The first Swedish forest owners' associations were established in the 1910s and 1920s. The purpose was to promote and improve management of the small scale forests. Since then the society, the forest sector and the conditions for the small scale forest owners have changed dramatically. Thus, it is no surprise that also the conditions for the associations themselves have changed. The purpose of this paper is to describe the development after the 1970s. The theoretical base is the typical development cooperation and its causes. The annual reports and other secondary sources are used as data sources. The number of forest owners' associations have decreased dramatically and presently is only four. Staff and forestry areas also have declined sharply. These consolidations can be explained by a wish to achieve increased efficiency through economies of scale. After the economic crises during the 1970s the number of members decreased but has since then increased but is still less than before the crises. However, the members' forest area didn't decrease as much as the number of memberships and it also has increased more rapidly. The average forest area has increased by15 hectares. Financial growth in the forest owners' associations has increased dramatically during the period studied. In the 2000s sales increased almost linearly with the exception of 2009 when the next recession caused by the global financial crisis temporarily reduced associations' turnover. Although the final results for the associations most years are positive and the losses reported some years are relatively small, some associations have had significant financial problems. In the 1970s it became apparent that during economic downturns the relatively low proportion of equity made them vulnerable. Therefore, they started to build up the equity. Return on equity has as an average during the 2000s been around 7-8% and some percentage lower if total capital is used as denominator. The last ten years, the solidity has remained relatively unchanged at about 50%. The number of association-owned sawmills has continued to decline while production in the remaining sawmills have increased dramatically. Production in the associations' sawmills has doubled since the early 1990's. Of the associations-owned pulp and paper companies only Södra's mills remain. One problem for the associations are a risk that the intent to form larger and more efficient organizations leads to increased "distance" between the associations and their members. This may mean a risk to lose "anchoring" to the members and that the officers start to act on their own as regular forest products companies. Another problem is that the members cannot take advantage of the large value growth that has occurred for the associations. Moreover, there are a lot of capital tied up in operations that do not really have any formal ownership.

Keywords: cooperatives, forest history, family forest, non-industrial forest owners, small scale forest owners

1 Introduction

Forest owners' associations' aim is to promote the profitability of its members' forestry. This is achieved through acting as an intermediary in members' timber selling to the forest products industry, offering service and advice, and lobbying, respectively. In Sweden there are 2012 four forest owner associations affiliated to LRF Forest owners, a national organization (LRF: The Federation of Swedish Farmers). Together they cover the whole country. Unlike a forest products company, forest owners' associations are owned and managed entirely by its members through a non-profit democratic organization. Role and function of the associations have changed a lot over the almost one hundred years that they have existed. Much of their history is already compiled and described by among others: Sveriges Skogsägareföreningars Riksförbund (1957), Andersson et al. (1980), Andersson KG (1988), Dahlgren (1990), Gummesson (1993), Åsling (1999), Karlsson (2001), Norra Skogsägarna (2008) and Karlsson (2011). However, there is a gap between the time the literature describes and the present time. This study may at least partly be seen as an extension of Anderson et.al. 's study from 1980 describing the development of the first forest owner associations from the 1910s to the late 1970's. The purpose of this report is through a number of key indicators to describe the development of Swedish forest owners' associations over the past three decades. The focus is financial development. Some data will also be presented for the four presently existing associations.

There have been a number of small forest owners' associations that are not connected to the National federation of Swedish Forest owners associations, SSR (Sveriges Skogsägareföreningars Riksförbund), and after a reorganization 1999 was named LRF Forest Owners (LRF Skogsägarna). These small independent associations are often breakaways from major associations which have prevented them from joining the national federation. The number of members of these independent associations was estimated at about 1% of the total membership of the associations that were connected to the SSR. Turnover was also approximately 1% of the total turnover (Andersson et.al. 1980). Since these small, independent associations do not have any major impact on the outcome, they will be excluded in this work.

Industrial policy and lobbying have played a major role and have also been an important part of associations' development. Sometimes it has even been the same people who held senior positions in both the associations and in government or parliament. This interaction has sometimes been critical for the development of the associations. This aspect will however not be addressed in this article.

1.1 Cooperative Theory[3]

Nilsson (1991) identifies three criteria which must be satisfied in order to determine whether an organization is cooperative or not:
- financial activity,
- promoting members' common needs and
- owned and controlled by its members.

Cooperative activities may be viewed as a partial vertical integration. Partial integration means that the participating companies retain their independence and only keep some of their freedom. The members accept a certain dependency to the cooperative association if they get some benefits in return.

[3] This section is based on Nilsson (1991)

The members have a double relationship with the cooperative. They are both owners and users of the cooperative's products or services. The members have formed an organization to operate a particular type of production or to meet certain needs. Simultaneously the members are customers or suppliers to the cooperative, thus own and control the company's operations. This means that the exchange of resources such as goods, services and money between the members and the company is not controlled by pure market mechanisms. Instead, they are influenced by mechanisms that are determined through a democratic process.

A cooperative organization can either consist of individuals, small business owners or entrepreneurs. By combining different types of members with possible business relationships, i.e. buying or selling goods and services to or from the members, four types of cooperatives can be identified:
- Consumer Cooperative
- Working Cooperative
- Purchasing Cooperative
- Supplier Cooperative

Consumer cooperatives and Working cooperatives consist of individuals and are therefore private cooperatives. Purchasing and supplier cooperatives instead have small business owners and professionals as members, making them production cooperatives. Consumer and purchasing cooperatives are procuring cooperatives with backward integration that provide members with goods or services while working and supplier cooperatives are selling cooperatives with forward integration.

However, it is far from always that a cooperative is the best way to coordinate the various parties in a supply chain. At least two requirements must be met when forming a cooperative. (1) Coordination involves an exchange between different parties. This exchange is associated with transaction costs that vary depending on factors such as the involved parties' level of knowledge and investment. According to the theory the parties choose coordination based on the lowest transaction costs; when transaction costs for a party increase, the incentive to integrate vertically decreases. Often management costs increase with increased vertical integration. Therefore the organizational structure depends on transaction costs relative to administrative costs. The prospects for vertical integration are greatest when high transaction costs are combined with low management costs. (2) Another criterion is that “coordination costs” are perceived as sufficient to justify the formation of a cooperative organization. Those who may benefit from a cooperative need not be interested in forming one. They may, for various reasons choose to accept a somewhat more expensive solution. It can even, due to various reasons be impossible to form a cooperative organization.

If an organization generates benefits that everyone can enjoy without having to give anything in return one consequence may be that nobody wants to bear the costs associated with the production of these goods. Individuals do not want to invest resources in an organization unless they get some benefits that are worth more than the input itself. Those who choose not to engage in a cooperative can still utilize and share the common values that a cooperative generates. The costs of running the organization are beard only by the members, i.e., “the free-rider problem”. This means that “everyone” is in favor of the formation of a cooperative, but none wants to become a member because the estimated investment cost is negative for each individual. To be able to establish a cooperative, investment calculation for each member must be positive. There are several possibilities for the individual calculation to become positive. If the weight of individual values is large enough, they will exceed the costs of forming an organization. In addition the value of public goods that a cooperative creates should be added.

Although the value of the social and individual values themselves are not large enough for the whole community, there may be a small group for which the individual calculation is positive. They can then themselves establish and manage an organization that creates public goods to a larger group. An organization with sufficient power can in various ways force or influence individuals to join the organization. The means may consist of different kinds of physical, economic and social sanctions against those who choose to remain outside the organization.

It is also possible that the decision to become a member is based on more aspects than a financial calculation. Factors such as social identity, moral conviction and similar aspects influence the decision. It may be that membership itself has a positive value to the individual or the existence of social relationships that gives her/him a social context. In addition, the decision may also be influenced by moral or ideological motivations, i.e., the individual is not acting only for financial gain but also because of a belief that it is right to get involved. Individuals with such motives can even get involved in the organization even though they are aware that the membership will "cost". External actors can also act as a catalyst for the formation of a cooperative. Examples are politicians, authorities, other existing cooperatives, current and potential members of cooperative organizations, NGOs, mass media and creditors.

Cooperative failures happen. They occur mainly in situations where the cooperative was formed during a period when there was a failure in the market plan even if the social conditions were good. Values of the members may change and as a consequence they lose interest in the cooperative. Changes in the outside world may also take place.

1.2 Approach and methodology

Data for this report are gathered from forest owners' associations' annual reports. All annual reports from 1979 to 2010, except three, have been studied at LRF's archives. Thus, this study cover a period of 30 years and the result is based on 251 annual reports. Data have been compiled and analyzed. The three missing annual reports have been researched at the present forest owners' associations and also by former active employees in the association but without success.

A weakness for this type of sources is that they are influenced by the purpose of the financial statements, i.e. the impression the associations want to give and also legal and formal requirements. Thus, to some extent this report reflects the forest owners' view of themselves. This is a limitation that the reader should be aware of. (Andersen and Gamdrup. 1994) There are other aspects in the history of forest owners' associations that are worth examining in future research.

There is no template for how an annual report from a forest owners' association should look besides what is required by Swedish law. Because of the long studied period and the large number of annual reports, variations exist. In some cases it has been difficult to determine how a particular variable is defined. The requirements for financial statements have also changed over the 30 years. On a few points, however the differences between associations and over time have been so great that adjustments have been necessary. An organization may choose whether to report for a calendar year or for a specified financial year. During the studied period, some associations used a divided financial year, while others have used a calendar year. Associations using a divided financial year have defined the financial year in different ways. In addition, some associations changed from a divided financial year to calendar year, and vice versa. In special cases, the financial statements included a period from eight to 16 months and thus represent a period twice as long as others. In this work, all statements except two covered a full

financial year and have been transformed to the calendar year where most of the months belong. During the storms Gudrun and Per, Södra forests' owners' association choose to extend the financial year 2005 to 16 months. The same happened the following year. During the period January 2005 to December 2007 Södra forest owners' association only published two reports, each one covering a period of 16 months. To avoid misleading results, data from these two statements were separated into three years.

2 Results and analysis

2.1 Organizational Structure

During the 1980s the trend from previous years that the associations merged with the aim to increase the influence on the roundwood market and make it possible to finance investments in production facilities ended. A consequence of the bankruptcy of Vänerskog (1981) became that forest owners around Lake Vänern for a shorter period had no association. Instead of letting any of the existing associations close to this area expand, the forest owners chose to create four entirely new forest owners' associations:
- Skaraborgs skogsägare
- Västra skogsägarna
- Värmlands skogsägare
- Örebro skogsägare

However, the break in the "merging-trend" was temporary. In 1987 the structural changes continued and the number of associations once again decreased. Fig. 1 illustrates the development of forest owners' associations between 1979 and 2010. From 1987 and until 2006 the number of associations decreased by a fairly steady rate from twelve to four. Since then, the number has been constant.

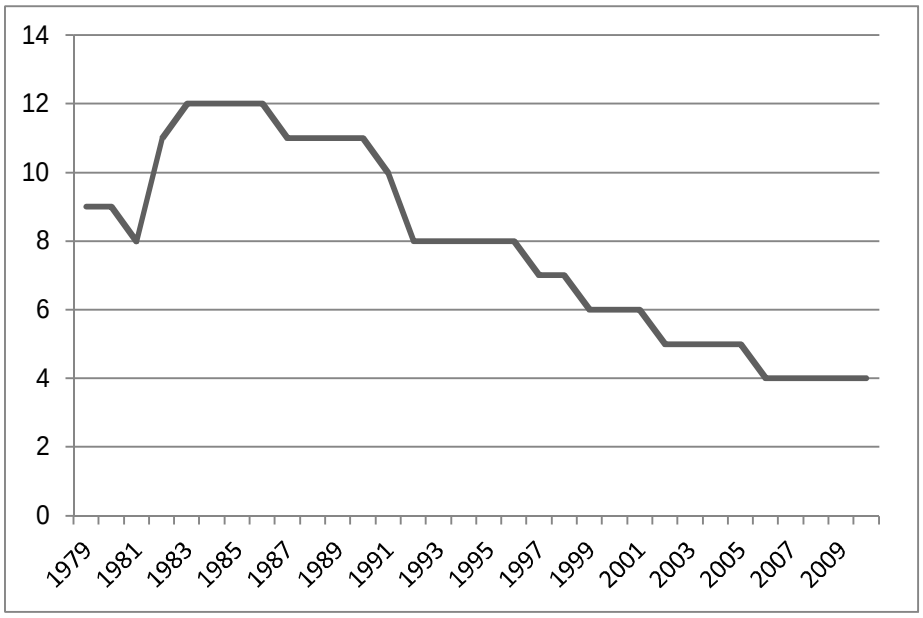

Fig. 1. Number of forest owners' associations

The four associations that are active 2012 include from south to north:
- Södra Skogsägarna
- Mellanskog
- Norrskog
- Norrlands skogsägare

The area covered by these associations has been established through a series of mergers and expansions, often because of the need to rationalization due to financial crises. For a complete description of their "family trees" up to 1979 see Andersson et al. (1980); the period after 1979 is summarized below.

Södra skogsägarna
The association has received its present extension by merging with Skånes skogsägare in 1992 and by taking over operations from Skaraborgs skogsägare when it went bankrupt in 1999. In addition, Södras skogsägare took over Mellanskogs operations in Bohuslän and Dalsland in 2005.

Mellanskog
In 1991 Örebros skogsägare merged with Mälarskog. Västra skogsägarna and Värmlands Skogsägare merged in 1992 and changed its name to Värmland-Bohuslän-Dals skogsägare. In 1997 the name was once again changed to Västra skogsägarna. Mellanskog and Mälarskog merged 1997. Västra skogsägarna merged with Mellanskog 2003.

Norrskog
Norrskog was formed in 1970 as a management association between Jämtland's, Medelpad's and Ådalarna's forest owner associations. These associations merged fully 1987 under the name Norrskog.

Norrlands skogsägare
In 1987 Västerbottens skogsägare merged with Örnsköldsviks skogsägare under the name Västerbotten-Örnskoldsviks skogsägare. In 2005 the name was changed to Norrlands skogsägare. The following year this association merged with the Norrbottens läns skogsägare.

2.2 Members

The serious crisis late 1970s had quite an impact on member development in the early 1980's. Many members chose to leave their associations when they realized how serious the situation was. Among those associations that survived the crisis years Södra was hit hardest by member losses. In addition, the bankruptcy of Vänerskog meant that 22 000 forest owners lost their association. Fig. 2 shows the membership development from 1979 to 2010. In the first half of the 1980s, total membership plummeted from over 120 000 to 78 000. Vänerskog and Södra had most of the losses. During that period, the associations also removed double registrations and inactive members from their registers.

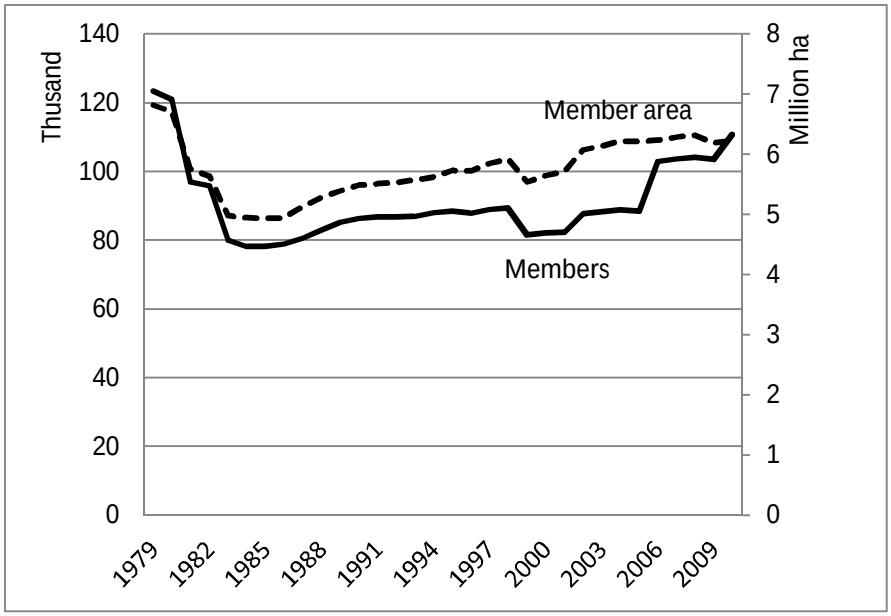

Fig. 2. Total number of members and total membership area

The owners who previously were members of Vänerskog chose to a limited extent to join any of the new forest owners' associations formed after the association's bankruptcy. During the time these new associations existed as independent associations they managed in total to get about 6 000 members. After the large losses the associations in southern Sweden slowly started to increase membership numbers. Between 1984 and 2005 the total number of association members increased with 10 000.

Changes in the Association Act forced forest owners' associations to count their members based on number of individuals instead of number of estates. It required a review of the entire membership register. Södra started to disclose their members in the new way 2006 and in 2010 also Mellanskog followed the new guidelines. The increases in number of members these years can be explained by the new way of counting. The number of members 2010 is shown in Table 1.

Total forest area belonging to members is shown in Fig. 2. (About half of the Swedish forest are owned by small scale forest owners is connected to a forest owners' association.) The area did not fall as sharply as the number of members after the crisis years. This means that those members who chosed to leave the associations during the period owned relatively small holdings. In Vänerskog, the average area per member was about 39 ha before the association went bankrupt while the equivalent average area for all associations was approximately 55 ha. Those members leaving Södra also consisted mostly of landowners to small holdings. The average area per member increased from 46 to 50 ha between 1982 and 1984. In the period after the crisis total member area has also increased at a faster rate than the number of members. Generally, all associations have a higher average area per member after the crises years. Forest area per member is shown in Fig. 3. Between 1979 and 2005, the average member area increased from 55 ha to 70 ha. After introduction of the new method for counting membership the area per member decreased to 60 hectares. Table 2 shows differences between the associations.

Table 1. Associations, number of members and member area 2010

Associations	Members	Member area 1 000 ha
Södra	51 346	2 366
Mellanskog	32 398	1 723
Norra skogsägarna	12 979	920
Norrskog	14 022	1 218
Total	110 745	6 227

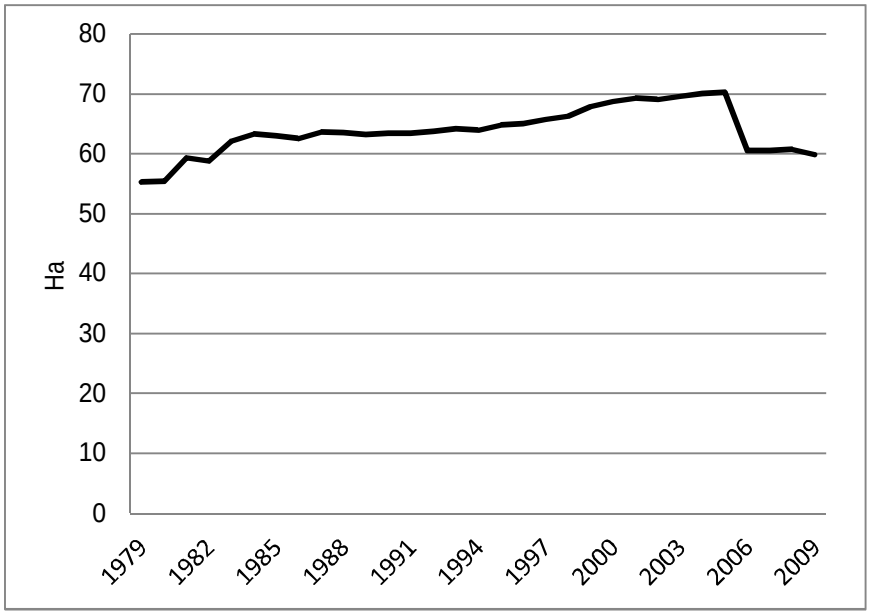

Fig. 3. Forest area, hectares, per member.

Neither the number of members nor the area has recovered fully after the sharp decline in the 1980s. Relative to the size of the decline, the forest area belonging to the members has recovered significantly better than the number of members. The increase in the member area corresponds approximately to three-quarters of the decline. Until 2005 the corresponding figure for the number of members just came up to a quarter.

Table 2. Area per member 2010

Association	Forest area per member, ha
Södra	46
Mellanskog	53
Norra skogsägarna	71
Norrskog	87
Total	56

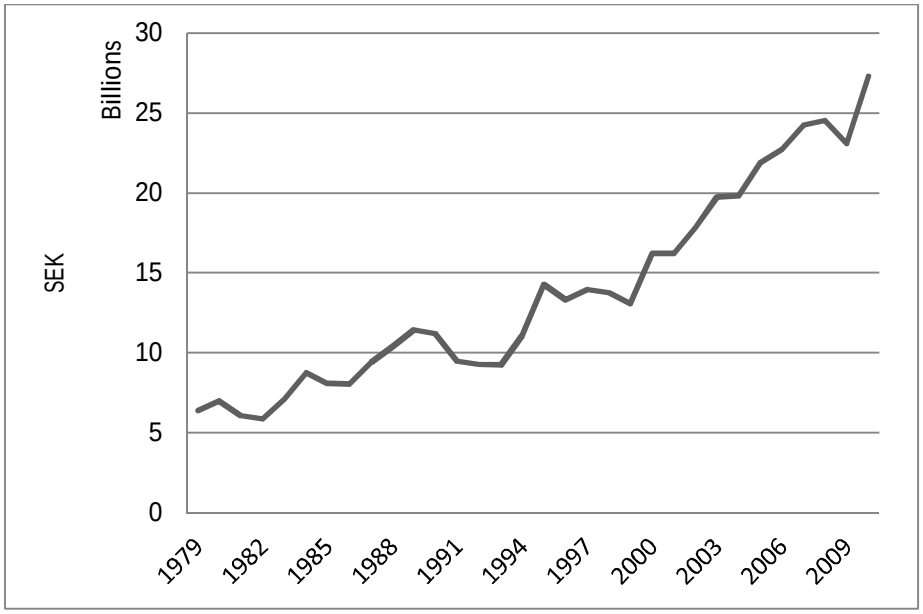

Fig. 4. Forest owners' associations' and subsidiaries' turnover

2.3 Turnover

Financial growth in the forest owners' associations has increased dramatically during the period studied. The total turnover including subsidiaries is shown in Fig. 4. (No adjustment has been made for inflation during the 1980s that was relatively large.) In the early years of the 1980s, the turnover falls due to a sharp drop in production in the industrial part. Starting with 1983 production starts to grow and sales doubled during the remainder of the 1980s.

The 1990s was marked by two recessions, as a consequence sales decreased during much of the 1990s. The exception was years 1994-95, when turnover instead increased rapidly and in 1997 when one can see a slight increase. In the 2000s, growth takes off again. Sales increased almost linearly with the exception of 2009 when the next recession caused by the global financial crisis temporarily reduced associations' turnover. Over the past ten years, sales doubled. Overall, Södra has a much higher turnover than the other associations as can be seen in Table 3. Södra also had a significantly higher growth rate. From 2000 onwards Södra stands for the lion part of total sales. The subsidiaries account for about ten billion SEK of the average turnover over the last four years.

Table 3. Total turnover for associations and its subsidiaries, average 2007-2010.

Association	Turnover in million	Association's share of total turnover
Södra	17 963	72%
Mellanskog	3 178	13%
Norra skogsägarna	1 855	8%
Norrskog	1 822	7%
Total	24 818	100%

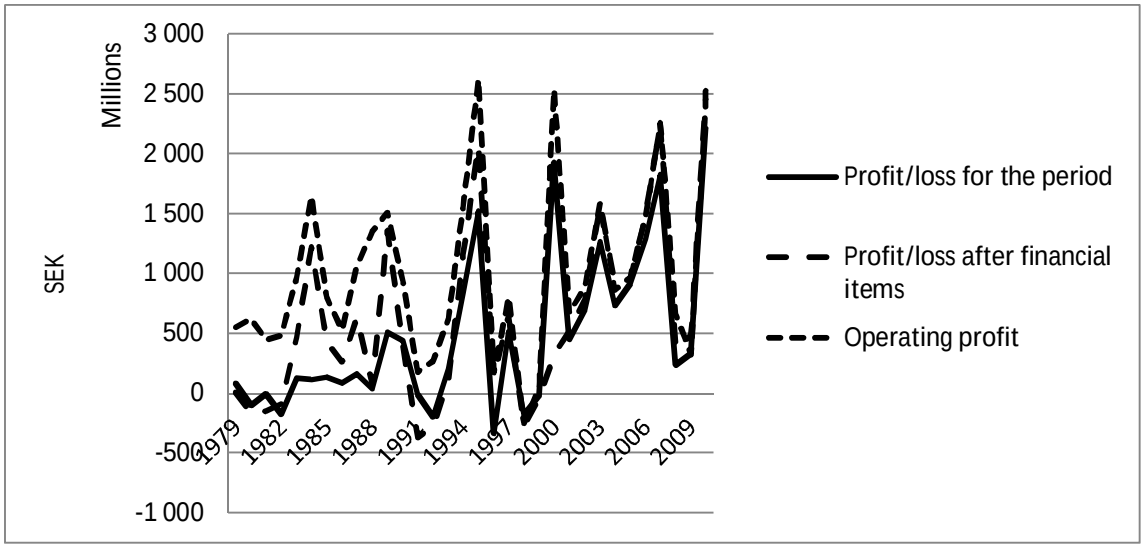

Fig. 4. Financial results for forest owners associations including subsidiaries

2.4 Financial Results

Financial results from the four associations' total operations are shown in Fig. 5. As can be seen they has varied considerably during the period. At the beginning of the period the associations reported low or negative results, since the previous crisis forced them to close or sell a large part of their industrial enterprises at substantially lower price than the book value. In addition, they had to make large depreciations on the value of several of their existing industries. After these years the associations continued to report low results to build up a reserve of untaxed capital. These reserves were then used during the 1990s recession. In the 1990s, the financial situation turned sharply and the associations reported one of the best results over the entire period between the two recessions. During the 2000s, the results remained at a relatively high level. The financial crisis in 2008-09 affected the associations' results negatively but the total reported result was never negative.

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Although the final results for the associations most years were positive and the losses reported some years were relatively small, some associations had significant financial problems. It is worth mentioning that both Mellanskogs and Skaraborgs skogsägare had trouble to manage on their own in the late 1990's. Skaraborgs skogsägare went bankrupt in 1999, while Mellanskog was supported by the LRF and was forced to sell a majority of its shares in its industrial companies. The financial results was also influenced by supplementary-payments to those members who had supplied timber during the past year. Associations' part of the overall result at the end of the period is shown in Table 4. Because of its large industrial operations Södra stands for the vast majority of the results.

Table 4. Financial performance, average 2007-2010, million SEK

Association	Operating profit	Profit after financial items	Profit/loss for the year
Södra	1 343	1 358	1 112
Mellanskog	24	26	18
Norra skogsägarna	24	- 6	- 4
Norrskog	30	29	23
Total	1 421	1 408	1 149

2.5 Equity

In the 1970s it became apparent that during economic downturns the relatively low proportion of equity in forest owners' associations made them vulnerable. Therefore, they started to build up the equity. Equity and members' capital contribution is shown in Fig. 5. Associations' equity can increase by balancing a portion of financial result or by the members' capital contribution.

At the beginning of the 1980s, equity had about the same size as members' capital contribution and was at a low level compared with the total capital. Members contributed capital increased at a fairly slow rate through a percentage deduction made from the reimbursement for timber deliveries and associations every year paying a certain rate for the capital contributed. The equity of the associations increased considerably faster because of the financial results of the associations and subsidiaries (production of owned forest products companies). This has meant that most of the equity in the associations is no longer linked to any individual member. Thus, the members cannot take advantage of the increased value of the associations and their subsidiaries.

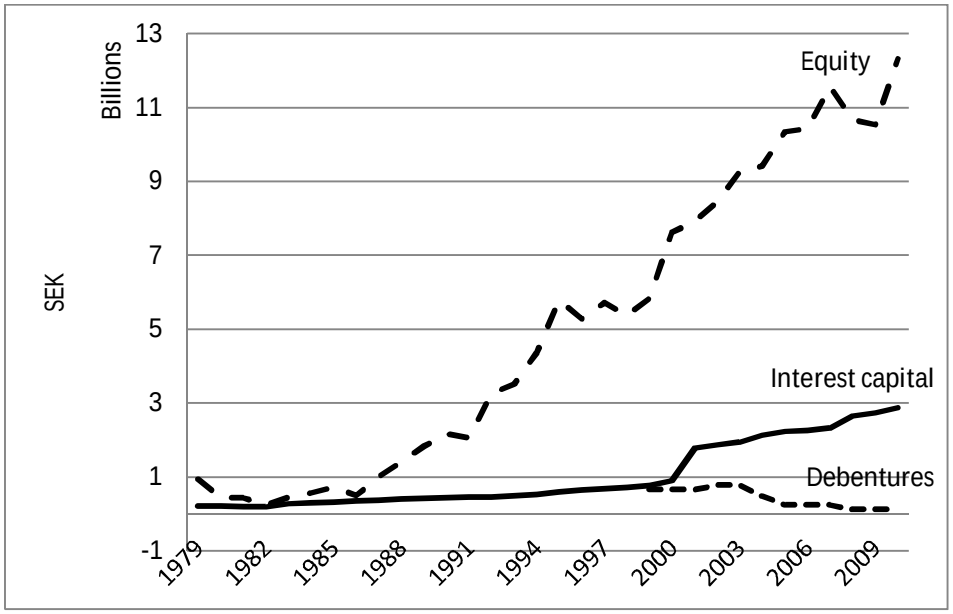

Fig. 5. Forest owners' associations including the subsidiaries' equity, members' participation issue and debentures

Table 5. Total equity in the associations and its subsidiaries, average 2007-2010, million SEK

Association	Equity	Participation issue	Debentures
Södra	10 362	2 120	160
Mellanskog	152	279	0
Norra skogsägarna	345	113	0
Norrskog	430	140	0
Total	11 289	2 654	160

In 2002 it became possible for associations to introduce debenture issue. This means that it is possible to transfer part of the "free" equity not linked to any member to contributed capital. The associations utilized this opportunity, which means that the contributed capital doubled. A few years earlier, the associations also began to use subordinated debentures as an opportunity for members to invest in the associations in a way that can be considered as a mixture between member loans and intermediate debenture issues similar to buying shares. This was also a way for associations to attract new capital to finance new investments. Debentures were used mostly by Södra during the early 2000's and have after that decreased. The average equity, capital contribution and subordinated debentures, for the period 2007-2010 are shown in Table 5. Despite the emissions and subordinated debentures, only a quarter of the equity is attributable to members, the rest is owned collectively.

2.6 Return

During the 1980s, associations in some years had a very low capital base. This means that return on equity easily became very high when the associations had a positive financial result. In 1983, the combined rate of return for all associations was over 170% and for the years 1986 and 1988 the return was about 60%. The main reason was low equity. If one uses instead total capital as denominator the rate of return will be 14% and 8% in the corresponding years. The financial returns from forest owners' associations' and subsidiaries' operations are shown in Fig. 6. As the extreme rate of returns in the 1980s would completely "hide" the variations during the remaining period only the period after 1990 is shown. The average rate of return 2007-2010 is shown in Table 6.

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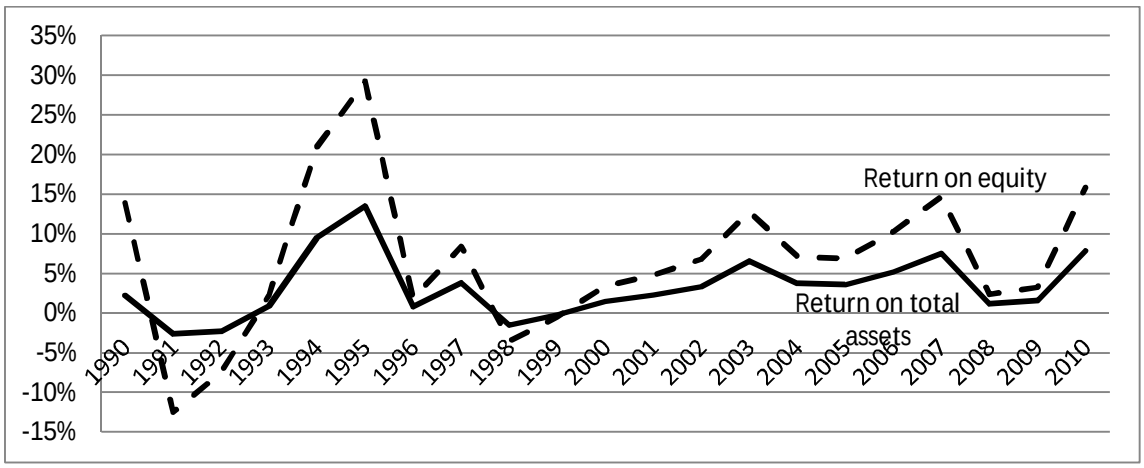

Fig. 6. Return on equity and total assets, respectively, for the forest owners' associations, including subsidiaries, 1990-2010

Table 6. Associations' including subsidiaries' rate of return, average 2007-2010

Associations	Rate of return on equity	Rate of return on total assets
Södra	9.5%	5.8%
Mellanskog	10.9%	1.1%
Norra skogsägarna	-1.2%	-0.0%
Norrskog	5.2%	1.7%
Total	9.2%	4.5%

2.7 Solidity

After the crisis years in the late 1970s, the forest owners' associations' solidity increased. Fig. 7 shows the associations' combined solidity. From a level of around 8% in the early 1980s, the solidity of the associations increased by balancing part of the financial result. In ten years the solidity increased to 40%. Since then it has continued to increase but at a much slower rate and the last ten years, the solidity remained relatively unchanged at about 50%. However, there are large variations between the associations as shown in Table 7. For example, Södra's solidity in 2010 was 51% while Mellanskog's only was 11%. The differences between the associations have also increased over the period.

2.8 Forest products companies

Forest owners' associations forest products companies were hit hardly by the crisis years in the late 1970's. The crisis meant that the associations in a few years had halved the number of association-owned companies. Meanwhile, production fell about the same. The number of association-owned sawmills has continued to decline while production in the remaining sawmills have increased dramatically. Production in the associations' sawmills has doubled since the early 1990's. Of the associations-owned pulp and paper companies only Södra's mills

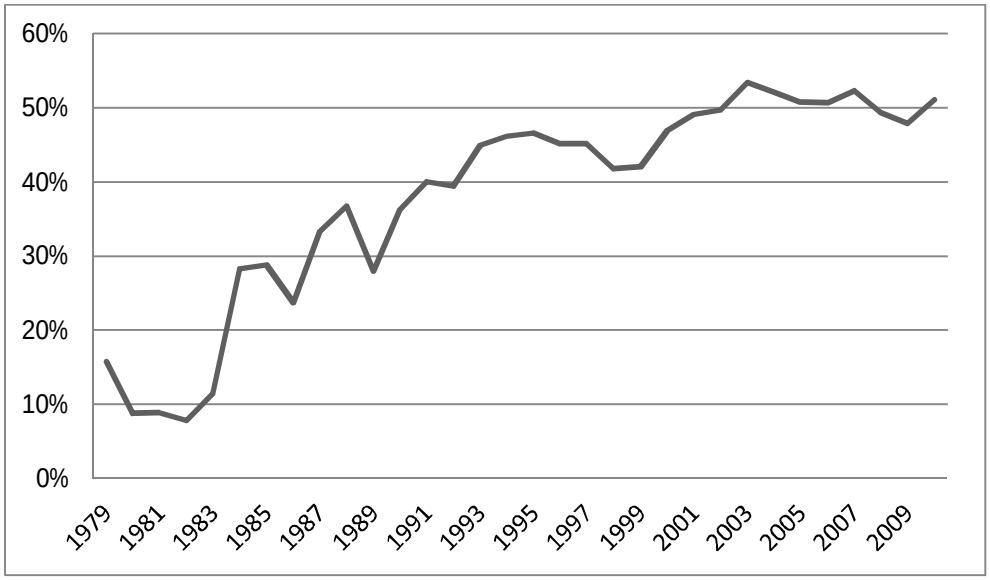

Fig. 7. Solidity as an average for all forest owners' associations and their subsidiaries

Table 7. Associations' and their subsidiaries' solidity, average 2007-2010

Associations	Solidity
Södra	60.5%
Mellanskog	7.4%
Norra skogsägarna	17.6%
Norrskog	31.1%
Total	50.2%

remain. The production in these mills have also doubled but is still lower than the total production for all forest owners' associations' pulp and paper mills before the crisis years. The forest products companies have played an important role for strengthening the financial situation of the associations. They have also played a important role when financing larger investments.

3 Discussion

Concentration has characterized the development of forest owners' associations since the 1950s. There was a break when the consequences of the crisis years in the late 1970s became obvious. When the associations were forced to replace the vacant space after Vänerskog's bankruptcy the former members decided to establish four new associations. The option to form one new association, or alternatively let any of the existing associations around Vänerskog's region take over the business was less attractive because the bankruptcy had a deterrent effect on the former members. This made it easier to establish several small associations where it was possible to view and understand the entire business and the individual members had greater influence. However, it was only a temporary interruption in the concentration phase. Just a few years later, the associations began again to merge into larger and more efficient businesses. The driving force in most cases was that the financial situation which made it difficult for small associations to continue on their own. The smaller associations had either difficulties to manage their own finances or had trouble with keeping the same efficiency level as the big associations. After 2005, the associations' structure has remained unchanged. The number of associations is currently four, which means that the potential for further consolidation among the Swedish forest owners' associations is limited.

Also the organization with forestry areas has followed the same trend as the associations during the period studied. Much due to the forestry areas altered function from gathering members to jointly coordinate forestry work to instead being an interface between the association and its members. Difficulties in finding committed members who want to assume positions of trust in the forestry areas have also been a contributing factor. There may be a risk that the intent to form larger and more efficient forestry areas lead to increased "distance" between the associations and their members. It is then possible to lose "anchoring" to the members and as a consequence the officers start to act on their own as regular forest products companies.

The financial situation of forest owners' associations has improved considerably over the period studied. It should be noted that the variation between different associations is great in many areas. In addition, Södra stands for a relatively large proportion of the total financial result. The revolutionary crisis years in the late 1970s have made it necessary to inject new capital into the associations and increase the solidity to avoid that a similar situation occur again. In this

respect there are major differences between the associations. The average solidity of all the associations increased from 8 to 50% over the studied period. Profits accumulated in the associations and thus the solidity increased. Meanwhile, the portion of the equity that is linked to members has not at all followed the same trend. Members contributed capital has increased by a reduction of timber cash payments, interest, and sometimes by participation issues. This has meant that the members cannot take advantage of the large value growth that has occurred for the associations. Moreover, there are a lot of capital tied up in operations that do not really have any formal ownership.

References

Andersen, V. and Gamdrup, P. 1994. Research Methods. In Theory and Method Learning - An Introduction, ed. Andersen, H. Translation Liungman, CG, 68-95. Lund: Routledge.

Andersson, B., Häckner, J. and Maple Manor, L. 1988. Skogsägarföreningarna i ett historiskt perspektiv (Eng.: Forest Ovners associations in a historical perspective). Stockholm: Sveriges Skogsägares Riksförbund. 1980.

Andersson, K G. Råvarukamp i norr - Gunnar Hedlund och Ncb (Eng.: Rawmaterial fight in Norhter Sweden – Gunnar Hedlund and Ncb). Stockholm: LTs förlag.

Brandesten, O. 2004 Lantbruks-föreningar, Mejeri-förenings-bolag och andra former. Några tidiga förslag och exempel. i Jordbrukarnas kooperativa föreningar och intresseorganissationer i ett historiskt perspektiv, red. Rydén, R, 139-169. (Eng.: Farmers cooperatives associations and interests organisations in a historival perspecitve), Stockholm: Kungl. Skogs- och Lantbruksakademien.

Dahlgren, G. 1990. En krossad dröm (Eng. A broken dream). Stockholm: LRF.

Gummesson, O. 1993. Utan kamp ingen seger - om Gösta Edström och Södra skogsägarna (Eng.: Without struggle, no victory – about Gösta Edström and Southern owners). Växjo: Södra skogsägarna.

Karlsson, I. 2001. Nere för räkning - Södras nedgång och uppgång under 1970- och 80-talet (Eng.: Down for count - Södra's fall and rise during 1970 - and the 80's). Växjö: South of Forest Owners.

Karlsson, I. 2011. Samverkan för styrka och tillväxt - Axplock ur skogsägarrörelsen i södra sverige (Eng.: Interaction of strength and growth - Selections from forest owners' movement in southern Sweden). Växjö: South of Forest Owners Cooperative Society.

Nilsson, J. Koopertiv utveckling (Eng.: Cooperative development). Lund: Routledge, 1991.

Norra skogsägarna. 2008. En samlad kraft - Norra skogsägarna 75 år (Eng.: A combined force - Northern forest owners 75 years). Edited by Jonsson, E. Umeå: Northern Forest Owners.

Skogsstyrelsen. 1980, 1981, …, 2010. *Skogsstatistisk årsbok (National* Board of Forestry. Statistical Yearbook of Forestry). Jönköping: National Board of Forestry.

Sveriges Skogsägareföreningars Riksförbund. 1957. Skogsbönder går samman - Några data ur en organisations tillkomst och utveckling (Eng.: Swedish Forest owners' Associations. Forest Farmers coming together - some data from an organization's origins and development). Stockholm.

Åsling, N G. 1999. Gunnar Hedlund - politikern och industrimannen (Eng.: Gunnar Hedlund - politician and industrialist). Stockholm: Ekerlids Publishers.

Forest Owners' Associations reports (all in Swedish)

Mellanskog. (1994, ..., 1996). Årsredovisning.... Gävle.
Mellanskog. (1979, ..., 1993). Verksamheten .... Gävle.
Mälarskog. (1991, ..., 1996). Årsberättelse .... Uppsala.
Mälarskog. (1979, ..., 1990). Årsberättelse .... Uppsala.
Norra skogsägarna. (2006, ..., 2009). Årsberättelse .... Umeå.
Norra skogsägarna. (1999, ..., 2005). Årsberättelse .... Umeå.
Norrbottens läns skogsägare. (1997, ..., 2005). Årsberättelse .... Boden.
Norrbottens läns skogsägare. (1996). Året som gått. Boden.
Norrbottens läns skogsägare . (1981, ..., 1995). Verksamheten .... Boden.
Norrbottens läns skogsägare . (1979, ..., 1980). Verksamheten .... Luleå.
Norrlands skogsägares Cellulosa AB. (1979, ..., 1980). Redovisning av verksamheten .... Kramfors.
Norrskog. (2008, ..., 2010). Årsberättelse .... Kramfors.
Norrskog. (2006, ..., 2007). Årsberättelse .... Kramfors.
Norrskog. (1982, ..., 2005). Årsberättelse .... Kramfors.
Norrskog. (1979, ..., 1981). Verksamheten .... Kramfors.
Skaraborgs skogsägare. (1998). 1997- 98. Skövde.
Skaraborg skogsägare. (1983, ..., 1997). Årsberättelse .... Skövde.
Mellanskog. (2000, ..., 2010). Verksamhetsberättelse .... Uppsala.
Mellanskog. (1998, ..., 1999). Årsberättelse .... Uppsala.
Mellanskog. (1997). Årsredovisning verksamheten 1997. Gävle.
Västerbottens – Örnsköldsviks skogsägareförening. (1987, ..., 1998). Årsberättelse .... Umeå.
Skåneskog. (1980, ..., 1991). Skånes skogsägare .... Kristianstad.
Södra. (2005, ..., 2009). Södra .... Växjö.
Södra. (1979, ..., 2004). Årsberättelse .... Växjö.
Vänerskog. (1980). Års- och koncernredovisning för Vänerskog ek.förening 1980. Karlstad.
Vänerskog. (1979). Årsring 1979. Karlstad.
Värmlands Forest owners. (1993, ..., 1997). Årsberättelse .... Torsby.
Värmlands skogsägare, (1992). Årsberättelse 1991/92. Torsby
Värmlands skogsägare. (1983, ..., 1991). Årsberättelse .... Torsby.
Västerbottens skogsägare. (1979, ..., 1986). Årsberättelse .... Umeå.
Västra skogsägarna. (1998 , ..., 2010). Årsberättelse .... Torsby.
Västra skogsägarna. (1983, ..., 1991). Årsberättelse .... Ed.
Örebro skogsägare. (1983, ..., 1990). Årsberättelse .... Örebro.
Örnsköldsviks skogsägare. (1979, ..., 1986). Årsredogörelse .... Örnsköldsvik

A Comparative Assessment of the Forestry Services in Finland and Sweden

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Abstract

Non-industrial private forest owners (NIPFs) are the most significant ownership group in Finland and in Sweden by owning more than half of the productive forest land. Emphasis on meeting the industry requirements for stable roundwood supply has traditionally dominated the service offerings targeted to NIPFs but the changing objectives of the private forest owners have also diversified their service needs. Therefore, it seems that the traditional 'roundwood supply approach' does no longer match the service needs among modern forest owners. More flexible service markets and a larger number of actors might improve conditions for those forest owners with more diverse service needs. Environmental and cultural similarities combined with the long common cultural traditions make the comparison of Finnish and Swedish forestry services markets reasonable: the good methods in each country could be adopted also by the 'neighbour'. The Finnish markets are facing structural changes when it comes to organising the service delivery system. In Sweden, especially the role of the forest owners' organisations and the present situation offers some clues of the way the Finnish system is possibly going to evolve. Changes in the financial base of the Finnish forest management associations towards the Swedish way of the voluntary membership system could affect the whole service markets. Simultaneously, the stronger interest groups of the independent forestry entrepreneurs in the Finnish markets are supporting entrepreneurship, compared with the Swedish where contractors struggle in a difficult market environment against strong industry. The theoretical objective is to examine and compare the market and institutional background for service innovation in the contexts of Finnish and Swedish forest clusters. Based on the concepts of service-dominant logic and dynamic capabilities, the empirical objective of the project is to describe the existing and potential service business models and their development possibilities. This research contributes to an improved service-dominant logic based system in which customer value is created at the level of the whole network of actors. Using qualitative approach and 16 thematic expert interviews in Swedish and Finnish service organizations, we will aim to identify potential barriers and opportunities for creating new services in the NIPF markets and, further, suggestions to develop new service innovations to fulfil emerging needs among forest owners.

