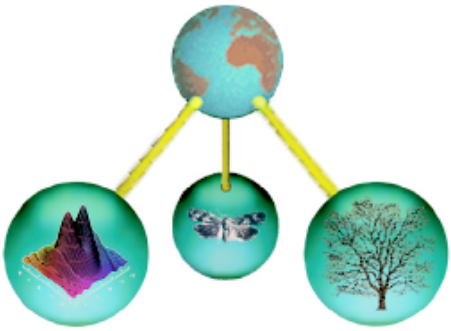

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A. Fischlin

IPCC estimates for emissions from land-use change, notably deforestation

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Swiss Federal Institute of Technology Zurich

Departement für Umweltnaturwissenschaften / Department of Environmental Sciences

Institut für Integrative Biologie / Institute of Integrative Biology

Address of the Authors:

Prof. Dr. Andreas Fischlin
Systems Ecology - Institute of Integrative Biology
CHN E 21.1
ETH Zurich
Universitaetstrasse 16
8092 Zurich

mailto:andreas.fischlin@env.ethz.ch

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Front Page:

Paddy fields from Varary, a village of the Biosphere Mananara-Nord, Madagascar. Photo by Nathalie Baumgartner (2005)

IPCC estimates for emissions from land-use change, notably deforestation

Andreas Fischlin[1]

Despite the uncertainties surrounding emissions from land-use changes, the best estimates and given our current understanding of the global C-cycle give a clear picture:

"Over the 19th and much of the 20th century the terrestrial biosphere has been a net source of atmospheric CO2, but before the end of the 20th century it had become a net sink" (Watson et al., 2001, IPCC SYR TAR, p. 44). Deforestation including degradation of previously pristine forests is a major source of carbon emissions. It is usually described as "Emissions from land-use change". The most authoritative estimates were put together by IPCC as follows:

Period	Emissions from land-use change, notably deforestation	Percentage of total anthropogenic CO2 emissions	Source
1980es	1.7±0.8	24% (= 1.7±08 / (5.5±0.5 + 1.7±0.8))	Watson et al., 2000, Table 2, p. 5,
	1.7 (0.6-2.5)	24% (= 1.7 / (5.4±0.3 + 1.7))	Prentice et al., 2001, Table 3.1, p. 190 (*)
	1.4 (0.4-2.3)	21% (= 1.4 / (5.4±0.3 + 1.4))	Denman et al., 2007, Table 7.1, p. 516
1990es	1.6±0.8	20% (= 1.6±08 / (6.3±0.6 + 1.6±0.8))	Watson et al., 2000, Table 2, p. 5
	1.6 (0.5-2.7)	20% (= 1.6 / (6.4±0.4 + 1.6)	Denman et al., 2007, Table 7.1, p. 516

All units are PgC/a or GtC/a where C is carbon, Pg is Petagram (10 to the power of 15 grams), Gt is Giga tonnes (10 to the power of 9 metric tonnes), and /a is per year flux (how much carbon enters the atmosphere from land-use changes, in particular deforestation). Ranges (±x) are 90% confidence intervals.

(*) Note that Prentice et al. (2001) give the same value for the best estimate for the 80es as Watson et al. (2000), but a slightly different uncertainty range by explicitly citing the range going from 0.6 to 2.5 PgC/a, containing all the values that were used to calculate the 90% confidence interval. Similar comments applies when comparing the IPCC SR LULUCF values with those from the IPCC AR4 assessments for the 90es (Watson et al., 2007 vs. Denman et al., 2007).

[1] Systems Ecology, ETH Zurich, Department Environmental Sciences, Universitätsstrasse 16, CH-8092 Zürich, Switzerland, andreas.fischlin@env.ethz.ch, http://www.sysecol.ethz.ch/

For the period of 2000-2006 Canadell et al. (2007) give a first estimate what the most recent emissions from land-use change are. They give a number of 1.5 PgC/a (≈16% from 9.1 PgC/a (total anthropogenic emissions), Table 1, p. 18867). But it has to be remembered that those estimates are not IPCC estimates and I consider it also premature to make estimates for the current decade. What the most recent studies indicate is that there is no significant departure from the trends as estimated previously and listed above. What can be said clearly, though, is that the emissions from deforestation go down percentage wise, since the anthropogenic emissions go so rapidly up (e.g. Raupach et al., 2007).

Another trend which is visible from above table is the tendency of the deforestation rates to slightly slow down, which is also stated by IPCC (Fischlin et al, 2007, p. 229) as follows: "Compared to the TAR (Gitay et al., 2001), the net global loss due to land-use change in forest cover appears to have slowed further". However, one must not overlook the fact over such slight improvements, that the deforestation rates are still very disturbing in their actual magnitude, up to 2% per year!

It has also to be remembered that the interannual variability of the C-cycle is considerable (e.g. Denman et al., 2007, Figure 7.4a, p. 516). This is not due to human activities. The main causes are natural variations, including El Nino events (Sarmiento & Gruber, 2002, Figure 3, p. 32) or volcanic eruptions (see e.g. Mt. Pinatubo eruption causing a clear dip in sequestration early 90es, Denman et al., 2007, Figure 7.4b, p. 516).

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