Harvested Wood Products - an Incentive for Deforestation?

Andreas Fischlin[1]

Abstract

Mitigation priorities in the forest sector should observe following sequence: REDD[2], sink enhancement, substitution of fossil fuel, and HWP[3]. If accounting for HWP is not done properly, the risk for an incentive for deforestation is real. To curb the disadvantages of HWP, some debiting of non-sustainable forest management as currently achieved through Article 3.4 of the Kyoto Protocol appears a necessity. Until effective REDD activities are implemented that provide true disincentives to deforestation, HWP may continue to create some risk of furthering deforestations in developing countries that are not constrained by the Kyoto Protocol. On the other hand, if HWP accounting is done properly as part of a LULUCF[4] scheme that minimizes risks of promoting deforestation and non-sustainable harvesting, HWP is to be welcomed as a means to help promoting the utilization of the climate-friendly, renewable natural resource wood. This would help mitigating climate change and in progressing towards a more sustainable society.

Citation:

Fischlin, A., 2008. Harvested wood products - an incentive for deforestation? In: Hetsch, S. (ed.), Proceedings of the Workshop on, *Harvested Wood Products in the Context of Climate Change Policies*, UNECE/FAO Timber Section, Geneva, Switzerland, Geneva, Switzerland; 9-10 September 2008, 47pp., UNECE/FAO Timber Section, p. 8-11.

[1] Systems Ecology, Institute of Integrative Biology: Ecology, Evolution, and Disease, Departement of Environmental Sciences, ETH Zurich, Universitätsstr. 16 – CHN E21.1, 8092 Zurich, Switzerland, http://www.sysecol.ethz.ch Mailto: andreas.fischlin@env.ethz.ch

[2] **R**educing **E**missions from **D**eforestation in **D**eveloping Countries

[3] **H**arvested **W**ood **P**roducts

[4] **L**and **U**se, **L**and-**U**se **C**hange and **F**orestry

3.2 HWP - an Incentive for Deforestation?

Andreas Fischlin, Systems Ecology, Institute of Integrative Biology: Ecology, Evolution, and Disease, Department of Environmental Sciences, ETH Zurich. Zurich, Switzerland. Email: andreas.fischlin@env.ethz.ch

Forests provide many provisioning, regulating, as well as cultural, spiritual and social services (Figure 1). Forests are relevant in the context of climate change in several ways: Firstly forests are a renewable natural resource providing humans with many goods such as wood (global harvest ~3 billion m3/a, Nabuurs et al., 2007). Secondly forests are to a significant extent involved in regulating the carbon cycle. Together with other terrestrial ecosystems they sequester large amounts of carbon (globally about 25% of anthropogenic emissions, Denman et al., 2007) and store that carbon typically permanently in above-ground biomass and soil organic carbon. Total carbon stocks of the terrestrial biosphere have recently been estimated to amount to 3449 PgC (Fischlin et al., 2007), which is roughly 4.5 times more than is currently contained in the atmosphere (777 PgC). 48% of this carbon is stored by forests. Thirdly forests are subject to many pressures and changes leading at present to large losses of carbon, mainly through land-use changes.

Although average emissions have not changed much in absolute terms, they gradually decreased from one quarter to one sixth relative to total anthropogenic emissions (Table 1).