Keywords: forestry services, Finland, Sweden, service dominant logic

1 Introduction

The area of privately owned forests land both in Finland and Sweden is rather stable and due to urbanization the owners are decreasingly dependent on their forestry incomes. Service providers that operate in these evolving markets try to attract the owners by introducing add-ons to their service portfolios that traditionally have been dominated by roundwood trade associated services. In the competition of this segment of forestry service market, innovativeness and the ability to find new ways to reach the forest owners become increasingly important. A broader understanding about the value creation of a modern forest owner is needed and it should be questioned if the current organisations with their current images are even capable of offering attractive and activating service portfolios to all private forest owner segments.

Both countries are among the most extensively forested lands in Europe and the forests are dominated by coniferous trees. In Sweden there is 28 million hectares forest land (69% of the total land area) of which 22.5 million is classified to productive forest land (FAO 2011, Swedish Statistical... 2011). In Finland there is 22 million hectares forest land (73% of the total land area) of which 20.1 million is classified to productive forest land (FAO 2011, Finnish Statistical... 2011). There are almost 228 000 private forest estates in Sweden and 374 000 in Finland and the mean size of private forest estate in Sweden is some 50 hectares and in Finland about 30 hectares (Fig. 1).

Private forest owners are the most significant ownership group in both countries. In Sweden, they own half of the productive forest land and in Finland 60% (Fig. 2). The state is also a significant owner in Finland by owning 26% of the productive forest land. In Sweden, the most of the state owned forests are held through a state owned company summing up the total number of state owned forests close to 17%. In Sweden, private owned companies have more forests (25% of the productive forest land) compared with Finland (9% of the productive forest land), but in both countries the industry is very dependent on roundwood supply of NIPFs.

Fig. 1. Statistics of forests and private forest owners in Sweden and Finland (sources: Swedish statistical… 2011, Finnish statistical… 2011, OpenStreetMap)

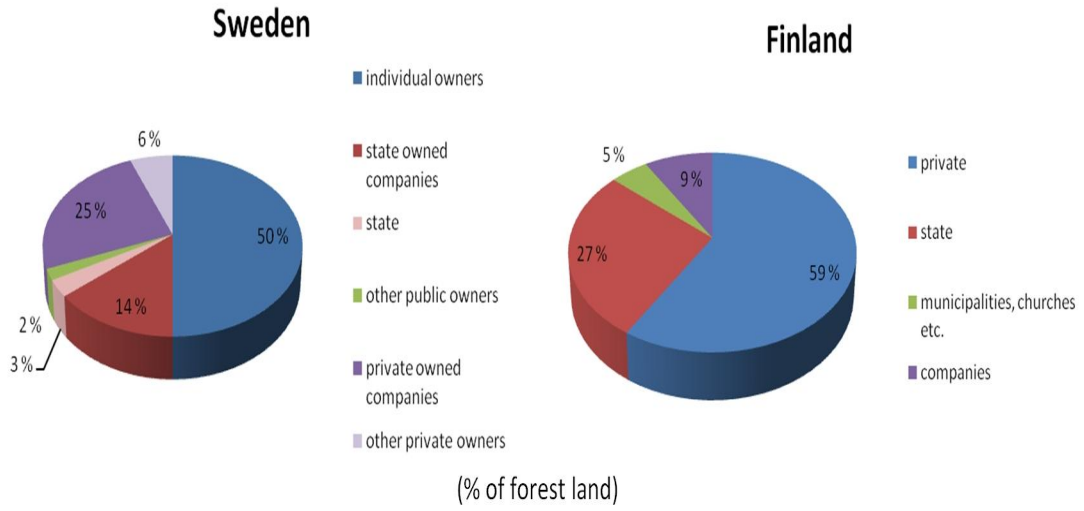

Fig. 2. Forest ownership in Sweden and Finland (sources: Swedish statistical… 2011, Finnish statistical… 2011)

There is ample research about the Scandinavian private forest owners and the structural change in the ownership. Trends like the increasing number of city-dweller owners, larger share of women and ageing among forest owners have been recognized as the drivers of increasing heterogeneity (e.g. Ripatti and Järveläinen 1997, Karppinen 1998, Boon et al. 2004, Ingemarson et al. 2006). The forestry service research, instead, is usually more concentrated on some specific part of the markets; most often roundwood markets (e.g. Rämö et al. 2002, Tilli and Skutin 2004). Although there is research about the services more broadly (e.g. Rämö and Toivonen 2007) and about the organisations (e.g. Sinkkonen et al. 2007, Lidestav and Arvidsson 2012, Lönnsted 2012), no up-to-date comparison of the Finnish and Swedish forestry services markets as a whole is available.

The concept of forestry service in this paper includes all various services offered to private forest owners. They include wood procurement, forest management, property administration and information services. In this study, we try to find possible differences in the logic the organisations in Finland and Sweden are providing services to the private forest owners. Identified differences can offer possibilities to predict the effects of changes in the markets. In Finland for example, the market environment change is now triggered by the institutional changes driven by politics. The exceptional position of the automatic membership and tax-like membership fees of the forest management associations are about to be abolished. Restructuring the public finance of the organisations will affect the whole forestry services markets. Instead of doing a deep all-inclusive comparison between the markets structures, the idea of this study is by exploring the logic of the organisations to find best practices, as well as possibilities for new emerging service oriented ideas in both countries.

The main organisations that offer forestry services to the private owners are listed in Table 1. In both countries, forest owners have their own organisations that supervise their interest. In Finland they are associations; their activities are based on the national policy and they are partly financed by tax-like membership fees. In the Swedish system they are cooperatives that pay shares of their profits to the owners. Forestry centres in both countries are public authorities that enforce forestry laws but they also offer some business-based services. In both counties, large-scale forest industry is a significant service provider and their service portfolios are built to support their main activity: wood procurement. The service portfolios of sawmills vary between basic wood procurement services to all-inclusive full service packages. Also forestry enterprises have rather variable assortments usually including operational services for forest management or forestry planning services.

Table 1. Forestry service organisation comparison between Sweden and Finland (Sources: Staland et al.[1] 2002, Rieppo 2010[2,] Tapion vuositilastot 2010[3] Rummunkainen et al. 2009[4])

	FINLAND	SWEDEN
FOREST OWNERS' ORGANISATIONS	- 103 local associations - automatic membership and membership fee - 70% of NIPFs pay membership fee[3] - supervising interests, lobbying - education, extension - help to sell wood - forestry operational services - planning, evaluation	- 4 regional cooperatives → pay shares of profits to the owners - 50% of NIPFs are members - supervising interests, lobbying - education, extension - buy stumpage from members
FORESTRY CENTER	-public services unit (channels funds, advisory, promotion, enforce implementation of the forestry act, forest inventory information) - business services unit (road building and maintaining, peatland management, forestry planning, seed and plant production)	- public authority - planning, evaluation, education, organising road building and management
LARGE-SCALE FOREST INDUSTRY	- few large-scale companies using pulp wood (one of them a cooperative owned by forest owners) - extensive full service packages - buy stumpage	- few large-scale companies using pulp wood - extensive full service packages - wood trade
INDEPENDENT SAWMILLS	- 1500 small sawmills (using less than 10000m3 wood annually) pulp wood (one of them a cooperative owned by forest owners)[2] - 170 major sawmills[2] - varying services	- 1600 small sawmills (producing less than 1000m3 annually)[1] - 300 major sawmills (producing more than 1000m3 annually)[1] - varying services
FORESTRY SERVICE AND HARVESTING ENTERPRISES	- 650 forestry service enterprises[2] - 1650 harvesting enterprises[2] - variety of expert services	-- ~ 1600 forest entrepreneurs[4] - variety of expert services

2 Theoretical background

The research interest in services and service innovations has in general evolved from various disciplinary backgrounds. A distinct area of service research has stemmed from business-oriented research into knowledge intensive services (Gallouj 2002, Miles 2005, Kuusisto 2005, Toivonen et al. 2007). In marketing, Vargo & Lusch (2004, 2006, 2008) and Grönroos (2008) have been propagating a new service marketing discipline. These issues have been discussed in studies on services under the topic of 'company driven inside-out view of the approach to one's markets' vs. 'outside-in view of a customer driven service-company'.

Service dominant logic (SDL) by Vargo & Lusch (2004) offers an interesting viewpoint for examining forestry services, presenting a case for mapping the new logic and the possible business opportunities it creates. According to the SDL, service is considered the fundamental driver of exchange and the physical goods are just the distribution mechanism for the service provisions (Vargo and Lusch 2004). According to the view, a customer creates value together with the company that offers resources for the process, and all social and economic actors can be thus be understood as resource integrators (Vargo and Lusch 2004 and 2006). Therefore, in order to add any additional value to the value creation process for a client, a service provider still needs to offer those resources that enable or improve the process.

In line with SDL, service providers and customers combine their resources in the value creation process, so the resource-based view (Barney 1991) should be widened to coverthe resources held by the customers as well (Gallouj and Savona 2010). Heinonen et al. (2010) have widened the perspective into customer dominant logic (CDL). Not only are resources of a customer regarding a service described by those authors, other activities of the customer and life as a whole as a primary driver of business interaction, have been covered. Connected to this, social network research has taken its first steps among Finnish private forest owners and their timber sales networks (Korhonen et al. 2012).

Although the interviewees in the empirical part of this study most commonly spoke from a more practical point of view, the SDL framework was nevertheless used as a starting point when designing the questionnaire for the thematic interviews. The main objective was to try to understand the logic that the service organisations use in their business and find out if it can be understood to be in line with the SDL-oriented mindset.

3 Data and methods

The first stage of interviews was performed in Finland in 2011 among eight forestry service organisations (Table 2). The interviews were with the forestry service enterprises (3 interviews), the forest management association, an information technology company, a large-scale forest industry company, a wood procurement company and a forest machine entrepreneur. The lengths of these interviews ranged between 0:37 hours and 1:54 hours with a mean of 1:02 hours.

Table 2. Interviews in Finland

Anonymous 1	forestry entrepreneur	Jun 2011
Anonymous 2	executive manager, forest management association	May 2011
Anonymous 3	managing director, information technology company	Sep 2011
Anonymous 4	owner relations director, large-scale forest industry	Mar 2011
Anonymous 5	forestry entrepreneur	Sep 2011
Anonymous 6	executive vice president, wood procurement company	May 2011
Anonymous 7	forestry machine entrepreneur	Oct 2011
Anonymous 8	forestry entrepreneur	Oct 2011

Table 3. Interviews for this study in Sweden

Anonymous 9	marketing chief; consulting company	Feb 2012
Anonymous 10	regional marketing chief; large-scale industry	Feb 2012
Anonymous 11	forest advisor, forestry centre	Feb 2012
Anonymous 12	manager, entrepreneurs' association	Feb 2012
Anonymous 13	forest advisor, forest owners' co-operative	Feb 2012
Anonymous 14	forestry expert, forest owners' central organisation	Mar 2012
Anonymous 15	forestry chief, forest owners' co-operative	Mar 2012
Anonymous 16	executive manager, conservation foundation	Mar 2012

The interviews in Sweden consisted of eight interviews in the local forestry service organisations having an emphasis on cooperatives owned by private forest owners (Table 3). The lengths of these interviews ranged between 0:54 hours and 1:46 hours a mean of 1:08 hours.

All 16 theme interviews except one (Anonymous 5) were recorded and transcribed. The interviewees were selected on the basis of their organisations: the most important organisations were chosen on the basis of earlier studies of forestry service markets and discussions with local researchers. The experts in the organisations were selected on the basis of their duties in order to find people with a deep insight of the forestry service markets.

The research method was qualitative in its approach because of the objective to broadly understand the logics of the market actors. Maxwell (1996) describes the qualitative method suitable for understanding meaning, context, identifying unanticipated phenomena. These characteristics influence the generation of new theories and understanding the process by which actions take place and thereby assist the development of causal explanations. Although the qualitative method can only offer references for a basis of an interpretation, it can increase the understanding about a phenomenon, if implemented thoroughly (Saaranen-Kauppinen and Puusniekka 2006).

Themed interviews were started with the interviewee giving a basic description of her or his particular organisation to induce the free flow of speech. The main themes were the organisation in itself, forestry services in the markets, changes happened in the demand and competitive environment. Since this approach was clearly perceived as being intrusive by one of the interviewees, the generality of the purpose of the study was stressed in the later interviews. Apart from this, the main objective was to explore the current general situation and

development needs in the forestry service market to identify existing barriers and opportunities, rather than to focus on the identification of the existing strategies of individual companies.

4 Results

Forestry service markets in Finland and Sweden are very similar from the viewpoint of the organisations and their service offerings. One of the most interesting differences is related to the forest owners' own organisations that lobby and supervise forest owners' interests in both countries. The Finnish way to organise the associations is about to change towards the Swedish system with voluntary membership. Nowadays the membership in Finland is automatic as well as tax-like membership fees. Currently, about 70% of the Finnish NIPFs pay membership fee, 29% do not have to pay it on the basis of their small estate size and 1% have a remission of the fees (Tapion vuositilastot 2010). In Sweden, half of the owners have decided to be members of the forest owners' cooperatives (Swedish Statistical... 2011). They pay a share to the organisation when they sell wood but they also get shares of the profits of the organisation.
The abolishment of the Finnish system of tax-like membership fee will force the associations to concentrate on the services that the forest owners are truly willing to pay for. The forthcoming change in the Finnish system will also remove restrictions for the businesses of the associations. This means, that they will be allowed to buy wood and have their own industry, like they have in Sweden. It can be expected that economic pressures will lead to consolidations among the 103 Finnish associations. Consolidations have decreased the number of forest owners' cooperatives in Sweden into four. This will mean that the associations will widen their scope not only to be local actors but more likely regional or even larger: Scandinavian. Whereas the associations in Finland have traditionally been local actors, the forest owners' cooperatives in Sweden have a much wider view: 'The biggest part of our business is to do business with timber and pulp wood' (-) 'And I think the business for us has changed. We are in the whole Scandinavia and northern Europe is nearly the same business area (Anonymous 15).

The change in the financial base of the Finnish forest owners' organisations currently seems to be the most significant organisational change in these two markets. The situations of the other organisations are more stable although the changes affect the Finnish markets as a whole. Forestry centres have their public funding in both countries and the Finnish version of business unit is adjustable as a result of the most recent organisational reformation. In Finland, there is also an interesting trial to create a service portal that will the connect forest owners and their forest inventory information to the forestry service providers. From the viewpoint of small forestry planning enterprises these can be seen as 'publicly financed actors that disturb the markets' (Anonymous 8) whereas organisations with other main businesses than planning more usually seem to feel it as a 'really good thing. It helps people to see what they have to do' (Anonymous 10).

Demand for forestry services seems to have changed in some perspectives. Forest owners no longer are that familiar with the forestry issues and they are more frequently requesting services and information. 'More and more living in the city and they don't live in the farm and they are not farmers. But you can also see a trend that people are less loyal. The loyalty is less because they want to compare. They know that they should' google' and have PriceRunners and you have things like that, so you have to compare different prices (-). And then maybe you take the one you used to have before because it's almost the same, but I think the thing is that you should compare. Otherwise you get cheated. You get fooled. I think it's a small trend' (Anonymous 11). Although there is information available there are also challenges: people have other interests than searching for information about subjects they are not interested in. If the forestry sector is unable to offer interesting and attractive services related to forests, people

become alienated from forestry. Another factor for increased demand for full services is the long time scale related to forests: 'When you own forest you're having a company that is working for a very, very long time, to be exact, nearly hundred years for a tree. Then you have to have business partners, partners for nearly the whole time. I think as a forest owner I want to have help with small plant with ditching, soil preparation, clearing and these kinds of things. This is just one piece. It's a like store that just sells socks. You have them. Maybe it's good quality of these socks but...' (Anonymous 15).

In Finland, passive forest owners have been seen as a threat to some extent, like Anonymous 4 defined: 'If you have some 10, 15 or 20 hectares of forest, you start thinking that there is just a berry field in the backyard, let it be there. It doesn't have economic significance and it goes away from the use of industry, little by little. This is what I see as a major threat in the long term'. From the Swedish point of view, the forest owners were more active despite the decrease in forestry know-how: 'They are active as owners. You have to let others do the job but you have to manage how to do it and that, I think Swedish owners are good at' (Anonymous 9). One of the reasons is undoubtedly the difference between estate sizes which changes the service needs but there may be some differences in the attitudes. Social factors like the following were not mentioned in any of the Finnish interviews as an aspect: 'very proud of it (to be forest owners) and it's something that – it's good in the social life' (Anonymous 9).

The long time scale in forestry operations and uncertainty related to the lack of knowledge have maintained personal selling an important channel for forestry services and the easiest way for the customers to buy them are full-service packages. As forest owners grow apart from their forests and have less time to spend on forestry, service organisations have concentrated more on offering full service packages to fill this gap. Interviewees both in Sweden and Finland told the demand for forestry services has evolved more towards easily available and understandable full service packages. This change in demand was seen in a Swedish forest owners' cooperative as follows: 'It's going straight to the direction of full service. Because when they call us, they say to me: "please, do anything you have to do. Then the money, when it is over: send it to me. Thank you"' (Anonymous 13).

There is one important obstacle related to offering full services among service organisations: the need of large scale to reach efficiency. Because of the stiffness of the wood markets, it seems that it is not enough to create a successful service concept but an organisation has also handle the whole value chain to processing. Even energy companies as new players have not successfully penetrated the market. 'The paper industry is so strong both Sweden and Finland. They have always controlled the market. They have had the control of pulp wood and they have the control of the sawmill products that come back to them. They don't like the idea of having – burn it up to get warmth'. (-)'but I think, but as a forest owner: if I can find a way to get more money for my forest, I give it to them if it's a sawmill or bioenergy power plant. But we are so brainwashed: "it's gonna be this way, it has been this way, it's gonna be this way". And I'm not sure, about 10-15 years from now: things can happen. You can say about, all the nuclear power, if they'd stop, we only need one more crash like in Japan somewhere in Europe' (Anonymous 12). Forest owners' organisations in both countries are actually filling the gap in the wood markets by creating freer markets for wood. In addition, Finnish forestry centre tries to connect the other service providers with forest owners. This would build better situation for small, service oriented companies. 'So, it's, maybe in the future we have more of the business that the good entrepreneurs, the free entrepreneurs can sell their services to private owners to make better business for everyone but the big companies don't want it because they want to control it, the whole chain. They want to control the whole chain' (Anonymous 12).

In both countries remote owning and demand for full services are challenges especially for the smallest sawmills and forestry service enterprises. 'Many contractors are married to the customer. They are not free business men. They are the workers for a company.' (Anonymous 12). Instead of the fierce competition of the current customers there might be possibilities for win-win results by the way of collaboration. By helping entrepreneurs to develop their marketing by offering a market place, it would be possible for industry to attract new customers among those forest owners who are difficult to reach. Instead of offering bulky all-inclusive services through one brand name, the personality and image of entrepreneurs could be utilized when contacting some customer segments. If there were possibilities for entrepreneurs, it could also help with 'a struggle to have good entrepreneurs and personnel: good workers' (Anonymous 14). The problem for that is the low attractiveness of the branch which is a result of difficult market situation. It is not solved only by marketing. 'The attractiveness of the branch: it's very low now. And we have told about it a lot in Sweden and I have been talking about it a lot in media and papers. My view is: we have the big companies – the big bosses in the big companies – they tell everyone: "we must tell everyone how good it is to work in the forest business: very good for a contractor, very good! We need a lot of them! And it's a very good future!"(-) Next day they come to the entrepreneurs and say: no profits at all. Ok, your costs have risen for 4 %, we give it to them, you get zero from us. You must work harder to get". This way of thinking and doing is catastrophic' (Anonymous 12).

From the viewpoint of service innovations, the forestry sector is not always seen as a very out-minded and communicative. The atmosphere is likely not sufficiently open: 'You have the same teachers, the same school, the same way of thinking and that's not a good thing' (Anonymous 12). The traditional branch in not attracting people from other sectors and the ones with new ideas tend to move to other branches: 'the people who have other ideas – see things with new eyes: a lot of them are not still in the forest sector because they haven't got a job!' (Anonymous 12).

5 Discussion

Despite the preliminary nature of this study, some interesting differences were found. It appears to be relevant to try to predict the changes in the Finnish situation based on Swedish experiences, because the institutional change is obviously underway. Especially the change in the financial base of the Finnish forest owners' organisations will lead to some operational changes. Consolidations are a probable result but the business models of emerging new units have to change as well. An interesting difference compared to Sweden is that in Finland there already is one nationwide forest owners' cooperative that has industry (Metsä Group). There may not be space in the market for new industrial plants owned by forest management associations, so their role may be more like mediators in wood trade. As electric wood trade systems develop and the scope of the Finnish forest owners' organisations enlargers, it is even possible that a Scandinavian level roundwood markets will emerge.
Another plausible change in Finland as a result of the consolidations of the forest owners' associations is the increasing number of the foreign workforce in forestry operational services. One significant reason for that is that the bigger forest owners' associations will not have similar responsibilities when it comes to supporting local communities: associations in Sweden are operating in large areas and their main objective seems to be to find the cheapest solution to forest owners need. In Finland, instead, associations are more local actors still employing local loggers, to some extent. Undoubtedly, this has been a moral barrier to using cheap labour and limited the number of large logger companies using foreign workers. From this point of view, enterprises able to organise cheap labour to offer full-service for forest owners' associations are

probably going to evolve. When subcontracting is widely used, there is also more need for supervision. This strengthens the role of forest owners' organisations.

It seems likely that if the current forestry service organisations try to attract those forest owners they have failed to activate until now, they should clearly change their business logic. They should either to be more clearly aware of the forest owners' economic situation to offer services at the right time or to be able to split the large-scale roundwood driven transactions into smaller pieces. If the owners are not at all familiar with forestry, the whole field of forestry services may seem too fuzzy for them, and there are currently not enough incentives to familiarize oneself with the branch. There are good experiences from developing tools in some other sectors, such as in buying airline tickets, to compare the services and find the best prices beforehand. Forestry services instead, are more fragmented and less transparent. As mentioned in one of the interviews, there is a trend of the need to compare the services beforehand. A similar trend can be found for example in the case of Finnish housing agencies (eg. Autio et al. 2012). Although personal selling is important and even essential in long scale decisions like they are in forestry, it is surprising how big role personal selling still has in this business despite the high costs and difficulties of finding sufficiently competent service-oriented people in the sector. By creating tools for entrepreneurs to facilitate easier contact with the 'passive' forest owners, it might be possible to get some seeds for new ideas to the markets of forestry services in Finland and Sweden.

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References

Autio, M., Huttunen, K. and Autio, J. 2012. Kulutustutkimus.Nyt 5 (2), 24–41.

Barney, J. 1991. Firm Resources and Sustained Competitive Advantage. Journal of Management, Vol. 17, No. 1, 99-120.

Boon, T., Meilby, H. and Thorsen, B. 2004. An empirically based typology of private forest owners in Denmark, : improving communication between authorities and owners. Scandinavian journal of forest research, suppl. 4: 45-55.
FAO 2011. State of the World's Forests 2011. Rome 2011

Finnish Statistical Yearbook of Forestry 2011. Finnish Forest Research Institute

Gallouj, F. 2002. Knowledge-intensive business services: processing knowledge and producing innovation. In Cadrey, J. & Gallouj, F. (Eds): Productivity, Innovation and Knowledge in Services. Edward Elgar: Cheltenham, UK. 256-84.

Gallouj, F. and Savona, M. 2010. Towards a theory of innovation in services: a state of the art. In Falloj, F. and Djella, F (ed.): The Handbook of Innovation and Services – A Multi-disciplinary Perspective. pp. 27-48

Grönroos, C. 2008. Service logic revisited: who creates value? And who co-creates? European Business Review, Vol. 20 No. 4 pp 298-314.

Heinonen, K., Strandvik, T., Mickelsson, K.-J., Edvardsson, B. and Sundström, E. 2010. A customer-dominant logic of service. Journal of service management, Vol. 21 No. 4, pp.531-548.

Ingemarson, F, Lindhagen, A. and Eriksson, L. 2006. A typology of small-scale private forest owners in Sweden. Scandinavian Journal of Forest Research; 21: 249-259

Karppinen, H. 1998. Values and objectives of non-industrial private forest owners in Finland. Silva Fennica 32(1): 43–59.

Korhonen, K., Hujala, T. and Kurttila, M. 2012. Reaching forest owners through their social networks in timber sales. Scandinavian Journal of Forest Research, 27:1, 88-99

Kuusisto, J. 2005. Innovation and Knowledge-Intensive Service Activities, OECD, Paris, France. http://www.metla.fi/org/ssfe/publications/Scandinavian_Forest_Economics_No_43.pdf

Lönnsted, L. 2012. Small-scale forest owners responsibilities: Results from a Swedish case study. Small-scale forestry. Volume 11, Number 3, 407-416

Lidestav, G. & Arvidsson, A.-M. 2012. Member, Owner, Customer, Supplier? - The Question of Perspective on Membership and Ownership in a Private Forest Owner Cooperative, Global Perspectives on Sustainable Forest Management, Okia Clement Akais (Ed.)

Miles, I. 2005. Knowledge intensive business services: prospects and policies. Miles, I. Foresight, 7, 39-63.

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Rieppo, K (Ed) 2010. Seeds of growth for small enterprises in forestry and wood-processing industries. TTS publications 406.
Available: http://www.tts.fi/kasvunevaat/files/tj_406.pdf

Ripatti , P. and Järveläinen, V.-P. 1997. Forecasting structural changes in non-industrial private forest ownership in Finland. J. For. Econ. 36, 215–230.

Rummunkainen, A., Dahlin, B., Penttinen, Selby, A. & Mikkola, J. 2009. Challenges to the forest machine business as a result of global economic change. Proceedings: International Scientific Conference, Organized on the occasion of the 90th anniversary of the Forestry Faculty in Prague, Czech Republic in 16. - 18. April 2009. Faculty of Forestry and Wood Sciences in Czech University of Life Sciences Prague

Sinkkonen, E., Tervo, M., Mäkinen, P. & Korhonen-Sande, S. 2008. Liiketoimintamallien resurssiperusteinen kilpailu metsäpalveluiden markkinoilla. Tutkimusraportteja 52, Helsingin yliopisto.

Staland J., Navrèn M. and Nylinder, M, 2002, Results from the Sawmill inventory 2000 (In Swedish), Swedish University of Agricultural Sciences, Department of Forestry Products and Markets. Report No 3, ISSN: 1652-0704.

Swedish Statistical Yearbook of Forestry 2011. Swedish Forest Agency

Tapion vuositilastot, 2010. (cited 15.Aug. 2012) Available: http://www.metsavastaa.net/files/metsavastaa/Tapion%20vuositilastot/Tapion_vuositilastot_2010_nettiin.pdf

Tilli, T. and Skutin, S.T. 2004. Roundwood markets in the Baltic sea region. Pellervon taloudellinen tutkimuskeskus, reports 188.

Toivonen, M., Tuominen, T. and Brax, S. 2007. Innovation process interlinked with the process of service delivery - a management challenge in KIBS. Economies et Sociétés, 2007. No. 3, pp. 355-384

Vargo, S. and Lusch, R. 2004. Evolving to a new dominant logic for marketing. Journal of Marketing, 68, 1–17.

Vargo, S. and Lusch, R. 2006. Service Dominant Logic – What It Is, What It Is Not, What It Might Be in The Service-Dominant Logic of Marketing: Dialog, Debate, and Directions, Robert F. Lusch and Stephen L. Vargo eds., Armonk, M.E. Sharpe, 43-56.

Vargo, S. and Lusch, R. 2008. Service-dominant logic: continuing the evolution. Journal of the Academy of Marketing Science (2008) 36: 1–10.

REDD+ benefit sharing mechanisms: Does it make a difference in equity?

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Abstract

The concept of Reducing Emissions from Deforestation and Forest Degradation (REDD+) has become a key debate of international cooperation on climate change. While most countries acknowledge the importance of so called community carbon benefits under REDD+ interventions, they are only just beginning the process of defining institutional arrangements for the sharing of economic benefits in REDD+. The Tanzanian Community Carbon Enterprise and UN-REDD+ models offer two examples of benefit sharing mechanisms which remains to be analyzed. The various actors and groups involved in designing these models have varying degrees of negotiation powers and diverse interests regarding the objectives, design and implementation of REDD+. This raises questions of institutional choices: how REDD+ benefit sharing mechanisms influences equity in forms of recognition of local representation and accountability of the non-governmental organizations to agrarian communities and in various levels of governance.

1 Introduction

Climate change poses enormous governance challenges and has profound social implications for people (see Byravan and Rajan 2008, Sovalcool and Brown 2009). It is assumed that the pro-poor climate strategies need public acceptance, thus public involvement in developing such strategies is necessary for their effective implementation. There is also a possibility that people's priorities in facing uncertainty related to climate change is more towards securing the future reactively in the short run, without variations among the various stakeholder groups at a local level (Sapountzaki 2007). The further research is needed to discover whether the proponents of global level climate strategies and interventions are able to understand the aspirations of the local stakeholders and function with responsive governance. This is particularly important for determining future socially-acceptable, climate-compatible development paths for local people (Mustalahti et al. 2012).
In our current study, REDD+ is approached as a global environmental governance[1] reform process, which can lead to both expected and unforeseen impacts, environmentally and socially. Within the global environmental governance regime, there is a proliferation of institutional arrangements and mechanisms involved in initiating a wide range of REDD+ activities in what could be "observed and controlled" as global multi-layered environmental governance. Ribot (2004;2007;2009) has

[1] Governance here means environmental governance consisting of the set of regulatory processes by actors such as governments, international organisations, communities, the private sector and NGOs which all influence each other (Lemos and Agrawal, 2006:298).

asserted that institutional arrangements necessary to bring actual decentralization are rarely established in so-called decentralization reforms related to the forestry sector. Instead, many interventions, such as REDD+, result in the transfer of powers to central government agencies, in which case governments simply proclaim that they are decentralizing and enact a theatrical image of reform for their donor audiences (Bolin and Tassa 2012; Mustalahti et al. 2012).
Some authors argue that the success of community-based interventions has been limited because elected local governments have not been sufficiently empowered to allow them to work properly (Ribot and Peluso 2003; Lund and Treue 2008; Mustalahti and Lund 2009; Poteete and Ribot 2011). In other words, governmental actions taken to strengthen forest communities' ability to access and exercise their rights through investments in various forms of capacity building activities were lacking or missing altogether (Corbera and Brown 2010; White et al. 2010; Fisher et al. 2011). Brockington (2007) has argued that community-based forest management (CBFM) are not serving the community democratically. The poorest segments of the communities are more vulnerable in capturing the benefits and may even be adversely affected by the CBFM regulations (Lund and Treue 2008). Therefore, the way in which climate change adaptation and mitigation strategies and interventions are designed and implemented can alter power relations at the local level either in favour of implementing the principles of equity, responsiveness and accountability, or vice versa. Democratic representation could create and force social justice, which is strengthened by equity[2], responsiveness and accountability (Manor 2004; Ribot 2004). Thus, these interventions are not just an economic tool for a post-2012 climate regime but also affect local democracy, citizenship, and constitution of public domain. Thus, our current interest in Tanzania as well as in Laos and Mexico in coming years, is to study further institutional arrangements choices in governance, wherein the outcomes, in terms of equity, remain to be analysed.

2 Research methods and cases

In order to understand the particular realities of environmental governance implemented on the ground, the cases in Tanzania have been selected based on their current involvement in the REDD+ activities. The context specific design of the fieldwork aims to reveal how local, national and global configurations of power intertwine in such processes and how they shape, and may be transformed through REDD+ in the case study countries. In January 2012, the RFGI programme[3] organized a methods meeting which helped to define the methods for this current long-term research called "REDD+: The new regime to enhance or reduce equity in global environmental governance?"
Tentatively, the RFGI research methods will be used Tanzania, Laos and Mexico during 2013-2017. In Tanzania, during the current pre-study in 2012, in the selected case study region, Lindi region in South-eastern Tanzania, two case studies was studied through qualitative research methods to allow profound understanding of the motivations and interests of the actors involved in environmental

[2] Equity here relates to negotiation powers, the right to participate in the planning and implementation of global environmental governance mechanisms, and the future allocation of costs and benefits among stakeholders locally and globally in climate change mitigation (Kontinen and Mustalahti 2012). In theory, the term equity is related to attempts to explain perceptions of fair or unfair distributions and citizenship behaviors (Adams 1965; Akan et al. 2009).
[3] RFGI is a comparative local-governance research and training programme of CODESRIA, International Union for
Conservation of Nature (IUCN) and the University of Illinois. More information from:
http://www.beckman.illinois.edu/strategic/files/RFGI_Programme_Summary_and_Introduction.pdf

governance, the authority relationships, and forms of interaction between them. The methods included participatory observations, interviews of the local representatives and other stakeholders, such as representatives of local and central government, civil society groups, members of the private sector and donors. In addition, the study concerned local by-laws, project related documents and evaluations and research literature addressing policies, laws and past decision-making structure and benefit sharing arrangements in the selected study areas in 2009-2012. In future, selected case study region will be studied through the context-specific approach[4] in order to deeply understand as well as triangulate the qualitative data. In 2013-2017, the research material to be collected is to be analysed and interpreted so that the context-specific impacts could be understood and compared between the different interventions in the three case study countries.

3 REDD+ Payments under the UN-REDD Tanzania Programme

Tanzania is one of nine pilot countries of the United Nations REDD Programme (UN-REDD), receives considerable funding from the Norwegian, Finnish and German governments and is participating in the World Bank's Forest Carbon Partnership Facility. In Tanzania, Zahabu and Jambiya (2007) have estimated that local communities could receive financial benefits of up to US$ 6,500 annually (if carbon is priced at US$ 5 per ton of CO_2 in the voluntary market) from the sale of their forest carbon credits gained through REDD+ activities. Channelling funds and power to local communities who should operate as the providers and sellers of REDD+ carbon credits could be a promising way to make REDD+ work for communities: However, clear benefit sharing arrangements at village and individual levels has been highlighted as a very complex issue in capturing these carbon revenues at local levels (Chhatre and Agrawal 2009; Blomley et al. 2011; Peskett 2011). During 2011, UN-REDD Tanzania Programme Management Team selected Angai Villages Land Forest Reserve (AVLFR) as a potential area for the piloting of REDD payments.
AVLFR is located in the Liwale district in Lindi region in Tanzania. The AVLFR encompasses nearly half a million hectares of land, of which about 30 % is forest and the rest is village general land. The AVLFR is managed by 13 villages which were established during the villagisation (*Ujamaa*) period in the 1970s as part of the effort of moving rural people closer to social services. The villagers secured formal ownership of 139 420 hectares of the forest reserve in 2005. A feasibility study of REDD+ project prepared by the Clinton Climate Initiative and participatory forest carbon monitoring (PFCM) demonstrated that AVLFR has high carbon stocks but same time threats to degradation due to land use changes and shifting cultivation in surrounding villages, and because of forest fires impacting to the regeneration. The AVLFR is relatively large in size and therefore have large amount of carbon benefits. Nevertheless the opportunity costs of these forests is expected to be low compared to other sites (Mukama et al. 2012). The selection to be part of the piloting of UN-REDD payments was justified by the fact that, the Angai forest is among the early community based forest management (CBFM) areas in Tanzania but not included in the pilot projects under Norwegian bilateral agreement funding. UN-REDD Tanzania programme is therefore envisaged to pilot REDD payments in the three selected districts in Tanzania including

[4] This approach focuses on the political and social setting – the 'context' – in which the intervention takes place, seeing the intervention and the context together as a whole simple because the fact that an intervention does not take place in a vacuum: an impact is produced by the interplay between the intervention and the several other processes already unfolding at the same areas or regions (Koponen and Mustalahti 2011:10).

Liwale district taking advantage of the already accumulated experiences on CBFM. In addition the selected village land forests have carried out carbon measurements of their forests which will facilitate the computation of credits for the piloting of the payments. A UN-REDD team of four staff visited the selected districts and carried out separate meetings with villagers, district commissioner, district executive officer, district natural resources officer, district forestry officer, and other district officers. In case of AVLFR, these officials were introduced to the UN-REDD intention of piloting the UN-REDD payments in the three identified villages, Mihumo, Ngongowele and Ngunja.

According to UN-REDD payment plans different payment modalities could be used depending on the forest ownership. Since, Angai Villages Land Forest Reserve is owned by the village under CBFM, the REDD fund based payments should in principal be channelled down to the village councils. As a control, the funds will pass through the district council where the forestry department will be responsible for following up on the implementation of activities. For this purpose a portion of the money i.e 15% will be kept at the district council for financial handling charges and implementation of follow-up of activities. The rest of the money (i.e 85%) could be disbursed to the village bank account and the expenditures could be decided by the village forest committees and endorsed by the district forestry department.

4 The Community Carbon Enterprise (CCE) model

A recent initiative aims to enhance the implementation of local benefit sharing approaches in PFM is the establishment of a 'Community Carbon Enterprise" (CCE) model, promoted by the Tanzania Forest Conservation Group (TFCG) and Community Forest Conservation Network of Tanzania (MJUMITA) and which could be managed on behalf of participating forest communities (Kimbowa et al. 2011). The CCE model is based on aggregation of voluntary emissions reductions from different villages, which will then be traded on the voluntary carbon market, after being certified and verified according to VCS and CCB standards. The main advantage of this approach is that it reduces the transaction costs associated with small, individual village's emission reductions, which would inhibit their participation in carbon markets. However many formidable challenges still need to be overcome such as the appropriateness and fairness of benefits that accrue to different actors, the actors who may or may not be entitled to benefits (equity issue) (e.g., community user groups; individuals; women), their "legitimacy" in receiving benefits; and the rules which govern benefit sharing (e.g., criteria in distributing revenues, rules within community groups, land tenure and carbon rights, etc.) (Mahanty et al. 2009; Schreckenberg and Luttrell 2009).

Prior to CCE establishment, an intensive process of social safeguards for community REDD+ projects was implemented in the form of social impact assessment and Free, Prior and Informed Consent (FPIC) procedures. REDD+ has been advertised as a means offering a win-win solution, bringing benefits to communities and reducing deforestation. During the first 18 months, four village land forest reserves (VLFR) covering 6501 ha have been established; draft village land use plans in six villages were developed; analysis of historical deforestation; collection of baseline carbon monitoring data; and market analysis were completed (MJUMITA 2011). The model was created based on the assumption that if REDD+ revenues can be directly channelled to the communities and can be equitably distributed within the communities, they could cover the opportunity costs and the forest management costs for communities.

The CCE model is based on aggregation of voluntary emissions reductions from different villages, which will then be traded on the voluntary carbon market, after being certified and verified according to VCS and CCB standards. Payments are performance-based commensurate with measurable reductions in emissions relative to a historical baseline and are calculated on a village by village basis. That is, after carbon credits are sold on the international voluntary market, each village will receive revenue based on the amount of emissions reduced in their forest areas. Revenue distribution within villages (at the individual/adult level) will be based on individual performance and contribution to the project as outlined in each village REDD+ revenue distribution by-laws. These by-laws are currently being established in each participating village and approved by the village assembly. Apart from the individual payment arrangements, the benefit sharing arrangements can also be established at the community level for the building of school or health centre for example.

MJUMITA aims to play the role of service provider linking communities with REDD+ finance or voluntary carbon markets in future. MJUMITA will be responsible for remote sensing, contracting third party verification, marketing and payment facilitation. Payments to the participating villages will be based on the potential average avoided emissions per year, minus the costs involved in PFM, intermediary costs of MJUMITA, the cost of third party validation, and registration and certification and brokerage fees (MJUMITA 2011). In case of CCE, term "benefit" refers exclusively to the net carbon rent which is the difference between the cost of implementing REDD+ (costs involved in PFM, intermediary costs of MJUMITA, the cost of third party validation, and registration and certification and brokerage fees) and the average global carbon price at which emissions reductions credits from REDD+ could be sold.

5 Discussion

The both REDD+ payment models in Tanzania claim to be based on honesty and transparency but in reality, this is hard to achieve, especially when many stakeholders are involved. The risk of corruption may be particularly high for the project implementers, such as District authorities in case of UN-REDD model and MJUMITA in case CCE models who are playing the role of service providers and have considerable control over how funds or benefits are managed. Also, although CCE model have conducted thorough PIFC procedures and social safeguard assessments (Kimbowa et al. 2011), there is always a risk that there was not a real democracy in the decision making process and locally elected representatives are not empowered and made accountable. Same concern and several questions can be raised in case of UN-REDD model: What is the role of different actors in the decision-making over the resources utilization, conservation, benefits and costs? What is the degree and level of local representations? What is the role of different actors' interests and conflicts in design of the REDD+ interventions? Specifically who and how carbon payments are designed and what type of principles are used as an accountability mechanism?
In Tanzania, several authors argue that the VLFRs have not been empowered enough to defend their rights and their interests (see e.g. Brockington 2007; Lund and Treue 2008; Bolin and Tassa 2012). Instead, many reforms result in the transfer of powers to central government agents in which case governments simply proclaim that they are decentralizing and enact a theatrical image of reform for their donor audiences (Mustalahti and Lund 2009).

Finally, the last point which is at the root of this research project is the issue of equity and recognition. Particularly, the question of who are the recognized and accountable institution in case for carbon payments is unclear at various level of governance and little is known about how the carbon revenue will be shared between communities and service providers as well as within communities and the implications in terms on individual's income improvement, recognition and accountability. There is a risk that the performance based-payment will not necessarily result in an equitable distribution of benefits if it is difficult to identify the rules affecting the eligibility criteria. The "pay for performance basis" at the community level involves that payments are based on demonstrable reduction of emissions. Once again, it is very difficult to assert that the project implementers have measured robustly the real emission reductions which are highly sensitive to the choice of baseline methods and data availability.

On the other hand, the individual performance (adult above 18 years old) based on the contribution to the avoided deforestation activities is still woolly-minded and may lead to social conflicts. Related to the first point of elite capture, there is an issue of equity and fairness here because the costs of REDD+ as estimated in the project's assessments are unlikely to include the "survival and local communities' perceived costs" since these lie outside of standard calculations. The poorest groups are likely to be compensated less because they are, well, poor. In this situation new policies improving livelihoods strategies (agricultural intensification or agro forestry) or alternative livelihoods (non-farm), referred as adaptation costs are critically important.

Benefit sharing is usually used in the context of REDD+ to refer to how financial incentives transferred from international funds or carbon markets are shared between actors within a countries (Peskett 2011). This raises questions surrounding exactly what is being shared; which actors the benefits are being shared between; and as a cross-cutting issue, the formal and informal rules that govern benefit sharing between actors. The relationships between different actors and rules and other types of benefits apart from the carbon sales revenues are also included in the schema to give a general overview of how REDD+ benefit sharing needs to be analyzed at the local level.
Additionally, types of REDD+ policies related to benefit sharing mechanism have already been distinguished; those that aim to generate "compensations" and those that generate "incentives", where compensations are benefits aiming to cover the foregone opportunity costs of deforesting the land, and incentives are the benefits of incentivizing positive choices of behaviour (Brown et al. 2008). Both incentives and compensations can be delivered up-front, to permit the commencement of REDD+, or dispensed over time, to guarantee the continuance of REDD+. Other category of REDD+ policies related to the distribution of benefits include also those that aim to generate "interventions". Interventions in this context are actions designed to create legal, administrative and technical benefits and include the regularization of land tenure, institutional arrangements, monitoring systems and other actions that are necessary to permit and guarantee positive outcomes for REDD+.

Another important consideration is the process by which sharing of benefit can be implemented: directly or indirectly (Peskett 2011). Direct benefit-sharing includes direct benefits to individual households (individual based performance) and indirect benefit-sharing includes benefits that aim to foster broader development and adaptation actions that enhance co-benefits (e.g. building of school or health centre). REDD+ benefits will be therefore distributed at national and local levels. The institutional choices in REDD+ policies used to establish the benefit sharing mechanism will affect the whole structure of a REDD+ scheme.

