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Deforestation and Climate Change - Research Challenges -

The following are some of the research challenges that were faced during a recent WWF effort to review existing data on the contribution of deforestation to climate change (carbon emissions) in key forest areas around the world. The list is not exhaustive, but highlights key issues that should be considered as countries go about implementing initiatives in support of reducing deforestation and forest degradation (REDD). One of the most glaring need is for data that can help to properly assess and monitor progress on reductions in deforestation and forest degradation.

1. High level of uncertainty regarding the magnitude of greenhouse gas (GHG) emissions from deforestation

Error rates for this research area vary, and uncertainty levels are high, for example:

- R. Houghton (Woods Hole Research Center) suggested that there is 50 per cent uncertainty in biomass values for the tropics, and that this translates into an uncertainty level of 80 per cent for carbon flux estimates.
- Baumert et al. suggest that at the national level, the degree of uncertainty of estimates of carbon emissions could be as high as 150 per cent.
- According to the Intergovernmental Panel on Climate Change (IPCC)'s estimates, there is a gap in the global carbon budget, with a missing carbon sink of between 2-4 Gt C/y.
- The IPCC has noted that deforestation rates for the tropics could be in error by as much as 50 per cent (cited in Archard et al., 2002).

2. Data on GHG emissions from deforestation, for the most part, only takes into account carbon dioxide (CO₂) emissions

Most estimates consider CO₂ only, and not emissions of other GHG (such as methane and nitrous oxide), which means that current figures may underestimate the problem. One estimate suggests that emissions of other GHG could add up to 15 per cent to the impact of deforestation on climate change (Fearnside and Laurance, 2004).

3. Carbon emissions from deforestation are not tracked beyond initial deforestation

Estimates of carbon flux do not track the carbon beyond the initial deforestation, accounting for the use of wood products extracted and the subsequent changes in vegetation, e.g. whether it is converted to agriculture or reforested; if deforested land is reforested, the carbon initially released could be reabsorbed, but if it is converted to pasture or permanent agriculture, the net loss of carbon will be greater. If the wood is used in furniture, the carbon is "locked up" for a long time, to be released only when the furniture is destroyed.

4. Estimates of carbon emissions from deforestation vary widely, as there are vast differences in how deforestation rates are calculated

- Rates of deforestation are uncertain and vary greatly depending on:
 - how the terms “forest area” and “deforestation” are defined, and whether or not forest degradation is included in the equation;
 - what the historical reference period used is;
 - how data is collected (e.g. field studies and surveys vs. various types of remote sensing); and
 - how the data is calculated (e.g. net rates of deforestation include both losses of natural forests and increases in plantations).
- The IPCC has noted that deforestation rates for the tropics could be in error by as much as 50 per cent.
- Deforestation rates for specific forest areas are often out-of-date, unavailable, or biased/unreliable.
- FAO’s data on deforestation rates has been widely criticized (see, for example, The Rainforest Foundation, “Irrational Numbers: Why the FAO’s Forest Assessments are Misleading”).

5. There is very limited data on carbon emissions from deforestation for specific forest areas

- While national level GHG emission data exists for most countries, very little data has been aggregated at the forest level. On the whole, only indicative information is available for specific forest areas.
- At present, calculating the carbon stored in forests and also the flux of carbon between the forests and atmosphere is extremely challenging due to the lack of data on:
 - biomass values of forests, and thus the amount of carbon stored in forests;
 - the extent and quality of the world’s forests; and
 - rates of deforestation.
- Carbon content of forests varies significantly depending on the density, age and type of trees, and the soils, and further research is also needed in this area (Stern Report).
- In addition, data on the drivers of deforestation and degradation is not always up-to-date and consistent between research studies.
- FAO and the Global Forest Resources Assessment have information on forest area changes and carbon stock changes at country level and for three points in time i.e. 1990, 2000 and 2005, but these cannot easily be aggregated/disaggregated into the specific areas for which we needed information. FAO has not done any carbon emission estimates.
- R. Houghton (Woods Hole Research Center) indicated that there is a real need for detailed information on what’s there (forest area, carbon stocks) as well as current and potential changes in land use (deforestation) and changes in biomass (degradation or sequestration). There is satellite data available for such calculations to be made, but no support for doing so.



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