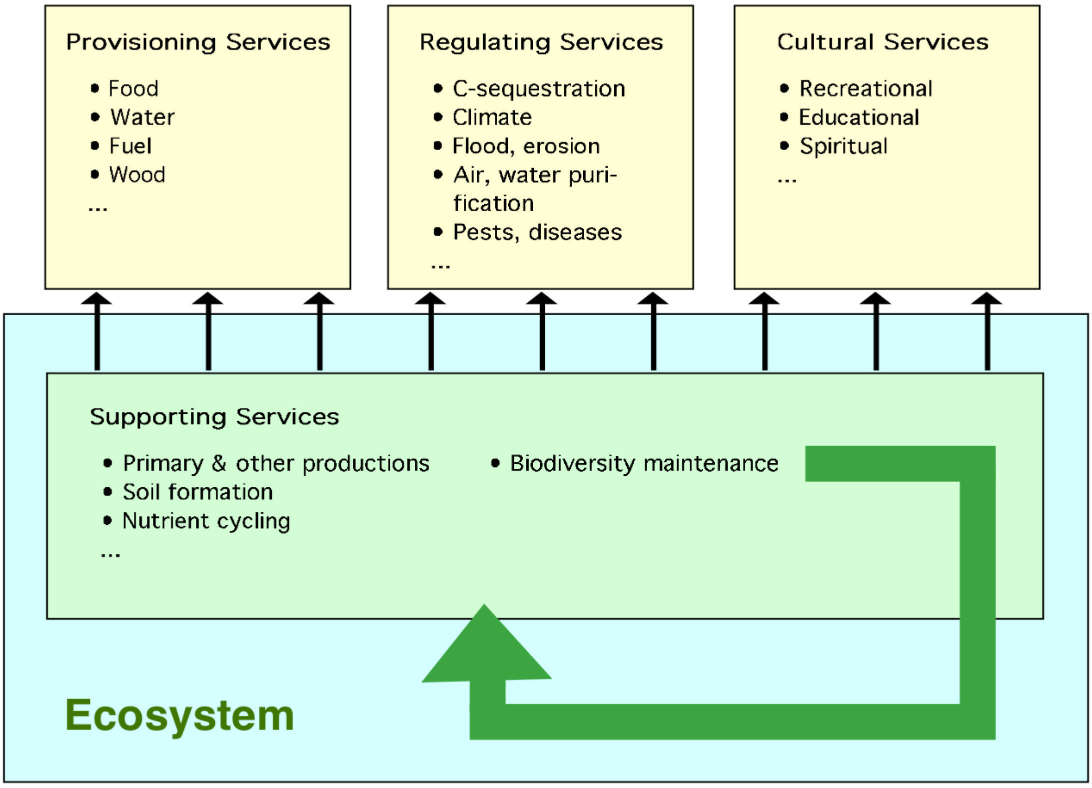

Figure 1: Services provided by forest ecosystems (after Fischlin, 2007).

Period	Emissions from land-use change, notably deforestation	Percentage of total anthropogenic CO_2 emissions	Source
1980es	1.7 ± 0.8	24%	(Watson et al., 2000, Table 2, p. 5)
	1.7 (0.6-2.5)	24%	(Prentice et al., 2001, Table 3.1, p. 190)
	1.4 (0.4-2.3)	21%	(Denman et al., 2007, Table 7.1, p. 516)
1990es	1.6 ± 0.8	20%	(Watson et al., 2000, Table 2, p. 5)
	1.6 (0.5-2.7)	20%	(Denman et al., 2007, Table 7.1, p. 516)
Present	1.5	16%	(Canadell et al., 2007)

Table 1: Evolution of significance of anthropogenic emissions from land-use change, notably deforestation, expressed as percentage of total anthropogenic CO_2 emissions in recent decades.

Attractive mitigation options (Watson et al., 2000) emerge from the services or roles, respectively, forest ecosystems play in the climate system, notably the global carbon cycle.

Article 4(d) of the UNFCCC[2] states that it is desirable to conserve or enhance reservoirs and/or sinks to mitigate climate change. Because of the significant losses through land-use changes (Table 1) reducing those emissions (cf. REDD[3] under UNFCCC) appears to be most effective compared to all other forest and forestry related mitigation measures, including the enhancement of sinks or the substitution of fossil fuels by fuel wood (Nabuurs et al., 2007), let alone storing carbon in harvested wood products (HWPs).

Nevertheless, it appears obvious that accounting HWPs under the UNFCCC as another mitigation measure, e.g. in the context of the Kyoto Protocol, would offer advantages for the following reasons:

- Current accounting schemes ignore the partial continued storage of carbon in harvested wood and debit the harvesting country with a complete CO_2 loss, even in cases where it exports wood. This constitutes a disincentive to harvesting and/or the long-term uses of wood products.
- Accounting of HWPs, however, would defer at harvest the accounting of the actual CO_2 emissions and would debit more accurately the factual emitters.
- Accounting of HWPs would create incentives for harvesting wood and is used in place of less climate-friendly materials and/or processes.