6 Conclusion

Both cases from Tanzania shows that by improving the chances of community participation in forest management, REDD+ interventions could contribute to reducing forest emissions and increasing forest carbon stocks. However, based on our pre-study material from Tanzania, we argue that locally elected village authorities and representatives should be devoted meaningful legislative, executive and judiciary powers in order to be able to represent their constituents' interests. Most importantly, vulnerable groups (poor, women, elderly and disabled people) could have been identified in earlier phases of project design. Democratic decentralization can increase equity and efficiency in natural resource management and benefit sharing mechanism (Ribot 2009). This could be done for example by involving forest-dependent communities in carbon monitoring which is seen as an effective and efficient way of measuring offsets and of ensuring that communities benefit from REDD+ (Zahabu et al. 2008; Mukama et al. 2011).

This raises question on how REDD+ is designed and implemented, and how it influences equity in forms of recognition and accountability of locally elected representatives and village governance involved REDD+ interventions. While the long-term review of the REDD+ in Tanzania may show that the interventions are not equitable in terms of access to benefits or impact to the local livelihoods because of various problems like elite capture and corruption, it may also show us that the scheme gives more possibilities to recognise local responsive representation and create counter powers through greater accountability to local people. In the long-run, these types of interventions in Tanzania could be expected to lead to a more equitable access to benefits and have a greater impact on the local livelihood through local democracy.

References

Akan, O.H., Allen, R.S. & White, C.S. 2009. Equity Sensitivity and Organizational Citizenship Behavior in a Team Environment. Small Group Research 40(1):94-112.

Adams, J.S. 1965. Inequity in social exchange. Adv. Exp. Soc. Psychol. 62:335-343.

Blomley, T., Lukumbuzy, K. & Brodnig, G. 2011. Participatory Forest Management and REDD+ in Tanzania. WorldBank. Washington, DC.

Bolin, A. and Tassa, D.T. 2012. Exploring climate justice for forest communities engaging in REDD+: experiences from Tanzania. Forum for Development Studies 39(1):5-29

Brockington, D. 2007. Forests, Community Conservation, and Local Government Performance: The Village Forest Reserves of Tanzania. Society & Natural Resources 20(9): 835-848.

Brown, D., Seymour, F. & Peskett L. 2008. How do we achieve REDD co-benefits and avoid doing harm? In Angelsen.A. (ed.) Moving Ahead with REDD Issues, Options and Implications. CIFOR, Bogor, Indonesia**:** 31-40.

Byravan, S. and Rajan, S.C. 2008. The Social Impacts of Climate Change in South Asia. Working Paper Series. *Social* Science Research Network. 24pp.

Chhatre, A. & Agrawal, A. 2009. Trade-offs and synergies between carbon storage and livelihood benefits from forest commons. Proceedings of the National Academy of Sciences of the United States of America 106: 17667-17670.

Corbera, E. & Brown, K. 2010. Offsetting benefits? Analysing access to forest carbon. Environment and Planning 42:1739-1761.

Corbera, E. & Schroeder, H. 2011. Governing and implementing REDD+. Environmental Science & Policy 14(2):89-99.

Fisher, B., Lewis, S.L., Burgess, N.D., Malimbwi, R.E., Munishi, P.K., Swetnam, R.D., Kerry Turner, R., Willcock, S. & Balmford A. 2011. 'Implementation and opportunity costs of reducing deforestation and forest degradation in Tanzania' Nature Clim. Change 1(3): 161-164.

Kimbowa, R., Mwayafu, D. & Njaidi, R. 2011. Benefit sharing to make REDD+ work for communities and forest conservation in Tanzania: The Community Carbon Enterprise (CCE) model. REDD -net programme.

Kontinen, T. & Mustalahti, I. 2012. Reframing Sustainability? : Climate Change and North-South Dynamics: Introduction to a special section. Forum for Development Studies 39(1):1-4

Koponen, J. & Mustalahti, I. 2011. Finnish forest and forestry aid – change in continuity. In: Mustalahti, I. (ed.) *Footprints in Forests: Effects and impacts of Finnish Forestry Assistance*. Elements for Discussion Series. Ministry for Foreign Affairs of Finland, Helsinki.

Lemos, M.C., & Agrawal, A. 2006. Environmental governance. *Annual Review of Environmental Resources* 31:297-325.

Lund, J. F. & Treue, T. 2008. Are We Getting There? Evidence of Decentralized Forest Management from the Tanzanian Miombo Woodlands. *World Development* 36(12): 2780-2800.

Mahanty, S., Guernier, J. & Yasmia Y. 2009. Fair share? Sharing the benefits and costs of collaborative forest management. *International Forestry Review* 11(2): 268-280.

Manor, J. 2004. User committees: A potentially damaging second wave of decentralisation. *European Journal of Development Research* 16(1):192-213.

MJUMITA 2011. Making REDD work for communities and forest conservation in Tanzania: preliminary results and lessons learned from a REDD pilot project in the Eastern Arc Mountains and Coastal Forests. Tanzania Forest Conservation Group. Dar es Salaam, Tanzania. Accessed in 28th August 2012: http://www.tfcg.org/pdf/TFCG%20REDD%20Poster%20Presentation%20SCB%20ATBC%20June%202011.pdf

Mukama, K., Mustalahti, I. & E. Zahabu, E. 2012. Participatory Forest Carbon Assessment and REDD+: Learning from Tanzania. International Journal of Forestry Research. Volume 2012, Article ID 126454, doi:10.1155/2012/126454. 14 pages.

Mustalahti, I., Bolin, A., Paavola, J. & Boyd, E. 2012. Can Local Realities Reach the National and Global REDD + frameworks? Ecology and Society 17(1):16.http://dx.doi.org/10.5751/ES-04498-170116

Mustalahti, I. & Lund, J.F. 2009. Where and How Can Participatory Forest Management Succeed? Learning From Tanzania, Mozambique, and Laos. Society & Natural Resources 23: 31-44.

Mustalahti, I. & Tassa, D. T. 2011. Analysis of three crucial elements of REDD+ in Participatory Forest Management. Scandinavian Journal of Forest Research 27(2):200-209

Peskett, L. 2011. Benefit Sharing in REDD+. Exploring the implications for Poor and Vulnerable People. World Bank and REDD-net.

Poteete, A. & Ribot, J.C. 2011. Forthcoming. Repertoires of Domination: Decentralization as Process in Botswana and Senegal. World Development. 39(3): 439-449.

Ribot, J.C. & Peluso, N.L. 2003. A Theory of Access. Rural Sociology, 68:2, pp. 153–181.

Ribot, J. 2004. Waiting for Democracy: The Politics of Choice in Natural Resource Decentralization., Washington, WRI: 141.

Ribot, J. 2007. Institutional Choice and Recognition in the Consolidation of Local Democracy. Democracy 50(1): 43-49.

Ribot, J. 2009. Forestry and Democratic Decentralization in Sub-Saharan Africa: A Rough Review, In L. A. German, A. Karsenty and A.-M. Tiani, ed., Governing Africa's Forests in a Globalized World. London: Earthscan.

Sapountzaki, K. 2007. Social resilience to environmental risks. A mechanism of vulnerability transfer? Management of Environmental Quality: An International Journal 18(3):274-297.

Schreckenberg, K. & Luttrell, C. 2009. Participatory Forest Management: A Route to Poverty Reduction? International Forestry Review 11(2): 221-238.

Sovacool, B.K. & Brown, M.A. 2009. Addressing Climate Change: Global vs. Local Scales of Jurisdiction? In Sioshansi, F. (ed.) Generating Electricity in a Carbon Constrained World. Elsevier Press. Chapter 5:(109-124).

White, A., Hatcher, J., Khare, A., Liddle, M., Molnar, A. & Sunderlin, W.D.. 2010. *Seeing people through the trees and the carbon: Mitigation and Adaptation to climate change without undermining rights and livelihoods.* In R. Mearns and N. Andrew. ed., Social Dimensions of Climate Change: equity and vulnerability in a warming world. The World Bank, Washington D.C.

Zahabu, E. & Jambiya, G. 2007. Community Based Forest Management and Carbon Payments: Real possibilities for poverty reduction? The Arc Journal 21: 25-27.

Green business practices in the wood industry sector – A review

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Abstract

Environmental aspects of the wood product supply chain have been on the agenda for a couple of decades now. It is claimed that unsustainable forestry practices may damage biodiversity and the provision of forest ecosystem services, while wood is simultaneously perceived as a renewable material with a comparatively low carbon footprint. As is the case in other sectors, the role of the customer for fostering greener industry processes has also been highlighted, e.g. in forest certification. The development of even more environmentally friendly processes relates closely to how they are implemented and viewed among actors in the forest supply chain. The research on green practices in the wood industries has not been thoroughly collected and reviewed. An assessment of the present knowledge on the matter is needed to establish the state of the art and find approaches for future research efforts. This paper is an attempt to review and reflect upon the published business oriented research on green supply chains for wood products. The study is based on articles retrieved in relevant databases and we focus on how the literature has developed the main focus, approaches and main results. Many studies have investigated end-consumer preferences for eco-labeled wood products, mainly in North America and Europe, while fewer are oriented toward e.g. communication of green properties or business to business relations. The article provides an overview of problems that have been covered by research and identifies 'white spots' where knowledge still is sparse. Finally, we summarize main findings, based on the review, and suggest strategies to increase the industry and societal relevance of the research on this topic area.

Keywords: Wood industry, supply chain management, green marketing, sustainable business

1 Introduction

It is claimed that unsustainable forestry practices may affect biodiversity and the provision of other ecosystem services; while wood, if responsibly sources, is simultaneously material with a comparatively low environmental footprint. Green business practices refer to a broad concept, normally involving industry or business processes that spare the environment from overuse and negative impacts. The concept also imply a that workers, customers and users are not negatively affected along the supply chain (SC). Hence, it belongs to a 'family' of descriptions of an economy that conforms to the goals of the 1992 Conference United Nations Conference on Environment and Development (UNCED) and the Brundtland definition of sustainable development. Related definitions are sustainable/responsible business, green or ecological marketing and green supply chain management.

It is evident that these green practices have to be integrated and implemented by the industry in order to be effective – by firms that operate on competitive markets with imperative profitability requirements. One forest sector instrument emanating from the Rio conference and the following processes were the introduction of environmental forest certification (e.g. Forest Stewardship Council FSC, Programme for the Endorsement of Forest Certification PEFC). The activities have however been expanding, integrating other processes for measuring and improving environmental aspects in the production. Sustainability matters of the forest sector have been discussed within the United Nations Forum on Forests UNFF, The Ministerial Conference on the Protection of Forests in Europe MCPFE, Rio +20. National strategies are underway and most forest companies have adopted environmental management oriented strategies.

One may conclude that the forest industry is a key sector in the world economy where environmental aspects have been intensively debated. Various attempts have also been launched along the various forest-based supply chains to improve their environmental performance. The underlying objectives are diverse, efficiency upgrading, to conform to government regulations, avoiding bad publicity, and attract more trust and confidence from customers, Environmental Non-governmental organizations (ENGOs) and other stakeholders.

The practical task has consisted of implementing green practices at different stages of the forest SC. A range of studies have dealt with issues related to green SC implementation. To succeed in the achievement of green forest industry processes it is necessary to collect and assess basic knowledge about factors influencing the diffusion of these practices in the forest supply chains. In particular, we need 'hands on' empirical knowledge about actors and their preferences, perceptions, expectations and priorities. Further, this need for insights ranges from the forest owner to end consumers - and all stages in between.

Hence, this study is an attempt to review the literature on the subject. This may provide a foundation to craft future policies, draw industry and managerial conclusions, and identify areas for investigations and research. The main objective has been to assess the empirical studies that have provided original knowledge. We focus on the geographical and topical scope of these studies and attempt to identify gaps. Interesting and important research paths outside the topic in focus, e.g. on policy, strategy, engineering, econometric trade analysis, biology and ethics, or development issues, have not been investigated. Instead we deal mainly with original research that has disclosed new social science related knowledge about different stages in the forest SC.

2 Method

Databases solicited were Web of Science Citation Index, Scopus, and CABI Google Scholar. We applied a range of search words such as: Wood products, Forest products, Lumber, Sawnwood, Paper products, Joinery, Timber, Wood-based. They were combined with words defining our research subject: Green marketing, Environmental Marketing, Ecological Marketing, Certification, Forest certification, Eco-labeling, Green standards, Sustainable Forestry Initiative, Green consumerism, Green supply chain, Green/sustainable production.

In order to qualify, the papers had to contain original research based on empirical data. Hence, general overviews or purely theoretical papers were excluded. Criteria for being included in this study's database were also that they focused on sustainable SC, and involved business administration/social science oriented studies. The studies were organized and assessed according to year, geographic region, approach, results and conclusions.

3 Results

3.1 General characteristics of the articles

A total of 47 research articles were included in the study. Out of these, 37 were based on data originating from North America, whereas nine covered Europe, and one was conducted in New Zeeland and China, respectively. Eleven studies presented the outcome of international comparisons. The by far most thoroughly studied country was the United States (33 studies).

The most represented journals in the study were Forest Products Journal, Forest Policy and Economics, Wood and Fiber Science, Forestry, Journal of Forest Economics, Silva Fennica. It is evident that the research on these issues is mainly published in forest- or wood science journals. Journals with a disciplinary focus, e.g. on marketing, business development or supply chain management, are less common.

The output of studies in the area is fairly constant over time (yearly production is shown in Table 1). Here it should be added that articles on certification during the first part of the 1990s were mainly overviews describing the development, principles and ideas behind forest certification. Since they were not based on original data they are not included in this study.

3.2 Supply chain focus

The dominating topic, particularly during the 1990s, was investigations of preferences and willingness to pay for certified wood products (Table 2). However, a few other inquiries have also elicited underlying perceptions, attitudes and expectations among different actors along the supply chain, e.g. forest owners, managers, wood industries and industrial buyers.

Table 2 does not reveal any trend, e.g. of new issues being explored - and other topics abandoned. Rather, one can observe a clear dominance of consumer studies throughout the period; and that studies of other intermediate supply chain actors (wholesalers, secondary wood industries etc.) are less frequent, although a limited number are being produced.

Table 1. Number of papers per year

Year	96	97	98	99	00	01	02	03	04	05	06	07	08	09	10	11
No of research articles	1	3	3	4	0	3	4	5	6	4	4	2	3	0	3	2

Table 2. Research regarding stage in SC

	Year		
Focus:	1996-2000	2001-2005	2006-2011
Forest Owners	1	3	3
Forest industry, retail	4	8	4
End consumers	6	11	7
Total	11	22	14

3.3 Approaches

The majority of the reviewed articles have employed standard survey approaches combined with multivariate statistical methods such as cluster analysis, factor analysis, regressions, conjoint and segmenting techniques (Table 3). Comparative studies of different populations also exist. A small number of qualitative studies, content analysis of text materials and experiments have also been tried.

3.4 Findings of the studies

Main results are summarized in Table 4. The results indicate a certain inertia adopting green business practices and related communication at different stages in the SC. Low awareness at consumer level is often mentioned as an obstacle for advancing green practices. But also forest industry appears reluctant to take a proactive stance on advancing sustainability goals.

Table 3. Classification by research approaches

Approach	Number of publications
Surveys	39
WTP estimation	15
Conjoint analysis	5
Choice experiment	2
Qualitative studies	2
Content analysis	1
Experiments	1

NB. Categories can be overlapping

Table 4. Main results and conclusions in reviewed studies

Part of supply chain:	Key results
Forest owners	• Owners and land managers have a positive attitude toward environmental forestry • They are however unsure about the benefits of certification • Some assume certification may improve credibility and public opinion towards forestry
Forest industry	• Industries certify and eco-label products for various reasons: risk minimization, consumer confidence, relations with ENGOs and stakeholders. • But there is a low interest for eco-labels because costs appear larger than benefits for the industry • Low perceived customer interest from industry • Geographical differences exist – Nordic firms are more environmentally focused
Consumers	• Consumers have a positive general attitude toward certification and sustainable forestry but quality and price are more important buying criteria • People are prepared to pay a limited green premium • Low awareness of forest certification • Green segments exist but they are hard to identify
Market communication	• Green communication grows slowly • Modes of labeling and information influence customer interest to buy green

The studies to date have to a large extent contained analyses of consumer preferences and willingness to pay investigations. Fewer studies aim at increasing the understanding of the underlying values and processes that form environmental consumerism. The application of greenness in business relations, or implementation of green procedures in forest industries are other topics that have only been occasionally investigated.

4 Discussion

Studies are geographically oriented on Northern America and Europe. As global consumption shifts, there are probably under-explored emerging markets, which merit deeper studies on preferences for certified wood or how actors along the supply chain deal with sustainability issues.

The surveys often target populations of private or industrial consumers, or supplying firms. These survey studies have generated tangible results. However, more alternative and innovative approaches – e.g. case studies and experiments - have only been tested in a few cases.

The research to date has provided many important findings and it has also identified interesting new challenges for researchers. Further studies could possibly generate a more complete basis for developing sustainable supply chains in the forest sector. Based on the reviewed studies, social science research approaches would shed more light on the following aspects:

Broader geographical scope: What are the conditions for the implementation of green business practices in growing and "young" economies in Asia, South America, and Africa – i.e. outside the markets that traditionally have been investigated?

New topics: It is reasonable that environmental perceptions, intentions and attitudes about certification have received most attention. However, coming studies could deepen our understanding about how green practices play out in *business relations*, *organizational culture* and *adoption processes*. *Communication* of greenness is an additional field to explore.

New methods: Surveys represent a clear-cut procedure to define and test hypotheses market and industry practices. Challenging further investigations should of course continue these studies, maybe with a firmer theoretical connection. However, qualitative approaches may create deeper understanding and new methodological challenges. Other approaches include experiments, action research and document studies.

List of reviewed papers

Aguilar FX and Cai Z. (2010) Conjoint effect of environmental labeling, disclosure of forest of *origin and price on consumer preferences for wood products in the US and UK. Ecological Economics* 70: 308-316.

Aguilar FX and Vlosky RP. (2007) Consumer willingness to pay price premiums for environmentally certified wood products in the US. *Forest Policy and Economics* 9: 1100-1112.

Anderson RC and Hansen EN. (2004a) Determining consumer preferences for ecolabeled forest products: An experimental approach. *Journal of Forestry* 102: 28-32.

Anderson RC and Hansen EN. (2004b) The impact of environmental certification on preferences for wood furniture: A conjoint analysis approach. *Forest Products Journal* 54: 42-50.

Anderson RC, Laband DN, Hansen EN, et al. (2005) Price premiums in the mist. *Forest Products Journal* 55: 19-22.

Archer H, Kozak R and Balsillie D. (2005) The impact of forest certification labelling and advertising: An exploratory assessment of consumer purchase intent in Canada. *Forestry Chronicle* 81: 229-244.

Bigsby HR and Ozanne LK. (2001) Consumer preference for environmentally certified forest products in New Zealand. *New Zealand Journal of Forestry* 46: 36-41.

Brody SD, Cash SB, Dyke J, et al. (2006) Motivations for the forestry industry to participate in collaborative ecosystem management initiatives. *Forest Policy and Economics* 8: 123-134.

Chen J, Innes JL and Kozak RA. (2011) An exploratory assessment of the attitudes of Chinese wood products manufacturers towards forest certification. *Journal of Environmental Management* 92: 2984-2992.

Forsyth K, Haley D and Kozak R. (1999) Will consumers pay more for certified wood products. *Journal of Forestry* 97: 18-22.

Germain RH, Harris S and Luzadis V. (2002) Environmental management systems: Assessing their level of use on industrial forestlands. *Journal of Forestry* 100: 12-18.

Grillo N, Tokarczyk J and Hansen E. (2008) Green advertising developments in the US forest sector: A follow-up. *Forest Products Journal* 58: 40-46.

Gronroos JCM and Bowyer JL. (1999) Assessment of the market potential for environmentally certified wood products in new homes in Minneapolis/St. Paul and Chicago. *Forest Products Journal* 49: 28-34.

Hansmann R, Koellner T and Scholz RW. (2006) Influence of consumers' socioecological and economic orientations on preferences for wood products with sustainability labels. *Forest Policy and Economics* 8: 239-250.

Hartsfield A and Ostermeier D. (2003) The view from FSC-certified land managers. *Journal of Forestry* 101: 32-36.

Hubbard SS and Bowe SA. (2005) Environmentally certified wood products: Perspectives and experiences of primary wood manufacturers in Wisconsin. *Forest Products Journal* 55: 33-40.

Hubbard SS and Bowe SA. (2006) Certified forest products: perspectives from industrial consumers in Wisconsin. *Journal of the Institute of Wood Science* 17: 206-211.

Jensen K, Jakus PM, English B, et al. (2003) Market participation and willingness to pay for environmentally certified products. *Forest Science* 49: 632-641.

Johnson D and Walck C. (2004) Integrating sustainability into corporate management systems. *Journal of Forestry* 102: 32-39.

Karna J, Hansen E and Juslin H. (2003) Environmental activity and forest certification in marketing of forest products - A case study in Europe. *Silva Fennica* 37: 253-267.

Karna J, Hansen E, Juslin H, et al. (2002) Green marketing of softwood lumber in Western North America and Nordic Europe. *Forest Products Journal* 52: 34-40.
Karna J, Steineck F and Juslin H. (2001) Green marketing of sawn timber and wood based panels in Finland and Sweden. *Journal of Forest Economics* 7: 145-168.

Kozak RA, Cohen DH, Lerner J, et al. (2004) Western Canadian consumer attitudes towards certified value-added wood products: An exploratory assessment. *Forest Products Journal* 54: 21-24.

Lindstrom T, Hansen E and Juslin H. (1999) Forest certification: The view from Europe's NIPFs. *Journal of Forestry* 97: 25-30.

Lippke B, Wilson J, Meil J, et al. (2010) Characterizing the importance of carbon stored in wood products. *Wood and Fiber Science* 42: 5-14.

Macias N and Knowles C. (2011) Examining the Effect of Environmental Certification, Wood Source, and Price on Architects' Preferences of Hardwood Flooring. *Silva Fennica* 45: 97-109.

Merry FD and Carter DR. (1997) Certified wood markets in the US: Implications for tropical deforestation. *Forest Ecology and Management* 92: 221-228.

O'Brien KA and Teisl MF. (2004) Eco-information and its effect on consumer values for environmentally certified forest products. *Journal of Forest Economics* 10: 75-96.

Owari T, Juslin H, Rummukainen A, et al. (2006) Strategies, functions and benefits of forest certification in wood products marketing: Perspectives of Finnish suppliers. *Forest Policy and Economics* 9: 380-391.

Ozanne LK, Humphrey CR and Smith PM. (1999) Gender, environmentalism, and interest in forest certification: Mohai's paradox revisited. *Society & Natural Resources* 12: 613-622.

Ozanne LK and Smith PM. (1996) Consumer segments for environmentally marketed wooden household furniture. *Wood and Fiber Science* 28: 461-477.

Ozanne LK and Smith PM. (1998) Segmenting the market for environmentally certified wood products. *Forest Science* 44: 379-389.

Ozanne LK and Vlosky RP. (1997) Willingness to pay for environmentally certified wood products: A consumer perspective. *Forest Products Journal* 47: 39-48.

Ozanne LK and Vlosky RP. (2003) Certification from the US consumer perspective: A comparison from 1995 and 2000. *Forest Products Journal* 53: 13-21.

Perera P, Vlosky RP, Dunn MA, et al. (2008) US home-center retailer attitudes, perceptions and behaviors regarding forest certification. *Forest Products Journal* 58: 21-25.

Stevens J, Ahmad M and Ruddell S. (1998) Forest products certification: A survey of manufacturers. *Forest Products Journal* 48: 43-49.

Teisl MF. (2003) What we may have is a failure to communicate: Labeling environmentally certified forest products. *Forest Science* 49: 668-680.

Thompson DW, Anderson RC, Hansen EN, et al. (2010) Green segmentation and environmental certification: Insights from forest products. *Business Strategy and the Environment* 19: 319-334.
Tikina A, Kozak R and Larson B. (2008) What factors influence obtaining forest certification in the U.S. Pacific Northwest. *Forest Policy and Economics* 10: 240-247.

Wagner ER and Hansen EN. (2002) Methodology for evaluating green advertising of forest products in the United States: A content analysis. *Forest Products Journal* 52: 17-23.

Veisten K. (2002) Potential demand for certified wood products in the United Kingdom and Norway. *Forest Science* 48: 767-778.

Veisten K. (2007) Willingness to pay for eco-labelled wood furniture: Choice-based conjoint analysis versus open-ended contingent valuation. *Journal of Forest Economics* 13: 29-48.
Veisten K and Solberg B. (2004) Willingness to pay for certified wooden furniture: A market segment analysis. *Wood and Fiber Science* 36: 40-55.

Vidal N, Kozak R and Cohen D. (2005) Chain of custody certification: an assessment of the North American solid wood sector. *Forest Policy and Economics* 7: 345-355.

Wilson B, Takahashi T and Vertinsky I. (2001) The Canadian commercial forestry perspective on certification: National survey results. *Forestry Chronicle* 77: 309-313.

Vlosky RP and Ozanne LK. (1997) Forest products certification: The business customer perspective. *Wood and Fiber Science* 29: 195-208.

Vlosky RP and Ozanne LK. (1998) Environmental certification of wood products: The US manufacturers' perspective. *Forest Products Journal* 48: 21-26.

Communicating environmental performance: qualitative study on the perspectives of the Nordic wood industry

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Abstract

The purpose of this study is to explore how companies in the Finnish, Swedish and Norwegian wood products value-chains currently employ environmental performance measures (EPMs) in their communication and to study the existence of strategic element in the use of EPMs. The primary data for this study was collected by conducting 41 thematic interviews in 2011 in the three countries and was analyzed using theory-driven thematization. According to our results the most important EPMs in this context are forest certificates and the key stakeholders targeted are customers, suppliers and environmental authorities.

1 Introduction

Since the 1990s, the availability and use of environmental performance measures (EPMs) on wood products and production processes have become increasingly common in marketing products in environmentally sensitive European markets (see e.g. Toivonen et al. 2008). According to International Organization for Standardization (ISO) 14031 (ISO2007), environmental performance evaluation standard "defines environmental performance as the results obtained by an organization with regard to its activities that interact with the environment". In this view, environmental performance extends beyond simple product-related environmental certificates. EPMs cover general environmental strategies in business, monitoring or auditing of operations, product development and design, certification of the chain of custody or modification of marketing functions.

The new EU Timber regulation that prohibits illegal timber in the EU market area will come into force in March 2013. Companies need to use a system of "due diligence" that makes sure that the timber they sell in the EU is harvested legally. According to the European Commission regulation (EU No 995/2010) operators should carry out a risk assessment and mitigate the risk in a manner proportionate to the risk identified, with a view to preventing illegally harvested timber and timber products from being placed on the internal market. As the forest certificates are inherently a way to show sustainable source of the wood in products, they are a way for uncertified companies to meet the requirements of the EU Timber regulation and this can expand the use of certified products.

The Nordic countries are important exporters of wood products, mainly to the European markets. Breaking into domestic and export markets, the value chain for wood can be divided into six stages (Fig. 1): 1) forestry and raw material supply, 2) primary processing (sawmills), 3) secondary processing (value-added producers), 4) wholesale, retail and export activities

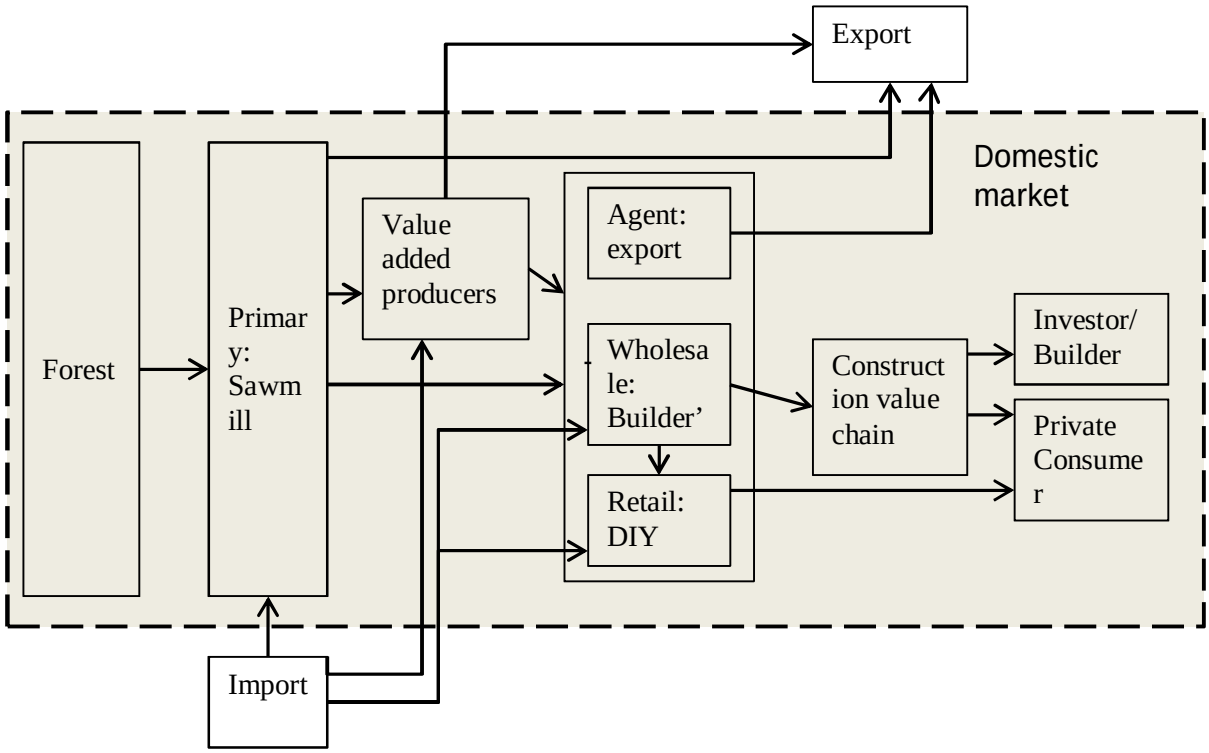

Fig. 1. The Nordic wood product value chain, adapted from Nord (2005)

(builders' merchants, DIY stores (do-it-yourself -stores) or export agents), 5) construction (contractors and sub-contractors), which serves directly 6) end-users (developers, investors and private consumers). Information flowing (bidirectionally) through the value chain improves the functioning of the supply chain and creates value for environmentally conscious customers.

While the role of environmental issues is more generally recognised, and research on consumer perceptions, understanding and use of product-related environmental information in Nordic countries exists (c.f. Leire & Thidell, 2005), no multi-country studies analysing the use of the wider spectrum of EPMs have been conducted in B-to-B (business-to-business) context of woodworking industry. The purpose of this study is to fill this gap by examining 1) how companies in the Finnish, Swedish and Norwegian wood products industry currently employ EPMs in their communication, 2) is there strategic element involving in the use of EPMs and 3) whether the growing pressure towards environmental performance is driven by customers, competitors or other stakeholder groups ?

2 Theoretical background

A core question in the business literature regarding environmental performance is whether it results also in economic/financial performance (see e.g. Porter 1991, Hart 1995, Russo and Fouts 1997, on the sources of competitive advantage in wood industry, see also Lähtinen 2007). For example, with introduction of new green products or services, companies can more efficiently use a differentiation strategy to reach certain environmentally conscious market segments or improve their customer retention (e.g. Ambec and Lanoie 2008). Ecolabels, forest certificates and other environmental performance measures may help companies to legitimate their business behaviour and in some cases to gain competitive advantage. Investments in improving environmental performance can also create opportunities for reducing costs (eco-efficiency).

González-Benito and González-Benito (2005) carried out a detailed study on the effects of different environmental proactivity measures on business performance, and found that the measures must be disaggregated to reveal connections. In the study environmental measures were factorized into four categories: planning and organizational practices, logistic processes, product design and internal production management. When the factors were tested in regression models against different business performance measures, it was found that planning and organizational practices do not drive business performance.

Among other key concepts is stakeholder theory of the firm (see e.g. Freeman 1984, Mitchell et al. 1997), which identifies groups that have an interest in companies' activities. Aside from the shareholders, employees and customers, local communities, regulators and, especially if environmental performance is concerned, environmental non-governmental organizations (ENGOs) are potential groups of key stakeholders. Strategically stakeholders' orientation has been viewed as a broad philosophy that includes ethics and social responsibility in managerial decisions (Ferrell et al. 2010). This broadening of customer orientation to focusing on multiple stakeholders has important implications for firms. Orientation to the diverse interests of stakeholder groups is central to strategic planning, and failure to address the interests of multiple stakeholder groups can negatively affect the company's reputation and eventually even its economic performance through decreased customer or employee retention.

Based on the literature we outline the following framework in Fig. 2 to illustrate the key components and their relationships in our empirical study. A reactive strategy occurs when companies make changes in its processes after some threat or opportunity has already occurred, whereas proactive strategy happens when companies act before they are under pressure to respond to some threats or new opportunities (Sharma and Vredenburg 1998, Vaccaro 2009).

3 Data and methods

The primary data for this study of Finland, Sweden, and Norway was collected by conducting 41 thematic interviews in 2011 in the value chain. The selection of interviewees was purposively performed to involve different actors in the business relations, suppliers and buyers, large-scale and small-scale producers, retailing chains and industrial buyers. The sample also covers different business strategies from companies with a clear focus to companies that cater for the mass market. 38 interviews were with business managers while 3 interviews were conducted with organizations: the Programme for the Endorsement of Forest Certification (PEFC Finland), PEFC Norway and a wood industry association in Finland. The interviewees approached were persons with overall responsibility for and insight into the company's environmental marketing/purchasing procedures.

Interview guide was developed for this study and it can be found online in Räty et al. (2012). The interviews were mostly conducted face to face, but in some cases they were held by telephone and in one case by email. All the interviews were carried out in the local language and lasted between thirty minutes and more than one hour. They were recorded in Finland and Sweden, and transcript summaries were written down. In Norway the interviewer used written notes. Furthermore, the answers to a set of key questions were assembled in a matrix format allowing easier pattern matching and comparisons across interviewees. The data was processed using content analysis and theory driven thematization (see e.g. Silverman 2000) and we provide some direct quotes from the interviews to increase reliability of analysis.

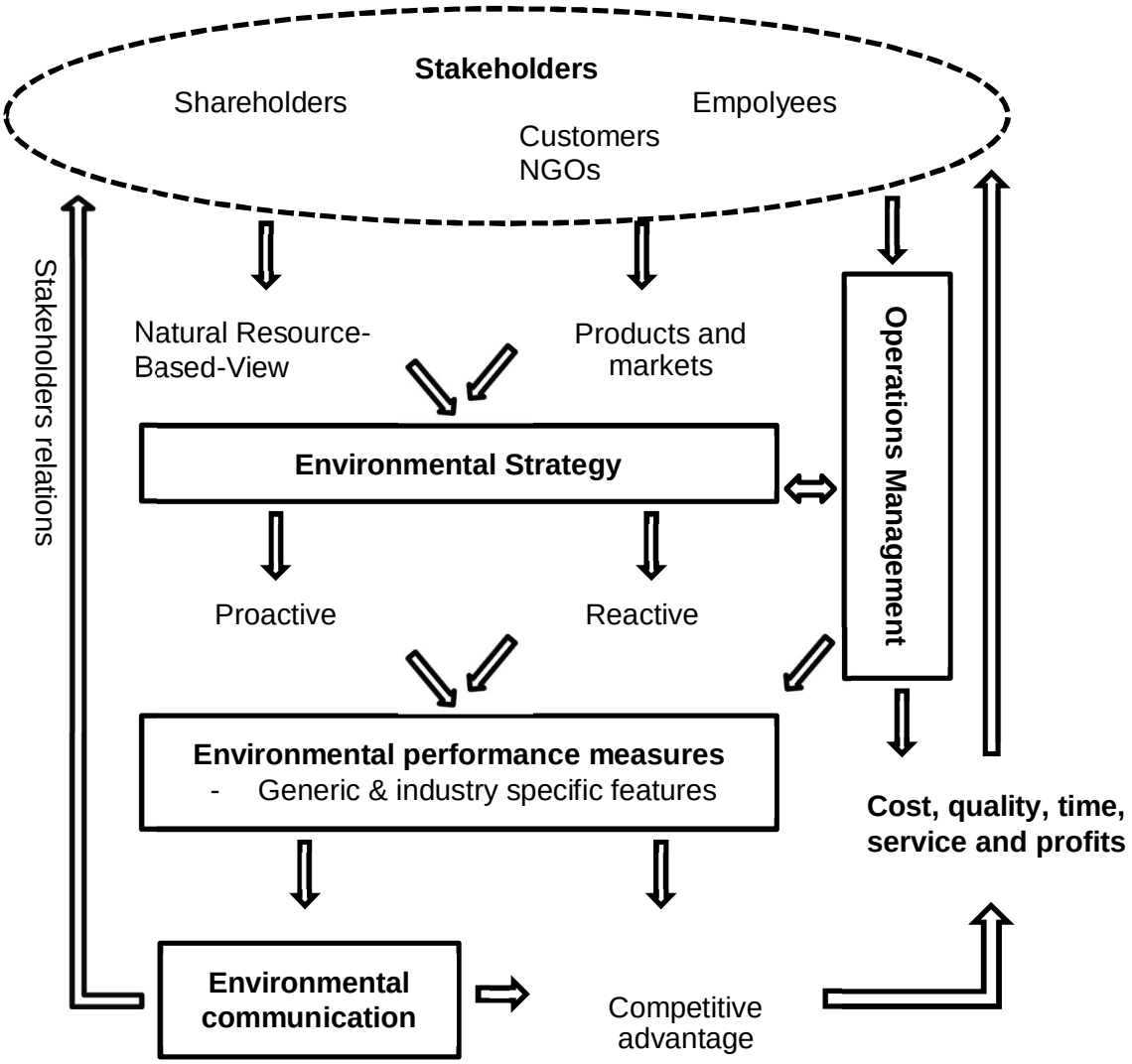

Fig. 2. Theoretical framework in the study (adapted from Jimenez and Lorente 2001, González-Benito and González-Benito 2005, Ambec and Lanoie 2008).

The choice between reactive and proactive environmental strategies, or the level of proactivity, shapes also the environmental communication. Communication can be targeted directly to the stakeholders, or it can appear as an integrated element of the firm's overall performance measurement system. Both ways of communication contribute to firm's competitive advantage, but apparently in different ways. Direct communication on EPMs contributes to compliance (or over-compliance) with formal or informal regulation, whereas environmental communication contributing to firm's performance appears as a proactive tool aside other tools of the operations managements (see e.g. González-Benito and González-Benito 2005).

Table 1. Number of companies in the study using EPMs (the number of companies that considered a measure as useful within parentheses).

	PEFC/FSC	Consumer labels	EMS	Green building	LCA/EPD	Other EPM	Total
Primary	10 (6)	1 (1)	9 (4)	1 (0)	5 (2)	1	11
Value-added	18 (13)	7 (8)	13 (8)	2 (1)	8 (3)	7	25
Construction	4 (3)	1 (1)	5 (1)	4 (0)	2 (1)	2	7
Retail	2 (3)	1 (1)	2 (1)	0 (0)	0 (0)	0	5
Wholesale	2 (1)	1 (0)	2 (1)	1 (0)	0 (1)	1	5
Total*	**25 (19)**	**7 (11)**	**20 (10)**	**6 (1)**	**10 (5)**	**9**	**38**

*The last row presents the number of individual companies. Note that columns do not sum up to the total number as companies may belong to multiple segments.

Consumer labels: Nordic Ecolabel, EU Ecolabel, Green Seal, Blaue Engel, Planet Positive, Rainforest Alliance, RealWood
EMS: Environmental management systems ISO 14001 and EMAS
Green building: LEED, BREEAM, DGNB, Miljöbyggnad
EPD & LCA: Environmental Product Declarations, life cycle studies, footprints

4 Results

4.1 Use of EPMs

According to Table, the most commonly used EPMs in the Nordic wood industry companies were forest certificates (PEFC, occasionally also FSC). Forest certificates were considered by managers to be mandatory for market entry or to maintain markets, especially in exports and B2B markets. However, the share of chain-of-custody certified wood products in the markets is still low. Some interviewees also emphasized problems with multiple forest certifications and hoped to achieve cost and resource savings by integration of different systems.

The bigger sized companies have commonly implemented environmental management systems (ISO 14001) while the use of more demanding European Eco-Management and Audit Schemes (EMAS) was in 2011 relatively uncommon. Green building certificates are used by large constructors, but their perceived usefulness among respondents was found to be low. Life Cycle Assessment (LCA) measures, including Environmental Product Declarations (EPD), are not widely used. Consumer labels other than SFM are seldom used, and among them the Nordic Swan Ecolabel was mentioned most often. In the future, companies expected a growing use of product specific LCA tools and EPDs, as driven by the requirements of green building systems currently being implemented in the Nordic countries.

4.2 Perceptions on key stakeholder groups

The main drivers for use of EPMs were customer requirements (particularly in certain export markets), internal information needs, and strategic decisions to act responsibly. There are also increasing information needs from e.g. institutional builders in certain markets, chiefly the UK. Competitive pressures from producers of wooden or other products play a minor role. It seemed to be difficult for the interviewees to list the benefits their customers have gained from using environmentally friendly products. The benefits ranged from a general “improved image” to more specific ones such as improved market access, larger market share, customer retention and customer relations. There were no clear differences between the different types of companies in their view of the benefits gained by customers, but these results are not meant for generalization.

According to the interviews, the most important stakeholders mentioned were customers, suppliers and environmental authorities. Sometimes it was not completely certain whether the respondents were actually ranking different stakeholder groups from the perspective of environmental issues, or assessing the overall company's stakeholder groups. In the smaller companies, managers sometimes had trouble with the identification of the whole spectrum of stakeholders beyond suppliers and customers, a similar finding to that found by Li et al. (2010) regarding the CSR perceptions of Finnish SME sawmill managers. The following quotes represent some interesting differences in the answers regarding the importance of various stakeholder groups:

- Journalists, forest owners are not proactive and do not respond to market demands. This is not how environmental problems should be solved. (Timber and interior wood producer)
- Local environment (the community where the factory is situated), employees, customers. (Treated wood producer)
- The most important stakeholder groups in terms of environmental issues are authorities, communities, construction firms and end-users. (Private house producer)
- Hard to say, several stakeholders are equally important. End-consumers play a key role. So also do local administrations and politicians. And the owner/planner is very important. One may say it is these three categories are our main stakeholders. (Constructor and developer)
- The most important stakeholders are certifying organizations, auditing firms and NGOs. (Primary and value-added producer)

4.3 Communication and strategic proactiveness

Fourteen companies can be classed as having an active approach to environmental communication. An illustrative example of this type of communication is given by a Finnish primary and value-added producer "We communicate the environmental friendliness of wood products, carbon footprints and the certificates we have in use. We want to direct the environmental communication towards end-consumers. This way we can also create pressure towards retailers." A passive approach was adopted by twelve companies and this is exemplified by a Swedish timber and joinery producer (: "Well, it depends. It's there on the product, and we use some of the information for those who are interested. But surely, no customer wants to have all the information. "A neutral approach falling between these two approaches was used by ten companies, for example by a Finnish sawmill: "We use PEFC in every product, in the wrappings and in our brochures. We don't really communicate any other environmental aspects to buyers."

It was interesting to note that many of the interviewed managers thought that wood is inherently so environmentally friendly, and that this is a sufficient base for environmental communication. The environmental awareness of customers is believed to be rather low, but higher among industrial and public sector customers. Owners' or investors' interest in documentation is limited, however. Documentation from suppliers is required in the case of chain-of-custody certification only. Within the domain of environmental communication, ecological aspects, recyclability of wood, sustainability of forest management practices, and the origin of wood were most commonly emphasized issues, uniformly towards all identified customer groups.

In our interviews, as a measure of pro-activeness towards environmentally related strategic orientation, we inquired about managers' intentions to redirect consumers' needs and wants towards less material and energy consumption and fewer CO_2 emissions: less environmentally harmful consumption or any other related aspect. Based on the interviews, pro-activeness could be interpreted as being present most commonly in the group of Swedish companies (emphasized strongly in five

interviews), followed in the relative frequency by Finnish companies (about half could be considered as being proactive, including small and large firms) and then in three Norwegian companies, which expressed views that can be interpreted as being proactive.

These findings should not, however, be generalized beyond the sample since there was a high degree of heterogeneity in terms of the companies' core business areas, target markets and size. Also, many respondents quite frankly answered just "no", without any further elaboration of the underlying reasons, so based on the interview data it was difficult to see beyond this negative attitude. A more indirect example from a Finnish value-added producer also illustrates a lack of will to redirect customer needs actively: "The company is not that interested in redirecting customers' needs and wants toward less environmentally harmful consumption. We hope that the pressure to that comes from somewhere else.". However, more proactive examples were expressed for example by a Swedish value-added company "When we design and develop our products we always consider the environmental impacts. We design our product in a way that all parts are possible to recover." and a Norwegian industrial end-user company as follows: "Yes, we would like to influence customers: decrease use of packaging, adjust orders making it possible to minimize transport. Suppliers: EMS, for example choice of surface treatment."

5 Discussion and conclusions

According to interviews done in wood-products value chain in three Nordic countries, the sustainable origin of wood and the ability to document the trustworthiness of company operations are the two most important characteristics of EPMs. The competitive or operational advantages of EMSs are not always easily identified or quantified, and genuinely proactive use of different measures was identified only in a few cases. Unlike what we assumed a priory, competitive pressure from non-wood materials was not generally perceived to act as a driver for improving and communicating environmental performance.

From the communication perspective, our results indicated that the Nordic wood industry needs hands-on help to raise the role of environmental performance measures in its market communication. This applies both in the heavily relationship-based business-to-business industrial markets and in the long chains towards final consumer markets in order to raise end-users' environmental awareness and target green marketing towards the most environmentally sensitive segments. As forest certification and EMS have developed to be minimum requirements in some key markets, companies seem to now lack efficient tools to demonstrate their environmental performance. LCA tools and EPDs are potential tools, but they are not yet widely identified as environmental performance measures.

In the future we can expect environmental issues to remain strongly on the wood industry research agendas due to the globally strong cry for sustainability. The future research should therefore focus, first, on providing more quantitatively oriented information on how companies could efficiently segment their industrial and consumer markets and, second, on getting a more qualitative understanding how different types of companies could plan and implement environmental communication more efficiently and effectively. In the end, what we would like to achieve is a sound progress in the way of developing stronger product and corporate brands based on corporate environmental and social sustainability in order to achieve higher brand loyalty and sustained profitability in this industry.

References

Ambec, S. & Lanoie, P. 2008, Does It Pay to Be Green? A Systematic Overview. Academy of management perspectives 23(4): 45-62.

Ferrell, O. C., Gonzalez-Padron, T. L., Huly, T. M. & Maignan, I. 2010. From market orientation to stakeholder orientation. Journal of Public Policy & Marketing 29(1): 93–96.

Freeman, R. E. 1984. Strategic Management: A Stakeholder Approach. Pitman, Boston. 276 p.

González-Benito, J. & González-Benito, Ó. 2005. Environmental proactivity and business performance: An empirical analysis. Omega 33(1): 1–15.

Hart, S. L. 1995. A natural-resource-based-view of the firm. Academy of Management Review 20(4): 986–1014.

ISO. 2007. ISO 14000 Environmental Management.

Jimenez, J. & Lorente, J. 2001. Environmental performance as an operations objective. International Journal of Operations & Production Management 21(12): 1553–1572.

Lähtinen, K. 2007. Linking resource-based view with business economics of woodworking industry: Earlier findings and future insights. Silva Fennica 41(1): 149–165.

Li, N., Toppinen, A. & Lantta, M. 2010. Corporate responsibility in the Finnish forest industry SMEs: Practice without preaching? The Corporate Responsibility Research Conference.

Mitchell, R., Agle, B. & Wood, D. 1997. Toward a theory of stakeholder identification and salience: Defining the principle of who and what really counts. Academy of Management Review 22(4): 853–886.

Nord, T. 2005. Structure and Developments in the Solid Wood Value Chain: Dominant Saw Milling Strategies and Industrialized Housing. Licentiate Department of Civil, Environmental and Natural Resources Engineering, Linköping University, Linköping.

Porter, M. E. 1991. America Green Strategy. Scientific American 264(4): 168.

Russo, M. V. & Fouts, P. A. 1997. A resource-based perspective on corporate environmental performance and profitability. Academy of Management Journal 40(June 3): 534–559.

Räty, T., Lindqvist, D., Nuutinen, T., Nyrud, A., Perttula, S., Riala, M., Roos, A., Tellnes, L., Toppinen, A. & Wang, L. 2012. Communicating the Environmental Performance of Wood Products. Metla working papers 230. 71 p.

Sharma, S. & Vredenburg, H. 1998. Proactive corporate environmental strategy and the development of competitively valuable organizational capabilities. Strategic Management Journal 19(8): 729–753.

Silverman, D. 2000. Doing Qualitative Research: A Practical Handbook. Sage Publications, Thousand Oaks, CA. 316 p.

Toivonen, R., Järvinen, E., Enroth, R. & Rämö, A. 2008. Environmental Quality of Wood Products – Preliminary Study about the UK Market. Pellervo Economic Reseach Institute Working Papers 111: 35.

Vaccaro, V.2009. B2B green marketing and innovation theory for competitive advantage. Journal of systems and information technology 11(4): 315-330.

A Change in the Paradigm? Ecosystem Goods and Services in Finnish Forest and Environmental Policies

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Abstract

The framework of Ecosystem Goods and Services, introduced by Millenium Ecosystem Assessment has entered as a key linkage between ecosystems and human well-being. This paper introduces and briefly analyses developments and state of affairs in Finland's forest and environmental policies and the ways the new emphasis on ecosystem services is so far documented in the strategies and policies related to forests and environment. Some attention is given to international and domestic reasons in this development, including a recent downturn of pulp and paper industries. The international changes from the "narrow " biodiversity focus to broader ecosystem services approach are already being taken into account in prospecting Finland's environmental policies. Comparing to the earlier "environmental turn" in forestry, one may call this as an ongoing "socio-economic turn" in biodiversity based environmental policies in Finland. Ecosystem goods and services will also play important roles in the larger economic, ecological and social frames called as 'green economy', 'green growth' and 'bioeconomy', outlined in some strategic reports. All these reasons, backed by the longer term or more recent development towards multiple-use, environmentally benign forestry and integrated natural resource management, may facilitate an active adaptation towards ecosystem goods and services framework in Finland's forestry. Consequently, an increased convergence and improved integration of forest and environmental policies within ecosystem services and other supporting frameworks, may result in policy changes which can be called as paradigmatic. Yet this preliminary conclusion requires better evidence and more detailed analysis – and the process itself more time to be consolidated.

Keywords: Biodiversity, forestry, environment, word, others

1 Introduction

In demonstrating the state and degradation of world ecosystems, Millenium Ecosystem Assessment (2005) adopted the framework of Ecosystem Goods and Services (in short; Ecosystem Services, ES) as a key linkage between ecosystems and human well-being.
The Economics of Ecosystems & Biodiversity-study (2010) further advanced the policy relevance of ecosystem approach, visioning it as the major tool towards responsible stewardship of the natural capital. Natural capital as a new concept to substitute and "rehabilitate" land as an economic resource emerged within ecological economics in the 1990s and was soon related to the concept of ecosystem services (Matero et al. 2003, Naskali et al. 2006).

There is a long history how the roles of "nature" or "land" has been perceived in the development of economic theories. Among the earliest examples, physiocratism regarded land as the most important source of wealth, while William Petty formulated concisely that "land is the mother and labor the father of wealth". Later general economic theories (before ecological economics) appreciated nature much less (Saastamoinen 1978, Naskali et al. 2006, Hiedanpää et al. 2010) while land resource economics (e.g. Barlowe 1958) and in particular natural resource conservation textbooks (e.g. Owen 1971) included resource classifications what can be seen as forerunners for some of the categories now further developed in the rapidly growing science on ecosystem services.

The concept of ecosystem was first suggested by A.G. Tansley (1935), in his article "The use and abuse of vegetational terms and concepts", published in Ecology. In ecological sciences, the ecosystem definition of Odum (1971) has been widely used (Kellomäki 2009): "Any unit that include all the organisms (i.e. the "community") in a given area interacting with the physical environment so that a flow of energy leads to clearly defined trophic structure, biotic diversity and material cycles (i.e., the exchange of matter between living and non-living parts) within the system is an ecological system or ecosystem". Ecosystem approach emphasize the integrity and integration of all ecosystems. For example, the 5th Conference of Parties (COP 5) of the Convention on Biodiversity (CBD) recognized Ecosystem Approach as a strategy for the integrated management of land, water and living resources that promotes conservation and sustainable use in an equitable way and emphasizes that humans, with their cultural diversity, are an integral component of ecosystems (UNEP/CBD 2010).

This is in line with the idea of decoupled socio-ecological systems (Haila and Levins 1992, Haila 2010, Naskali 2010) which links more explicitly the influence of economy and institutional structures on the functioning of ecological systems. Already now it seems that the concept of ecosystem goods and services will be able to provide a genuine policy framework for further integrating natural and man-made (eco)systems in the ways sustainable development requires (e.g. Hiedanpää et al. 2010, TEEB 2010, Ratamäki et al. 2011).

The purpose of this explorative paper is to introduce and briefly analyze development and state of affairs of ecosystem services in Finland's forest and environmental policies as reflected in some strategic policy documents and research reports. It is also it is considered what that may mean in further development.

2 Environmental policies and ecosystems

Environmental policy is one of the strong mandates of the European Union and the union has also been very ambitious in the environmental arena. Since Finland joined EU in 1995, the Finnish environmental policies, which as such had developed favorably during the previous (say) two decades, had to be adopted to the EU rules, alongside the growing importance of international environmental conventions EU also has promoted. As a new newcomer, Finland's environmental authorities seriously wanted to become among the best also in the EU class, following the prevailing official policy in Finland, which took every EU directive literally as was often claimed in general discussion (Heiskanen et al. 2009, OECD 2009). On the other hand, people's attitudes in environmental matters worked in a variety of ways (Sairinen 2001). Although that position among the forefront countries has probably already been achieved, to comply with the requirements derived from entirely different environmental, policy and cultural contexts, within the short time scales given, was not an easy task. This in particular appeared to be the case with the Natura 2000 programme, largely related to forests (cf. OECD 2009). The second still continuing problem arises from the authoritarian tendencies of the EU that fail to understand the context of wolves for rural livelihoods (Hiedanpää and Bromley 2010).

The OECD Environmental Performance Review (OECD 2009) provides the most comprehensive evaluation of Finland's environmental policies and environmental management. The review saw consolidation of progress and further alignment with EU environmental acquis. But it says that despite its low population density, Finland has experienced great pressures on its sensitive environment, as expressed by high energy and material intensities. Other environmental policy priorities include addressing climate change, fostering co-operation to improve water quality of the Baltic Sea, enhancing biodiversity in forests, and improving waste management and material efficiency (OECD 2009)

A new National Biodiversity Strategy covers the period 2006-16. OECD (2009) saw a lack of quantitative targets as an obstacle for evaluation. However, it noted that the integration of nature and biodiversity conservation concerns in national legislation has been strengthened and that Finland has ratified most international agreements in the field of nature and biodiversity conservation. The gaps in the national protected areas network, particularly in regard to forests and shore habitats in the South, and ecological connectivity were found (OECD 2009).

The fourth Red List of threatened species was published in 2010. There are 2,247 threatened species in Finland, which is 10.5 per cent of the 21,400 species evaluated. During the last ten years, the status of 186 species (10 % of the 1,505 species evaluated in 2000) has improved, while that of 356 has deteriorated. The majority of threatened species live in forests (36%) and changes in forest habitats are the primary threat to a total of 693 species. The rate of decline in species inhabiting forests and traditional rural biotopes has slowed slightly (Rassi et al. 2010).

OECD (2009) report's recommendations concerning *nature and biodiversity* and being closest to forests include the following: set up a national peatland strategy to guide efforts for their conservation and management, including peatland exploitation for energy use; enhance protection of rare and threatened forest habitats; link any support to private forest owners to otherwise unremunerated but beneficial public services; and increase the financial contribution of the tourism industry towards nature conservation, for example through public private partnerships and user fees on recreation services. Among other observations related to forests was, that though increasing, government support to environmental management is a small part of total government support to private forestry (OECD 2009). Ecosystem services (approach) as such were not among the major policy recommendations.

Ratamäki et al. (2011) summarize several points as policy related advantages of ecosystem services approach. It is a valuable instrument for interactive and multidisciplinary discussions about natural resources and their governance. The term also opens up new views on strategic planning of environmental policy and highlights the importance of socio-ecological processes. The ecosystem services approach allows to identify and understand how the ecological and societal elements are intertwined and together form the ensemble of governance of the natural and environmental resources.

Rather than considering the societal functions related to the utilization of naturalresources as a threat to ecological sustainability, the ecosystem services approach helps us to learn how to use these societal functions as means in governance (Ratamäki et al. 2011).

Ratamäki et al. (2011) further note that the ecosystem services concept has enforced the development of monetary evaluations and economic instruments. But they also recognize the fears of many scientists and stakeholder groups that these economic considerations may become too dominant, and emphasize that other evaluation methods and instruments must also be systematically developed.

3 Forest policy and ecosystem services

In regard to the policy formation and governance forest policy and environmental policy in Finland are in different positions. Forest policy stand largely on its own domestic wooden legs and decision making is primarily in the hands of the national government and the parliament as well as the national stakeholders. It is very much within a sphere of national governance, much because the European Union has not a mandate in forest policy. This does not mean that international principles and recommendations are not having influence on Finnish forest policy. It is the other way round. Finland has been active in international forest arrangements and is therefore committed to be in the forefront in complying with the international soft norms in forestry such as the non-legally binding Forest principles of UNCED 1992, UNFF recommendations and Pan-European Criteria and Indicators for Sustainable Forest Management.

In the past there used to be many, sometimes considerable, tensions between the major architects of forest and environmental policies in Finland: the Ministry of Agriculture and Forestry and the Ministry of Environment, emerging gradually since the establishment of the latter in 1983, although environmental policies started to develop much earlier. However, often the conflicts were first found to appear outside of the offices of the ministries, in the form of activities of environmental organizations and movements or between the major stakeholders and their networks or "coalitions". Although, largely due to the different mandates and complexity of issues, some tensions between the ministries still exists, much of it was released during the "environmental turn" of Finnish forestry since mid 1990s. For example, the reform of Forest Act and Nature Conservation Act was done in a coordinated way and the National Forest Programs were keenly affiliated with a Forest Conservation Program for Southern Finland with considerable funding. All that increased cooperation between the two ministries (Palo 1993, Saastamoinen 1996, Ollonqvist 1998, Viitala 2004).

Similar paradigmatic "environmental turn" can be seen in the world forestry (although uneven, if not polarized, geographically and between country groups) due to global environmental conventions, the non-legally binding forest agreements, pressures from environmental NGOs,

promoted also via market actors, and other international activities (Humphrey 2006, Saastamoinen 2009, McDermott et al. 2010, Rayner et al. 2010).

The concise and target-oriented forest policy of Finland has already for decades being formulated in national forest programs or been influenced by similar types of earlier programs, however developed more independently from the state leadership than the modern national forest programs.

Finland's (revised) national forest programme 2015 was accepted by government resolution in December 2010. The program carries a sub-title *Turning the Finnish forest sector into a responsible pioneer in bioeconomy* (Ministry of Agriculture and Forestry 2011). " In bioeconomy, natural resources are used in a sustainable manner, replicating and taking advantage of biological processes in the processing operations " the programme defines. It is visioning that "over the next few decades the forest sector can and should be developed into a *biocluster*, which produces more and more materials and services to other industrial sectors". Ecosystem goods and services are mentioned in several connections in the program document, but not as the mainstream approach.

Ecosystem services were taken as an additional indicator into the Finnish application of Pan-European Criteria and Indicators for Sustainable Forest Management. However, so far it formally include only one possible description for the classification of ES for Finland's forests without direct connections to the document's abundant empirical data, which as such is useful for demonstrating the quantitative and qualitative dimensions of the state of many forest ecosystem goods and services (State of Finland's Forests 2011).

The best practices so far in the Finnish forestry can be found in the state forests, covering roughly one third of forestry land areas (including open fell areas of the north, treeless peatlands and also state owned water areas). All these areas are managed by the hybrid type business oriented state forest organization carrying the traditional name Metsähallitus, which refers to its past central role in forest administration. It is an innovative organizational structure under the Ministry of Agriculture and Forestry and the Ministry of Environment. The latter supervises the activities of the department called Nature services, having the management of national parks and other conservation activities as its main tasks.

Hytönen (2009, 102) observes that "the planning systems of Metsähallitus provide many possibilities to take care of nature management crossing the borders of ecosystems. Natural resource planning and landscape-ecological planning being part of it provide a possibility to compromise the needs of economic use of forests, nature conservation and recreation at local and regional levels". Recently Metsähallitus published comprehensive guidelines for nature management based on ES concept and approach (Päivinen et al. 2011).

4 Considerations and preliminary conclusions

The concept of ecosystem services brought by Millenium Ecosystem Assessment (2005) together with its complementary TEEB (2010) can be interpreted as a paradigmatic change in the processes based on the Convention on Biological Diversity, being in the core of international nature conservation agenda. Although CBD as such has always had an anthropogenic "dimension" , ecosystem services approach makes it more visible and stronger.

At the same time it brings biodiversity more understandable and operational, and therefore probably more acceptable for the majority people.

These international changes from ”narrow ” biodiversity focus to broader ecosystem services approach are already being taken into account also in prospecting Finland’s environmental policies (Ratamäki et al. 2011). Comparing to the earlier “environmental turn” in forestry, one may call this as an ongoing “socio-economic” turn in biodiversity based environmental policies.

In particular, ecosystem goods and services will play important roles in the larger economic, ecological and social frames called as ‘green economy’, ‘green growth’ and ‘bioeconomy’, originally being visioned in the broad field of environmental policies, ecological economics and environmental movements (e.g. Craincross 1991, Naskali et al. 2006).

These aspects have more recently been given much consideration also in many reports oriented towards economy, society and industries at large. For example, Natural resources strategy *Intelligently powered by nature* (SITRA 2010) claims for being one of the world's first national natural resource strategies to combine all natural resources under a shared strategic framework. It states that sustainable use of natural resources is becoming the driving force behind global development.

Sustainable use of forests has been the backbone of the forest industries in Finland. However, the tight competitive conditions in global forest industries demonstrated by the ongoing structural changes in pulp, paper and other forest industries in Finland, have compelled for the renewal of visions, strategies and images (Hetemäki et al. 2011). What has been called an unexpected downturn and crisis of pulp and paper industry in Finland, has resulted numerous state supported analyses and reports within the government, in research institutes and universities, besides the internal analyses within the industries, to find the ways out of the crisis. While each report has had their own focus, the results and recommendations concerning the future of the whole forest sector produced during (e.g. Niskanen et al. 2008) and after the crisis (Hetemäki et al. 2010, Donner-Amnell et al. 2011), can be summarized as emphasizing the need to develop a more diversified industrial and other value-adding (production and consumption) structures based on forests and forestry. These kind of policy recommendations can be called as diversification strategies and they are well in line with a suggested multi-cluster strategy to complement the existing forest cluster strategy (Saastamoinen 2005, Saastamoinen et al. 2006). It has made the whole forest sector more responsive to many challenges and opportunities, which the new concepts such as ecosystem services and biocluster may be able to envisage.

All the above reasons, backed by the longer term development towards multiple-use and environmentally benign forestry and integrated natural resource policy, may facilitate an active adaptation towards ecosystem goods and services framework in Finland’s forestry.
Consequently, an increased convergence, collaboration and better integration of forest and environmental policies within ecosystem services and other supporting frameworks in Finland, may result in policy changes which can be called as paradigmatic.

However, although the logic of argumentation above may be regarded to be sound, the evidence given above is sporadic and more detailed work and analysis is needed, before the question mark in a title can be removed. At the end of the day, it is practices, policies, politics and people, which do it or not.

References

Barlowe, R. 1958. Land Resource Economics. Englewood Cliffs. N.J.

Cairncross, F. 1991. Costing the Earth. The Economisy Books Ltd.

Donner-Amnell, J., Miina, S., Pykäläinen, J. & Tuuva-Hongisto, S. (toim.) 2011. Maailma haastaa. Metsä tulevaisuuden ratkaisuissa. Itä-Suomen yliopisto, Metsätieteiden osasto. Silva Carelica 56:1-256.

Haila, Y. 2010. Ekososiaalinen symbioosi. In: Hiedanpää, J. Suvantola, L. & Naskali, A. 2010. Hyödyllinen luonto: ekosysteemipalvelut hyvinvointimme perustana. Tampere: Vastapaino. Pp 53-74..

Heiskanen, E., Kivisaari, S., Lovio, R. and Mickwitz, P. 2009. Designed to travel? Transition management encounters environmental and innovation policy histories in Finland. Policy Sci 42:409–427

Hetemäki, L., Niinistö, S., Seppälä, R. & Uusivuori, J.(eds.) 2011. Murroksen jälkeen . Metsien käytön tulevaisuus Suomessa. [After the Crisis: The Future of Forest Use in Finland. In Finnish] 140 p.

Haila, Y. and Levins, R. 1992. Humanity and nature: ecology, science and society. London. Pluto Press. 270 s.

Hiedanpää, J. and Bromley, D.W. 2010 The Harmonization Game: Reasons and Rules in European Biodiversity Policy. Environmental Policy and Governance. Env. Pol. Gov. (2010

Hiedanpää, J., Suvantola, L. & Naskali, A. 2010. Hyödyllinen luonto: ekosysteemipalvelut hyvinvointimme perustana. Tampere: Vastapaino. 283 p.

Hytönen, M. 2009. Ekosysteemilähestymistapa metsien hoidossa ja käytössä – kirjallisuusselvitys. Metlan työraportteja 139:1-132.

Kellomäki, S. 2009. Trees, forests and forest ecosystems. In. Kellomäki, S. (ed.) 2009. Forest resources and sustainable management. Papermaking science and technology. Book 2. Finnish Paper Engineers' Association. Jyväskylä. Gummerus. pp. 16-96.

Kniivilä, M., Horne, P., Hytönen, M., Jäppinen, J.-P., Naskali, A., Primmer, E. & Rinne, J. 2011. Monia hyötyjä metsistä – ekosysteemipalveluiden yhteistuotanto ja tuotteistaminen. PTT raportteja 227:1-66.

Matero, J., Saastamoinen, O. & Kouki, J. 2003. Metsien tuottamat ekosysteemipalvelut ja niiden arvottaminen. Metsätieteen aikakauskirja 3/2003:355-384.

MA 2005. Millenium Ecosystem Assessment. Ecosystems and Human Well-Being: General Synthesis. Island Press. Washington DC.

McDermott, C., Cashore, B and Kanowski, P. 2010. Global Environmental Forest Policies. Earthscan. 372

Ministry of Agriculture and Forestry. 2010. Finland's National Forest Programme 2015.

Ministry of Agriculture and Forestry (2011). State of Finland´s Forests 2011 Based on the Criteria and Indicators of Sustainable Forest Management. Ministry of Agriculture and Forestry & Finnish Forest Research Institute. Writers and Editors: J. Parviainen and S. Västilä, Finnish Forest Research Institute

Naskali, A. 2010. Ekosysteemipalvelun termodynaamiset juuret. In: Hiedanpää, J. Suvantola, L. & Naskali, A. 2010. Hyödyllinen luonto: ekosysteemipalvelut hyvinvointimme perustana. Tampere: Vastapaino. Pp 33-52.

Naskali, A., Hiedanpää, J. & Suvantola, L. 2006. Biologinen monimuotoisuus talouskysymyksenä. Suomen ympäristö 48:1-141.

OECD 2009. The OECD Environmental Performance Review. Finland.

Odum, E.P. 1971. Fundamentals of ecology. 3rd edition. Toronto. W. B. Saunders Co. 574 p.

Ollonqvist, P. 1998. Metsäpolitiikka ja sen tekijät. Pitkä linja 1928-1997. Metsälehti Kustannus. Helsinki.

Owen, O.S. 1971. Natural Resource Conservation. New York.

Palo, M. 1993. Ympäristötietoisen metsäpolitiikan strategia. In: Palo, M & Hellström, E.(toim). Metsäpolitiikka valinkauhassa. Metsäntutkimuslaitoksen tiedonantoja 471:1-467.

Primmer, E., & Karppinen, H. 2010. Professional judgment in non-industrial private forestry: Forester attitudes and social norms influencing biodiversity conservation, Forest Policy and Economics, 12:2, 136-146.

Päivinen, J., Björkqvist, N., Karvonen, L., Kaukonen, M., Korhonen, K.-M., Kuokkanen, P., Lehtonen, H., Tolonen, A. (eds.) 2011. Metsähallituksen metsätalouden ympäristöopas. Metsähallitus. Vantaa. Metsähallituksen metsätalouden julkaisuja 67: 1-162.

Rassi, P., Hyvärinen, E., Juslén, A. & Mannerkoski, I. (eds.) 2010. The 2010 Red List of Finnish Species. Ympäristöministeriö & Suomen ympäristökeskus, Helsinki. 685 p.

Ratamäki, O. Vihervaara, P. , Furman, E. & Tuomisaari, J. 2011. Ekosysteemipalveluiden tutkimus osaksi ympäristö- ja luonnonvarojen hallintaa. Suomen ympäristökeskuksen raportteja 7/2011, 66 p.

Rayner, J., Buck, A. & Katila, P. (eds.). 2010. Embracing complexity: Meeting the challenges of international forest governance. A global assessment report. Prepared by the Global Forest Expert Panel on the International Forest Regime. IUFRO World Series Volume 28.

Saastamoinen, O. 1978. Luonnonsuojelu ja talousteoria. Summary: Conservation and economic theory. Helsingin yliopiston maankäytön ekonomian laitos. Julkaisuja 4: 1-89.

Saastamoinen, O. 1996. New Forest Policy: the Rise of Environmental and the Fall of Social Consciousness. Finnish Journal of Rural Research and Policy. English Supplement 1996. (Maaseudun Uusi Aika) Vol 3: 125-137.

Saastamoinen, O. 2005. Sosiaalisen kestävyyden ja sosiaalisen pääoman kehitys metsäalalla. In: Niskanen, A. (toim).. 2005. Menestyvä metsäala ja tulevaisuuden haasteet. Kustannusosakeyhtiö Metsälehti. Pp. .72-95.

Saastamoinen, O., Donner-Amnell, J. and Rantala, T. (toim.) 2006. Näkökulmia metsäalan sosiaaliseen kestävyyteen ja sen tulevaisuuteen. Joensuun yliopisto, metsätieteellinen tiedekunta, Tiedonantoja 168:1-139

Sairinen, R. (2001), Public Support for Environmental Policy in Finland: Cultural Interpretations of Survey Results. Scandinavian Political Studies, 24: 129–148.

SITRA 2010. Natural resources strategy. Intelligently powered by nature.

TEEB 2010. The Economics of Ecosystems and Biodiversity: Mainstreaming the Economics of Nature: A synthesis of the approach, conclusions and recommendations of TEEB.

Viitala, J. 2004. Metsäpolitiikan valtaa ja vääntöä. Tietosanoma. Helsinki.

UNEP/CBD 2010. Report of the Fifth Meeting of the Conference of the Parties to the Convention on Biological Diversity Serving as the Meeting of the Parties to the Cartagena Protocol on Biosafety (Reposted to incorporate the corrections in UNEP/CBD/BS/COP-MOP/5/Corr.1 and 2) http://www.cbd.int/mop5/documents/

Competitiveness of the Estonian timber products and comparison with Scandinavian and Baltic countries

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Abstract

The aim of the study is to find the Estonian timber sector competitiveness in the world timber markets. The different foreign trade related indices –Balassa index a.k.a. revealed comparative advantage index (RCA), relative import advantage (RMA), revealed competitiveness RC – were calculated for the assessment. The foreign trade data from UN COMTRADE database are used for the calculations. The ranks for different product groups were calculated for the year 2010. The best result for Estonia was in the prefabricated buildings product group, where Estonia ranked first in the world (RC = 3.50).

Keywords. Forest sector, Estonia, foreign trade, revealed competitiveness

1 Introduction

The aim of the current study is first, to find the competitiveness of the Estonian timber sector in the world timber markets by using different foreign trade related indices, and second, to compare the Estonian position and situation with neighbors and competitors from the Baltic (Latvia & Lithuania) and Nordic (Denmark, Finland, Norway & Sweden) countries. The change of market shares of different timber products and revealed comparative advantage indexes are calculated for the assessment.

2 Short overview of methods

In international trade analysis the revealed comparative advantage index (RCA), also known as Balassa index (BI), is widely used. The Balassa index provides different mathematical formulations to be used for specific problems (Dieter and Englert 2007).

(1a)

$$RCA_{ij} = \frac{\frac{X_{ij}}{\sum_i X_{ij}}}{\frac{\sum_j X_{ij}}{\sum_i \sum_j X_{ij}}}$$

Where X=export value, i=commodity class, j=country.

Here the numerator describes the share of country j export value to the world total export value of the commodity i. In formula 1a this share can be called the country's market share of the total world export market. The denominator shows the share of country j export in total world export.

The RCA calculation can also be given as

(1b)

$$RCA_{ij} = \frac{\frac{X_{ij}}{\sum_j X_{ij}}}{\frac{\sum_i X_{ij}}{\sum_i \sum_j X_{ij}}}$$

If RCA_{ij} >1, then a country has a comparative advantage; the country of interest is specialized in producing the commodity of interest. The country which has relatively cheaper production factors exports the goods (Dieter and Englert 2007). If the RCA_{ij} <1, then the country is at a comparative disadvantage with this product.

As in Formulas 1a and 1b are observed only export, then in some literature the same RCA index is also called RXA index – revealed comparative export Advantage. There are two problems: a) the RCA is double counting the product and/or country information in the same formula, as shown by Vollrath in 1991 (Bojnec and Ferto, 2009), and b) only export is analyzed. For import analysis the similar index RMA-Relative iMport Advantage is used.

(2)

$$RMA_{ij} = \frac{\frac{M_{ij}}{\sum_j M_{ij}}}{\frac{\sum_i M_{ij}}{\sum_i \sum_j M_{ij}}}$$

where *M* is import value, *i*=commodity class, *j*=country. If the RMA_{ij} >1, then the country has an import advantage: import exceeds export.

Revealed competitiveness – RC

(3)

$$RC_{ij} = \ln(RXA_{ij}) - \ln(RMA_{ij})$$

Positive values of the RC index indicate a competitive/comparative advantage, while negative values indicate a comparative/competitive disadvantage.

3 Data

The current study uses data from United Nations Commodity Trade Statistics Database (UNCOMTRADE). The queries were made according to the SITC (Standard International Trade Classification) classification – revision 3, which included data from 2007-10. According to STIC classification the group 811 – prefabricated buildings – is a part of section 8 – miscellaneous manufactured products, not necessarily wood products. In the current study we assume that prefabricated buildings are wood products, either log houses or indoor factory-made prefabricated modules, in which the main construction frames and most other components are made from wood.

4 Short overview of results

Fig. 1 shows Estonia's position in the global ranking of world timber markets. The most competitive industries are those producing prefabricated wood houses. Results for year 2010 indicate that Estonia has the highest RC value (3.50) in the group of prefabricated buildings among the 116 countries included. The second best result is in other manufactured wood, where Estonia ranked 8th, but the RC value was relatively low – 2.01. For Estonia the second highest RC value (3.23) was in chips and particles, but in world ranking it placed 22nd among 94 countries.

In the total sum of all observed product groups in 2010 Estonia holds 18th place (RC=1.32). In 2010, 132 countries reported export and import data of observed wood products. The most competitive country according to our calculation is Cameroon (RC=3.90), followed by Brazil (RC=2.52) and Guyana (RC=2.38). Of the Baltic and Scandinavian countries Latvia was in 5th place (RC=2.36); Lithuania, 17th (RC=1.37); Sweden, 31st (RC=0.74); Finland, 33rd (RC=0.66). 57 countries have positive RC value - their export value of observed products is higher than import value. Denmark ranked 62nd (RC=-0.28) and Norway, 102nd (RC=-2.09).

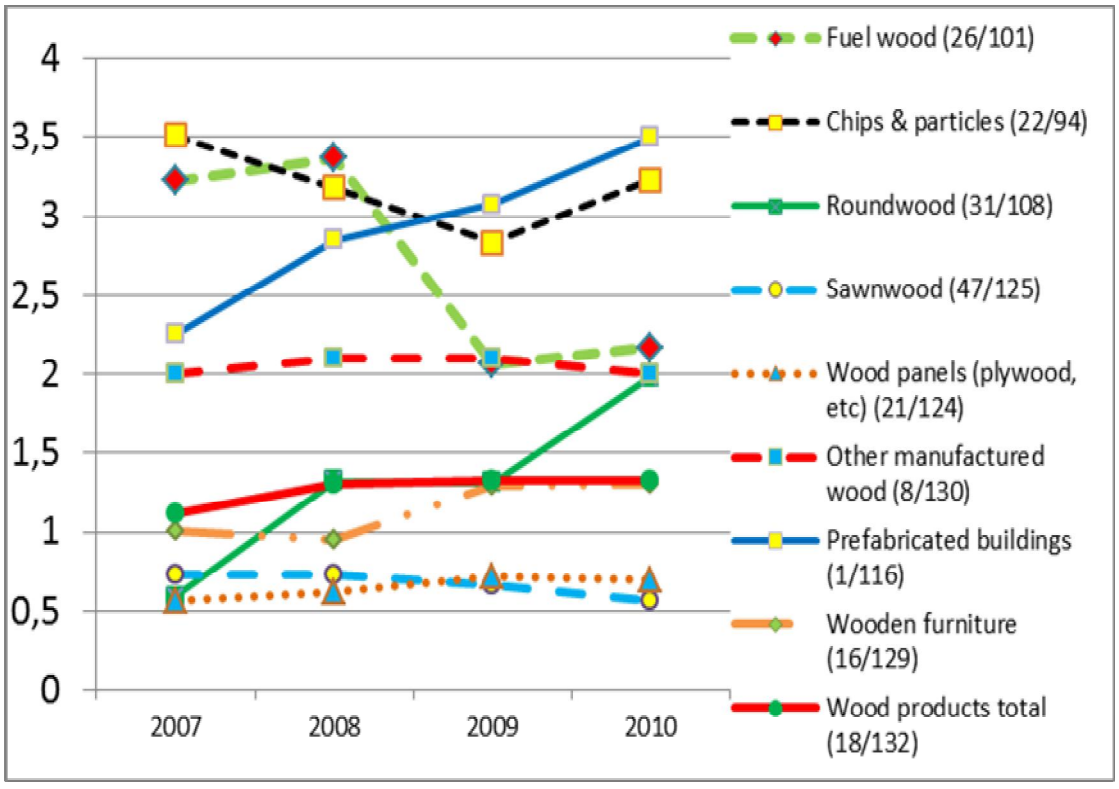

Fig. 1. Revealed competitiveness of Estonian timber products in 2010. (In parentheses Estonian rank in the world /the total number of countries in that product group in 2010, e.g. for fuel wood, Estonia ranked 26th of 101 countries.)

References

Bojnec,Š; Fertö I.(2009) Agro-food trade competitiveness of Central European and Balkan countries. Food Policy 34 (5), 417-425.

Dieter,M.; Englert,H.(2007). Competitiveness in the global forest industry sector: an empirical study with special emphasis on Germany. European Journal of Forest Research, 126, 3, 401-412.

UNCOMTRADE (2012) United Nations Commodity Trade Statistics Database http://comtrade.un.org/db/ (accessed 03.02.2012)

SITC (2006) Standard International Trade Classification, Revision 4,191 pages. United Nations. http://unstats.un.org/unsd/publication/SeriesM/SeriesM_34rev4E.pdf (accessed 03.02.2012)

Carbon footprint of products from the Norwegian sawmilling industry

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Abstract

Carbon footprints are commonly used to assess environmental properties of building products, for comparisons of similar products and in order to minimize the environmental impact of products and projects. A carbon footprint is calculated with the use of life cycle assessment (LCA), where the emissions from cradle-to-grave are accounted for as well as emissions from upstream production like electricity. Sawmill production is a multiple output system and the choice among the methods on how to allocate the footprint have previously shown to be important. This paper finds that methodological choices for electricity mix and carbon cycle of bioenergy of a potential much larger importance. The Norwegian electricity mix is almost carbon neutral, but a change in practice to international mixes can have large impacts. Bioenergy from forests have up until now usually been regarded as carbon neutral, but an approach with carbon dept will make the emissions almost half of fossil fuels. The present article aims at providing an overview of previous LCA studies and comparing the results with recent LCA studies carried out in cooperation with Norwegian sawmill industry. This will show the possible effects for the carbon footprint of sawmill products from a changes in common practice for the choice of electricity mix and including an accounting of the carbon cycle of bioenergy.

Keywords: sawmill industry, carbon footprint, life cycle assessment (LCA)

1 Introduction

The importance of carbon footprint of sawmill products comes from the importance of forest as a large carbon sink and that buildings are using a substantial amount of carbon intensive materials and energy. Increased use of wood products could therefore be of importance in climate change mitigation. Low carbon footprint of building materials is an increasingly important parameter in sustainable building practices. Among the several measures that can be used to document environmental properties of wood products, few can be used for numerical benchmarking such as the carbon footprint. For an overview of all possible measures, se Räty et al. (2012) which have studied environmental performance measures used by professional actors in the wood value chain from sawmills to contractors.

The Norwegian Government recently published a new white paper on climate efforts. According to the report, construction materials have different greenhouse gas emissions, but these emissions should be accounted for in the sector where the emissions take place. However, a life cycle perspective is useful to compare different materials. An example of this used is to replace steel beams with gluelam beams. The report also referred to the tool www.klimagasskalkulator.no, which can be used to calculate the climate footprint of buildings including materials. Further the report acknowledges the agreement of COP17 in Durban to include Harvested Wood Products (HWP) in the national greenhouse gas inventories. (Report No. 28 to the Storting, 2011-2012).

The tool www.klimagassregnskap.no, is a free online tool provided by Statsbygg, the state building company. It is used in the BREEAM-NOR classification scheme and as a criteria in a programme Future Cities. The data for climate footprint of materials have shown not to be updated and consistent. For example gluelam beam and post which have had a large difference in climate footprint. These have not been based in best available data, which are environmental products declarations (EPD). In the next version of the tool, new data are intended to be added.

In Norway, 11 EPDs are available for solid wood products. Five are from the Norwegian sawmill's industry association and the six remaining are from individual manufacturers. The EPDs are demanded especially by Statsbygg and building projects which are to classified with BREEAM-NOR. Also there is an evaluation method for called ECOproduct where EPDs are used as data basis and which is used for comparative evaluation of materials.

Inclusion of the carbon cycle in the carbon footprint of a wood product is practised in various ways. The PAS2050:2011 use an approach for weighted average impact of delayed emissions. According to the Norwegian product category rules and practice used with the EPDs in Norway, the effects of the carbon cycle is left out of the carbon footprint of the product. This rule also account for biomass energy use and is commonly referred to as the carbon neutral approach. A third approach is to include carbon uptake and release with no temporal effects. This implies that forests sequestrate carbon during growth and that this carbon will be released during combustion or degradation of the wood. This approach has been used in EPD for Western Red Cedar in America and particleboard in Germany. Another approach incorporates the contribution that the carbon have to climate change in the time between a wood is combusted and until the forest have been regrown. Hence, the carbon emissions from wood combusted at a sawmill will create a carbon debt and with rotation period of 98 years 1 kg of biogenic CO_2-emissions will equal 0.42 kg of fossil CO_2-emissions (Cherubini 2011).

An important issue in LCA is the multifunctionality in production. This is important for the sawmilling industry where sawn wood makes up approximately half of the output of production and where other outputs like sawdust, bark and heat are sold as co-products. According to EC

Fig. 1. The transmission of electricity between the countries in Northern Europe in 2010. (ENTSO 2011)

(2010) there are three options to deal with multifunctionality in LCA. The preferable method is subdivision, which means that the system that is studied are divided up in processes to a degree that inputs and outputs are possible to align. The second option is allocation, where the inputs and emissions are allocated between the different outputs. This can be done based on mass, energy or economic value and is valid for attributional LCA. The third option is to use system expansion/substitution, where another common production scenario for a co-product is subtracted to the main product. For example production of waterborne heat from LPG is subtracted to account for biomass based energy sold to a district heat. This approach is suitable for consequential LCA, where the goal is to assess "what if" scenarios.

At the end-of-life phase there have also been different practices on where the life phase actually is ending. Similar to multifunctionality, the question is between allocation and system expansion. Allocation is used when the benefit of a new product from waste is allocated to a new production system. This will ensure that no double counting is performed and it is therefore intended for an attributional LCA. In a consequential LCA it could be relevant to include the benefits of reuse, recycling or recovery. Another approach is proposed in Werner et al (2007) with a functionalistic approach to solve allocation problems with wood.

The Norwegian electricity production is about 95% hydropower, but also imports electricity from other countries. The Norwegian physical consumption mix (production+import) have very low carbon footprint compared to Nordic or European mix which have a lot more coal power. There has been a change in common practice of using Norwegian towards Nordic with the argument that the electricity is traded on the Nordic market. An illustration of the electricity transmissions from and to Norway is shown in Fig. *1*. Based on EU policies, a newer

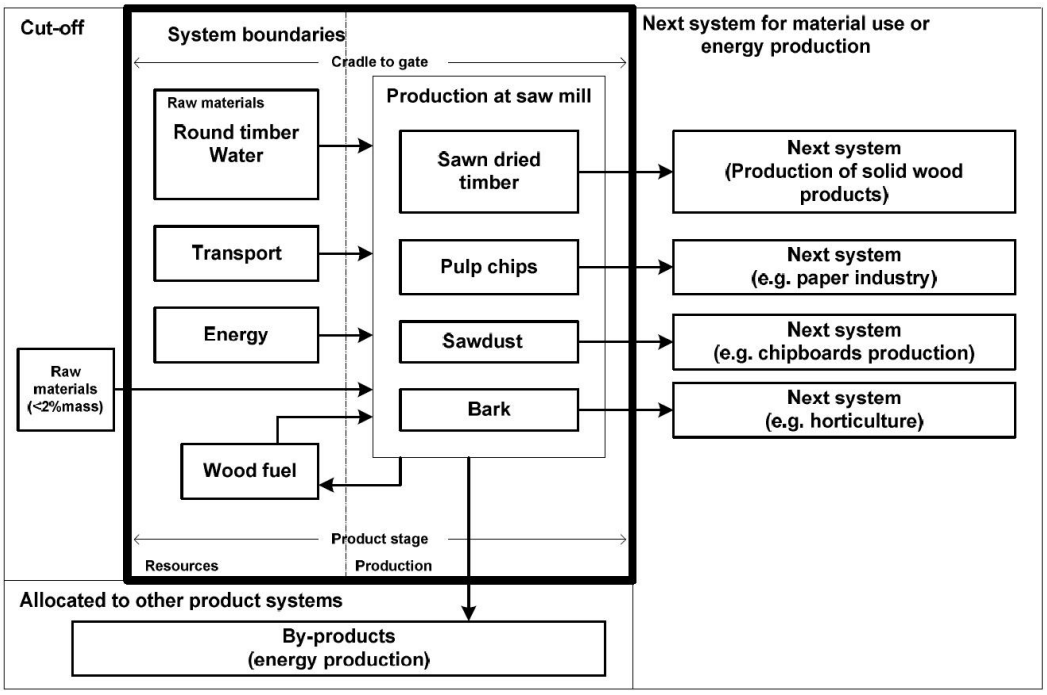


Fig. 2. Life cycle inventory system for production at sawmill (EPD-Norge 2009)

approach is to include the Guarantee of Origin (GO), where the production of renewable energy can be sold as a financial attribute on a European market. The consequence of this is that a substantial share of the Norwegian hydropower production is sold abroad and that the residual mix is closing to the European mix. The inclusion of GO in LCA is controversial as it does not follow the physical flows of a functional unit.

2 Method and material

The goal is to assess the process contributions for carbon footprints of the products from the Norwegian sawmill industry as well as the impact of different methods to calculate the impacts of electricity and bioenergy use. The sawmill products that will be assessed are: Sawn wood, bark, green by-products (sawdust, chips and hogs), dry by-products (sawdust, chips and hogs) and waterborne heat.

The life cycle inventory of sawmilling in Norway is based on the procedures in the product category rules (PCR) for solid wood products previously used to make EPDs for Norwegian wood products. The system boundaries for this approach are illustrated in Fig. ***2***. The base case is assessed with the process contributions for the carbon footprint and is using the same data and procedure used to make EPD for Norwegian sawn wood (Wærp et al, 2009). Additional three scenarios have been assessed using other procedures for calculating emissions from electricity and bioenergy consumption. The alternative with Nordic electricity mix have been calculated based on an average Nordic consumption for 2008, 2009 and 2010 from ENTSO (2010 & 2011) and NORDEL (2008). The second alternative has been to calculate the electricity based on residual electricity mix when GO are accounted for. The third has been to use the carbon dept approach from Cherubini (2011) with assumption of a 98 years rotation period. For life cycle impact assessment, the IPCC2007 100yr has been used.