On the other hand accounting of HWPs may create unwanted side-effects such as:

- Incentives to unsustainable harvesting including deforestation in industrialized as well as developing countries

[2] United Nations Framework Convention on Climate Change http://www.unfccc.int

[3] REDD – Reducing Emissions from Deforestation in Developing Countries is an agenda item of current UNFCCC negotiations (see also keyword “Bali Roadmap”) http://www.unfccc.int

- Industrialized countries seeking credits to offset fossil fuel emissions may use HWP accounting while the wood needed to generate those credits is harvested in developing countries where additional land-use changes may result, possibly also in competition for land needed for the production of biofuels
- HWP potential is more limited than that of carbon sequestration in forest soils, since the latter offers in many circumstances unlimited storage capacity, albeit sequestration rates are low. Intact ecosystems provide an infinite storage capacity
- The substitution effect of using wood in place of alternative high emission products is significantly higher than the sequestration of carbon in HWPs and is already credited in current accounting schemes
- Unless wood is extremely efficiently harvested and processed, there may arise risks of permanent CO_2 transfers into the atmosphere compared to a mere sequestration in forest ecosystems (Fischlin, 1996)

In conclusion mitigation priorities in the forest sector are in the sequence given: REDD, sink enhancement, substitution of fossil fuel, and HWPs (e.g. Nabuurs et al., 2007). To curb the disadvantages of HWPs, some debiting of non-sustainable forest management as currently achieved through Article 3.4 of the Kyoto Protocol appears a necessity. Until effective REDD activities are implemented that provide true disincentives to deforestation, HWPs may continue to create some risk of furthering deforestations in developing countries that are not bound by the Kyoto Protocol’s Article 3.4. On the other hand, if HWP accounting is done as part of a LULUCF scheme (Schlamadinger et al., 2007) that minimizes risks of promoting deforestation and non-sustainable harvesting, HWP accounting is to be welcomed as a means to help promoting the utilization of the climate-friendly, renewable natural resource wood. The latter would help humans to progress towards a more sustainable society.

References

Canadell, J.G., Le Quere, C., Raupach, M.R., Field, C.B., Buitenhuis, E.T., Ciais, P., Conway, T.J., Gillett, N.P., Houghton, R.A. & Marland, G., 2007. Contributions to accelerating atmospheric CO_2 growth from economic activity, carbon intensity, and efficiency of natural sinks. *PNAS*, **104**(47): 18866-18870. doi: 10.1073/pnas.0702737104

Denman, K.L., Brasseur, G., Chidthaisong, A., Ciais, P., Cox, P.M., Dickinson, R.E., Hauglustaine, D., Heinze, C., Holland, E., Jacob, D., Lohmann, U., Ramachandran, S., da Silva Dias, P.L., Wofsy, S.C. & Zhang, X., 2007. Couplings between changes in the climate system and biogeochemistry. In: Solomon, S., Qin, D., Manning, M., Chen, Z., Marquis, M., Averyt, K.B., Tignor, M. & Miller, H.L. (eds.), *Climate change 2007: The Physical Science Basis. Contribution of Working Group I to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change (IPCC).* Cambridge University Press, Cambridge, United Kingdom and New York, NY, USA, pp. 499-587.

Fischlin, A., 1996. Conflicting objectives while maximizing carbon sequestration by forests. *NATO ASI Series*, **I-40**(452): 163-172

Fischlin, A., 2007. Leben im und mit dem Klimawandel – Lebensgrundlagen in Gefahr? Systems Ecology, ETH Zurich, Zurich, Switzerland, 17 pp.

Fischlin, A., Midgley, G.F., Price, J.T., Leemans, R., Gopal, B., Turley, C., Rounsevell, M.D.A., Dube, O.P., Tarazona, J. & Velichko, A.A., 2007. Ecosystems, their properties, goods and services. In: Parry, M.L., Canziani, O.F., Palutikof, J.P., van der Linden, P.J. & Hanson, C.E. (eds.), *Climate change 2007: Impacts, adaptation and vulnerability. Contribution of Working Group II to the Fourth Assessment Report of the Intergovernmental Panel of Climate Change (IPCC).* Cambridge University Press, Cambridge, UK, pp. 211-272.

Nabuurs, G.J., Masera, O., Andrasko, K., Benitez-Ponce, P., Boer, R., Dutschke, M., Elsiddig, E., Ford-Robertson, J., Frumhoff, P., Karjalainen, T., Krankina, O., Kurz, W., Matsumoto, M., Oyhantcabal, W., Ravindranath, N.H., Sanz Sanchez, M.J. & Zhang, X., 2007. Forestry. In: Metz, B., Davidson, O.R., Bosch, P.R., Dave, R. & Meyer, L.A. (eds.), *Climate change 2007: Mitigation. Contribution of Working Group III to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change (IPCC)*. Cambridge University Press, Cambridge, UK, pp. 541-584.