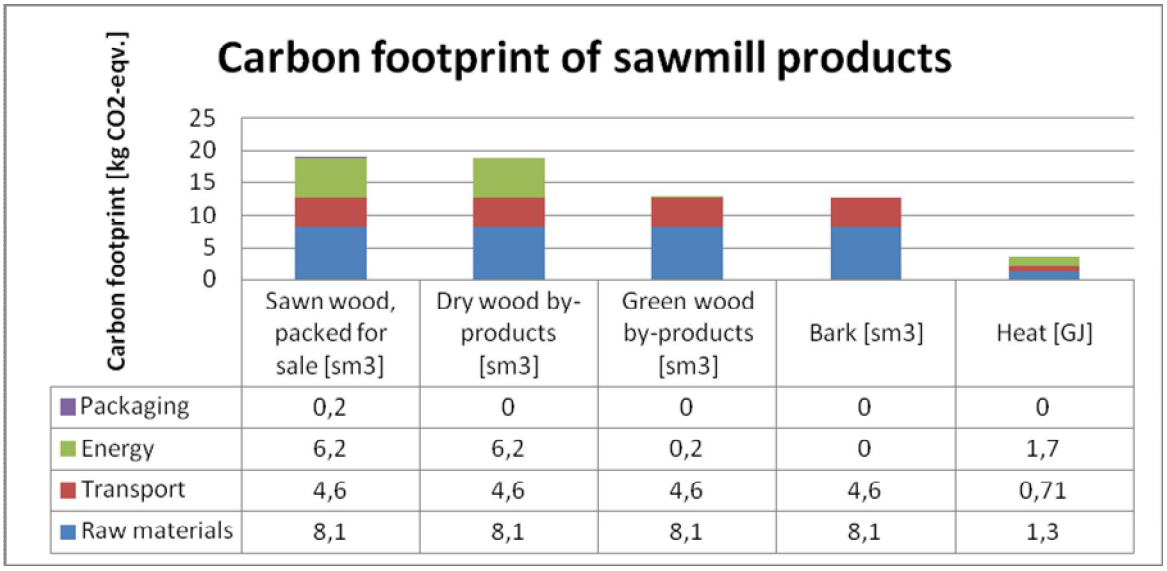
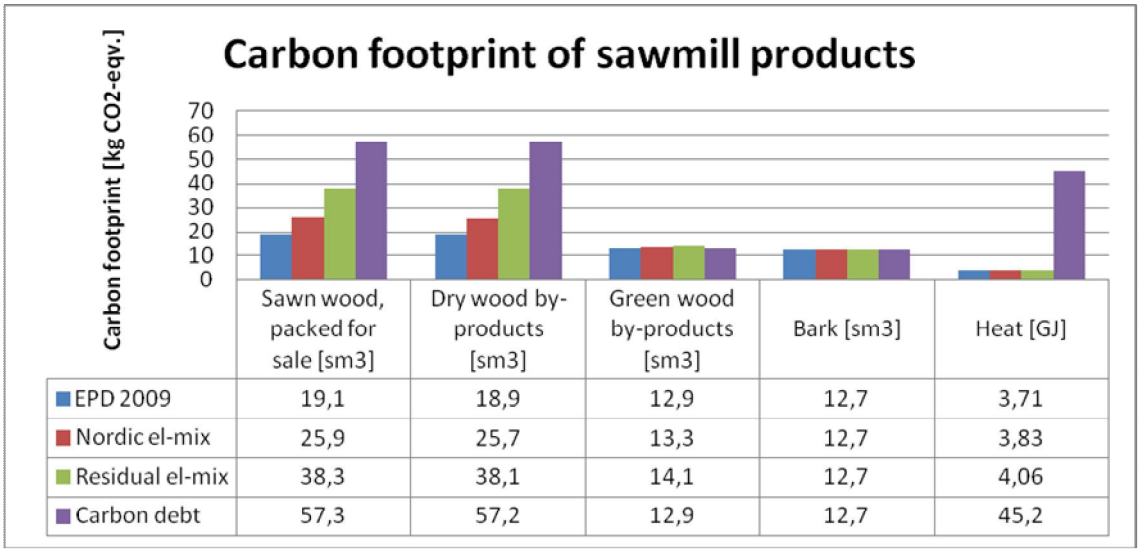


Fig. 3. Process contribution for carbon footprint of sawmill products after EPD from 2009

3 Results and discussion

The results of process contributions to the carbon footprint of sawmilling products are shown in Fig. ***3***. It is clear that upstream processes of forestry and transport to sawmill have the largest contributions to the carbon footprint. The sawn wood and dry by-products have larger footprint based on the energy use in the kiln drying. The heat production has additional emissions caused by direct methane emissions from the combustion process.

Three alternative scenarios related to impacts for energy is assessed and the results are illustrated in Fig. 4. The first scenario with a Nordic el-mix shows a moderate increase of about 30 % for the carbon footprint of sawn wood and dry by-products. Green by-products, bark and heat shows only marginal differences. The second approach with residual el-mix have the same relative impact, but the increase for sawn wood and dry by-products are about 100%. The largest effects are in the third scenario which applies the carbon debt accounting approach for biogenic carbon dioxide emissions. It shows a more than an order of magnitude of increase in carbon footprint. This again have a large impact of the kiln dried products. Sawn wood and dry by-products have an increase of almost 300% compared to the base case.



	Sawn wood, packed for sale [sm3]	Dry wood by-products [sm3]	Green wood by-products [sm3]	Bark [sm3]	Heat [GJ]
EPD 2009	19,1	18,9	12,9	12,7	3,71
Nordic el-mix	25,9	25,7	13,3	12,7	3,83
Residual el-mix	38,3	38,1	14,1	12,7	4,06
Carbon debt	57,3	57,2	12,9	12,7	45,2

Fig. 4. Sensitivity analyses of different methological choices for calculating electricity and bioenergy use for products from the Norwegian sawmilling industry.

4 Conclusion

The results show that:

- The calculations of carbon footprint of sawmilling products after the procedure used for EPDs show that upstream transport and forestry operations have the largest contribution.

- New procedures for calculating emissions from Norwegian electricity consumption can change this and increase the footprint of kiln dried products by 30% for a change to Nordic electricity mix and a 200 % increase with the residual electricity mix approach.

- A change from the carbon neutral assumption for forest bioenergy to a carbon dept approach can increase the carbon footprint of sawn wood by 300%. Hence, it is the methodological choice with the highest effect on carbon footprint of kiln dried sawmill products.

Further work should look more into the appropriateness of these methods approaches to attributional LCA and EPDs.

References

EC 2010. International Reference Life Cycle Data System (ILCD) Handbook - General guide for Life Cycle Assessment - Detailed guidance. Research Centre - Institute for Environment and Sustainability. First edition March 2010. EUR 24708 EN. Luxembourg. Publications Office of the European Union.

ENTSO 2010. *Statistical yearbook 2009.*

ENTSO 2011. *Statistical yearbook 2010.*

EPD-Norge 2009. NPCR015 Solid Wood Products.

EPD-Norge 2012. Emission factors for electricity (physical mix). Available at: http://www.epd-norge.no/getfile.php/PDF/EPD/Emission%20factors%20for%20electricity%20%28physical%20mix%29.pdf

Cherubini, F., Peters, G.P., Berntsen, T., Strømman, A.H. & Hertwich, E. 2011. CO2 emissions from biomass combustion for bioenergy: atmospheric decay and contribution to global warming. *GCB Bioenergy, 3*(5), p. 413-426.

Report No. 28 to the Storting , 2011-2012.. Good buildings for a better society. A future oriented buildings policy. *The rural and regional policy of the Norwegian Government White Paper No. 28.*

Räty, T., Lindqvist, D., Nuutinen, T., Nyrud, A.Q., Perttula, S., Riala, M., Roos, A. Tellnes, L.G.F, Toppinen, A. & Wang, L. 2012. Communicating the Environmental Performance of Wood Products. Available at: http://www.metla.fi/julkaisut/workingpapers/2012/mwp230.htm

Werner, F., Althaus, H-J., Richter, K. & Scholz, R. W. 2007. Post-Consumer Waste Wood in Attributive Product LCA. Context specific evaluation of allocation procedures in a functionalistic conception of LCA. *Int J LCA, 12*(3), p.160-172.

Wærp, S., Grini, C., Folvik, K. and Svanæs, J. 2009. Livsløpsanalyser (LCA) and norske treprodukter. Resultater fra MIKADO-prosjektet. Prosjektrapport 50, SINTEF Byggforsk, Oslo, Norge.

Consumer perceptions on responsibility of wood product suppliers in Finland

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Abstract

Today's consumers often perceive an additional benefit associated with responsible business practices and sustainability of purchased products. Regarding wood products, environmental quality has in the earlier studies been found to be a part of the total product quality. However, there is still lack of knowledge on the consumers' attitudes towards socially and environmentally responsible supplier characteristics. Therefore we address in this paper what kind of perceptions do consumers hold for their wood product suppliers particularly with regard to environmental and social responsibility. Our data is collected during 2004-2007 as exit data from home retail centers selling building materials and our respondents (n=227) were Finnish adult consumers. Perceived supplier characteristics associated were found to be linked with both domestic origin of wood and domestic company ownership. Based on this there seems to be some scope for developing wood products marketing based on these issues.

Keywords: wood products, consumers, producers, environmental and social responsibility

1 Introduction

1.1 Consumer markets of wood products

In the Finnish housing sector, residential construction is shifting towards renovation and maintenance construction, and from building of multi-story flats towards building individual and detached homes. In this context, private consumers have an increasing influence on the selection of products and materials used in housing. Regarding wood products, their environmental quality is a part of total products quality, which has not yet been utilized to its full potential (see e.g. Toivonen 2011, 2007). However, previous research on marketing and markets of specifically Finnish wood industry has traditionally concentrated on organisational customers in developing its products and marketing strategies (see Toivonen et al. 2005, Kärnä et al. 2003). Despite that over 40% of the production of the Finnish sawmilling industry is consumed domestically, there is lack of research-based knowledge focusing on consumers' quality related needs with regard to wood product utilization in the domestic markets (as an exception, see Toivonen 2012).

At a general level, anecdotal evidence suggests that consumers are giving increasing consideration to the ethical components of products and business processes. For example, according to a large multi-country survey by McKinsey (Bonini and Oppenheim 2008), 87 % of surveyed consumers are concerned about the environmental and social impacts of the products they buy, 33% of consumers say they are willing to pay a premium for green products,

and another 54 % care about the environment, and want to help tackle climate change. But when it comes to actually making purchasing decisions, words and deeds often diverge.

Nevertheless, a growing body of literature indicates that many of the today's consumers perceive an additional benefit associated with social and environmental responsibility (corporate social responsibility, CSR) of purchased. Auger et al. (2003) states that "…consumers increasingly care about the ethical components of products and business processes and these concerns have financial implications for the businesses involved". Commonly introduced benefits of improved environmental/ethical product quality for the producers include higher customer loyalty, lower price sensitivity, insurance against negative events, and sometimes even accrue positive price premiums (Green and Peloza 2011, Abrantes Ferreira et al. 2011). It has been proposed as well that firms selling primary or intermediate goods are less environmentally sensitive due to weak pressure from final consumers and lack of high-quality environmental management systems than those that sell final goods (Khanna and Anton 2002).

The aim of this paper is to contribute to research by addressing which supplier characteristics/attributes do consumers perceive important in the Finnish wood product market, and particularly, to which supplier characteristics is sustainability connected with?

1.2 Previous research

In the United States (the US), a set of studies on wood products have considered the effect of tangible and intangible product attributes on consumer preferences (e.g. Vlosky et al. 1999, Aguilar and Vlosky 2007, Anderson and Hansen 2004, Bigsby and Ozanne 2002, Hansen and Bush 1996, O'Brien and Teisl 2004). Based on the early findings in Vlosky et al. (1999), among the 803 US homeowners surveyed, the respondents were categorized by cluster analysis into 5 segments based on their views on forest certification. The most environmentally favourable group ("True Blue Greens") was found to be the largest group with a 40 % share. Summarizing them, traditional socioeconomic and demographic features utilized as the basis for market segmentation have had limited power in predicting and defining groups of "green" consumers. Thus, wood industry should find alternative ways to identify consumer segments that are sensitive to sustainability issues.

In Europe, previous literature on wood products consumer perspectives related research (reviewed in Rametsteiner et al. 2007) indicated only few existing studies in the group of studies included. Mainly the body of studies was dominated by more practically oriented omnibus surveys and consultancy reports.

Hansmann et al. (2006) found in case of Swizerland consumer sustainability orientation favoring ecological and social aspects as compared to economic aspects and to positively correlate with the intention of buying eco-labeled wood products. Based on this, the authors assess that it should be possible to promote sustainable forestry and to enhance the demand for correspondingly certified products through marketing and other strategies. Furthermore, applying UK survey data of do-it-yourself (DIY) companies, Toivonen (2007) concluded that it is important endowing wooden products with environmental information when the aim is to attract the customers with interest in the environmental quality of wooden products.

Järvinen et al. (2001) underlined in their study on German wood products markets, that the companies trading wood products considered it important to provide more information on the multiple quality-dimensions of wood products to consumers. The findings of the study underlined in particular, that issues related to safety and health impacts are important and deserve more attention in product development and marketing.

1.3 Theoretical background

In this section we overview recent literature regarding corporate responsibility in the context of consumer markets and marketing. As studies of consumers' attitudes toward certified forest products relate to the wider issue of how consumers respond to eco-labeled products and social and environmental responsibility of suppliers in general, we discuss issues related to ethical or green consumerism from the product and supplier perspective and then evaluate the state of the art of the respective research in wood product markets context.

Sustainability of business operations, as well as specific processes and products, is generally defined to consist of three dimensions; economic, environmental and social sustainability (Brundtland commission etc.). General rise of business ethics and corporate responsibility have brought environmental and social impacts from business activities under general scrutiny along with economic performance, requiring integration of social and environmental performance of products and services more closely into corporate strategic decision-making. Mohr and Webb (2001, p. 47) define a socially responsible consumer through their "purchase, use, and disposition of products on a desire to minimize or eliminate any harmful effects and maximize the long-run beneficial impact on society", and thus avoiding buying products from companies that harm society.

Maignan and Ferrell (2004) have analysed corporate responsibility in the marketing context by advocating for importance of wider stakeholder orientation instead of narrow customer/consumer value creation. Consequently, "stakeholders show concern not only for issues that affect their own welfare (e.g. consumers calling for improved product safety), but also for issues that do not affect them directly (e.g. consumers condemning for child labour)". (p. 7). Concerning consumers in Nordic countries, Leire and Thidell (2005) conclude that these tend to be generally aware of the fact that products may be associated with complex environmental problems since they have been exposed to eco-labels long before the concept of sustainable development became common knowledge.

Madrigal and Boush (2008) have connected product social responsibility as a distinct brand personality dimension, so that consumers may be motivated to buy from a socially responsible brand, because it allows them to also express their own personal values. In this context, willingness to reward a brand for its environmentally responsible efforts may be viewed as a reciprocating tactics. For companies reaping competitive benefits, integration of CSR to core business strategy would be important.

According to Green and Peloza (2011), CSR can provide three forms of value to consumer: functional, emotional and social. Each of these may enhance or diminish not only the overall value proposition for consumers, but also value created by in one CSR domain can either diminish or be disconnected from other product attributes. From managerial perspective, this would help firms to understand how CSR activities can impact their customers' overall perceptions of value from the firm.

According to Bonini and Oppenheim (2008) to increase the sales of environmentally sound products, companies must remove five barriers—namely, (1) lack of consumer awareness, (2) negative perceptions on environmentally friendly products, (3) distrust, (4) high prices, and (5) low availability. In other words, producers must by education increase consumers' awareness of green products, improve the quality of eco-products, strengthen consumer trust by honest communication, try to lower the prices of green products, and increase availability of these

products. These same tactics should be applicable and should be pursued in case of wood products as well.

The green consumer purchasing model and the impact of buying process has been investigated in the UK data on self-declared green consumers (Young et al. 2010). The model consists of five elements: general green values and knowledge, green criteria for purchase, barriers and facilitators for product purchase, the actual purchase and feedback. Knowing this process facilitates identification of key factors helping green consumers to product purchase: strong green values, previous purchase experience, ample time for decision making, good knowledge of relevant environmental issues, good availability of range of green products and sufficient income level for green purchasing.

Elements related to environmental impacts of wooden products in housing, social acceptability of products and aesthetic characteristics of wood can be associated with a distinct consumer lifestyle, consisting of complex interplay between consumer background, values, attitudes, needs and behaviour. While environmental issues are increasingly relevant for the selection of wood products and other building materials, they can be assumed to clearly contribute to the perceived total product quality by consumers (Toivonen 2007). It is not only a question of the concrete product, and its quality, but of an entity that consists of the physical products, all the service included and even the immaterial issues related to the supplier, such as supplier reliability and overall responsibility including respect for environment (see e.g. Toivonen 2011). Well-known models of particularly supplier and service –related dimensions of perceived product quality have been presented by Parasuraman et al. (1994), Zeithaml (e.g. 2000), and Grönroos (e.g. 1998). The findings of these seminal studies are underlying also in many wood industry related research (e.g. Hansen and Bush 1996, 1999). Toivonen (2012) observed that for Finnish consumers of wooden products, the perceived quality of product tangibles (appearance, use properties and technical quality) provides more value than that of product intangibles including the quality of environmental and social product characteristics. In addition, perceived product quality and perceived value are logically linked: the more important the quality dimension is, the more value the product provides from the consumer standpoint.

2 Data and methods

The survey data consists of 227 responses from Finnish consumers of 18-75 years of age. The responses were collected during 2004-2007 from four different home retail centres selling building materials (65 respondents from Helsinki metropolitan region, 27 from South-West Finland and 136 from East Finland).

The exit technique applied in this study has become increasingly common in the forest products consumer research (Anderson et al. 2005), and it has advantages compared to mail surveys: The data may be better representative to consumers buying wood products and shopping in home centres than a data representing more perfectly all Finnish consumers but collected using a mail survey. Targeting the consumers visiting home centres and the home construction fairs should also improve the validity of the data. The general disadvantage of the exit technique is that the sample is not necessarily representative to the desired total population (e.g. Anderson et al. 2005), as in our case. Therefore it is not possible to explicitly define the non-response rate or to generalize the results to any larger population.

The variables representing perceived importance of environmental friendliness and other supplier characteristics were measured using a five-point scale (for example, 5=”very

important", 3="not important or unimportant", 1="not important at all") in order to capture differences in consumers' perceptions. The statistical analysis of the data includes descriptive methods (frequencies, means), cross-tabulation, exploratory factor analysis (e.g. Hair et al. 2009), and binary logistic regression. Consumers' self declared willingness to pay was coded based on the question "*How large a price premium would you pay for environmentally high-quality products in comparison to other, otherwise similar quality products*" as being either equal to zero (group 1) or being a positive price premium above similar normal product (group 2).

3 Results

A preliminary analysis of our data reveals that our sample of Finnish consumers of wood products consists of a majority of male respondents (62 %), average age is 44 years, 23 % reside in rural area, they are from non-single households (81%) and have at least one child (67%). From socio-economic background, they are dominantly home-owners (76 %), and with 42% their annual gross income is below 32,000€, which was about the average at the time of the data gathering. About one third of respondents also own forestland (30%) or summer cottage (34 %).

We analysed the consumer perceptions on issues related to the supplier of wood products "*How important are following aspects when deciding where to buy wood products*?" A maximum likelihood factor analysis with varimax rotation was conducted on the 17 items (Table 1). The KMO=0,85 and Bartlet's test (χ^2(df. 136)=1366,94 p<0,001) indicated that prerequisites for analysis were in order. Four dimensions were extracted based on Kaiser's criterion. The first factor (consisting of 6 items) is named as "F1 Ease of contacting the supplier and product availability", second (consisting of 3 items) can be named as "F2 Domestic origin and respect for environment", the third (consisting of 2 items) refers to "F3 Service and expertise of personnel". The fourth (consisting of 6 items) is named as "F4 Image and reputation of the supplier".

The results provide a clear dimensional structure of supplier related quality aspects important to the consumers in our data set. It is notable that high technical quality of the traded products is very important, on average, for the respondents, but it does not load highly on any of the factors, nor does it form a factor of its own. This is probably due to low variation in perceptions of the importance of this quality issue since almost all respondents consider this either important or very important.

Table 1. Factor analysis of supplier characteristics.

	Mean (std.)	F1	F2	F3	F4
Long opening hours, also in the evenings and weekends	3,54 (1,11)	**0,66**			
Convenient location of the seller	3,87 (0,87)	**0,62**			
Ease of contact to the seller	3,96 (0,85)	**0,62**		0,37	
Fast delivery	4,09 (0,79)	**0,47**			0,28
Wide variety of products	4,14 (0,76)	**0,40**		0,21	0,30
Possibility to obtain information/order products via internet	3,20 (1,22)	**0,39**			
Domestic origin of products	3,84 (0,98)		**0,99**		
Domestic origin of supplier store	3,64 (1,03)		**0,71**		0,31
Environmental aspects taken care when considering business	3,46 (0,99)		**0,42**	0,31	0,27
Expertise of sales personnel	4,37 (0,68)	0,25		**0,75**	0,33
Service willingness and friendliness of sales people	4,27 (0,81)	0,35	0,20	**0,66**	
Product related guarantee and service	4,00 (0,91)		0,26	0,35	**0,52**
Reliability and reputation of the supplier	3,80 (0,82)	0,48	0,21		**0,50**
Image of store	3,53 (0,87)	0,34	0,38		**0,47**
Product tailoring possibilities	4,02 (0,74)	0,28		0,40	**0,43**
Flexible terms of payment	3,09 (1,18)				**0,37**
High technical product quality	4,50 (0,61)				**0,33**
Factor eigenvalue		2,46	2,06	1,74	1,69
Total variance explained (%)		(14,47)	(26,60)	(36,84)	(46,77)
Cronbach's α		0,73	0,79	0,77	0,70

*Factor loading cut-off point was 0,20

4 Discussion

The objective of this study was to bring added information on which supplier related quality attributes Finnish consumers' perceive reflecting environmental and social responsibility in case of wood products. Our Finnish consumer data indicates that supplier characteristics associated with environmental responsibility are linked with both domestic origin of wood and domestic company ownership.

The resulting dimensions of consumers' perceptions of wood product supplier characteristics, including environmental and social responsibility, are fairly well in congruence with earlier research on wood product retailing companies from the UK (Toivonen 2007, Järvinen et al. 2001), and from Germany (Järvinen et al. 2001, 2002, Toivonen et al. 2005). The observation indicates existence of a stable and thus general structure of producer characteristics, services and CSR issues, and confirming this finding with particularly consumer data from UK and Germany is one interesting avenue for further research.

From managerial perspective our results suggest that it is potentially beneficial to create a company image that underlines being environmentally and socially responsible, including providing health-safe and domestic products. Wood products industry might consider using a reference to domestic origin as a cue about wider environmental and social responsibility. Overall, revealing effective cue/indicator attributes about social and environmental responsibility inherent to wood products would be an interesting avenue for further research.
A number of limitations are connected especially with the data employed in this study. This is due to the exit technique used in data collection, which does not allow reaching representative sample of consumers but the respondents are picked up among consumers visiting building material retail shops. In addition, the data was collected during several years. Nevertheless, the respondents are expected to be well-familiar with wood products and considered seriously the issues of interest of this study. Therefore the results of the study provide interesting and useful indications of consumers' perceptions even though these need to be treated as indicative only.

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References

Abrantes Ferreira, D., Goncalves Avila, M. & de Faria, M. 2010. Corporate social responsibility and consumers' perception of price. Social Responsibility Journal 6(2): 208-221.

Aguilar, F. & Vlosky, R. 2007. Consumer willingness to pay price premiums for environmentally certified wood products in the U.S. Forest Policy and Economics 9: 1100-1112.

Anderson, R. & Hansen, E. 2004. The impact of environmental certification on preferences for wood furniture: a conjoint analysis approach. Forest Products Journal 54(3): 42-50.

Anderson, R., Fell, D., Smith, R., Hansen, E. & Gomon, S. 2005. Current consumer behavior research in forest products. Forest Products Journal 55(1): 21-27.

Auger, P., Burke, P., Devinney, T. & Louviere, J. 2003. What will consumers pay for social product features. Journal of Business Ethics 42: 281-304.

Bigsby, H. & Ozanne, L. 2002. The purchase decision: Consumers and environmentally certified wood products. Forest Products Journal 52(7/8):100-105.

Bonini,S. & Oppenheim, J. 2008. Cultivating the green consumer. Stanford Social Innovation Review 6: 56-61.

Grönroos, C. 1998. Marketing services: the case of a missing product. Journal of Business and Industrial Marketing 13(4/5):322-338.

Hair, J., Anderson, R., Tatham, R. & Black, W.C. 2009. Multivariate Data Analysis with Readings. X edition. Prentice Hall Inc., Englewood Cliffs, New Jersey.

Hansen, E. & Bush, R. 1996. Consumer perception of softwood lumber quality. Forest Products Journal 46(10):29-34.

Hansen, E. & Bush, R. 1999. Understanding customer quality requirement: Model and application. Industrial Marketing management 28(2):119-130.

Hansmann, R., Koellner, T. & Scholz R. 2006. Influence of consumers' socioecological and economic orientations on preferences for wood with sustainability labels. Forest Policy and Economics 8:239–250.

Järvinen, E., Toivonen, R., Enroth R-R. 2001. Competence and image of wood on the German building material markets. Pellervo Economic Research Institute Working Papers No. 50. 74 p.

Järvinen, E., Toivonen, R., Enroth R-R. 2002. The German wood product markets – Importance of supplier characteristics – Prospective consumption. PTT Working papers No. 54. 44 p.

Khanna, M. and W.R. Anton. 2002. Corporate Environmental Management: Regulatory and Market-based Incentives. Land Economics 78(4): 539-558.

Kärnä, J., Hansen, E. & Juslin, H. 2003. Social responsibility in environmental marketing planning. European Journal of Marketing 37:848-871.

Leire, C. & Thidell, Å. 2005. Product-related information to guide consumer purchases – a review and analysis of research on perceptions, understanding and the use among Nordic consumers. Journal of Cleaner Production 13: 1061-1070.

Madrigal, R. & Boush, D. 2008. Social responsibility as a unique dimension of brand personality and consumers' willingness to pay. Psychology and Marketing 25: 538-564.

Maignan, O. & Ferrell, I. 2004. Corporate social responsibility and marketing: An integrative framework. Journal of the Academy of Marketing Science 32(1): 3-19.

Mohr, L. & Webb, D. 2005. The effects of corporate social responsibility and price on consumer responses. The Journal of Consumer Affairs 39: 146.

O'Brien, K., & Teisl, M. 2004. Eco-information and its effects on consumer value for certified forest products. Journal of Forest Economics 10: 75-96.

Rametsteiner, E., Oberwimmer, R. & Gschwandt, I. 2007. What do Europeans think about wood and its uses? A review of consumer and business surveys in Europe. Ministerial Conference on the Protection of Forests in Europe: 70.

Snoj, B., Pisnik, K. & Mumel, D. 2004.The relationship among perceived quality, perceived risk and perceived product value. Journal of Product and Brand Management 13(3):156-167.

Toivonen, R. & Hansen, E. & Järvinen, E. & Enroth, R-R. 2005. The competitive position of the Nordic wood industry in Germany - intangible quality dimensions. Silva Fennica 39(2):277-287.

Toivonen, R. 2007. Perceived environmental quality of wood products: The UK market.J. of Forest Products Business Research. Vol. 4, Article No. 2. 27 p. www.forestprod.org/jfbr-online.html

Toivonen, R. 2011. Dimensionality of quality from a customer perspective in the wood industry. Dissertationes Forestales 114. 71 p.

Toivonen, R. M. 2012. Product quality and value from consumer perspective – An application to wooden products. J. Forest Econ. (2012). 17 p. Article in press.

Vlosky, R., Ozanne, L. & Fontenot, R. 1999. A conceptual models of US consumer willingness-to-pay for environmentally certified wood products. Journal of Consumer Marketing 16: 122-136.

Young, W., Hwang, K., McDonald, S. & Oates, C. 2010. Sustainable consumption: green consumer behaviour when purchasing products. Sustainable Development 18(1): 20-31.

Zeithaml, V.A. 2000. Service quality, profitability, and the economic worth of customers: What we know and what we need to learn. Journal of the Academy of Marketing Science 28(1):67-85.

What can we sell behind timber production? The role of forest externalities in the eastern Alps and the implementation of payment for environmental service schemes.

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Abstract

Forest externalities represent today an emerging source of income. Carbon sequestration, biodiversity maintenance and recreation activities in mountain woodland areas are three forest services that have been a core issue in the recent political framework. However, the stiff legislative system and unclear property rights have been two mayor themes that have inhibited the implementation of payment for environmental service (PES), especially in the Italian civil law system. The paper shows the potential willingness to pay (WTP) of forest externalities generated in the in the Eastern Alps, for Veneto's dwellers: basic information to develop any market-based mechanism to stimulate the commercialization of forest services. Using choice experiment approach, an estimation of marginal values has been assessed for each service. The results report the trade-off effect among the different use of forest externalities. Higher WTP was found on direct use-value services by sub-grouping the sample on target socio-demographic categories. Unfamiliar externalities, like biodiversity, have had irrelevant role compare to the other forest services. Finally, based on these findings a specific PES scheme on target externalities has been drafted for the alpine context.

1 Background and Introduction

Alpine mountain forests provide a wide range of environmental goods and services available for the society's needs (MA 2005). Despite wood production has been the main outcomes for centuries, the welfare growth and the new need of the society have triggered the demand of secondary forest products and services (FOREST EUROPE UNECE and FAO 2011). Non-wood forest products (NWFP) such as cork, chestnuts, truffle and wild mushrooms have been the forerunners forest products of this change in the Italian peninsula. Recently the recreational picking has further increase the NWFP economic meaning and it has effected dramatically the forest sector at local level (Pettenella and Secco 2006, Maso et al. 2011) becoming in some places the main forest income (Pettenella and Secco 2006). However, whether NWFPs changed in few decades from public to common goods (no excludability but rivalry) as result of the forest user congestion and pressure, several environmental services (ES) remain pure public good. Recreation in forest, stand carbon storage, woodland water filtration, biodiversity maintenance and soil protection are example of ES that has been target by the forest managers but rarely achieved as key output of forest management (Gatto et al. 2009) even if it was made compulsory by forestry law and their demand has increased (Notaro and Paletto 2011).

Policy makers have enacted special forest and environmental laws to stimulate ES maintenance and provision. Nevertheless, the overall effect has been minimal, or even affecting negatively the forest sector, in terms of employment and ES provision. The lack of financial means to support the new management costs and the limited definition of property rights have been the major constrains on command and control policy tools. Moreover the scarce attention given to the

property fragmentation added further constrain in terms of management costs and efficiency of a given policy (Piussi and Pettenella 2000, Canton and Pettenella 2010).

Recently, payment for environmental service (PES) has been introduced as new financial mechanism in Easter Alps in order to stimulate financially the ES provision. PES are based on voluntary bilateral agreement based with direct or group contracts, between at least a supplier and a buyer, in which the parts trade a certain ES and its provision is guaranteed (Wunder 2005). Basically, PES schemes have introduced the concept of "economic equity" for the ES provision, where the so call buyer pays the ES supplier. Examples are some measures of the common agriculture policy (CAP) to finance biodiversity within the Natura2000 area. However since PES implementation, the economic evaluation of the payment dimension, and indirectly ES, has been a challenge for the promoters. On the contrary of the concept of the "cost of provision" based on the supply side, forest externalities might be also estimated in different ways. Choice experiments are demand based methods used to assess the market value of compound goods such as forest ES, especially while their complexity and the scale are rather high or the acceptability of the ES policy have large impact. Their use has been quite common among scholars, thought the ES policies implementation is still limited. In this paper we aim to evaluate the main ES generated by the forests in the North-East Italy as basic knowledge to stimulate the commercialization of ES through PES schemes. Using simple multinomial logit (MNL) model, the effect of subsampling and parameters second order interaction compared to the main socio-demographic factors will be tested to provide a general assessment of the ES in the case study area. The paper is organized as followed: a general overview about the alpine forest ES valuation; the methodological approach; the results and consideration about of the main models and findings, concluding briefly.

2 Literature review

The ES valuation in the Alps has become a core issue, thanks to the need to draft new broad policy in the forest sector to enhance ES. Since cost based assessment has been widely used, demand based valuation studies have been recently introduced to test the acceptability of a given policy framework. Interesting outcomes has been recently reported by (Grêt-Regamey et al. 2008) that presents a list of case-studies on environmental valuation of landscape, biodiversity, recreation and avalanche protection values in the Alps mainly applying contingent valuation. Nevertheless the high differences on the assessment points at the general problem of scale and heterogeneity of the respondents willingness to pay (WTP). Other studies about total economic value (Croitoru 2007, Goio et al. 2008) have used a mixture of methodologies assessing one by one the main ES generated in the alpine forest pointing out the problem of random stakeholder's preferences in the long run. Recently, a new approach based on choice experiments has smoothly moved several scholars toward state preferences. Among the ES, recreation has surely attract the highest interest especially in very eye-catching place in the alps (Tempesta and Thiene 2004, Gios et al. 2006). Other contribution on recreational activities in mountain area has improved the reliability of the estimation, studying the heterogeneity within socio-demographic parameters (Scarpa et al. 2007, Thiene and Scarpa 2008) through latent class analysis. This method is based on stakeholders' stratification within homogeneous groups and it allows understanding the factors influencing personal choices, useful information support for the policy maker. A further progress was the direct estimation of WTP, avoiding the distribution draft of the utility coefficients and then model derivative to estimate the WTP distribution (Scarpa et al. 2008).

Notwithstanding, strategic or protest answers are a problem that might introduce several bias in the estimation. Respondent income limits or the political reliability of an area in which the ES

valuation is enforced might be seen as the major constraints to the final model results. Despite methodological approach has been improved, it remains crucial the attribute definition especially on spatial and temporal scale. Although the majority of the papers addressed target ES, it has rarely assessed all together. A trial has been provided for Spanish forest (Brey et al. 2007), however the use of choice experiment approach of the all ES generated by the alpine forest has never been done. Hereafter, we will compare latent class and subsampling analysis results to estimate all the main externalities provided by the alpine forests as basic information to draft potential large scale PES schemes.

3 Material and methods

The study has been funded within the NEWFOREX project for the entire Veneto Region, North Eastern Alps, and it is the first attempt to merge different findings available in the literature to assess the WTP for the Alpine ES. The basic information needed to implement new ES policy in the Alps using evidence from the ES "consumer" behaviour. The study aims to assess the WTP through a choice experiment application, and a second looking at the implementation of PES schemes using WTP information. This last one is based on the concept of PES scheme effectiveness (Wunder 2008, OECD 2010b), in which the preliminary condition of the PES scheme are analysed.

4 Choice experiment methodology

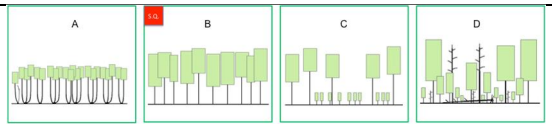
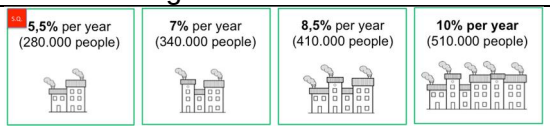
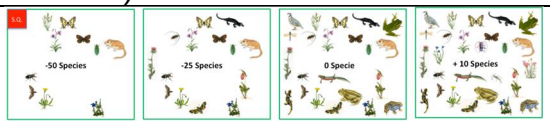
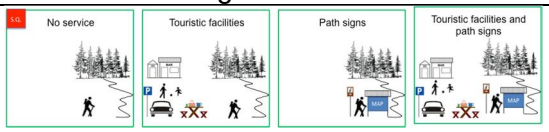
The choice experiment application has been divided in three parts: the attributes and attributes level definition, the survey and data collection, the statistical design calculation according to the methodology suggested by (Bliemer and Rose 2009). The target sample was 600 respondents among Veneto's dwellers to which another seventy people was added for the pilot version of the questionnaire.

4.1 Attributes definition

Many authors have studied ES evaluation mainly focusing in forest services that may be stimulated by (Boxall et al. 1996, Hanley et al. 1998, Lehtonen et al. 2003, Mogas et al. 2006, Brey et al. 2007): soil erosion, carbon sequestration, biodiversity and recreation. Initially, we have defined three main groups of ES to be incorporated in the choice experiment (CE), such as biodiversity protection, carbon sequestration and recreational services provision. This last service has been split in further three components such as forest structure view along paths and roads, aesthetic landscape view and presence of recreation facilities; here we did not considered ES already paid such as hunting, fishing, wild mushroom picking and cross country sky. In total, five attributes have been used to build the CE scenarios with four level each, as describe in the second session we analysed endangered and key ecosystem species protection (making reference to the extinction rate) and landscape or scenic beauty preservation. Finally, in the third session, a group of economists was involved in order to get a general overview on the payment mechanisms to be applied in the CE and to review the attributes, where was decided the most suitable payment based on an additional annual fee proportional to the household income

, which have been though to cover the next 10 years of policy financed by a public-private fund managed by the Regional government. The attributes levels have been built within three focus group session having 8-12 expert each. The interviews aimed to ask directly their

Table 1. Attribute and attribute level for ten years policy.

Attribute	Attributes level	Reference
Forest structure view along paths and roads	 A=thick stand forest (coppice); B=even aged forest (Status Quo – S.Q.); C=uneven aged forest; D=uneven aged forest with dead tree	(Nielsen et al. 2007)
Carbon sequestration in forest sector as Veneto's dweller carbon neutral	 Level 1= 5.5% (or 280.000 people) of Veneto's dwellers (S.Q.); Level 2=7%; Level 3=8.5%; Level 4=10% (the maximum percentage whether all the forest will leave in natural evolution)	(Mogas et al. 2006)
Number of threaten species	 Level 1=-50 species (S.Q.); Level 2= -25 species; Level 3= 0 species lost; Level 4=+2species gain from surrounding regions.	(Lehtonen et al. 2003, Christie et al. 2006, Jacobsen et al. 2007)
Landscape aesthetic view	 Level 1=-10% of grassland; Level 2=-5% of grassland (S.Q.); Level 3= 0% of grassland; Level 4=+2% of grassland	(Tempesta and Thiene 2004, Tempesta and Marangon 2005, Grêt-Regamey et al. 2008)
Recreation in forest	 Level 1= No service (S.Q.); Level 2=Touristic facilities; Level 3= Path signs; Level 4=Touristic facilities and path signs	(Christie et al. 2007)
Cost	Levels= 25, 50, 75, 100, 125, 150, 175, 200€/household/year	

Note: picture source: our elaboration; red boxes in the attribute level are referred to status quo situation.

personal opinion compared to the other positions in a semi-open debate. In the first session the aesthetic value of forest structures and carbon sequestration were discussed, while in

Also water-quality and quantity enhancement might have been considered as a further attribute; however due to the extraordinary plain floods in 2010 several protest answers have recorded in the pilot version of the questionnaire in Veneto region. In fact, forest structure view along paths and roads was thought to cover water related services, but, as we tested the issue was still too sensitive at the time of the survey leading several strategic answers[1] hence a consistent bias on the evaluation. Moreover, the weak linkage with forest management at regional scale let us exclude water-related services from the CE. In fact there are evidence that forest management on the present situation may partially affect water quality and quantity at forest management unit or local scales, but no effects have been recorded at medium or watershed scales (Birot et al. 2011). Moreover the forest-water interactions in the study area are stabilized due to the high forest cover, caused since the second half of last century by the continue farmland abandonment. Surely, active forestry might also have a positive role in landslide protection (O'Loughlin 1974, Bagnaresi et al. 1999, Andréassian 2004, Neary et al. 2009), but only at local or forest management unit scale. Summing up all these reason, we did not consider water-soil relate externality, converting the attribute toward aesthetic view of forest management, basically the only thing average people see about forest practices according to a focus groups session on this attribute.

4.2 Questionnaire design and data collection

CE session in the questionnaire has been introduced with a brief description of each single attribute and attribute levels. Each attribute presentation ended with a simple question asking to the respondent its preferred attribute levels. This helped the respondents to understand the topic as well to select those people that did not understand CE, weighting their answers or even removing some interviewees in case of strategic or protest action. Each respondent had 6 choice tasks in which they may choose between with two alternatives and the status quo.
The questionnaire has been spread out during the summer period (July-October) and we opted to implement a face-to-face survey technique. The population sample was chosen in 60 Veneto's municipalities (10% of the total municipalities) and selected by inhabitant dimension and location between mountain and plain dwellers. The survey ended the second half of October with 711 validated respondents, while respondents were chosen according to gender and age class: 74 from the pilot phase and 637 from the main survey in which most of the data mining has been provided. The main statistic between the population and the sample has been reported in Table 2.

[1] Just for giving an example, the higher level of no-responses or protest answers in the pilot test were recorded in the flooded areas. Interviewees in this location were considering the regional government as the main responsible of the disaster.

Table 2: Sample-population comparison

		Veneto's population		Population sample		
	Level	pop.	[%]	n. of people	[%]	Δ (s-p)
Gender	Female	2.52	51	312	49	-2
	Male	2.41	49	325	51	2
	Total	4.94*	100	637	100	
Education	Unknown	0.62	13.8	0	-	-13.8
	Elementary	1.18	26.15	34	5.3	-20.85
	Middle High School	1.33	29.41	250	39.2	9.79
	High School	1.11	24.48	276	43.3	18.82
	University and post	0.28	6.15	77	12	5.85
	Total	4.52**	100%	637	100%	
Class age	under 18 years old	1.54	-	-	-	-
	18-30 years old	0.66	19.46	139	21.8	2.34
	31-40 years old	0.78	23.15	127	19.9	-3.25
	41-50 years old	0.81	24.04	135	21.2	-2.84
	51-60 years old	0.62	18.51	121	19	0.49
	over 61 years old	0.5	14.84	115	18.1	3.26
	Total voters	3.37*	100	637	100	

Note: one star number is relate to year 2011, while two stars are referred to year 2001

4.3 Statistical design and choice experiment

The CE statistical design has been calculated in two phases according to (Bliemer and Rose 2009); firstly we draft a D_z-efficient design, instead of orthogonal design, using priors equal to zero (Bliemer and Rose 2005) in Ngene© software, then the information gathered in the pilot questionnaire has been used to estimate the betas for the final statistical design implemented in the main survey. Based on the CE answers we estimated the multinomial logit (MNL)(McFadden 1974) model that has been used as priors in final statistical design. The benefit of this procedure is the possibility to weight the maximum and minimum values of continue variables. The higher values of cost attribute are less frequent than lower levels as it occurs in reality. MNL is the most widely used model in choice experiment, but it has limited ability to capture respondent behaviour heterogeneity. However, whether it is applied to a certain socio-economic categories with dataset subsampling, it helps to calculate the WTP within the given group as ratio between the negative attribute beta and the beta of cost, and in case of effect coded variable the numerator is multiply by two (Bech and Gyrd-Hansen 2005). The rationale behind this concept is the higher homogeneity within the socio demographic group with regards the remaining part of the population. Moreover, the second order interaction with high sensitive variables like income and education has been tested. According to (Train 2003) other more flexible models might be applied whether Hausman test (Hausman and McFadden 1984) is statistically significant, hence there are differences between the alternatives of the choice task. In our case, latent class (LC) model has been used to check what variable are meaningful for the policy makers.

5 Results and discussion

The estimation of a general WTP for Veneto's population is a crucial information for the policy maker. The first results was calculated with MNL model, using Nlogit4 software©®, in different portion of the population; however the results have been quite feeble (see Table 3). This might be explained on the answer heterogeneity; for instance model 1 shows the general unwillingness to pay for the majority of the attributes, except for recreation facilities and path signs. Slight improvements of the models occur selecting particular portion of the sample. The rejection of protesters (model 2) or mountain non-users (model 4 – all plain dwellers) does affect significantly the log-likelihood function and r-squared increasing the overall outputs of the model. It is worth to mention the high significance of cost attributes, recreation facilities and path signs, basically, the main variables that the average respondents were looking for. Moreover, the multitudes of activities in mountain forest increase the heterogeneity of mountain users (model 3).

Further improvement in the model estimation has been obtained by recoding carbon sequestration, extinction rate (biodiversity) and grassland open areas (landscape) in effect coded variable. We took as reference level each variable *status quo* (5.5% for carbon sequestration, -50% species for biodiversity and -5% for landscape). As we can see in Table 4, the MNL model outputs were clearly improved both in terms of variable significance and r-squared increment, describing the non-linear trend of the variables utility. In fact already in the general model (model 1) several variables have become significant, even more removing protesters (model 2) and mountain non-users (model 4). If we look at carbon sequestration variable in model 1, we may clearly see the non-linearity effect: firstly increasing at 7%, than decreasing at 8.5% of carbon sequestration and finally increasing again at the higher level.

Table 3. MNL model outputs

	Model 1	Model 2	Model 3	Model 4
ASC	0.045	0.368**	0.404**	0.462*
VIEWA	-0.003	-0.006	-0.025	0.042
VIEWC	0.030	0.047	0.003	0.111
VIEWD	-0.005	-0.012	-0.005	-0.020
CO2	0.052	0.027	0.024	0.023
BIODIVERSITY	0.002	0.004*	0.005	0.005
LANDSCAPE	-0.005	-0.004	-0.009	0.009
RECRST	0.048	0.035	-0.019	0.145*
RECRS	0.010	0.036	0.118	-0.095
RECRSST	0.224***	0.221***	0.187***	0.261***
COST	-0.009***	-0.010***	-0.007***	-0.017***
Obs.	3822	3492	2076	1416
Log-L	-3925.129	-3581.817	-2177.952	-1330.578
R-sqrd	0.05928	0.06557	0.03845	0.13844
Adj. R-sqrd	0.05792	0.0641	0.0359	0.13508

Note: starred values represent the p-value : * = 0.10, ** = 0.05, *** = 0.01.

Table 4. model outputs for recoded variables

	MNL					LC	
	Model 1	Model 2	Model 3	Model 4	Model 5	G1 (55%)	G2 (45%)
ASC	-0.190	0.173	-0.143***	-0.508	0.906***	0.846**	-0.234***
VIEWA	0.045	0.048	0.067	0.011	0.005	0.0632	0.128*
VIEWC	0.116	0.164*	-0.000	0.165	0.030***	-0.236	-0.354***
VIEWD	-0.143**	-0.189***	-0.112	-0.158	-0.023***	-0.001	0.224***
CO2 +7%	0.254**	0.352***	0.117	0.540***	0.038***	0.245	-0.311**
CO2 +8.5%	-0.298***	-0.373***	-0.277***	-0.357***	-0.036***	-0.143	-0.023
CO2 +10%	0.347**	0.303*	0.428***	0.611**	-0.008	1.174***	0.758***
BIO -25	0.077	0.040	0.017	0.482**	-0.022***	0.339	0.468***
BIO 0	0.122	0.179**	0.175*	-0.102	0.027***	0.017	0.292**
BIO +10	-0.117	-0.076	-0.079	-0.381*	0.021***	-1.218**	-0.590***
LAND -10%	-0.071	-0.099	0.104	-0.294***	-0.167***	0.134	-0.039
LAND 0%	0.111	0.129	0.198	0.188	0.035	-0.242	0.264*
LAND +2%	-0.089	-0.122*	-0.143	-0.050	-0.152**	0.152	0.150
RECRST	0.013	-0.019	-0.099	0.048	-0.020	0.451***	0.053
RECRS	0.018	0.066	0.036	-0.075	0.196***	-0.796***	-0.016
RECRSST	0.309***	0.313***	0.253***	0.608***	0.229***	0.979***	0.154***
COST	-0.008***	-0.009***	-0.004***	-0.012***	-0.015***	-0.039***	0.005***
Obs.	3822	3492	2076	1416	3492	3492	
Log-L	-3896.92	-3548.00	-2166.08	-1297.78	-3539.50	-3836.35	
R-sqrd	0.06604	0.07440	0.04369	0.15968	0.07661	0.23174	
Adj. R-sqrd	0.06396	0.07214	0.03976	0.15460	0.07436	0.22776	

Note: starred values represent the p-value : * = 0.10, ** = 0.05, *** = 0.01.

Despite the use of continue variables, the recoding has highlighted the respondent' propensity to have higher attention on the extreme levels of attributes, highlighting a scarce knowledge about ES. Nevertheless mountain user subsample (model 3) still maintained high heterogeneity. A further step in the model refining is surely the interaction effect between education and forest structure, carbon sequestration and biodiversity. In model 5 the role of respondents knowledge on the single attribute level clearly emerges. On the contrary to the previous models there is a higher significance of biodiversity and forest structure attributes, while the betas for carbon sequestration have changed in terms of significance; respondents clearly gave more attention to lower percentage levels. Out of education, several models have been estimated testing the interaction effect with income, household dimension and environmentalism attitude, but generally only education has had a substantial effect on attribute significance and model meaningful. At last, also LC model has been estimated, but no interesting improvements have been reached. In

fact, cost beta of group 2 is positive and the parameters of group 1 are not so meaningful. Among the explanation we gather this behaviour might be related to the "yeah saying" effect or to the people that did not understand the task. According to (Hanley et al. 2001) it is a relative common behaviour in choice experiment, especially if the population sample consider all the population strata. Old people, "green" supporters or people that do not understand the attributes or the choice tasks are categories that might deeply affect the overall output of the models as in our case. Mountain users have higher heterogeneity then mountain non-users that manifest a propensity toward ES payment support. ES option or existence values are clearly higher than ES use value showing a potential perceived scarcity for plain dwellers. The combination of the majority of the ES in the same valuation allows to find what attributes are less likely to be choose. Aesthetic view of forest structure and landscape are in fact less appreciate by the respondents, while on recreation, biodiversity and carbon sequestration, they have a greater utility. On the contrary of target specific valuation (Scarpa and Thiene 2005), where the sample is selected among the good or service users, on large scale policy all the population has to be involved. The subsampling help us to assess for a given socio-demographic strata a general WTP useful to draft large-scale policies. Also the use of probability factor of LC group might be used, but in the most of the cases the given socio-demographic parameters we are searching is mixed within the group. Policy makers has high risks to promote ES policy due to the lack of awareness of the voters and even more to the threat to introduce more taxation not supported by a given part of the population., hence they usually seek homogeneous group.

The overall WTP for an additional variation of each attributes wave between the 29 (model 4 in Table 3) to 574€/household/year (model 5 in Table 4), that means approximately 12 to 528M€/year (8% of the families are under the minimal income threshold) if the policy is applied to the strata the model was estimated for considering a million household taxpayers. On average a potential fund might be built on the plain dwellers taxpayers to enhance carbon sequestration, biodiversity maintenance and recreation facilities with an average monetary flux of 323M€/year. This value might be consider in line with other similar studies (Tempesta and Marangon 2005, Goio et al. 2008) that have assessed the total economic value (TEV) of Italian forest landscapes by asking to respondent whether they were willing to abrogate a law for forest fires prevention thus reducing the tax load. The results estimated a TEV of 722.6 €/ha, with a non-use value component of 665 €/ha, which correspond to 220M€/year applying our socio-demographic parameters. Are these data reliable? Yes they are, whetherconsidering the common agriculture expenditure of 1200€/household/year that an average household pays every year and one third is used to subsidies the second agro-forestry measure (second CAP pillar) (OECD 2010a). PES schemes may be draft based on the preliminary results; nevertheless to archive effectiveness, further research should target at the main aspect of the contract theory. The parts definition, the measure of the given ES and it's zoning and even more important the definition of the cause-effect relation with land management compared to the other potential measure the manager may adopt. An historical example has been the commercialization of recreational wild mushroom picking in Borgotaro area. Wild mushrooms has been considered public goods since the early '90s, period in which the congestion over these NWFP was very high. Despite the implementation of simple command and control policy, the policy makers together with forest owner association introduced a permit fee based on quantity and time of harvesting. The fund created was then used to compensate particular forest management practice (Giovannetti et al. 1998) to stimulate wild mushroom production in forest per hectare, the only approach able to fulfill the huge demand (around 33,000 pickers) of this recreational activity (Pettenella and Kloehn 2007). As we can see, the Borgotaro case respected all the main figure needed to draft a PES scheme (parts, well define ES, conditionality) and even more it achieved effectiveness due to the incapability to use alternative strategy to supply the demand. Other case study exist also in the water sector (Pettenella et al. 2012) or within NATURA2000 program, however PES

schemes remain still rare for ES provision. According to the findings a weak point on the PES implementation for carbon, biodiversity and recreation, remains the zoning and the coordination of the consumer and supplier that increase the transaction costs. Nevertheless the perceived ES scarcity is a clear signal on the demand side and it will push toward the ES commercialization; so far the weakest problem of the neoclassical economy.

6 Conclusions

CE is an innovative econometric approach to estimate mountain forest externality values as basic information for PES scheme implementation. Nevertheless, unexpected outputs may rise up. For instance the users might be less willing to pay for a service that they already have. Thus, CE may lead to strategic answers in order to avoid any payment. In model 3 this effect was proved. In fact, we have seen a clear un-interest by mountain users to spend extra money in activities or externalities for which they do not get any direct utility. Moreover, high complexity of choice task may lead uncertainty; hence the respondent could decide to avoid to choose. Apparently, the absence of forests in Veneto plains led people from urban areas to have higher sensitivity toward green issues. Finally the *status quo* informs the respondent on the actual situation anchoring its answers to the reference levels. Probably the lack of environmental sensitivity highlighted in the present work is linked to the knowledge deficiency of the average respondent. Hence increasing the awareness on forest-related environmental services could support the introduction of market-based mechanisms to commercialize forest externalities. Environmental education is surely a strategic tool to be considered in the future but it is also a hot and challenging issue and two question have to be answered: who decides the right level of awareness and information? Is it ethically acceptable to invest in education and information with the aim of increasing the willingness to pay and hence introducing new market-based mechanisms? Policy makers might be resilient to answered by the policy makers searching for votes.

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References

Andréassian, V. 2004. Waters and forests: from historical controversy to scientific debate. Journal of Hydrology **291**:1-27.

Bagnaresi, U., Minotta, G., Vianello, G., Barbieri, A., Simoni, A., Tedaldi, G. & Busetto, R. 1999. Relazione conclusive del progetto di ricerca: effetti dei diversi tipi di trattamento dei boschi sul deflusso idrico afferente al bacino di Ridracoli (anni 1993-1999). Dip. Colture Arboree, Università degli Studi di Bologna.

Bech, M. and Gyrd-Hansen, D. 2005. E¡ects coding in discrete choice experiments. Health Economy **14**:1079-1083.

Birot, Y., Gracia, C and Palahì, M. 2011. Water for Forest and People in the Mediterranean region - a challenging balance. What Science Can Tell Us **1**:1-174.

Bliemer, M.C.J. and Rose, J.M. 2005. Efficiency and Sample Size Requirements for Stated Choice Studies. Institute of Transport & Logistics Studies, Sydney, Australia.

Bliemer, M.C.J. and Rose, J.M. 2009. Designing Stated Choice Experiments: The state of the Art. 11th International Conference on Travel Behaviour Research, Kyoto, Japan

Boxall, P.C., Adamowicz, W.L., Swait, J., M. Williams, M. & J. Louviere. 1996. A comparison of stated preference methods for environmental valuation. Ecological Economics **18**:243-253.

Brey, R., Riera, P. & Mogas, J. 2007. Estimation of forest values using choice modeling: An application to Spanish forests. Ecological Economics **64**:305-312.

Canton, A. and Pettenella, D. 2010. Motivazioni gestionali dei proprietari forestali privati: un caso di studio nel comune di Recoaro Terme (VI). Forest@ - Rivista di Selvicoltura ed Ecologia Forestale **7**:44-57.

Christie, M., Hanley, N. & Hynes, S. 2007. Valuing enhancements to forest recreation using choice experiment and contingent behaviour methods. Journal of Forest Economics **13**:75-102.

Christie, M., Hanley, N., Warren, J., Murphy, K., Wright, R., & Hyde, T. 2006. Valuing the diversity of biodiversity. Ecological Economics **58**:304-317.

Croitoru, L. 2007. Valuing the non-timber forest products in the Mediterranean region. Ecological Economics **63**:768-775.

FOREST EUROPE UNECE and FAO. 2011. State of Europe's Forests 2011. Status and Trends in Sustainable Forest Management in Europe., FOREST EUROPE, Liaison Unit, Oslo, Norway.

Gatto, P., Pettenella, D. & Secco, L. 2009. Payments for forest environmental services: organisational models and related experiences in Italy. iForest - Biogeosciences and Forestry **2**:133-139.

Gios, G., Goio, I., Notaro, S. & Raffaelli, R. 2006. The value of natural resources for tourism: a case study of the Italian Alps. International Journal of Tourism Research **8**:77-85.

Giovannetti, G., Zingari, P. & Terzolo, P. 1998. Exploitation of forest productivity through increased mushroom production. Acta Horticola **457**:127-132.

Goio, I., Gios, G. & Pollini, C. 2008. The development of forest accounting in the province of Trento (Italy)ä. Journal of Forest Economics **14**:177-196.

Grêt-Regamey, A., Walz, A. and Bebi, P. 2008. Valuing Ecosystem Services for Sustainable Landscape Planning in Alpine Regions. Mountain Research and Development **28**:156-165.

Hanley, N., Mourato, S., & Wright, R.E. 2001. Choice modeling Approaches: a Superior Alternative for Environmental Valuation? Journal of Economic Surveys **15**:435-462.

Hanley, N., Wright, R. & Adamowicz, V. 1998. Using Choice Experiments to Value the Environment. Environmental and Resource Economics **11**:413–428.

Hausman, J. and McFadden, D. 1984. Specification Tests for Multinomial Logit Model. Econometrica **52**:1219-1240.

Jacobsen, J. B., Boiesen, J.H., Thorsen, B.J., & Strange, N. 2007. What's in a name? The use of quantitative measures versus 'Iconised' species when valuing biodiversity. Environmental and Resource Economics **39**:247-263.

Lehtonen, E., Kuuluvainen, J., Pouta, E., Rekola, M. & Li, C.-Z. 2003. Non-market benefits of forest conservation in southern Finland. Environmental Science & Policy **6**:195-204.

MA. 2005. Ecosystems and Human Well-Being: Synthesis. Island Press, Washington DC, US.

Maso, D., Matilainen, A. & Pettenella, D.M. 2011. The role of networks in non-wood forest products and services market development.*in* G. Weiss, D. M. Pettenella, P. Ollonqvist, and B. Slee, editors. Innovation in Forestry: Territorial and Value Chain Relationships. CABI, Nosworthy way, Wallingford, Oxfordshire OX10 8DE, UK.

McFadden, D. 1974. The Measurement of Urban Travel Demand. Journal of Public Economics **3**:303-328.

Mogas, J., Riera, P. and Bennett, J. 2006. A comparison of contingent valuation and choice modelling with second-order interactions. Journal of Forest Economics **12**:5-30.

Neary, D., Ice, G.G. and Jackson, C.R. 2009. Linkages between forest soils and water quality and quantity. Forest Ecology and Management **258**:2269–2281.

Nielsen, A. B., Olsen, S.B., & Lundhede, T. 2007. An economic valuation of the recreational benefits associated with nature-based forest management practices. Landscape and Urban Planning **80**:63-71.

Notaro, S. and Paletto, A.. 2011. Links between Mountain Communities and Environmental Services in the Italian Alps. Sociologia Ruralis **51**:137-157.

O'Loughlin, C. 1974. The effect of timber removal on the stability of forest soil. Journal of Hydrology **13**:121-134.

OECD. 2010a. Agricultural Policies in OECD Countries at a Glance. Paris, France.

OECD. 2010b. Paying for Biodiversity enhancing the cost-effectiveness of payments for ecosystem services. OECD, Parice, France.

Pettenella, D. and Kloehn, S. 2007. Mediterranean mushrooms: how to market them. Pages 52-68 *in* N. Berrahmouni, X. Escuté, P. Regato, and C. Stein, editors. Beyond Cork—a wealth of resources for People and Nature. WWF Mediterranean and IPADE, Madrid, Spain.

Pettenella, D. and Secco, L. 2006. Small-scale forestry in the Italian Alps: From mass market to territorial marketing. Pages 398-408 *in* International conference on "Small-scale forestry and rural development: The intersection of economics and society", Galway, Ireland.

Pettenella, D., Vidale, E., Gatto, P. & Secco, L. 2012. Paying for water-related forest services: a survey on Italian payment mechanisms. iForest - Biogeosciences and Forestry **5**:210-215.

Piussi, P. and Pettenella, D. 2000. Spontaneous Afforestation of Fallows in Italy. Pages 151-166 *in* NEWFOR - New Forest for Europe: Afforestation at the Turn of the Century. European Forest Institute, Freiburg, Germany.

Scarpa, R. and Thiene, M. 2005. Destination Choice Models for Rock Climbing in the Northeastern Alps: A Latent-Class Approach Based on Intensity of Preferences. Land Economics **81**:426–444.

Scarpa, R., Thiene, M. & Tempesta, T. 2007. Latent class count models of total visitation demand: days out hiking in the eastern Alps. Environmental and Resource Economics **38**:447-460.

Scarpa, R., Thiene, M. and Train, K. 2008. Utility in Willingness to Pay Space: A Tool to Address Confounding Random Scale Effects in Destination Choice to the Alps. American Journal of Agricultural Economics **90**:994-1010.

Tempesta, T. and Marangon, F. 2005. The total economic value of Italian forest landscapes.*in* Conference "The Multifunctional Role of Forests Policies, Methods and Case Studies", Padova, 28 - 30 April 2005. , Padova, Italy.

Tempesta, T. and Thiene, M. 2004. The willingness to pay for the conservation of mountain landscape in Cortina D'Ampezzo (Italy).*in* Proceeding of 90th EAAE Seminar "Multifunctional Agriculture, policies and markets: understanding the critical linkages". Rennes-France.

Thiene, M. and Scarpa, R. 2008. Hiking in the Alps: exploring substitution patterns of hiking destinations. Tourism Management **14**:263-282.

Train, K. 2003. Discrete Choice Methods with Simulation. Cambridge University Press, New York, US.

Wunder, S. 2005. Payments for environmental services: Some nuts and bolts. CIFOR **42**:1-32.

Wunder, S. 2008. Necessary Conditions for Ecosystem Service Payments.*in* J. Reid and J. Boyd, editors. Economics and Conservation in the Tropics: A Strategic Dialogue. Conservation Strategy Fund, San Francisco, US.

Challenges and opportunities for the Chinese value-added wood products companies

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Abstract

The past decades have witnessed a dramatic increase in the demand for China's wood products. However, a fast-growing demand for wood products and limited domestic timber resources has increased China's dependence on imported wood. As a result, China has grown to be the most important player in the global trade of wood products both as an exporter of value-added wood products and as an importer of wood resources. The objective of this study is to examine managers' perceptions of the challenges and opportunities facing the Chinese wood products companies by applying the modified Porter's five force model. In the empirical part, qualitative semi-structured interviews with 28 managers of 7 wood products companies in China were conducted. The results suggest that low labour costs were no longer perceived as a source of competitive advantage for the Chinese companies. To develop and maintain competitive advantage in global markets, the Chinese firms should adjust their business strategies by changing production focus from low-end to high-end products, by changing sales direction from overseas to domestic markets, and focusing on development of independent brands. To compensate for the deficiency in raw materials, the Chinese companies should improve the utilization of raw materials, acquire forest lands or invest in sawmills in lower-cost and forest-rich countries. With the encouragement of the Chinese government, the Chinese farmers are showing higher enthusiasm for afforestation. Furthermore, the volatile government policies bring not only challenges but also opportunities for future development of China's wood products industry.

Keywords: Challenges, opportunities, China, value-added wood products companies.

1 Introduction

The last few decades have witnessed a rapid growth of China's economy, which has greatly increased the disposable incomes of the Chinese consumers. Thus, there has been a pent-up demand for improved housing conditions that have stimulated a sharp increase in the domestic demand for wood products in housing components and interior applications, in addition to furniture and other furnishings (Ganguly and Eastin, 2011). In the meantime, the growing demand for low-cost value-added wood products in developed countries has provided the Chinese companies to export large quantities of price-competitive value-added wood products, mainly wooden furniture, plywood, and wood flooring (Wan et al., 2011).

Driven by both domestic and international demand, China's wood products industry has developed very quickly with tremendous expansion of production capacity, which has led to a dramatic increase in the proportion of China's wood products in both domestic and international markets. However, a fast-growing demand for wood products combined with limited domestic timber resources has increased China's dependence on imported wood. As a result, China has grown to be the most important player in the global trade of wood products both as the largest exporter of value-added wood products and the largest importer of logs and lumber (Ganguly and Eastin, 2011).

Abundant labour supply and low production costs have widely been acknowledged as the main sources of competitive advantage (CA) of the Chinese wood products companies in global competition. However, this assumption is changing with the rapidly rising costs of labour, raw materials and energy combined with the rapid technology transfer and the increasing corporate environmentalism (Chan, 2010). In addition, the recent global economic crisis has caused profound impacts on the Chinese export-orientated wood products companies (Cao et al., 2010), which are facing multiple burdens of a reduction in tax benefits, the tightening of China's monetary policy, the appreciation of the Chinese Renminbi (RMB), and the anti-dumping actions taken by importing nations. The combination of these factors has wiped out the healthy profit margins experienced by the Chinese manufacturers. China's wood products industry is now facing tougher times. Nevertheless, despite the current challenges and obstacles, China's dynamic economic growth and huge market potential present a good opportunity for the continuous development of China's wood products industry. It is expected that China's wood products market will continue to grow in the long term and China has possibilities to expand its wood products industry globally.

There are few academic studies addressed China's wood products market in an international context, except one recent study by Han et al. (2009) that explored that the global competitiveness of the Chinese wooden furniture industry. The purpose of this study is to examine managers' perceptions of the challenges and opportunities for the Chinese value-added wood products companies as well as the countermeasures that should be taken to improve the competitiveness of the Chinese companies. In this study, we focus on the branches of plywood, wooden furniture and wood flooring as they are China's most important value-added wood products, which have remarkably increased their coverage in the international markets and the trend is expected to also continue in the future.

2 Theoretical background

As a strategic analytical tool, Porter's five forces model (Porter, 1979) served as the theoretical background for our study and it was used to analyze the business environment in China's wood products industry. Porter's model is based on the insight that a company strategy should meet

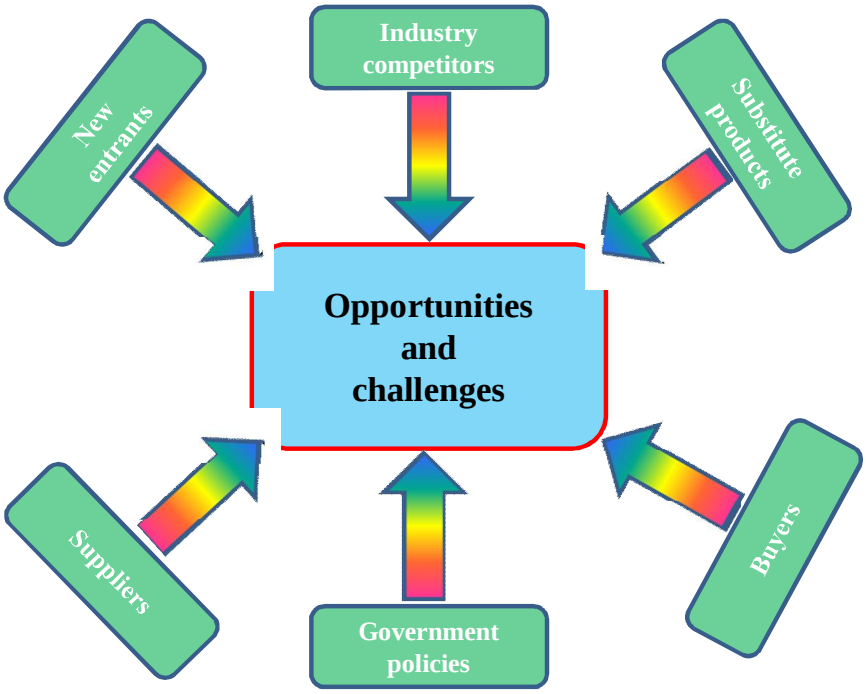

Fig. 1. Theoretical framework of the study (Modified from Porter, 1979)

the opportunities and challenges in the organization's external environment. According to Porter (1979), five forces are comprised of rivalry among existing firms, threat of new entrants, threat of substitute products, bargaining power of suppliers, and bargaining power of buyers. For most industries, rivalry among existing firms is the major determinant of the competitiveness of the industry. It usually involves a mixture of price competition, improvement of product quality and customer service, introduction of new products, brand identity, and advertising campaigns (Porter, 1979; 1980; 1985). Threat of new entrants refers to the threat of new or potential players pose to existing players in an industry. New entrants may enter a market with lower costs or new technology and resources (Porter, 1979; 1980; 1985). A threat of substitute products exists when a product produced from another industry performs the same function or satisfies the same need as the existing product produced by the firms within the industry (MaRS). In Porter's model, the threat of substitutes usually impacts an industry through price competition. Bargaining power of suppliers is described as the power that suppliers exert over firms by raising prices, lowering quality, or reducing availability of their products, whereas bargaining power of buyers refers to the pressure that customers exert on firms to make them provide higher quality products, better customer service, and lower prices (Porter, 1979; 1980; 1985).

The theoretical framework of our study is shown in Figure 1. It is modified from Porter's five-force model (Porter, 1979). In addition to the five forces, a sixth force – government policies is added to our framework because government is a major stakeholder in any industry and government policies and regulations can dictate the level of competition within the industry. By analyzing these six forces, an industry can develop a better understanding of its key strengths, weaknesses and the trends which present the most relevant opportunities and challenges (Hansen and Juslin, 2011). The objective of this study is to explore the challenges and opportunities and challenges facing the Chinese wood products companies.

3 Materials and Methods

The data of this study were gathered from the medium and large-sized wood products companies in China. Such purposive sampling was based on the assumption that the medium to large-sized companies are most likely to actively conduct strategic activities that are of interest in our studies (Stiles, 2001).The categorization of China's wood products companies into small, medium, and large enterprises was based on their fixed capital detailed by Sun and Chen (2003). The fixed capital of a small, medium, and large wood processing company is less than 20 million RMB, 20-50 million RMB, and over 50 million RMB, respectively. Our data gathering was targeted at some typical companies that produced value-added wood products with a certain scale and level of competitiveness in two provinces of China: Guangdong Province in South China, which is one of the most advanced regions in the field of wood processing (Luo et al., 2009), and Heilongjiang Province in Northeast China, which is an important timber production base and one of the traditional bases of wood-processing industry.

We selected 30 companies for our data gathering with the help of forest industry associations and forestry bureaus, but only got permission to interview 28 managers of seven of them. These companies focused on producing either low-value-added or high-value-added wood products in either the Chinese domestic or the international markets. Among seven case companies, two of them focused on producing low-value-added products and operated in the domestic low-end market, two companies were export-oriented and mainly produced low-value-added products for the international low-end markets, and the rest three companies principally produced high-value-added products in the domestic high-end markets.

In September 2011, a total of 28 semi-structured interviews with the managers of the seven case companies were conducted to study the managers' views on the challenges and opportunities for the Chinese wood products companies. The interviewed managers were members in the companies' top management teams and were responsible for the firm-level strategic decision-making related to general management, raw material procurement, production, and marketing. The questionnaire comprised a variety of closed and open/open-ended questions arranged in five thematic sections: (1) general information about the company, (2) sourcing and procurement of wood raw materials, (3) product manufacturing, (4) marketing and sales, (5) managerial opinions on the challenges and opportunities facing the Chinese wood products companies and the countermeasures that should be taken to improve the competitiveness of China's wood products industry. To encourage respondents to be open and honest, before starting the interviews, it was already agreed that the identity of any interviewed managers/companies would be kept completely anonymous and confidential.

The data gathering was commenced by contacting target companies by phone to inquire about their willingness to participate in the study. This was followed by sending a letter of introduction along with the questionnaire to each willing company to ask them to first familiarize themselves with the study's semi-structured questionnaire. And then, the participants were contacted by telephone to set a date for an interview. The whole interview survey was conducted in Chinese, which is the native language of the interviewer and all the interviewees. Each interview lasted between one and two hours.

Due to sample selection constraints, the investigation must be regarded as a case study series and the possibility of generalizing the results of the study is therefore limited. However, since all the respondents were experienced and knowledgeable about the topic and the obtained results of our study were also able to meet the aims of the study, the validity of the applied method and data can be considered to be good. Moreover, the reliability of the information is

most likely to be quite high because of the clear theoretical structure in addition to the exact execution of the study.

4 Results

The seven case companies had been established between five and 17 years. Instead of specializing on a single product category, most companies manufactured a diverse range of products. Even manufacturers of wooden flooring produced a wide range of floors, such as laminate flooring, engineered flooring, and solid wood flooring. Based on our data, we analyzed the six forces and their effects on China's wood products industry.

4.1 Rivalry among existing firms

As is well known, the booming growth of China's wood products industry is primarily attributed to abundant labour force and low production costs (Han et al., 2009). As the world's largest producer and exporter of value-added wood products, China has maintained a strong position in the global wood products market. However, there are some constraints to achieving the sustainable development of China's wood product industry. In terms of quality and unit price, China still falls behind traditional strong competitors such as Italy and Germany. Most of China's products are low-end without their own brands or with designs that are simply imitated and lack originality. For the Chinese export-oriented wood products companies, they have entered the international markets mainly by the original equipment manufacturing (OEM) route. There are very few well-known Chinese brands in global markets. Although some top Chinese brands hold strong market positions and brand value among the Chinese customers, they have experienced difficulties in entering the international high-end market. The international high-end markets are still dominated by foreign brands. This is due to the gaps in productivity, management and technical levels still found between the Chinese branded and international branded companies.

Take wooden furniture as an example, some big global furniture countries, such as Italy, Germany and Sweden, possess world class of design, high level of manufacture technique and advanced equipment. Their products attract customers, especially high-end customers, all over the world because of high quality of products and good image of brands (Lindman et al., 2008). Apart from the overseas markets, foreign furniture manufacturers and distributors have actively been seeking market share in China. The most active and successful one is IKEA from Sweden (DRCNet, 2006). Furniture manufacturers from Italy and Spain are also fighting for market share, primarily in the high-end market niche.

4.2 Threat of new entrants

China's wood products branch is a fragmented industry with relatively low investment levels and simple technologies. The majority of the Chinese wood product companies are small- and medium-sized enterprises (SMEs) (Sun and Canby, 2011). It indicates that the entrant barrier into China's wood products industry is relatively low, which allows new competitors easily enter the market and join the competition. Therefore, in addition to the current competition from high-income countries, China's wood products industry also faces upcoming competition from a number of low-to-medium and low-income countries (Han *et al.*, 2009), such as Vietnam, Malaysia, and Indonesia, Mexico, Brazil, Poland, and countries of the Middle East (Roger, 2009). Lately, some foreign multinational companies (MNCs) have begun to shift their manufacturing bases from China to these countries. The main reasons include the rising costs of labor and raw materials in China, low average income and/or abundant forest resources in those

countries. Moreover, some large MNCs want to reduce their exposure to production disruptions by implementing a strategy of diversifying across several countries.

In terms of wooden furniture, Vietnam and Malaysia are currently strong competitors to China for exporting wooden furniture to the United States (Ganguly and Eastin, 2011). Apart from the Asian countries, Poland took the advantage of proximity to the West European market, and has become an export-oriented furniture producer. Almost 90% of its production has been exported, 78 per cent of which has been transported to EU countries. Mexico has the same pattern, shipping 90 per cent of its furniture to the United States (Ratnasingam, 2002).

4.3 Threat of substitute products

Products made from other materials, such as bamboo, agricultural residues, plastic, steel, aluminum or plastics, for the same end uses as wood products can be a potential substitute for wood products. The interviewed managers indicated that the value-added wood products would not be replaced by some other substitute products in the foreseeable future. It is mainly due to the excellent properties of wood, such as natural, sustainable, renewable and recyclable. Moreover, wood is customarily a more traditional product that particularly attracts high-income consumers. For instance, the higher-end wooden furniture sought by higher-income consumers may be less likely to be substituted by plastic or metal furniture.

4.4 Bargaining power of suppliers

As the most important production factor, wood resources are critical to the development of the wood products industry. However, China is a country with low forest cover per capita and there is uncertainty in wood supply for the wood products manufacturing. China’s wood products industry is heavily dependent on imported logs and lumber as the raw material inputs for wood products production. Russia and New Zealand are the two main log-supply countries for China, and Russia and Canada are the two major lumber-supply countries to China (Taylor, 2010).

Thus, the dramatic growth in production of China’s wood products has precipitated a huge demand for wood resources, and has therefore increased wood prices. The rise of raw material prices is also due to inflation, pollution and deforestation (Roger, 2009). In particular, Russia's accelerated log export tariffs have had a great impact on China's wood products industry – they have considerably increased the cost of logs. Moreover, some other countries have also set laws to restrict the export of wood because of the protection of environment and economic considerations. So, the procurement of raw materials is a big challenge for the Chinese domestic wood processing industry. In order to meet the Chinese domestic and export-oriented demand for wood products, huge amount of raw materials must be either produced/substituted domestically or imported from other countries (Wan et al., 2011).

Another asset firms are competing over is worker force. With skilled workers, companies can produce good products. With higher cost of labour force, the Chinese companies will have move to more rural areas to find workers because in urban and heavily industrialized areas of China, the labour rates are higher, whereas in rural areas the labour rates are lower (Hunter and L, 2007).

4.5 Bargaining power of buyers

The fast expansion of China’s wood products industry is driven by the rapidly growing domestic and international markets. In the domestic market, the increasing consumer disposable incomes make China a large and potential marketplace. In the international markets, the United

States and the European Union are the two biggest export markets of China's value-added wood products (Taylor, 2010). However, a number of anti-dumping complaints and anti-subsidy investigation from these importing countries have caused China's wood products industry to experience a decline in profitability and sales volume. Moreover, non-tariff trade barriers, such as the recently established EU regulations for wood and wood products, which require all the commercial companies in the production chain to submit documents certifying the legality of the raw material, entails additional costs to the Chinese producers. Apart from the tariff barriers, more and more technical barriers and international certification standards call for cleaner production and greener products, which restrict the expansion of the Chinese manufacturing sector and China's export (Qiu and Yang, 2007). All these have helped China's new competitors, such as Vietnam, Mexico and Indonesia, to compete in China's major export markets.

4.6 Government policies

Governments plays a key role in public policy formulation and implementation in addition to defining the legal framework to guide and regulate the conduct of business. They usually use policy instruments, including fiscal policy, monetary policies, tax incentives, subsidies, and regulations, to help achieve their objectives through the impact they have on the actions of producers and customers. Government policies have influences on all other five forces.

According to the results of data collection, we summarized the major challenges and promising opportunities facing China's wood products companies. As listed in Table 1, these challenges and opportunities were examined from the perspective of market demand, raw materials, labour force, technology and innovations, and government policies.

5 Discussion and conclusions

By using the modified Porter's five forces model, this article explored the challenges and opportunities for China's wood products industry from the external environment perspective. To meet the increasing demand of wood products at home and abroad, China's wood products industry has undergone fast growth in the past two decades. Abundant low-cost labour has traditionally been regarded as the main source of CA of the Chinese wood products companies and the Chinese manufacturers have understandably adopted a low-cost strategy. Since the Chinese wood products companies have been production- and cost-driven, most of the Chinese companies have focused on producing low-value-added products for the low-end market. With the rising production costs, tightening of China's monetary policy and the appreciation of RMB, the decreasing international demand for wood products resulted from the global financial crisis, and the counter actions of trade protectionism in developed countries, the price competitiveness of China's wood products industry has gradually weakened. And meanwhile, China is experiencing an increasing challenge from lower-cost countries. So, low-cost labour is no longer perceived as a source of CA of the Chinese firms, and implementing purely traditional low-cost strategies has become a less viable option for the Chinese companies to sustain CA. To maintain and enhance its international competitiveness, the Chinese wood products companies need to adjust their business strategies. With the rapid growth of China's middle class, there has been an increasing demand for high-end differentiated products in the Chinese market. This has provided potentially fruitful opportunities for the continuous development of China's wood products industry. It indicates that the development of China's wood products industry will not solely rely on overseas markets. Many export-oriented companies have started to switch their focus from the international low-end market to the domestic high-end market to produce high-value-added products. The Chinese government has also been promoting structural transition of

its economy from export-driven to domestic demand driven economic development (Sun and Kerstin, 2010).

Furthermore, most of China's wood products do not own independent brands or do not hold strong brand value in global market. To make Chinese brands world-renowned, the Chinese branded companies should further develop their differentiation strategy, strengthen R & D capabilities and produce more sophisticated and high-value-added products, enhance international experience and adjust management structures, build independent famous brands that have international influence, and get access to global distribution networks.

Wood raw material is a critical resource for wood products production. To cope with the shortage and rising costs of wood resources, some Chinese companies have improved the utilization of raw materials and mill by-products, develop forest lands in the lower-cost and forest-rich countries to supply the growing domestic demand. Additionally, with the encouragement of the Chinese government, the Chinese farmers are also showing higher enthusiasm for afforestation.

As a consequence of global financial crisis and trade protectionism from importing nations, both the western governments have carried out a series of policies and regulations to limit China's exports of low-priced wood products. However, the Chinese government has also taken measures to support the continuous development of China's wood products industry. Some government policies, e.g., the appreciation of RMB, bring not only challenges but also opportunities for future development of China's wood products industry.

Owing to the explorative nature and small sample size, our results cannot be generalized beyond those companies that participated in the interviews and may thus not represent the opinions of managers for the whole China's wood products industry. Consequently, the present study can be considered to be a preliminary step in understanding the business dynamic in China's wood products industry and its possible development trends in the global wood products markets. To achieve more representative results, future studies should be targeted at obtaining more comprehensive data from a larger set of Chinese companies.

Table 1. Challenges and opportunities for the Chinese value-added wood products companies

Industry Factors	Challenges	Opportunities
Market Demand	Weaker demand in international markets: The global financial crisis has resulted in a decline in the purchasing demand of wood products from the United States and Europe, which has led to a substantial decline in the exports of China's wood products.	Domestic demand is the engine driving the continuous growth in China's wood products industry: 1) China's booming economy, huge population and acceleration of urbanization have driven a dramatic increase in its domestic demand for wood products. 2) Along with the Chinese consumers' rising income, there has been an increase in demand for high-end differentiated wood products among the fast-growing Chinese middle class.
Raw materials	Shortage and rising costs of wood raw materials	1) Efficient wood procurement and utilization: To deal with deficiency in timber resources, pollution control and environmental management, the Chinese companies can improve the utilization of raw materials and forest products, e.g., by using forestry residues and mill by-products to produce wood products. 2) To reduce China's dependence on imported wood and meet future timber demand, the Chinese government has encouraged plantation development and is now operating the world's largest plantation development program. The Chinese farmers are showing higher enthusiasm for afforestation, especially, the fast-growing and high-yielding forests have been largely planted in China. Moreover, some companies have shifted low value-added production chains to the country of origin of the raw materials and develop forest lands there, e.g., Laos and Myanmar.

		3) Besides, wood substitute products, including non-wood material (bamboo and straw) and recycling urban waste wood, would become a passive choice for the China market (Wan et al., 2011).
Labour force	1) Shortage of labor force and rising costs of labor force in China may hamper the future growth of China's wood products industry. 2) Growing competition from the wood products industry of lower-cost countries, such as Vietnam, Thailand and Malaysia, in China's key export markets.	1) Large salary increases in China may attract more workforce and talents to work for the company. 2) In responses to the growing competition from the newly industrialized countries, some Chinese manufacturers have turned their focus to the domestic market, in which there is a prosperous prospect, and some Chinese companies have shifted or outsourced the labor-intensive business operations to those lower-cost countries and built factories.
Technology and innovation	1) China lacks competitive wood products in global markets. Most of China's wood products are low-value-added, with low technological content and weak competitiveness. 2) With contract manufacturing base, numerous Chinese OEM companies have not developed their own designs and innovative capabilities. The lack of independent brands and updated technologies has hampered their efforts to move upward along the value chain and sustain competitiveness in the long run.	To improve sustainable competitiveness, some major Chinese wood products companies should strengthen the capabilities of research and development (R & D) and independent innovation, develop up-to-date production technology and new products, enhance internal management and brand management, and shift the production focus from low-value-added products to the high-value-added products.
Government policies	1) High export tariffs on log exports from Russia make China's wood products industry face log scarcity while bearing higher costs of logs. 2) The US and European anti-dumping duties, non-tariff trade barriers, technical barriers international certification standards on exports of China's wood products have not only restricted the exports of China's wood products, but also helped China's new competitors, such as Vietnam, Mexico and Indonesia, to compete China in overseas markets.	1) In response to the Russian log export tax and higher delivered log prices, some Chinese companies have built sawmills in Russia and then shipped sawn wood to China. 2) To boost its exports, China is expected to increase export tax rebates on a series of products, including high-tech and high value-added goods and labor-intensive goods (Ding, 2012). 3) Rising environmentalism has driven consumers and wood products manufacturers to consider using certified wood products.

3) A decrease in China's tax incentives for foreign enterprises may discourage foreign direct investments into China and accelerate the exodus of foreign enterprises to lower-cost countries.
4) Exchange rate fluctuations (the depreciation of the USD and the Euro and the appreciation of RMB) pose a challenge to the Chinese export-oriented enterprise. They will raise the export price of China's wood products, resulting in the loss of China's price advantage and the reduction in China's exports. For employees in the manufacturing sector may face the risks of reduced income or even unemployment.

4) Responding to the economic slowdown and to stimulate the domestic consumption of wood product, the Chinese government has carried out a series of policies to encourage housing and infrastructure developments, e.g., loosening regulations for tax policy, and loan policy for small and medium-sized enterprises. The State Forestry Administration has also taken a number of measures to increase investment, stimulate domestic demand, and provide a more favourable environment for forest companies (Ma et al., 2009).
5) The RMB appreciation not only brings advantages to the industries that need to import raw materials but also promotes the Chinese companies to make overseas investments. It significantly reduces their overseas investment costs, and enhances the firm's international purchasing power and capacity of foreign investment, paving the way for the Chinese enterprises to implement "going out" strategy. The Chinese companies could also take better advantage of exchange reserves to develop forest lands and invest in lower-cost and forest-rich countries.

References

Barnat, R. 2005. Business and Its Environment. Available at: www.strategy-formulation.24xls.com/en113 (accessed 21 September 2012).

Cao, J., Seol, M. and Eastin, I. 2010. Chinese wood products industry targets domestic market for growth. Center for International Trade in Forest Products (CINTRAFOR) News. Available at: www.cintrafor.org/publications/newsletter/C4news2010spring.pdf (accessed 3 September 2012).

Ding Q. 2012. China to raise exports tax rebates. Available at: www.chinadaily.com.cn/business/2012-02/20/content_14647547.htm (accessed 3 September 2012).

DRCNet. 2006. DRCNet database.

Ganguly, I. & Eastin, I. 2011. Economic and environmental aspects of China's wood products industry. Center for International Trade in Forest Products (CINTRAFOR) News. Available at: www.cintrafor.org/publications/newsletter/C4news2011winter.pdf (accessed 3 September 2012).

Han, X., Wen, Y. and Kant S. 2009. The global competitiveness of the Chinese wooden furniture industry. Forest Policy and Economics 11(8): 561-569.

Hansen, E. & Juslin, H. 2011. Strategic marketing in the global forest industries (2nd ed.). The United States: Shelton Turnball.

Hunter, S. L. & Li, G. 2007. Market competition forces: A study of the Chinese case goods furniture industry. Forest Products Journal 57(11): 21-26.

Lindman, M., Scozzi, B. and Otero-Neira, C. 2008. Low-tech, small- and medium-sized enterprises and the practice of new product development: An international comparison. European Business Review 20(1): 51-72.

Luo, X., Li, R., Lin, L., Gao, X., Pan, G., Xia, E., and Li, J. 2009. Challenges and opportunities for China's small and medium forest enterprises. Forest Connect, Food and Agriculture Organization of the United Nations, Rome.

Ma, Q., Liu, J. and Du, W. 2009. How Chinese forestry is coping with the challenges of global economic downturn. Unasylva 233(60): 43-48.

MaRS. Threat of substitutes. Available at: www.marsdd.com/articles/threat-of-substitutes/ (accessed 21 September 2012).

Porter, M. E. 1979. How competitive forces shape strategy. Harvard Business Review, March/April.

Porter, M. E. 1980. Competitive strategy: Techniques for Analyzing Industries and Competitors. New York: Free press.

Porter, M. E. 1985. Competitive Advantage: Creating and Sustaining Superior Performance. New York: Free Press.

Qiu, Y.W. & Yang, G. 2007. The impact of green trade barrier on Chinese forestry products export and countermeasures. International Trade Issues 5:24-28 (in Chinese).

Ratnasingam, J. 2002. Export dynamics of the South East Asian furniture industry. Furniture Design Manufacturing Asia 14(7): 52–55.

Roger. 2009. China furniture industry outlook and predictions for 2009. The ACF China Co- Millstone Trading. Available at: www.acf-china.com/blog/2008/11/12/china-furniture-industry-outlook-and-predictions-for-2009 (accessed 3 September 2012).

Stiles, P. 2001. The impact of the board on strategy: An empirical examination. Journal of Management Studies 38(5): 627-50.

Sun, X. & Canby, K. 2010. China: Overview of forest governance, markets and trade. Forest Trends, for FLEGT Asia Regional Programme.

Sun, X. & Canby, K. 2011. China: Overview of forest governance, markets and trade. Forest Trends, for FLEGT Asia Regional Programme.