Prentice, I.C., Farquhar, G.D., Fasham, M.J.R., Goulden, M.L., Heimann, M., Jaramillo, V.J., Kheshgi, H.S., Le Quéré, C., Scholes, R.J. & Wallace, D.W.R., 2001. The carbon cycle and atmospheric carbon dioxide. In: Houghton, J.T., Ding, Y., Griggs, D.J., Noguer, M., van der Linden, P.J., Dai, X., Maskell, K. & Johnson, C.A. (eds.), *Climate change 2001: The scientific basis. Contribution of Working Group I to the Third Assessment Report of the Intergovernmental Panel on Climate Change (IPCC)*. Cambridge University Press, Cambridge a.o., pp. 183-237.

Schlamadinger, B., Bird, N., Johns, T., Brown, S., Canadell, J., Ciccarese, L., Dutschke, M., Fiedler, J., Fischlin, A., Fearnside, P., Forner, C., Freibauer, A., Frumhoff, P., Hoehne, N., Kirschbaum, M., Labat, A., Marland, G., Michaelowa, A., Montanarella, L., Moutinho, P., Murdiyarso, D., Pena, N., Pingoud, K., Rakonczay, Z., Rametsteiner, E., Rock, J., Sanz, M.J., Schneider, U., Shvidenko, A., Skutsch, M., Smith, P., Somogyi, Z., Trines, E., Ward, M. & Yamagata, Y., 2007. Options for including LULUCF activities in a post-2012 international climate agreement. Part I – Synopsis of LULUCF under the Kyoto Protocol and Marrakech Accords and criteria for assessing a future agreement. *Environ. Sci. Pol.*, **10**(4): 271-282

Watson, R.T., Noble, I.R., Bolin, B., Ravindranath, N.H., Verardo, D.J. & Dokken, D.J. (eds.), 2000. Land use, land-use change, and forestry - A special report of the Intergovernmental Panel on Climate Change (IPCC). Cambridge University Press, Cambridge, 377 pp.

3.3 Substitution effects of wood-based construction materials

Leif Gustavsson, Department of Engineering and Sustainable Development, Mid Sweden University. Östersund, Sweden. Email: leif.gustavsson@miun.se

Forests can play an important role to limit the atmospheric concentration of carbon dioxide (CO_2). Using products made from sustainably managed forests to replace fossil fuels and energy-intensive materials can reduce net CO_2 emission. Such substitution will affect energy and carbon balances of wood product mainly due to four mechanisms. These are the typically lower energy demand to manufacture wood products compared with alternative materials; the avoidance of CO_2 emissions from cement process reactions; the increased availability of biofuels from wood by-products that can be used to replace fossil fuels; and the physical storage of carbon in forests and wood materials.

Integrating knowledge from the fields of forestry, industry, construction, and energy, a framework was employed in a life-cycle perspective to analyse substitution effects of wood-based construction materials by using a case-study approach applied to complete buildings (Gustavsson et al. 2006). A multi-storey wood-framed building in Sweden was compared to a functionally-equivalent building made with reinforced concrete structural frame. The results show that less primary energy was needed to produce the wood-framed building materials than the concrete-frame materials. CO_2 emission was significantly lower for the wood-frame building due to reductions in both fossil fuel use and cement process reaction emission. The most important single factor affecting the energy and carbon balances was using biomass by-products from the wood product chain as biofuel to replace fossil fuels. The heat value of biomass residues from forest operations, wood processing, construction and demolition was greater than the fossil energy inputs to produce the materials in the building. These benefits might best be realised by integrating and optimising the biomass and energy flows within the forestry, manufacturing, construction, energy, and waste management sectors.

October 2008

Proceedings of the Workshop on

Harvested Wood Products in the Context of Climate Change Policies

9-10 September 2008

United Nations Palais des Nations, Geneva, Switzerland edited by

Sebastian Hetsch

UNECE/FAO Timber Section

October 2008, Geneva, Switzerland

Table of Content

3.10 Joint Forest Sector Questionnaire (JFSQ) 24