Sun, C. and Chen, X. 2003. Small and medium forest enterprises in China. Research Centre of Ecological and Environmental Economics, Beijing, China and International Institute for Environment and Development, London, UK.

Taylor, R. E. 2010. Increasing demand from China. China's soaring demand to create huge opportunities for Canadian lumber – highlights from: The China Book – Outlook to 2015. International Wood Markets Group Inc. Canadian Wood Products July/August 2010.

Wan, M., Toppinen, A. and Hänninen, R. 2011. Econometric analysis of China's plywood market. Forest Products Journal 60(7/8):679-687.

Forest industry foreign investments: case study of three companies in China

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Abstract

Internationalization of operations constitutes an important part of the global forest industry integration process over recent decades. As a resource based industry, drivers of corporate expansion have been defined as both resource seeking and market seeking in the global context. China is regarded as one of the most dynamic countries with development potential concerning both resources and markets to attract foreign direct investment (FDI). From 2004 to 2008, FDI in the forest industry in China has doubled and FDI projects have maintained around 550 cases annually. The high density of investments has raised critical issues with respect to business ethics including corporate environmental sustainable development and interactions with communities at the local level. The aim of this study is to use a case study approach to compare the process of FDI in the forest industry in China and to explore the sustainability of operations from corporate governance viewpoint. Three case companies headquartered in Europe, North America and Asia were chosen. Corporate FDI strategies, financial performance, cooperation with local community and stakeholder involvement were evaluated and compared. Finally, managerial suggestions will be given case by case referring to the corporate sustainable operations in China.

Keywords: Foreign investment, forest industry, China

1 Introduction

Forest industry has undergone a dynamic consolidation process in last three decades at the global scale. In this process, corporate international expansions constitute an important role in resources and markets seeking. The most significant structural change in the forest industry is that large-scale production plants and sales activities were established in the developing and transition countries, which have gradually substituted the traditional production and sales networks in the developed countries. China, Brazil, India, and Eastern Europe have becoming the new emerging economies to attract

FDI in the forest industry driven either by their large domestic markets, by the abundant natural resources or both.
China, ranked as the global second largest economies with USD 7 trillion GDP in 2011 (the World Bank, 2012), attracts plenty of foreign investments in terms of commerce, resource and service. The rapid development speed (average GDP growth 9.9% per year since 1995) provides various market demands and opportunities, labor supplies and consumptions in China (the World Bank, 2012). In order to absorb foreign investments, Chinese government has significantly improved infrastructures in terms of transportation, water supply, electricity and natural gas. In addition, relevant laws, regulations and policies have been revised according to requirements of market economy and the WTO membership. The stable investment environments, attractive investment policies, good availability of low-cost labor forces and huge market potentials have become significant advantages to attract foreign investment in China.

The forest industry only accounts for less than 1% of GDP in China. However, its gross output value maintained at a high growth rate and increased almost three folds in this decade from RMB 93.9 billion to RMB 259.6 billion (China Statistical Yearbook, 2011). In terms of the paper and paperboard sector, from 2005 to 2009, the production amount increased from 60 million MT to 90 million MT with an annual growth rate of 10 percent and the consumption amount maintained at the growth speed of 9 percent (Figure 1). However, the average consumption amount in China (67 MT / 1000 capita) still lags behind the European (126 MT/1000 capita) and the US (226 MT/1000 capita) levels (FAO, 2011). In terms of the wood pulp sector, from 2005 to 2009, the pulp production capacity accounts less than half of the consumption ability in China (Figure 2). The continuous huge demands in paper and pulp sectors evoke the strong market seeking motive to invest in China.

China has opened the domestic market to international investors since the economic transition initiated from 1978. From 2004 to 2008, FDI in the forest industry in China has doubled from USD 357 million to USD 834 million and FDI projects have established around 550 cases annually (SFA, 2004; 2008). The country's industrial upgrading and relocation pushed the old state-owned paper and paperboard companies from the government planning system to the market mechanism. According to the Chinese 12th Five-Year Plan for the Paper Industry (2011), more than 10 million tons of outdated papermaking capacity will be eliminated in 2015. Corporate mergers and acquisitions, joint ventures (J&Vs), and FDI are recommended aiming at energy saving and emission-reducing production.

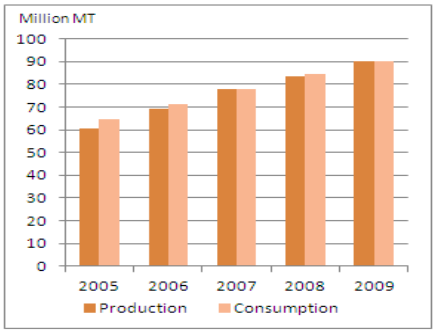

Figure 1. Paper and paperboard production and consumption (Million MT) in China from 2005 to 2009. (FAO 2011)

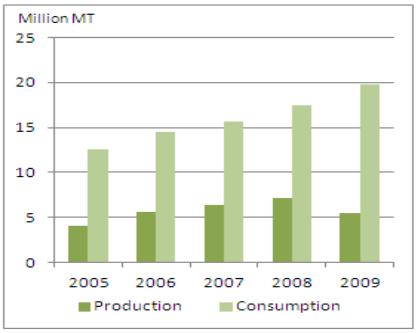

Figure 2. Wood pulp production and consumption (Million MT) in China from 2005 to 2009. (FAO 2011)

The prosperity of China as an investment destination evoked plenty of research concerning policy, governance, macro economy, and technology spillover perspectives (Cole et al., 2009; Han et al., 2004; Huang and Tang, 2012; Wang, 2007). However, from corporate operational point of view, we find that studies referring to multinational companies' (MNCs) foreign investment in the forest industry in China are still very limited (Zhang et al., 2012). Hence, the aim of this study is to explore the current status of MNCs in China referring to financial, operational and managerial aspects.

2 Theoretical background

Internationalization is regarded as "the process of adapting firms' operations (strategy, structure, resource, etc.) to international environments" (Calof and Beamish, 1995 p.116). In Zhang et al. (2012) we summarized the internationalization theories into four categories, which are internalization & transaction cost theory, resource based theory, industrial organization theory and managerial incentives theory. Corporate expansion motivations have been defined either as resource seeking, market seeking or efficiency seeking to pursue corporate internationalization through variable expansion ways of FDI, J&V, licensing or exporting (Behrman, 1981; Mudambi, 2002). The scale and paths of corporate internationalization have been influenced by both macro environment and corporate management factors, in which economy, policies, culture, technology, labor forces, infrastructure, corporate products, R&D ability, and managerial structure may be included. We believe that corporate internationalization is a cyclic process, through which company gradually gains the operational and financial efficiency, improves the competitive advantages and may realize sustainable development goals in the global context (Zhang et al., 2012).

3 Methods and data

In this study, we choose the comparative qualitative case study as method to have a glance at MNCs' operations in China. The case companies include UPM from Finland, Asia Pulp & Paper (APP) from Indonesia and International Paper (IP) from the US. Three case companies finely represent different cultural backgrounds originating from different continents and we hypothesize that these differences to some extent have impacts on corporate investment strategies and their implementations in China.

We mainly rely on the documentary information in this study. Company information comes from sources of corporate annual reports, financial fillings, sustainable reports, corporate websites and brochures. General information includes all relevant digital channels of newspapers, journals, magazines and NGO publications focusing on the time period 2002 - 2012.

4 Results

4.1 Comparison of case company operations in China

Among the three companies, UPM is a leading Finnish company in doing fiber and biomass-based business aiming at create values from renewable and recyclable materials. UPM was established in 1995 through a merger of Kymmene Corporation, Repola Ltd and its subsidiary United Paper Mills Ltd. After two decades of development, UPM comprises of three business groups (energy and pulp, paper, and engineered materials) and operates its production plants in 16 countries all over the world.

UPM expanded its business into China in 1998 by setting a wholly owned subsidiary in Changshu, Jiangsu province. After 14 years of development, UPM has invested a paper mill, a labelstock factory and an Asia R&D center in Changshu production base and a RFID factory in Guangzhou with a total of 1367 employees. Until 2010, UPM has accumulatively invested 802 million Euros in China in business areas of paper, label materials, plywood, saw timber and RFID tag products serving both Chinese and Asia Pacific markets. UPM has sales offices covering the southern and eastern part of China. Besides, UPM owns a jetty in Changshu, which ensures the efficiency of products exporting and raw materials importing from Indonesia, South America, Finland and Canada.

APP is a family based company established in 1972 and subordinates to the Sinar Mas Group which is one of the largest conglomerates in Indonesia. The main business areas of APP are paper, pulp and packaging. APP has dedicated to be the best pulp and paper manufacturer on international-standards to provide the superior value to its stakeholders. APP operates its plantation and production units mainly in China and Southeast Asia.

APP entered China in 1992, which is the earliest among three case companies. Unlike UPM, APP set up J&V with Chinese company at the initial stage of expansion, and then gradually started to invest its subsidiaries. APP continuously implements the "plantation-pulp-paper integration" development strategy and operates business areas of plantation, pulp, fine art paper, industrial paper and household paper in China. After two decades of operations, assets of APP in China has reached USD 13 billion by owning 18 pulp and paper enterprises and over 20 plantation farms (more than 300,000 hectares of plantations) in Yangtze and Pearl River Delta with total employees of 8,900.

IP is the world's largest paper, packaging and forest products company. It was founded in 1898 and is one of only four listed companies with more than 100 years history in the US. IP focuses on business areas of printing paper, industrial packaging and consumer packaging by operating production plants in more than 20 countries. In 2011, its global sales reached around USD 26 billion and ranked 387 of top 500 largest companies in the world.

IP started its Chinese business since 1994 and has already accumulated USD 2 billion assets. IP has owned 19 production and sales plants operating costumer and industrial packaging business in 17 cities of China. Besides, IP has J&V business with Shandong Sun Paper producing the coated carton board. IP has no plantation areas in China right now and raw materials are imported from IP's plantations all over the world.

The Table 1 and 2 summarizes the operational information concerning three case companies (UPM, APP and IP) in general and in China in particular.

Table 1. Background information of case companies

	UPM	APP	IP
Headquarter	Helsinki	Singapore	Memphis
Founded year	1995	1972	1898
Business areas	Energy & pulp Paper Engineered materials	Paper Pulp Packaging	Printing papers Industrial packaging Consumer packaging
Global sales	10,068 million Euros (2011)	N.A.	26,034 million Dollars (2011)
Return on Equity	6.3% (2011)	N.A.	18.2% (2010)
Global employees	23,909 (2011)	N.A.	61,500 (2011)
Number of operating countries	16 (2011)	3	More than 20

4.2 Comparison of environmental and social related activities

Forest industry has been considered as the high pollution, high resource consumption but low efficiency industry in China. As world leading enterprises in the forest industry, UPM, APP and IP have made plenty of efforts in environmental protection in China. For example, UPM has accumulatively invested USD 36 million in advanced facilities including waste water treatment, air emission treatment, and solid waste recycling. In UPM Changshu mill, the solid waste is 100% recycled and the waste water and air emissions were much lower than the Chinese National Standard. APP continuously implements the plantation-pulp-paper integration strategy and has invested USD 865 million in environmental protection in China, which is the highest among three case companies. However, doubts concerning APP's environmentally damaging logging activities have never ceased. IP has dedicated to manage natural resources and reduce the environmental footprint in China. The core sustainability philosophy in IP is that it pursues a business success while sustaining a better world for generations.

Table 2. Operational information of case companies in China

	UPM	**APP**	**IP**
Initial year in China	1998	1992	1994
Forms of investment	FDI	FDI and J&V	FDI and J&V
Assets in China	802 million Euros (2010)	USD 13 billion (2010)	About USD 2 billion
Sales in China	479 million Euros (2010)	USD 5.9 billion (2010)	USD 706 million (2010)
Number of employees in China	1,367 (2010)	38,900 (2010)	3,500 (2010)
Headquarter in China	Changshu, Jiangsu	Shanghai	Shanghai
Number of facilities in China	3 production plants 1 R&D centre 6 sales offices	18 pulp and paper enterprises Over 20 plantation farms	19 container plant 1 Asia Customer Solution Centre 1 IP-Sun J&V
Certifications	ISO9001 ISO14001 OHSAS18001 CoC of FSC CoC of PEFC	ISO9000 ISO9001 ISO9002 ISO14001 OHSAS18001 CoC of PEFC Certifications of PEFC	ISO9001 ISO9002 ISO14000 ISO14001 ISO18000 CoC of FSC
Plantations in China	No	More than 300,000 hectares of plantations (2008)	No

Source of raw materials	Imports from Indonesia, South America, Finland and Canada	Yunnan province, Hainan province, Cambodia	Imports

Corporate social responsibility has aroused wide concerns over recent years and companies are expected not only to care about its profits, but to care about all its stakeholders. UPM, APP and IP have participated in various philanthropic projects in terms of disaster relief, environmental improvement, community construction and university scholarship in China. UPM mainly focuses its social activities on environmental projects including village drinking water improvement, climate change investigation, water protection, community plantation and fruit plantation etc. In addition, UPM has also actively set more than 10 different kinds of scholarships aiming at help primary school students in poverty areas and outstanding students in universities in China. APP implements its social responsibility mainly in disaster relief and social donation perspective. Up till now, APP has accumulatively donated around USD 94 million in China and set university scholarships in Peking University, Xiamen University etc. IP focuses its social activities mainly in environmental aspect as well. IP has contributed more than USD 100 million to cooperate with China State Forestry Administration (SFA) aiming at exchanging knowledge and personnel to support the development of Chinese sustainable forestry management. IP also participated in the community tree plantation project in Inner Mongolia fighting with desertification. Beside, IP has set the Asia Scholarship to support students in financial need and set IP Asia Holiday Giving by donate clothing, household items to children in poor conditions. Table 3 summarizes main environmental and social activities by case companies in China in recent years.

From the stakeholder point of view, broader opinions can be found concerning operational status of case companies in China. UPM has been awarded by both state and local governments as the environmental friendly enterprise in consecutive years in China. The Greenpeace has also stated its supports since UPM announced that it has no intention to have plantations in China. Besides, UPM was also certified as one of China's top employers by corporate research foundation (CRF) institute, which affirmed its HR strategy and competitiveness in the Chinese labor market. Non negative opinions have been found concerning UPM's operations in China until now, which indicated a well-established recognition, efficient cooperation and friendly communication between UPM and its stakeholders in China.

Table 3. Examples of environmental and social activities of case companies in China

	UPM	APP	IP
Environmental management	• USD 36 million in advanced facilities • Minimization of waste water and air emissions • Decreasing water & electricity consumption	• Plantation-Pulp-Paper Integration • USD 865 million in environment protection •Raw materials: fast growing & fertile plantations	• Managing natural resources • Reducing environmental footprint • Building strategic partnerships with stakeholders •
Social responsibilities	• Support for Sichuan earthquake reconstruction • Wuhan Climate Change trip • Yunnan Lijiang water protection task • Village drinking water project in Shanxi • Community plantation in Henan • UPM University Scholarship Program	• Setting scholarships in Universities • Participation in disaster relief, social donation, construction of Olympic venues • Total donation of around USD 94 million	• Tree Planting project to fight desertification in Inner Mongolia • Cooperate with SFA for the sustainable forestry practice and management • IP Asia Scholarship

In comparison, APP has been receiving both positive and negative stakeholder comments, in which most of supports come from national authorities and local government, but criticisms come from NGOs. The controversy on APP's operations has mainly focused on its plantations and sources of raw materials in China. APP was honored as the excellent corporate citizen, environmental friendly enterprise and low carbon enterprise in recent years by state and local governments. Simultaneously, APP's plantation projects were considered by official media as a positive impulse to stimulate community economic growth. However, through consecutively investigation and research, Greenpeace has announced plenty of evidences to accuse that APP has participated in illegal logging activities and has induced to deforestation of natural forests in

Yunnan and Hainan provinces. Facing these argumentations, Chinese government authorities have a very blur attitude about APP's plantation and logging activities, which keep doubts and debates continuing.

IP has received mostly positive opinions from stakeholders concerning their operations in China. IP was awarded as the world's most ethical companies for sixth straight year since 2006 and honored as the world's most admired companies for ninth straight year since 2002. As the world largest paper and pulp producer, IP has been perceived to implement its sustainable and efficient operations in China well (however, information is not very specific about corporate operations in China and examples found are mainly on the whole company context). Table 4 listed stakeholder opinions concerning the case company's operations in China.

Summing up current operational status of three case companies, we made the SWOT analysis of their operations in China (Table 5). Based on it, UPM has good reputation, advanced facilities, green image and friendly relationship with government authorities, which could be helpful for its expansion in China. However, building up a competitive sales network is still a challenge for UPM's marketing development, due to the constraint of the wholly owned subsidiary and the lack of local market channels. APP has advantages in terms of high degree of localization, high market shares and brand recognition in China. The implementation of plantation-pulp-paper integration investment strategy has brought systematic opportunities for APP's development. However, being reported frequently involved in illegal logging and other environmental unfriendly activities, APP has met challenges not only to enhance its public relationship teams, but also to improve its management structure to be honest and transparent to all stakeholders. IP owns advanced techniques, solid brand and well located production plants serving Chinese customers. The growing Chinese market has offered and will offer plenty of opportunities for IP's continuous portfolio of investments in China. The cooperation with local know-how may be a challenge for IP's operations because of cultural and managerial differences. Besides, the balance of investments between Chinese market and others are also a challenge for this huge business warship.

Table 4. Examples of stakeholder opinions concern the case companies during 2002-2012

	UPM	APP	IP
Support	• The honour of Top Employer (2012) • Greenpeace supports UPM's development strategy in China (2008) • State Environmental Friendly Enterprise (2005) • Environmental Friendly Enterprises of Jiangsu Province (2004) • Top 100 Environmental Projects of China (2003) •	• China Excellent Corporate Citizen (2011) • Environmental Friendly Enterprises in paper industry (2010) • Low Carbon Enterprise in China (2009) • Yunnan Daily: APP plantation project brings job opportunity and economic benefits to local communities (2005)	• World's Most Ethical Companies for sixth straight year (2012) • World's Most Admired Companies for ninth straight year (2011)
Mistrust	N.A.	• Greenpeace: APP destroyed 13% of natural forest in Hainan (2011) • Greenpeace: APP cut down virgin forests in Yunnan (2004) • Zhejiang Hotel Association boycotts APP products (2004)	N.A.

Table 5. SWOT analysis of case company's operations in China

	UPM	APP	IP
Strengths	• Good reputation • Advanced facilities • Green image • Good relationship with government	• High degree of localization • High market share • High brand recognition	• Advanced techniques • Solid brand • Well located production plants
Weaknesses	• Thin local sales networks	• Suspicions on illegal loggings & environmental unfriendly activities • Low transparency	• Cultural distance
Opportunities	• Expansion of marketing channels	• Efficient implementation of plantation-pulp-paper integration •	• Expand Chinese market
Threats	• Local competitors • Cooperation with local know-how	• Public relationships • Brand vulnerability in environmentally sensitive markets	• Cooperation with local know-how • Balance between numerous world markets

5 Conclusions

In general, China has been considered as the most important strategic investment market for MNCs in the forest industry and operating in China has already brought in significant financial benefits. However, challenges and threats have also been shown up in MNCs' operations, which are induced not only by corporate background, investment strategy and managerial structure, but also by coping with unique Chinese culture and local circumstances. Hence, we first suggest that MNCs aiming at China have to target a clear business area and specific investment location of their operations. Second, we suggest MNCs localize not only production plants, but management teams and ways of communication as well. Third, MNCs needs to keep close relationships with government authorities, local communities and NGOs to ensure wide stakeholder supports and well-functioning cooperation. Last but not least, due to local differences and uncertainty in world's pulp and paper industry markets (including paper substitution by the means of digital media), MNCs should invest step by step in order to minimize operational risks in China and overcapacity in global markets.

References

Behrman, J. 1981. Transnational corporate in the new economic order. Journal of International Business Studies 12(1): 29-42.

Calof, J. and Beamish, P. 1995. Adapting to foreign markets: Explaining internationalization. International Business Review 4: 115-131.

China Statistical Yearbook. 2011. Web site: http://www.stats.gov.cn/tjsj/ndsj/2011/indexch.htm.

Chinese 12th Five-Year Plan for the Paper Industry, 2011. Published by National Development and Reform Commission, Ministry of Industry and Information Technology, and State Forestry Administration. 36 p.

Cole, M.A., Elliott, R.J.R. and Zhang, J. 2009. Corruption, good governance and FDI location in china: A province-level analysis. Journal of Development Studies 45(9): 1494-1512.

FAO. 2011. FAO yearbook of Forest Products 2009. Food and Agriculture Organization of the United Nations, Rome. 337 p.

Han, G.L., King, L. and Guo, S.J. 2004. Political economy of FDI and economic growth in China: A longitudinal test at provincial level. Journal of Chinese Political Science 9(1): 43-62.

Huang, Y.S. and Tang, H.W. 2012. FDI policies in China and India: Evidence from firm surveys. World Economy 35(1): 91-105.

Mudambi, R. and Mudambi, S.M. 2002. Diversification and market entry choices in the context of foreign direct investment. International Business Review 11(1): 35-55.

SFA. 2004. State Forestry Administration. Web site: http://www.china001.com/show_hdr.php?xname=PPDDMV0&dname=0367A41&xpos=51

SFA. 2008. State Forestry Administration. Web site: http://www.forestry.gov.cn/portal/main/s/225/content-276059.html

The Wolrd Bank. 2012. Web site: http://data.worldbank.org/country/china

Wang, C.Q. 2007. Is the relationship between inward FDI and spillover effects linear? An empirical examination of the case of China. Journal of International Business Studies 38(3): 447-459.

Zhang, Y., Toppinen, A. and Uusivuori, J. 2012. Internationalization of the forest industry: A synthesis of the literature and implications for the future research. Submitted manuscript. 35p.

Abstracts

Determinants of demand for forest recreation.

Abildtrup, J.

The determinants of the recreational value of forest include the site quality, including their accessibility, and the distribution of alternative forest and non-forest sites which may serve as substitutes or complementary recreational sites. Compared to previous studies, we focus on local context variables (urbanization and urban green space) in the demand for forest recreation. We carry out a web-based survey on a sample of residents in Lorraine (North-East of France). In particular, we test the compensation hypothesis, suggesting that people with less green space in their own residential environments make more frequent trips to parks or nature reserves. Respondents who had visited at least one forest during the last twelve months were asked to identify the most visited forest on an interactive map integrated in the online questionnaire. They participated also in a choice experiment where they were asked to choose between hypothetical forests and the most visited forest during the last 12 months. An extensive database describing the more than 5000 forests (recreational forest units) in Lorraine by recreational facilities, forest structure and ecological variables are established. The demand is estimated using the so-called linked-model, i.e. combining a site selection model and a count model for trip demand. Both the stated and revealed preference data indicate that visitors have an additional willingness to pay for forest with parking and picnic places, marked trekking paths, lakes or rivers, and forest dominated by broad-leaf tree species or mixed tree species compared to coniferous forests without recreational facilities and waterbodies. While we did not find a significant effect of urban green space on the demand for forest visits we showed that the number of visits in urban park decreases with an increasing expected utility of a forest visit, indicating substitution between forests and urban parks in the demand for high-frequency outdoor recreation.

The Power of Behavioural Models in Defining New Types of Market Segments of Non-Industrial Private Forest Owners in Finland.

Albarracin, G.

Recent research outcomes on segmentation of round wood markets of non-industrial private forest (NIPF) owners in Finland have shown that alternative research methods based on behavioural outcomes provide accurate results on trends and preferences of market choice. These alternative research methods are based on analysing interdependencies within the dyadic relationships of private suppliers and industrial buyers of round wood. Consistent data analysis focusing on goals and attitudes of NIPF sellers has repeatedly proposed significant considerations for establishing a new type of group segmentation in the round wood market in Finland. Thus the evidence which supports alternative market segmentation either provides additional information to the traditionally established segmented groups based on the analysis of socio-economic data or even in some cases propose to replace them with new definitions which further contribute to the power of the data of the model. Additionally, these new definitions propose that latent factor variables are extremely significant in their role of key informant within the research model as well as in helping to explain the error term of the established research models. In other words, these new research approaches increase the power of simplicity of the model as well as confirm the significance of both behavioural motives and drivers of choice. The survey data on NIPF owners was collected in January 2012 via the delivery of 2200 questionnaires. A total of 550 questionnaires were valid and included in the data analysis. Data analysis was conducted with a confirmatory approach and extracted the underlying variables with factor analysis methods of maximum likelihood and oblimin rotation. Specifically, results of the research model consistently confirms that supplier-buyer relationships are either relational, interismistic, or transactional and that objectives behind their behavioural motives are based either on satisfying the level of economic safety (Marslow, 1943), keeping up with level of own well-being and life satisfaction (NEF, 2009), or helping to lower the impact of ecological footprint on forests (NEF, 2009).

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Performance of various PFM modalities in Ethiopia: a possibility for harmonization at national scales

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Over the past few decades, Participatory Forest Management (PFM) has emerged as a key strategy internationally. Following the recognition that centralized and expert-dependent forest management practices have been unsuccessful in halting deforestation, the government of Ethiopia, with assistance from international donors, has been implementing PFM pioneer projects since the early 1990's. The experiment is based on the assumption that participation of local communities, which are the major stakeholders using the forest resources, is essential for reversing the *de facto* open access to forests. The PFM pilot projects have used a diversity of implementation strategies, however, that need to be evaluated before a national PFM strategy can be formulated. The present paper conducts an evaluation of the institutional set up and the outcomes of seven pioneer old PFM sites distributed in Oromia and Southern Nations Nationalities and People Regional states. Outcomes are assessed as forest users' perceived changes (before and after pioneer projects) in (1) ownership feeling over the resource (2) change in forest condition (3) change in livelihood of members, and (4) stability of the PFM institutions. Qualitative data was collected in focus group discussions, semi-structured and key informants interviews. Our findings indicate that in most sites the forest cover and ownership feelings of the community have improved after introduction of PFM. Post project assessment, however, shows that weak law enforcement, revocation of PFM agreements by the government, high project staff turnover and inequitable forest benefit distribution endangers the sustainability of PFM in Ethiopian pioneer projects. The paper argues that scaling up PFM without consideration for these issues risks multiplying mistakes.

Key words: PFM, forest condition, institutions, ownership, livelihood, project

Investigating embedding effects in valuation of forest: ” Linking qualitative evidence to quantitative analysis of embedding effect”

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Embedding effects play a crucial role on the validity of choice experiment method (CE) outcomes. Therefore, identifying these issues and their relation with attribute and level selection is crucial in choice experiment studies. In this study, two aspect of embedding i.e. contextual embedding issue and scope sensitivity in forest valuation among different forest users such as active, passive and potential active users are addressed.

Regarding contextual embedding, a preliminary qualitative study showed that public expressed their preference jointly and inseparable about two forest characteristics, i.e. “diversity of species” and “insurance and resilience of forest ecosystem through species diversity” which don’t fully correspond with ecologist’ point of views. As the first step, using split sample CE study was undertaken in which ‘species diversity’ was evaluate in two different embedding contexts. Using two identical questionnaires but applying reminder of insurance services of biodiversity in only one of questionnaire, we tested for the separability of these two attributes. As the second step, scope sensitivity was integrated in the internal tests among different levels of environmental improvement relevant with attributes. The results suggested that respondents are insensitive to the reminder and these two concepts are inseparable in their view so their WTPs cover both attributes. In addition, based on the results public were sensitive to the scope (level) of each attributes and forest active users had higher WTP in compare with Forest passive users. So it suggested that non-scope sensitive values unrelated to or inconsistent with the level of environmental improvement could be estimated through choice experiments and applying qualitative evidences in attribute and levels identification .This also shield light on getting true public’s values from the improvement of ecosystem services to be informed to policy-makers.

Keywords: Embedding effect, Valuation, Choice experiment, Qualitative evidence, Insurance

Using a hypothetical auction frame to elicit stated compensation needs to avoid deforestation among households in the Brazilian Amazon

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The implementation of global REDD+ programs could potentially be in the form of a payment for environmental service (PES) scheme of historic dimensions. However, efficiency is a central issue, and knowledge of patterns of opportunity costs among rural populations likely to be affected by REDD+ remain scant. We applied an auction and standard contingent valuation instrument to assess the WTA compensation among a split sample of rural households in the Brazilian Amazon for stopping deforestation activities. The results are compelling and showed that the auction framing format effectively reduced means and variances of stated WTA. Mean WTA is reduced by almost a factor of two, and the sample variance is reduced almost fourfold. The auction framing not only effectively reduces the proportion of very high stated WTA observations, but generally reduces upward biases across the distribution. We compared the elicited measures to standard foregone income measures of opportunity costs. While foregone agricultural income did imply a higher WTA, other determinants affected different groups. Amongst poorer households, REDD+-based transfers could be an attractive low-risk income source, and due to limited alternatives, stated WTA is relatively close to foregone income measures. For higher income groups, larger gap between WTA and opportunity cost exists, likely due to the existence of alternative options for labour and inputs, which reduces the true opportunity costs of stopping deforestation. This study is the first of its kind to apply such a framing in a WTA study, and the robustness of results is remarkable and promising given the developing country context in which it was implemented.

Keywords: Contingent valuation, REDD+, Payment for Ecosystem Services, willingness to accept, livelihoods

Forest Owner Objectives as Precursors of New Customer Value Formation in Finnish Forest Sector

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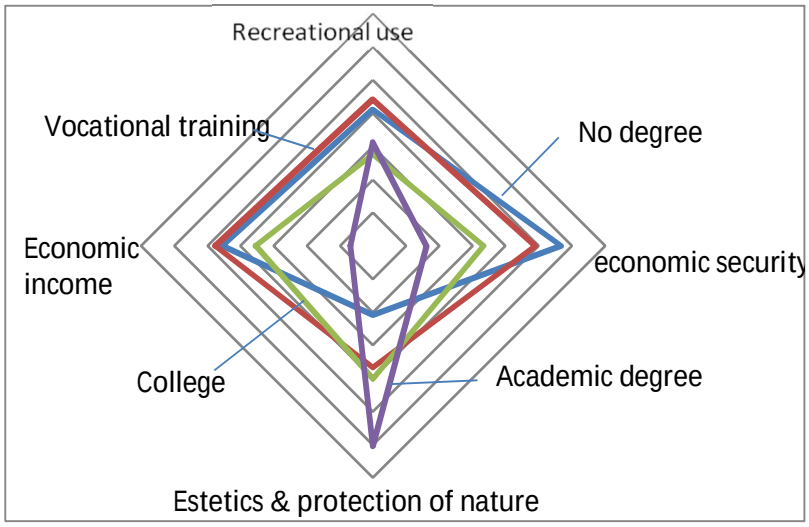
Finnish forest industry is under intensive pressure to alter its ways of functioning. Especially in raw-wood procurement or raw-wood trade, the value perceptions of private industrial forest owners have changed fast. This paper reports some preliminary finding of Tekes financed FP-serve project done at University of Helsinki department of Forest Sciences. It reports some basic finding concerning the objectives of forest ownership(n=550). From an exploratory factor analysis of 22 items measuring forest owner objectives a four dimensional solution was found. This four dimensional solution consists of economic income, economic (emotional) security, esthetics (conservation), and recreational use of forestry. Thus, only one of the dimensions touches the traditional raw-wood trade incentives of forestry as a means of income. However, as traditionally forest owners are relatively old (mean 62 years), what has happened is that the oldest groups seem to have moved away from income preferences towards economic security. Meanwhile, the groups valuing most nature protection and recreational use (in line with emotional security of the forest owned) are those with the highest education. Thus, the criteria, that "forest owners do not understand their best", is untenable. We argue that our results are in line with the servitisizing of economy where the service dominant logic (vargo & Lucsh, 2004, 2008, 2011) and intangible value (Kuusisto, 2011; Toivonen, 2010; and Ostrom & Bitner, 2009) describe the preferences – also with Finnish NIPFs'.



Exploring how landowners perceive societal requirements regarding voluntary participation in environmental management - using a case of wetland restoration

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Politically and in the public debate there is an increased focus on how private landowners should contribute to nature and the environment by changing their management practices. As this may conflict with landowners' management plans, voluntary agreements have been used to create incentives to participate. Studies have investigated how the design of voluntary agreements influences landowners' willingness to accept voluntary agreements. Less attention has been given to how landowners perceive requirements when society suggests participation in voluntary agri-environmental practices. The aim of this study is to investigate how landowners perceive the rationales behind agri-environmental schemes as a measure of how they perceive requirements from society. Rationales behind agri-environmental schemes explored are; they 1) recognise private property rights 2) benefit the environment 3) modify behaviour 4) are voluntary and 5) offer financial incentives.

To allow for an in-depth study we chose one among many possible cases of environmental management, that is, wetland restoration. Potential wetlands are designated all over Denmark but we selected two specific areas to get a common ground for the interviews. Twenty-three in-depth, semi-structured interviews were conducted with 34 farmers in the case areas.

Preliminary results show that landowners' perceptions of private property rights were that if landowners are given societal responsibilities then they should have financial or other forms of compensation. The landowners questioned the suggested project's ability to reduce nitrogen leakage and wanted to make sure that they are acknowledged for eventual contribution to reduction. Most landowners thought they would have to modify behaviour both within and outside the wetlands. Furthermore, the landowners questioned the voluntariness of the schemes, as compulsory purchase might take place because authorities need to designate wetlands somewhere in order to achieve policy goals. Landowners emphasised the importance of financial compensation while simultaneously criticising the actually offered compensation for being far below market price of the land they lose.

Key words: landowners, agri-environmental schemes, rationales, perception, motivation

Design of value chains in volume-intensive market segments – exploiting economies of scale, scope and integration

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The wood value chain is facing further consolidation with fewer and larger actors along the various positions in the vertical marketing system, from raw material to finished products and systems. Increasingly, finished products and systems are sold directly to end customers or via large retail chains (so called mega-retailers). This tendency is apparent even accounting for competition enhanced by increased globalization.

Large suppliers of wood products and large industrial customers and mega-retailers experience situations, where there are fewer potential partners for large-scale business agreements. The customer-supplier relationships are moving in the direction of bilateral relationships between large and resourceful suppliers and customers, with fewer options to play "the competitive game". Traditionally, the wood value chain has been characterized by aiming for economies of scale. Wood products manufacturers have focused on high raw material recovery thus moving towards larger and more efficient production units. The retailing business has moved in the same direction as a consequence of the competitiveness on the end-user market with its focus on price. Consequently, there are actors adopting a scope strategy aiming at differentiation in some dimensions. There has thus been a build-up of large suppliers and retailers.

In this new competitive landscape, both suppliers and customers have to rethink their traditional strategies and to design more complex value chains (and business models), often with more than two partners involved. We describe a business case of a co-operation between one large sawmilling company and one smaller wooden component manufacturer on the supplier side, and a large mega-retailer on the customer side. The sawmilling company and mega-retailer have strong large scale orientations, with solid finances and a focus on large volumes. The manufacturer of wooden components is small-scale and not able to operate on its own as a partner to the large customer.

The result of the study indicates the possibilities for large scale professional actors to opt for economies of integration by introducing a third party. Agreements are negotiated and secured by the large actors' professionalism and size, and control of input material and market knowledge. The flexibility and efficiency of producing and delivering adapted products are created by the innovativeness of the small-scale component manufacturer, investing in niche markets. The study therefore indicates a possible business option for actors in the presently scale-dominated value chain.

Keywords: wood value chain, mega-retailer, economies of scale, scope and integration

Heterogeneity in the demand for recreational access – distributional aspects

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This paper addresses the question of how to adequately model empirical variation in willingness to pay (WTP) for a public good and demonstrates the importance of appropriate modelling of heterogeneity for policy and decision making on public good provision. Even if on average voters are to gain from a specific decision (positive mean WTP), politicians may decide against it if the median voter stands to loose—and vice versa. We use a choice experiment, which among other attributes, includes an attribute suggesting enhanced public access in privately owned forests in Denmark. We focus our investigation on this attribute, due to its current policy relevance and find a remarkable and illustrative pattern. We compare results—in terms of WTP distributions—from four models i) a multinomial logit model, ii) a mixed logit model assuming a Normal distribution of WTP for access, iii) or assuming an Johnson SB distribution and finally, iv) assuming a mixture of two Normal distributions to describe the distribution of WTP. The latter models have, by a margin, the best model fits. We find that across all models, the sample mean WTP for enhanced access is negative. However, the asymmetric models reveal that the empirical distribution does in fact have a positive median WTP. In the model assuming a mixture of Normals, we find a minority group of respondents expressing very negative mean WTP, whereas the large majority group has a significantly positive mean WTP—but a factor of 10 smaller in absolute terms. Consequently the mean and the median WTP have opposite signs and are quite different. This highlights the importance of analysing in detail the distribution of WTP before giving policy recommendations.

Using DEA to compare the efficiency of planned forest management actions to actual forest management actions

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A guiding principle in the development of forest management plans is that the plan should meet the principles of optimality, and thus efficiency. The resultant plan represents a snapshot in time of the decision makers (DMs) preferences, which can change through time as the DMs life situations changes. Even though the DM undertook the effort of formulating a plan for the forest, the actual decisions taken in the forest may not represent the planned activities. The divergence between these two decisions can be evaluated as the difference between the stated and observed preferences. This measure evaluates how closely the plan was followed, however it does not evaluate how close the actual decisions were to an optimal use of resources. As a method to compute the efficiency of the DMs actual choices, Data Envelopment Analysis (DEA) is used to evaluate the efficiency of both the planned and actual forest management decisions compared to the production potential frontier. In traditional DEA applications, the evaluation for efficiency is done through a relative comparison of a set of actual decision management units (DMUs). As a method to evaluate the efficiency of the forest management actions, a series of optimized plans, developed from the initial inventory data, serve as the DMUs to provide a relative comparison. The usefulness of this process is highlighted in an analysis of several privately held forest management plans from private owners in Finland. For these cases, the efficiency of the planned and actual management activities are evaluated with a fixed set of input and output criteria. This allows for an evaluation the effectiveness of the planning process, and evaluates the efficiency of the actual forest management actions taken in the forest.

Keywords: Data Envelopment Analysis, forest planning, efficiency analysis

Finnish and Swedish Sawnwood Exports to the UK market in the EMU regime.

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The business environment for sawnwood producers based in the traditional forest-industry countries of the boreal zone has changed dramatically in the last decade. Among the greatest changes is the establishment of the European Monetary Union (EMU). However, the effect of the associated exchange rate changes on international forest-industry trade in European markets has not previously been examined. The present study attempts to fill this gap by analyzing the effects of currency movements on Finland's and Sweden's competitiveness in the international sawnwood market. Johansen's multivariate cointegration method was applied for formulation of the separate partial equilibrium model systems for bilateral trade flows from Finland and Sweden to analyze pricing of sawn softwood for the UK market in 1995–2008. Rather than competitive markets, our findings indicate the existence of price discrimination and market power on the part of exporting firms. The results show that Finnish exports have been greatly affected by the currency movements between euros and British pounds in the UK market. Furthermore, the estimated values for exchange-rate pass-through coefficients indicate that Finnish exporters have passed on some of the exchange rate changes between these currencies to the UK customers. This result is in line with similar estimations for the period before the EMU. The present estimates show a slightly lesser degree of exchange-rate pass-through, possibly suggesting transition towards a more competitive environment in the UK's sawn softwood market.

Keywords: European Monetary Union (EMU), exchange-rate pass-through, forest products trade, pricing, sawnwood, cointegration analysis

Revisiting an empirically based analysis of household-level adaptation in high altitude villages in Nepal.

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Climate change may significantly impact the assets, activities and income of rural households throughout developing countries. Estimating possible future vulnerability is therefore essential to climate change impact assessments. This case study paper aims to assess household-level coping and adaptation possibilities in high altitude villages in Lower Mustang, Nepal. These are generally characterised as having limited economic resources, low levels of technology, low skill levels, poor infrastructure and weak institutions, and are thus likely to have low coping and adaptive capacity. Village-level background information was collected using qualitative techniques. This was followed by a structured household survey (2009), emphasizing household assets and income, and a separate survey focusing on households' response to economic shocks. Livelihood strategies were identified using cluster analysis and adaptive responses to shocks (coping strategies) were modelled on the basis of the survey data. Existing regional and national-level climate studies and local data on temperature and precipitation were used to prepare scenarios of present and future agricultural harvest outcome distributions. A household-level simulation model was developed and the development with regard to households' incomes, assets and allocation of time to various activities was simulated over a period of 50 years using Monte-Carlo simulation. Two main scenarios were examined and compared. Based on the simulations household-level coping capacities were analysed, and conditions that stimulate or constrain coping were identified. Possibilities for increasing coping capacity, especially for poorer and more vulnerable households pursuing livelihood strategies with a significant environmental resource use component, were discussed.

Observations and implications of Finnish forest owners' economizing behaviour

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Forest management decisions can be seen as economic choices. The assumption of rational and economically optimal choices frequently fails in family forestry, in which various multiple-use motivations as well as legacy and sentimental values shape landowners' decisions. Moreover, scarcity of time and information as well as the imperfection of individuals' cognitive abilities result in bounded rationality. Pingle and Day (1996) illustrated six modes of *economizing behavior* as decision-makers' pragmatic responses to the limits of rationality: trial and error, imitation, following an authority, habit, thoughtless impulse, and hunch. This presentation argues that among these, following an authority, imitation and habit are the most common ones in family forest owners' decision making. Recent interview and survey datasets from Finland provide evidence on the economizing decision-making logic and frequency of related decision-making strategies among family forest owners. Trusting forest professionals, thus delegating decision-making power is the prevalent strategy for approximately one fifth of owners. Meanwhile, two fifths of owners want to learn from authorities and outcomes of comparable previous actions. Asking for peer advice and learning from other owners' experiences reflects a mix of imitation and learning from authority. In turn, many owners tend to build their own decision rules to make forestry decisions easier and approach the habit type of choice behavior. These findings indicate that the quality of advice and forest management guidelines have rather direct impact on the quality of forest owners' decisions. When public funding for forestry advisory continues to decline and the significance of peer advice via social media and traditional communication channels increases, free-of-charge economizing behavior may become more complex. This may increase the need for market services that particularly focus on facilitating the ease of forest ownership. Lack of suitable authorities or role models may lead to bad decisions or indecisive and thus passive owners.

Keywords: bounded rationality, forestry advisory, market services, peer-to-peer learning

Compilation of foresight studies to support forest policy processes in Finland.

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The global financial crisis, Russia's taxation policy for exported wood and EU's targets for the use of renewable energy have had a significant effect on the forest sector in Finland in recent years. The significance of foresight work has increased, as the operational environment of the forest sector is complex and constantly changing.

Yet, there is a long tradition of forest-related foresight studies: For instance, UNECE Timber Committee, FAO Forestry Commission, IIASA Forestry Programme and ITTO in cooperation with many national and international organizations have produced information on trends and made policy analyses. At a national level, forest-related foresight work has been carried out in Sweden, France, Germany and United States among others. Additionally, numerous industry-specific international organizations have implemented foresight processes.

In Finland, forest-related foresight studies have recently been carried out by the University of Eastern Finland, the Finnish Forest Research Institute and the Ministry of Agriculture and Forestry as a part of the National Forest Programme. In addition, other instances such as consulting companies, forest industry as well as other research institutes have published foresight reports. Interest and resources for foresight exercises have increased in the society in general. Also, methodology has benefitted from recent advances.

The aim of our study was to compile the current information, in a condensed form, on the recent foresight work carried out in the Finnish forest sector and in other relevant sectors and to identify strenghts and possible gaps in the acquired foresight information. Our focus was on the foresight work published or carried out in 2008 or later in Finland, with additional information from relevant sources abroad. Results of this study will be presented. The review will serve the Ministry of Agriculture and Forestry in forest policy processes as well as point out possible new directions for future forest-related foresight studies.

Do forest owners share the public's values? An application of Schwartz 's value theory

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Schwartz's value theory is applied in the context of Finnish family forest owners and their values are compared to those of the public at large. This comparison may give insight how value changes in society are reflected to forest owners' values and objectives, and hence their actual forestry behavior. The empirical study is based on the use of the Short Schwartz's Value Survey measure (SSVS) in a nationwide mail inquiry (**n**=2116). Instead of using several value indicators, SSVS directly measures motivational types, the ten universal motivational or value types being self-direction, stimulation, hedonism, achievement, power, security, conformity, tradition, benevolence and universalism.

According to the results forest owners ranked universalism which includes such values as the beauty of nature and art and nature conservation slightly lower than the whole population. The difference was clearly increased when female forest owners were compared to women in the whole population who valued universalism as the second most important value after benevolence. Traditions were valued clearly more by forest owners than the public. Forest owners were also classified into two groups based on their values. "Softies" highly emphasized benevolence and universalism while "Toughies" were strongly in favor of power and achievement. The probability to belong to Softies increased by forest owners' age and it was larger for female owners and owners with recreational or multiple objectives for their forest ownership. Toughies were more often farmers and rural dwellers than Softies.

Communities of Practice in non-industrial private forestry

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Increasing uses of forests, such as bioenergy and biodiversity protection, are challenging family forest owners' knowledge acquisition and decision making in Finland and elsewhere. Forest owners are also becoming economically less dependent and spatially estranged from their forest properties. Simultaneously, publicly funded forestry guidance calls for improved efficiency. Advisory practices need new ways to reach forest owners and to encourage them for forestry decisions that are conformable to their forest use goals. A potential model to diversify and renew guidance are Communities of Practice (CoPs). In CoPs forest owners, possibly together with experts, gather around an interesting issue, share their experiences and learn from each other. Learning from peers who are or have been in similar situations could be a relevant supplement to expert-driven guidance. This study aims to find out if CoPs exist in family forestry in Finland. To be able to identify them we search for the basic elements of CoPs: domain, community and practice. Additionally, we study the possibilities to strengthen or even create new CoPs. The data were gathered via seven focus group interviews, reaching 44 interviewees. Four groups consisted of local forestry professionals and one group consisted of national forestry extension developers. In addition, there were two different forest owner groups. Discussions in the groups considered communication between forest owners and professionals as well as the communication between owners. In addition, contexts, benefits and drawbacks of learning from the experiences of 'similar others' were discussed. Discussions were taped and transcribed. Qualitative content analysis will reveal the existing CoP-type features within private forestry in Finland. Particularly, which issues are dealt with and how, what kind of information is exchanged and who are involved? Furthermore, the promising elements and barriers of CoPs, as well as the possible role of forestry professionals in supporting CoPs, will be discussed.

Keywords: experiential knowledge, focus group interviews, guidance, mentors, peer-to-peer learning

Growth and yield in forest sector models: a review and application of individual tree models in Norway

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Recent history has seen an increase in the utilization of forest sector models to identify potential impacts of various policies or timber market shocks. These models are particularly useful in that they employ economic theory to capture the interaction of supply and demand in a framework where commodity prices are endogenous to the policy or shock simulated. The models vary widely in terms of geographic scope, intertemporal dynamics, product incorporation, and forest growth representation. These variations lead to distinct differences in both the types of policies or shocks that can be evaluated and the simulated market responses. This study begins with a presentation of the timber supply methodology of a suite of current forest sector models along with a discussion of their advantages and limitations. Next we present an application of an individual tree model to the National Forest Inventory data of Norway for inclusion in a partial, spatial equilibrium model of the Norwegian forest sector (NorFor). We conclude with a comparison of projected harvest and inventory levels using this individual-tree supply approach with the current NorFor supply representation based on a stand-level growth and yield model.

Modelling the Economics of the Reference Levels for Forest Management Emissions in the EU

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In the recent climate change conferences of UNFCCC new accounting rules have been suggested for forestry sector to provide incentives for forest management and emission mitigation actions. There has also been pressure to modify accounting rules to avoid giving credits for sequestration which would occur naturally. Country-specific reference levels for Annex I countries have been suggested to be used as baseline for carbon sequestration target of forest sector. Each country has proposed a reference level based on baseline harvest and growth of forest, accounting for the effect of policies implemented before 2009. A country will gain carbon credits if emissions from forest management are below the baseline reference level, while a country whose emissions exceed the baseline reference level will lose carbon credits. Gains and debits are limited with caps which are proportional of the national carbon emissions in the year 1990. With an economic model we study how the setting of reference levels will affect to the forest sector, harvesting volumes, carbon reservoirs in harvested wood products and price of wood. Also the effects of setting caps for gains and debits as a function of the carbon dioxide emission allowance (EUA) are studied. We also investigate analytically the proposed reference levels and study how to proceed into 'more correct' baseline reference levels.

Keywords: Carbon reservoirs, harvested wood products, wood consumption and price

Proposals to improve forest holding size and structure in Finland

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In Finland, there are in total 347 000 family forest holdings over 2 hectares of productive forestland. Family forest owners number 737 000, which is 14 % of all Finnish citizens. Average size of a forest holding is 30 hectares and average age of a forest owner is 60 years. Family forestry without connection to agriculture or forest industry is not regarded in Finland as a business but financial investment. Because separate financial policies are applied to business investments and financial investments, structural instruments applied in agricultural farms or family companies cannot be used in family forestry. From the roundwood production point of view, the forest holding structure is increasingly regarded ineffective.

A ministerial working group concluded in January 2012 the most effective ways (in effectivity order) to improve forest holding size and structure in Finland:

- Conditional concession for inheritance and donation tax for forest holdings
- Developing land consolidation arrangements for improving forest holding structure
- Conditinal concession for profit taxation from forest holding assignment
- Developing and increasing advise and education for transfer to next generation
- Allowing companies as forest owners to make in taxation reserves and forest deduction
- Enlargement and administration development of jointly owned forests
- Using state forests as incentives to establish jointly owned forests
- Advising heirs as forest owners to form private partnerships or jointly owned forests
- Developing forest renting.

Working group proposals aim at improving profitability and sustainability of forestry as well as roundwood supply in Finland. However, only proposals on advise and education (4, 8), jointly owned forests (6, 7) and partly also land consolidation (2) seem to proceed in governmental decision making.

Keywords: family forestry, forestry business, holding structure, advise, consolidation, jointly owned forests

Smallholders, local governance, and benefit distribution in forestry projects: The case of tea oil forestry in China

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While internationally, large-scale forestry projects have gained in importance for climate change mitigation, the implementation of such projects, particularly in regions with smallholder forestry like Southeast and East Asia, faces various obstacles. The organization of smallholders is one crucial element for the success of these projects. Hereby, an equal distribution of benefits is generally considered vital. It will support a balanced socio-economic development in poor rural areas, guaranteeing long-term success and a sustained stock of carbon sinks.

China presents an especially interesting case of smallholder forestry. The conversion from collectively-managed to household-management forest in 2003, which is, however, still collectively owned, has increasedthe number of participants in large-scale forestry projects substantially. Simultaneously, the government has been promoting plantations for biodiesel production from oil seeds, such as jatropha and tea oil tree (camellia oleifera). Using the case of a governmental program for tea oil tree plantations, as well as the case of a European Investment bank project, this research inquires the distribution of benefits under their respective institutional arrangements and organization of smallholders. Empirical research was undertaken in three counties of Jiangxi province, China, in 2011, consisting of semi-structured stakeholder interviews and a survey with 308 smallholders. Results show that, on the village level, we can distinguish four implementation schemesof tea oil tree plantations, i.e. individual, partnership, collective, and cooperation with company. Distinguishing factors for these schemes are property rights relations, monetary input distribution, productive resource distribution and extension services. As this research will show, these criteria impact the distribution mechanisms of output sharing, respectively generating different distribution effects for poor smallholders. Results will be important also for other countries where smallholder forestry is prevalent, and carbon sink projects are to be implemented.

Using SA8000 criteria as a tool to understand employee sentiments on corporate responsibility: case of Chinese manufacturing SMEs

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Increasingly complex social and labor issues are becoming a major concern affecting Chinese companies in their pursuit of a growth and profitability. While disciplinary research has delved into basic facets of job satisfaction, less attention has been given to tackling the applicability of influential international corporate responsibility benchmarking initiatives. Using Social Accountability SA8000 standard as a tool, our study aimed to explore the facets of employee perceptions of their organization's ethical behavior through a survey of 835 employees from twenty export processing and labor-intensive private manufacturing SMEs in the Pearl River Delta of China. Results of our semi-confirmatory factor analysis indicate that the SA8000 standard is able to capture some core dimensions of employee sentiments towards their employer's ethical behavior. Based on the applicability of a four-dimensional measurement scale, including employee benefits and welfare, discrimination, work health and safety, and corporate governance, our results build ground for further examination of business ethics and employee job satisfaction in manufacturing companies.

Keywords: Social Accountability 8000, job satisfaction, business ethics, semi-confirmatory factor analysis, China,

Customer value of decision support services among Finnish family forest owners – a discrete choice experiment

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Customer value is generally defined as a customer's perceived preference for and evaluation of those service attributes, attribute performances, and consequences arising from use that facilitate achieving the customer's goals and purposes in use situations (Woodruff 1997). Our aim is to examine how family forest owners value different attributes of decision support service when heterogeneity in forest owners' preferences and motivations (forest ownership goals and decision-making styles) is taken into account.

The data was acquired by a postal survey to a sample of 400 North Karelian family forest owners with a response rate of 53%. The survey included a discrete choice experiment (DCE) of decision support services. The choice sets in the DCE comprised of a forest fact sheet provided to a owner free of charge and two supplementary decision support service packages with varying levels of predetermined attributes (including price, participation option (e.g. field trip), guidance to use the forest plan, business plan component (e.g. cash flow projection) and biodiversity management component).

In 34.5 % of all choices, a service package was preferred over the free-of-charge forest fact sheet indicating that an owner's willingness to pay for supplementary service attributes exceeded the price of services. Choice modeling further revealed that 1) a field trip with a planner 2) management recommendations for sites with high values of biodiversity, scenic beauty and/or game and 3) economic cutting recommendations based on the owner's rate of return requitement were the most valued service attributes. Systematic preference heterogeneity was caused by a decision-making style, income, previous cutting behavior and professional status (being retired or not) of the forest owners. In addition, significant unobserved preference heterogeneity was revealed. The results provide guidance for marketing strategies of service suppliers and extension activities of public institutions.

Keywords: forestry advisory, postal survey, customer preferences, service design

Reference:

Woodruff R.B. 1997. Customer Value: The Next Source for Competitive Advantage. Journal of the Academy of Marketing Science 25: 139-153.

Wealth ranking in 12 Tanzanian villages – turning failure into triumph

Meilby, H., Burgess, N., Chamshama, S., Kajembe, G., Lund, J.F., Ngaga, Y., Ngowi, S., Njana, M., Skeie, K., Theilade, I. and Treue, T.

Rapid Rural Appraisal techniques are frequently used for wealth-ranking of households in rural communities. The main justifications of such approaches are that they are fast, allow pre-stratification of households in preparation for surveys and that they have been shown to have at least some empirical validity as means of stratifying households by socio-economic status. Sometimes, however, the participatory process may fail to produce consistent wealth categories, or people refuse to accept labels such as 'poor' and 'rich' and/or are reluctant to assign such categories to households within their village. A household survey in Tanzania was conducted in 12 villages across eastern Tanzania in 2008-2010. In all villages a participatory wealth ranking exercise was conducted and used for stratification of households. Sample households (n=40 per village) were allocated proportionally to wealth categories. The structured household survey emphasized assets, income, and perceived effects of Participatory Forest Management. The value of individual non-productive assets was estimated through a follow-up survey and combined with results from the household survey to estimate total value of assets for each household. In this study the original, partly inconsistent wealth ranking is examined and compared with estimated incomes and asset values. Next, alternative wealth classification rules are introduced and resulting classification outcomes are examined and discussed.

Cost-effectiveness of measures which promote pollination services in boreal agricultural landscapes

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Species diversity on arable land and associated ecosystem services have decreased due to intensified agricultural production and loss of non-crop habitats in boreal agricultural landscapes. There have been attempts to mitigate this negative trend by agri-environmental schemes, but applied measures have often proved to be both ineffective and expensive. Research on the cost-effectiveness of measures is therefore required.

We considered three biodiversity measures in southern Finland: A) a biodiversity zone established on the margin of a forest abutting on a field, B) a biodiversity strip on a field at a forest border and C) an environmental fallow. In our study, a forest biodiversity zone (measure A) consists of a 5-m wide meadow-like treeless strip and a 20-m wide transitional zone which is managed by repeated selection cuttings to create a mixed-species uneven-aged stand structure. A biodiversity strip on the margin of a field (measure B) refers to a 5-m wide uncropped strip covered by wildflowers or perennial grasses. An environmental fallow (measure C) is either a biodiversity field established by a meadow-plant seed mixture or a grass field established by perennial grasses.

The effectiveness of measures in promoting pollination services was determined by the achieved increase in bumblebee abundance compared with the prevailing land use. Control areas of measure A were managed according to the recommended good practices in forestry (even-aged management). Control treatments of measures B and C were the corresponding areas of a field in conventional feed-barley production. Costs of measures incurred to a private landowner were calculated by subtracting the present value of a net income stream obtained from an area where the measure is applied from the present values of net incomes received from the corresponding forests and fields managed according to current practices and recommendations.

The results indicate that the cost-effectiveness of the measures applied on fields is better than those applied in forests even though the price of cereals is assumed to retain its current high level. The best outcome with least costs was obtained by using a meadow-plant seed mixture including brown and wig knapweeds (*Centaurea jacea* and *Centaurea phrygia*), daisy (*Leucanthemum vulgare*), white clover (*Trifolium repens*) and common bent (*Agrostis capillaris*). For a landowner, the use of field measures is also supported by the fact that, on fields, land use can be changed quickly if necessary.

Keywords: agri-environmental scheme, biodiversity strip, biodiversity zone, bumblebee, environmental fallow, uneven-aged management

Spatial-econometric analysis of landowner participation in voluntary forest conservation programs.

Nielsen, A.S.

A principle threat to terrestrial biodiversity is the lack of proper habitat. For many industrialized countries a long-standing history of intensive land-use has left a fragmented landscape with only few undeveloped areas. Denmark is a prime example of this.
A great share of the remaining habitat is privately owned, leading species conservation in the hands of private landowners who often lack proper incentives to coordinate their land-use with conservation objectives. To circumvent this public conservation policies are required.
Such policies include e.g. protecting of land through land acquisitions or the involvement of private owners through regulative, informational or financial instruments to encourage more of them to manage their land in accordance with nature conservation goals.
This study focuses on voluntary conservation programs, and the factors determining landowner participation in these. Using existing Danish private forest as a case study, 3 different voluntary conservation schemes deployed by the Danish Nature Agency from 1997-2010 is examined, drawing on detailed information about the owner's socioeconomic status and information about the owner parcels. Further as many species rely on habitat that spans across owner boundaries, a challenge when designing such schemes is to ensure owner coordination to increase the connectivity of the enrolled lands. To examine whether landowners show evidence of coordination in their conservation decision, the discrete choice model is extended to test for spatial spill-over effects in a spatial-econometric setting.

Keywords: Landowners, preference modelling, spatial econometrics, biodiversity, conservation

Optimal Management of Norway Spruce With Carbon Sequestration

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In this study a process-based growth model for even-aged Norway Spruce (*Picea abies* [L.] Karst.) is coupled with economics and optimization to analyze optimal management and cost of carbon sequestration. We extend earlier literature by including detailed timber quality features and optimized thinning. Our results show that tree diameter has a major role in defining the optimal timing of harvests especially with higher interest rates. Optimal management with carbon sequestration mainly postpones thinnings, lengthens rotations, and increases sawlog yield. Economic cost of carbon storage is presented for two different sites and two different interest rates. These costs are compared to CO_2 abatement costs in other sectors on a national level. This study suggests it would be economically optimal to use carbon sequestration in order to fulfil national commitment to the EU, i.e. to reduce greenhouse gas emissions by 2020.

Keywords: carbon sequestration, process-based model, optimal thinning, optimal rotation, Norway spruce management

Business models for timber frame industry enterprises in multi dwelling house construction in Finland and Sweden

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The recent productivity improvement in multi dwelling construction processes has opened for substituting on site construction with industrial processes. Increased prefabrication of components and systems have resulted in the development of industrial construction timber enterprises (house component and other woodworking industry enterprises) but also sawmills and their upgrading activities (pre cutting, planing and other upgrading) to gradually adopt new intra firm value creation activities including planning and assembling services. The prior major business model, processes cost minimizing for standard timber products, has been transferred towards client oriented tailor made solutions and services. The major contractors and other construction system integrators have been reluctant to introduce the upflow enterprises in value chains and to participate in the development of new industrialization with improved component and product offerings for multi dwelling house construction.

This paper discusses the value creation positioning and coverage in the business model formation among the timber element production industry enterprises. The business models are based on the vision formation and implementation strategy with using, maintaining or selling construction enterprises as clients integrating multi dwelling house construction processes. Research task here is to extend a business model taxonomy for the three major industrial product offering types for timber construction products (components, elements and modules) by including further client types and market conditions in the multi dwelling construction Multi dwelling construction constitute annual house construction majority in both countries with aggregate volumes of the same magnitude. The core task is to discuss the future options to develop the business models that fit with the objectives of the major construction producers and real estate developers.

Valuing and developing market-based mechanisms for enhanced forest amenities in private lands: The case of Ruka-Kuusamo, Finland

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Forestry has significant impacts on the quality of the forest landscape for recreation and nature-based tourism. In Finland, the rapid growth of nature-based tourism has expanded outdoor recreation activities from protected areas into timber production forests both in private and public lands, particularly so in northern Finland. This has created a demand for modifying current forest management regimes, especially regeneration practices aimed mainly at timber production. As landscape and recreational benefits mainly represent direct and indirect use values of forests, it is relevant to study the possibilities for creating a direct compensation mechanism between the potential buyers (tourists or tourism entrepreneurs) and providers (forest owners) for such services.

In this paper we first describe the main requirements for developing a Landscape and Recreational Values Trading scheme in Finland. Second, we present preliminary results from a recent choice experiment study that investigates foreign and domestic tourists' demand for and willingness to pay for enhanced forest amenities in private forests of the Ruka-Kuusamo area in northeastern Finland.

The results support the idea that tourists are willing to pay for selected improvements in the quality of outdoor recreation environments. Both foreign and domestic tourists were willing to pay for improvements in the quality of the forest landscape, in terms of a less frequent occurrence of clear-cutting and site preparation areas along the routes, as well as for increased biodiversity. Foreign tourists' willingness to pay was significantly higher than domestic tourists'. Neither group would be willing to pay for extended outdoor recreation routes or increased carbon sequestration, even though reductions in these services might mean a welfare loss.

Keywords: environmental benefits, non-timber forest services, choice experiment method, market-based mechanisms

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Role of governmental and local policy in forest degradation and sediment transportation to the Caspian Sea

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Forests protect water quality by slowing runoff, stabilizing soils and filtering pollutants. Conversion of forest land to other uses interrupts these natural processes and increases the potential for water quality impairment. Since soil erosion and sediment redistribution have implications for both soil and water resources, and scientists have established that the movements of soil, sediment and water are intrinsically linked, it is critical to implement integrated resource protection strategies. It is therefore, encouraging that policy maker and managers are now opting to manage soil erosion and sediment transfers at a catchment or river basin scale, as has been proposed in the Eu water framework directive, for example. Excessive or enhanced soil erosion due to poor land management can result in both on and off-site impacts that are detrimental to a whole range of receptors. Erosion, transport and sedimentation processes gain increasingly importance in socio – economical and ecological respect. This study seeks to survey the role of forest degradation and land use changes in soil erosion and ultimately sediment transportation by rivers. Based on problem-solving logic, it is possible to drive a five stage model of policy cycle which is consisting of: agenda setting, policy formulation, decision making, policy implementation and policy evaluation. The overarching objective of this thesis is to determine what strategies and policies need to be implemented in order to decrease the treatments arising from sediment transition into the Caspian Sea. In addition, this study seeks to examine the relationship between the extent of Hyrcanian forest degradation and the extent of sediments arising from both degradation and soil erosion which are transported to the Caspian Sea.

Normal forest structures and the costs of age-class transformation: an extended summary

Price, C.

It is sometimes suggested that, because transformation of uneven-aged stands into an even-aged structure reduces profit, even-aged stands should be transformed to uneven-aged structure. The argument is false, because transformation *in either direction* incurs opportunity costs of felling trees before and/or after their optimal rotations. This effect can be demonstrated, without the complicating factors of interaction between trees within a stand, by modelling transformations and reverse transformations between a single-aged forest and a forest containing a normal age-class series of even-aged stands.

The model used has the normal revenue characteristics: the first positive revenue is achieved at 20 years, rising rapidly at first but eventually approaching an asymptote. For ease of computation, the stands are taken to be unthinned, but it is expected that the results would remain similar for thinned stands. Only timber revenues are considered as benefits in this treatment. (Even though other factors have an important influence on rotation, they would not fundamentally change the results either, except as noted.) A 3% discount rate is used.

Each transformation process starts from either a single-aged forest or a forest with a normal age-class structure of stands. Each ends with either a forest whose age-class structure is optimised with respect to rotation, or one that is single-aged across all stands. The results in outline are as follows.

The most desirable stand structure to receive, as a gift, is composed of stands grown on the rotation of maximum forest rent (mean annual net revenue). This is invariably longer, often considerably longer, than the Faustmann rotation: 97 years as opposed to 56 years in the example taken.

Pukkala et al. (2010) raise this question: “which structure of uneven-sized forest stand would I *least* wish to clear fell and transform to even-aged”? This question embodies not just the future cash flows forgone from this crop and its uneven-sized successors, but the current standing value of the crop and future cash flows of its even-aged successors. In the context of even-aged stands in our sample normal forest, the answer is: the normal forest structure I would least wish to sacrifice would be one with a rotation of 49 years. Furthermore, any normal forest with a rotation less than 27 years or more than 77 years should be converted, with net gain, to a single-aged forest on a Faustmann rotation.

Any normal forest on an other-than-Faustmann rotation is worth transforming to a normal forest on a Faustmann rotation, by an accelerated or retarded programme of felling. But, because of the prolonged transformation period, any normal forest on a rotation longer than 88 years would be better transformed in one period to a single-aged Faustmann rotation.

But the optimal Faustmann rotation is unlikely to be the best rotation to transform to, either for a normal forest or a single-aged one. This is because of the effects of target age-class structure on the degree of deviation from optimal rotation required during the transformation period. Only with very low discount rate, when long-term effects of optimal structure overwhelm the short-term costs of transformation, is the Faustmann rotation approached as the ideal target structure.

The best rotation to create from bare land is one of 53 years. This is slightly shorter than the Faustmann rotation, because of the desirability of launching a profitable crop sooner rather than later. A rotation as short as 35 years would give no profit at all, so delay would not be an issue.

If an existing single-aged forest on a Faustmann rotation is to be transformed to a normal forest, the most profitable target rotation is 44 years. This is shorter than the Faustmann rotation, in order to reduce the degree of felling before and after the optimal age.

In all cases considered, there are opportunity costs in transforming from one age-class structure to another, whether from normal to single-aged forest, or *vice versa*. This might theoretically be offset if cost savings can be achieved. For example, major reduction in regeneration cost in mixed-age forests could justify transformation from an existing single-aged forest. An unrealistically large gain in scale economies would be needed to justify transformation from a normal to a single-aged forest. A very low discount rate would be needed to make these arguments persuasive in favour of a theoretically ideal structure to be achieved in the long term.

Thus transformation of even-aged to uneven-aged *stands* would probably have to rely on some other justifications than those applying to a normal series of even-aged stands, such as the assortment of tree sizes that can be cut by using a single-tree selection system, or the environmental gains of diverse tree sizes within a stand (Price and Price, 2009).

Keywords: optimal age-class structure, optimal rotation

A full electronic version of the working document from which this summary is derived may be obtained from the author at c.price@bangor.ac.uk.

References

Price, C. and Price, M. 2009. Cost–benefit analysis of continuous cover forestry. Scandinavian Forest Economics 42: 36-65.

Pukkala, T., Lähde, E. and Laiho, O. 2010. Optimizing the structure and management of uneven-sized stands of Finland. Forestry 83: 129-42.

Optimal rotation with differently-discounted benefit streams

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Several reasons have been given to justify discount rates which decline through time. The expected and computed result is a sequence of progressively lengthening rotations. Reasons have also been given why different kinds of benefit (or cost) might be discounted at different rates: in particular, carbon fluxes. A similar lengthening sequence of rotations then invariably arises, whether the benefits are consumptive ones realised at the rotation end, or non-consumptive ones whose annual value increases through the rotation. (Constant annual benefits have no effect on rotation, irrespective of discount rate.) The factors which justify different discount rates for different *kinds of benefit* do not lead to the dynamic inconsistency that arises when discount rates differ according to the *length of the discounting period.*

Rising carbon flux price and the paradox of forest-induced reduction of atmospheric carbon stock

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Reasons can be given, on both supply and demand grounds, why the price of a carbon flux into or out of the atmosphere might rise through time: such predictions are now embedded in the calculations mandated by some governments. A productive forestry cycle entails both early sequestration (at low prices) and late volatilisation (at high prices) of carbon. Hence a productive cycle might be deemed "loss-making" on its carbon account, even though in every future time period its effect on atmospheric carbon stock is beneficial. While this effect might be mitigated or reversed by discounting of carbon flux values, in practice there is debate about whether such values *should* be discounted at all. In addition, arbitrary governmental rules on what kinds of carbon flux "count" can make forest utilisation which is carbon-positive within the whole materials system appear to be carbon negative, an anomaly which is exacerbated by rising carbon price.

Assessing the socio-cultural impacts of biodiversity cooperation networks of the METSO programme

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To safeguard overall sustainability in forest conservation it is necessary to consider ecological, economic, social, and cultural viewpoints simultaneously. However, particularly the socio-cultural aspects are difficult to measure and thus often poorly considered. Furthermore, practical decision-making requires that sustainability assessments are as easy and simple as possible. This study sought to develop and test a practically feasible procedure for measuring and monitoring the socio-cultural impacts of the biodiversity cooperation networks within the Forest Biodiversity Programme METSO. Fundamentally, the procedure falls within a multi-criteria decision support (MCDS) framework. First, a literature review helped to select and operationalize a set of 10 criteria and 25 indicators. Second, empirical data for the indicators were gathered from seven cooperation networks in November 2010 and January 2012 with email questionnaires. Applying the indicator data to an additive utility model yielded cumulative utility scores for all networks and for both operational years. According to the results, improvements from 2010 to 2011 took place particularly within the indicator "*Achievement of innovation and new operation models*". Generally, the best performances appeared under the criterion "*Acceptability*". The high (positive) total socio-cultural impacts can be achieved through different strategies: by gathering sub-utility from all criteria with rather equal weights or by concentrating on a few locally important criteria with higher weights. The presented procedure enables longitudinal monitoring of socio-cultural sustainability, which is beneficial, because some outcomes of actions appear with a delay. The method may help to compare the networks' sub-utility distributions, i.e., performance profiles, which provides valuable information for policy-makers. However, it is noteworthy that some indicators rely on subjective expert judgements, which is why direct comparisons between networks should be done with caution. Following task is to link or merge the monitoring of socio-cultural impacts with other dimensions of sustainability.

Keywords: additive utility model, expert judgements, sustainability impact assessment

The evaluation of sectoral competitiveness on the basis of external trade, based on the example of Estonian forest management and logging sector

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One of the key issues of Estonian Forest Development Plan 2020 is to maintain and increase the competitiveness of Estonian forest sector. For the maximum effect for the sector (also for the whole country in wide perspective), all parts of the sector should operate competitively. In 2004 the competitiveness of Estonian forest industry sector was analyzed, using the competitiveness indices of external trade. Until now the competitiveness of the Estonian forest management and logging sector has not been studied. Since there is no commonly accepted definition of sectoral competitiveness among economic theorists, different approaches can be found in the literature, which are mainly based on productivity or external trade. In the current paper the suitability of competitiveness indices based on external trade in evaluating sectoral competitiveness are tested, using Estonian forest management and logging sector as an example. The competitiveness of Estonian forestry and logging sector is evaluated using:

1. the changes of market shares of Estonian roundwood in main export markets;
2. competitiveness indices based on external trade – revealed competitveness advantage (RCA) and relative trade advantage (RTA) in vis-a-vis comparison with the main competitors.

The external trade data from UN COMTRADE and EUROSTAT databases are used for the calculations. The market share of Estonian roundwood in the main export markets (Sweden and Finland) has increased during the period 2002 – 2011, respectively about 1% in Finland and 10% in Sweden, but at the same time the volumes have decreased. The calculated indices of RCA and RTA in vis-a-vis comparison with Latvia are indicating Latvia to be more competitive in exporting roundwood, during the period 2002-2011. On the other hand, Estonian annual felling volume has increased about 40% in 2011 compared to 2002 and domestic consumption of roundwood has increased about 70% during that period. The export volume of roundwood has decreased 17% and import volume 47%, which indicates the structural change in Estonian forest sector external trade. Due to the development of Estonian forest industries, most of the roundwood (sawlogs) is consumed domestically. Since Estonia has a limited demand for pulpwood, which forms about 20% of the total felling volume, it is the main export article (to Scandinavia) of forest management and logging sector.

To sum up, using only the indices of external trade for evaluating the competitiveness of Estonian forest management and logging sector is not sufficient for the fundamental conclusons of the competitiveness of the sector, since most of the product (roundwood) is oriented to the local market, which decreases the share of roundwood (roundwood is the output of forest management and logging sector) in total export of Estonia. For this reason, in the comparison with the countries or group of countries which are more oriented to exporting raw material instead of consuming it domestically (the share of roundwood is higher in total export) lower rankings are obtained.

Keywords: competitiveness, revealed competitive advantage, relative trade advantage, market share, external trade

Dual discounting in forest sector climate change mitigation

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Discussions regarding the efficiency of climate change mitigation efforts are predicated on future costs and benefits and thus heavily influenced by discounting. One such regime, dual discounting, involves discounting carbon values differently from non-carbon values; the argument being that environmental values are becoming scarcer and thus should not be subject to regular discounting. Previous stand-level analyses show that discounting carbon with a lower rate than non-carbon values improves the profitability of forest-based climate change mitigation projects such as afforestation. We challenge this result for cases where the forest has initial carbon stock. Using the national forest inventories of Norway and a partial, spatial equilibrium model of the Norwegian forest sector, we find that discounting carbon less than non-carbon values increases harvest and consequently decreases carbon sequestration in the short term. Lowering the carbon discount rate leads to more investments in forestry and thereby substantially higher long-term climate change mitigation efforts.

Keywords: Climate policies, boreal forests, economics, partial equilibrium, forest sector modeling, discounting

Participatory Forest Management in Tanzania and livelihoods of rural people – evidence from 12 villages

Skeie, K., Burgess, N., Chamshama, S., Kajembe, G., Lund, J.F., Meilby, H., Ngaga, Y., Ngowi, S., Njana, M., Theilade, I. and Treue, T.

Participatory Forest Management (PFM) in Tanzania aims to improve forest condition, livelihoods for local people and natural resources governance at the village level. Using data collected from 12 villages and forest areas with (n=10) and without (n=2) participatory forest management across eastern Tanzania we aim to assess how livelihoods of villagers compare between forest management regimes. Data show that most villagers across the study sites are poor, with small numbers of wealthier people. There is little overall income variation across forests under PFM, but there is considerable variation of benefits from the PFM forest between village wealth classes. Richer village members are able to secure preferential access to the PFM forest and utilise it (or benefit from issuing licences) for livestock keeping (in drier forests), charcoal production (close to access routes to towns), and harvesting (where high value timber remains). Data suggest that the PFM approach has made certain sectors of the community more wealthy, typically those setting the rules and enforcing them. But they also indicate that the overall impacts across the community are marginal – and may be negative for the poorest community members.

Compensations for temporary conservation contracts and private forest owners' timber income losses

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In Finland the Forest Biodiversity Programme for Southern Finland (METSO) aims to halt the decline in forest habitats and species and establish stable favorable trends in forest biodiversity by 2016. Forest protection in the context of the METSO Programme is based on voluntary actions by landowners, including both permanent and temporary measures. The aim of the study was to examine the timber income loss incurred to a private forest owner if she/he protects a forest site in METSO Programme for 10-year period. We also compared the timber income loss to the compensation that was actually paid for that particular forest site for a 10-year conservation contract.

The data of this study was gathered from regional units of the Finnish Forestry Centre. The data included detailed information of the most recent temporary METSO conservation contracts for 10-year period. Total number of conservation contracts analyzed in this study was 183. To calculate the forest owners' income loss for each forest site we used SuojeluMotti-program. SuojeluMotti-program is based on The Finnish Forest Research Institute's (Metla's) Motti-program, which is a stand-level analysis tool for forest management. SuojeluMotti-program uses net present value to calculate the economic impacts of different forest management decisions. We found that the compensation paid to the forest owner was in most cases significantly higher than the timber loss incurred during the contract period. The current compensation instrument used for 10 year period conservation contracts is based on the stand's stumpage value and do not include the expectation value for forthcoming loggings as the SuojeluMotti-programme does. That explains the differences between the actual compensation level and the estimated income loss.

This study is a part of Metla's research project: The monitoring of the impacts of the Forest Biodiversity Programme for Southern Finland (METSO 2008-2016). Full report (in Finnish): http://www.metla.fi/julkaisut/workingpapers/2011/mwp207.pdf

Firm proactiveness and corporate social responsibility in global forest industry

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Companies involved in natural resource extraction, such as forestry, significantly influence the environment they operate in. Therefore, active engagement in corporate social responsibility (CSR) and managing close relationships with key stakeholder groups, i.e., governments (e.g., legal compliance), communities (e.g., work force, raw materials) and environmental NGOs (e.g., risk reduction) has become a necessity to maintain the social license to operate. In this paper we argue that firm proactiveness has positive influence on firm's corporate social performance. First, it can act as a stance towards CSR, and second, it may be a precondition to gain competitive advantage by investing in CSR. In our analysis we concentrate on forest industry and use international survey data from managers of 60 companies. A positive impact of firm proactiveness on CSR could be found using regression analysis. However, unlike many previous studies confirming a positive effect of company size on corporate responsibility – due to higher media visibility or access to more resources – we found no evidence on the impact of company size. The results also show that employees and managers in a proactive firm more often take initiatives to improve the environmental performance compared to the employees and managers in a less proactive firms.

Keywords: corporate responsibility, environmental management, proactiveness, forest industry

Faustmann formula before Faustmann

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A common perception in forest economics is that the celebrated 'Faustmann formula' was discovered in 1849 and that the 'Faustmann rule' or Faustmann-Pressler solution to the optimal rotation age was derived from it a decade later by Pressler. Recent research has significantly extended this view by showing that the economic ideas behind these innovations were presented already in the end of the seventeenth century in England during so-called financial revolution. In his remarkable writings in 1683 and 1701, John Houghton, a London-based editor and fellow of the Royal Society, explicitly recognized the opportunity cost of forest capital and compared forestry with other forms of land use employing calculations that are in line with modern capital and investment theory. In 1730, a competent land surveyor and accountant John Richards from Essex contributed to the development of this type of forest economic thought by calculating forest value under both intermittent and sustained yield management using discounted cash flow to infinity, and thus discovering the Faustmann formula over 100 years before Faustmann.

It took quite a long time before the modern principles of forest and natural resource economics were rediscovered in the 'scientific forestry' that emerged in the German territorial states in the latter part of the eighteenth century. This delay was at least partially due to the fact that the development of economic thought followed quite different course in Central Europe than it did in England where extensive political and institutional changes led to the establishment of relatively modern financial and commercial markets already at the turn of the eighteenth century.

This paper explores the early development of forest economic thought under the German 'scientific forestry' more closely than has been done previously and shows that a modern analytical perspective to the valuation of forests was presented also in the German discipline well before Faustmann. Moreover, there is evidence that a competent German forest mathematician, Johann Hossfeld, used differential calculus to produce the optimal cutting or rotation age almost 60 years before Pressler who in the natural resource economic literature has been regarded to anticipate marginal analysis.

Competing in the Global Economic Recession

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The financial crisis that started in mid-2008 has led to a subsequent economic recession. Although officially declared over, global financial degradation may result in a ?double-dip? recession with no substantive relief in the near term. Consequently, fundamental shifts within global forestry and the forest industry sectors have taken place with disruptions, dislocations, and uncertainties felt through the entire chain from the forest to markets. This is the worst downturn for forest products markets since the first oil crisis in the 1970s. Manifestations have included decreased demand, fluctuating prices and changed exchange rates, increased competition, overcapacity, low profitability, wood supply problems, and competition for raw materials exacerbated by the emerging bio-based energy sector. Although the ability of the forest sector as a whole to experience strong growth during the recession and when recovery begins is doubtful, there are many actions that individual companies can take to create competitive opportunities during the crisis and solidify position when markets strengthen. This paper presents specific actions that can be taken to create or maintain competitive advantage across the forest sector supply chain in this time of crisis. Moving forward, companies will seek to create competitive advantages and in so doing they will adopt different strategic postures alongside making a variety of strategic adjustments. Although the future of the sector remains unclear, it is important to magnify some key areas at the intersection of economic recession and company responses. In this paper, we outline some key strategic considerations that may help companies both to prepare for and navigate through the crises that downward business cycles present. We begin with a suggestion for in-house business cycle forecasting capabilities to be adopted to better prepare companies for economic shocks. We then draw from previous research and briefly outline how various strategic postures during a recession can affect companies? post-recession performance. In the section that follows, our focus is on the leadership structures conducive to post-recession success, and finally, we discuss some key areas and strategies that can help ameliorate negative changes brought on by the Great Recession.

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Forest transition in developing countries : analysis of the level of forest cover at the turning point using a Heckman truncated model procedure

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The forest transition refers to the change from decreasing to increasing in the forest area of a country. Where the forest cover reaches its minimum is called the turning point. At this point, the country does not deforest anymore. This paper studies the probability of occurrence of a turning point for a developing country, and then explain the level of forest remaining at this moment. Indeed, it is be strongly policy relevant and interesting to consider which variables determine the forest cover at the turning point. Why do some countries experience a turning point at 10% forest cover while other ones experience it at 30%? This paper allow to progress on the comprehension of the cumulative nature of deforestation along the development process. Moreover, it can help to strengthen public policies to fight against deforestation, by transposing the results to countries that have not yet observed a turning point, and thus affect the right variables to make the turning point occur earlier in time and higher in forest cover. Since only some countries are observing a turning point, the existence of a selection bias must be taken into account. A Heckman truncated model procedure is used.

The Effect on Forestation of the Collective Forest Tenure Reform in China

Xie, L., Berck, P. and Xu, J.

To alleviate rural poverty, stimulate investment in forests, and improve forest conservation, the Chinese government enacted a policy leading to small individual holdings of forest lands that previously were administered by villages. Using data collected from 288 villages in eight provinces over three years, this paper measures the effect of the reform on forestation. Because villages had to vote on whether the reform would take effect, we are able to identify the causal effect of the reform by using an IV estimator based on the countywide decision to offer the reform package. We find an increase in forestation of 7.87% of the forest land in the year of the reform.

Keywords: China, Forestation, Land Reform, Individualization.

Performance of various PFM modalities in Ethiopia: a possibility for harmonization at national scales

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Over the past few decades, Participatory Forest Management (PFM) has emerged as a key strategy internationally. Following the recognition that centralized and expert-dependent forest management practices have been unsuccessful in halting deforestation, the government of Ethiopia, with assistance from international donors, has been implementing PFM pioneer projects since the early 1990's. The experiment is based on the assumption that participation of local communities, which are the major stakeholders using the forest resources, is essential for reversing the *de facto* open access to forests. The PFM pilot projects have used a diversity of implementation strategies, however, that need to be evaluated before a national PFM strategy can be formulated. The present paper conducts an evaluation of the institutional set up and the outcomes of seven pioneer old PFM sites distributed in Oromia and Southern Nations Nationalities and People Regional states. Outcomes are assessed as forest users' perceived changes (before and after pioneer projects) in (1) ownership feeling over the resource (2) change in forest condition (3) change in livelihood of members, and (4) stability of the PFM institutions. Qualitative data was collected in focus group discussions, semi-structured and key informants interviews. Our findings indicate that in most sites the forest cover and ownership feelings of the community have improved after introduction of PFM. Post project assessment, however, shows that weak law enforcement, revocation of PFM agreements by the government, high project staff turnover and inequitable forest benefit distribution endangers the sustainability of PFM in Ethiopian pioneer projects. The paper argues that scaling up PFM without consideration for these issues risks multiplying mistakes.

Key words: PFM, forest condition, institutions, ownership, livelihood, project

Analysing household-level poverty dynamics in rural communities in developing countries

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The forest literature on poverty dynamics in forest reliant communities in developing countries is almost entirely based on cross-sectional assessments of the relative contribution of forest to total household income. These snap-shot pictures provide information on the current consumption and gap filling functions of forests but they do not allow an analysis and understanding of the role of forests in contributing towards escaping poverty. To address this issue, we use panel income data collected quarterly in 2006 and 2009 in the same households (n=416) in three sites in Nepal. The data is used to develop dynamic models which categorize households with regards to their expected wealth status and assess the weight of the eight major income sources in each category. Preliminary analyses show that 32 households moved into poverty, 98 moved out of poverty, 42 remained poor and 274 households remained non-poor. The main income source for households that became poor was livestock, with forest income coming in fourth both in 2006 and 2009. For those who moved out of poverty, the main income source was livestock in 2006 and remittances in 2009. Forest income dropped from the fourth to the seventh most important income source. For those who remained non-poor, their main income source was business in both years. Forest income dropped from sixth to the seventh most important source of income. Lastly, for those who remained poor, the main income source was wages in 2006 and livestock in 2009. Forest income dropped from the third to the sixth most important income source. Forest plays a minor role for most households, and does not appear to play any significant role in allowing households to move out of poverty. Thus forests appear more important in preventing than reducing poverty. There is also a trend favouring income sources such as remittances, livestock and business income. This could be as a result of increased forest restrictions or increased opportunities in other income sectors.

In a granite landscape

Colin Price

Here, where the forests lie gently fragmented
by *joki* and *järvi* of different sorts,
sit those from the mainstream, and those who dissented,
to proffer their views and exchange latest thoughts.
There are theorists, modellers, raw-data-lovers;
those who preach dogmas, and those who have none;
one who revisits, and one who discovers
that nothing is *truly* new under the sun.

We begin with the first and the lasting impression
from Professor Richard Vlosky who gave us the key
to competitive schemes to come out of recession
ahead of the rest: which, of course, *all* can be.
And out in the working groups, curious conclusions
have undermined theories we used to rehearse;
e.g. (if I may mention my paper) confusions
on how rising carbon price makes matters worse.
There were studies whose scholarship threatened to oust man-
ic smugness concerning the place we are at:
I had *thought* that Paul Samuelson plagiarised Faustmann,
but the trail of deceit goes back further than that.
For Faustmann himself had failed to cite a
precursor or two; his lit. review fails
to mention some Englishmen and a Dutch writer
whose grandmother came – I conjecture – from Wales.

There were searches for magical numbers that marry
our data to models – or the other way round –
in the markets for roundwood according to Jari;
those factors which clarify, those which confound.
For econometrics is very like raising
our children: the trick lies in keeping them saved
from disaster, through choice and judicious time-phasing –
which make children, like data-sets, more well-behaved.
There was time for free thought – yet not lacking in rigour –
combining the best of the old and the new
for a future of thinking, with hybridised vigour,
about trees fixing carbon like no grass can do.

Some variables given, and others endogic
allowing efficient extraction of betas;
some ecosystemic, some sociological,
broad'ning communal engagement in planning by many, … many, … many, … many metres.
Thus ecologists colonise civil society,
mayors study markets, and to co-integrate,
economists rank ecosystem variety
by giving equivalent euro-based weight.
Cross-elasticity; concepts cross-cultural;

cross-cutting models that move with the times;
and pricing the service of eagle or vulture –
all allow introduction of new paradigms.

Here, where a landscape formed grandly from granite
we foresters do what we can to ensure
that we talk of what future remains for the planet,
and what wood contributes to make it secure.
The landscape reflects presentations revealing
perspectives: philanthropists, sociopaths,
some who tap streams of intuitive feeling,
some who love granite-like logic of maths.

There were visits to masts that record each extreme of
environment for the big project called SMEAR,
with funds that economists only can dream of –
they've got instruments measuring *everything* here:
analysers that render repeated, complete oz-
one values, computers to plot every curve ….
Else a trip to encounter the local mosquitoes
that infest Siikaneva's swamp nature reserve.

There was honest researching, that aimed to impede o-
ver-zealous claims, like "trees stop earth getting hot":
for there *are* warming models embracing albedo
which suggest that the best thing is, felling the lot.
As for deforestation's ongoing defiance
of Kuznetzian turning points, *somewhere* in time it
must come to an end, given only compliance
with bonds that ensure no bad outcome for climate.

I would like to report on our third, and last, plenary
session: an expert extolling the case
for biomass energy from forest greenery:
but she hasn't yet given it – just watch this space.
Next, we look forward to REDD – plus or minus;
green marketing; values land owners perceive.
And those sessions we'll go to tomorrow, define us
in terms of the things we prefer to believe.

But occasional accidents, lead to a session
on topics we never had thought of before;
serendipity bearing us into possession
of new ways of thinking that open their door.
And so we attack, with all verve and all valour
new problems, and old ones once more re-addressed
from new angles, and when we recall Hyytiälä
we'll remember its having been one of the best.

I'm sorry for all of the papers missed out on –
I couldn't be sitting in three diff'rent places.
But their abstracts give plenty we might think about on
the aeroplane, as we return to our bases.
And hence we prepare for departure, excited
by mainstreams of thinking – and other-than-these;
here, where land-fragments lie nicely united
by forests of gently eccentric tall trees.

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