factsheet

No 5. November 2012 | MITIGATION

Key research findings

Forests and climate change mitigation

What policymakers should know

- **Carbon sinks:** Forests play a critical role in regulating the Earth's climate through the carbon cycle; removing carbon from the atmosphere as they grow, and storing carbon in leaves, woody tissue, roots and organic matter in soil. The world's forests absorb 2.4 billion tonnes of carbon dioxide each year, or about one-third of the carbon dioxide released through the burning of fossil fuels.[1] Forests also represent the world's most significant terrestrial carbon store, containing an estimated 77 percent of all carbon stored in vegetation and 39 percent of all carbon stored in soils; twice as much carbon as is present in the atmosphere.[2]

- **Greenhouse gas emissions:** Deforestation and forest degradation accounts for between 10 and 15 percent of global human-induced greenhouse gas (GHG) emissions[3] and the burning of peatland associated with forest clearing accounts for an additional 3 percent of emissions. These emissions are greater than the entire global transportation sector.[4] Eighty percent of these emissions stem from only 10 countries, mainly in the developing world.[5] In some countries, such as Indonesia, deforestation and forest degradation are the principal source of emissions. The loss of global forest cover also means a loss of the forests' natural capture and storage capacity, amplifying emissions from other sources.

- **Peatlands and mangroves:** Peatland forests cover about 3 percent of the Earth's land area but store as much as one-third of all soil carbon. Similarly, carbon density in mangrove forests is more than four times higher than in upland tropical forests.[6] The loss of peatland and mangrove forests contributes disproportionately to carbon dioxide emissions, biodiversity loss and to the vulnerability of coastal communities, making the conservation of these ecosystems key in the fight against climate change.

- **REDD+:** Since the 13th Conference of the Parties (COP13) to the U.N. Framework Convention on Climate Change (UNFCCC) in Bali in 2007, the UNFCCC has progressively recognised the package of measures now known as REDD+, which stands for Reducing Emissions from Deforestation and forest Degradation, as well as the conservation and sustainable management of forests, and the enhancement of forest carbon stocks in developing country forests. At the COP16 in Cancun in 2010, REDD+ was officially incorporated into the UNFCCC's agreement on climate change. At COP17 in Durban in 2011, negotiators agreed on monitoring guidelines as safeguards for REDD+ implementation and on the means for developing estimates of emissions that would have occurred in the absence of REDD+ (i.e., reference emission levels).

  Reference levels (RLs) and reference emission levels (RELs) are most commonly used as a business as usual baseline to assess a country's performance in implementing REDD+ (UNFCCC 2011). RLs are needed to establish a reference point or benchmark against which actual emissions (and removals) are compared. In fact, emissions reductions cannot be

defined without having first agreed on the RL, which is therefore critical for gauging the effectiveness or forest carbon impact of REDD+ policies and activities. New research[7] at CIFOR on a stepwise approach provides guidance on how countries with little data can begin to develop RL, and can improve their estimates as better data becomes available.

- **The + in REDD+**: Managing standing forests better, and expanding tree cover through socially- and environmentally-responsible reforestation and restoration, are cost- and time-effective strategies to conserve and enhance carbon stocks and mitigate climate change[8], as well as to facilitate adaptation. Integrating the + in REDD+ with carbon conservation in agricultural systems capitalises on the potential of whole-of-landscape responses to climate change[9].

- **Doing REDD+ well:** CIFOR's Global Comparative Study of REDD+ is providing negotiators, policymakers and implementing agencies with the information they need to design REDD+ architecture and implementation strategies. A CIFOR study published in June 2012 called *Analysing REDD+* says that REDD+ is moving ahead, but at a slower pace and in a different form than expected five years ago. The study takes stock of REDD+ and asks: How has REDD+ changed and why? How is REDD+ unfolding in national policy arenas? What does REDD+ look like on the ground? What are the main challenges in designing and implementing REDD+? And, what are the choices for making REDD+ more effective, efficient, and equitable?

- **Learning to measure GHG emissions:** Recent research by CIFOR has revealed major capacity gaps in the ability of most tropical forest-rich nations to measure and monitor the amount of greenhouse gas emissions they save by safeguarding their forests. Eighty-nine out of ninety-nine tropical countries had 'very large to medium' gaps between what is required for REDD+ monitoring under national circumstances and their current capacities.[10] The study is intended to help direct international efforts to increase capacity in developing countries to monitor, report and verify (MRV) changes in their greenhouse gas emissions.

Notes

1 Pan, Y. *et al*. 2011 A large and persistent carbon sink in the world's forests, 1990-2007. Science. Vol. 333.

2 The Eliasch Review 2008 Climate change: financing global forests. Office of Public Sector Information, Information Policy Team, Kew, Richmond, Surrey TW9 4DU. http://www.official-documents.gov.uk/document/other/9780108507632/9780108507632.pdf (16 November 2012).

3 van der Werf, G.R. *et al.* 2009 CO_2 emissions from forest loss. Nature Geoscience 2: 737–738.

4 IPCC 2000 Land use, Land-use change and forestry. Cambridge University Press, Cambridge, UK.

5 WRI 2008 CAIT: Climate Analysis Indicators Tool. World Resources Institute, Washington D.C.

6 Donato, D. *et al*. 2011 Mangroves among the most carbon-rich forests in the tropics. Nature Geoscience: 4, 293–297.

7 Herold, M. *et al*. 2012. A step-wise framework for setting REDD+ forest reference emission levels and forest reference levels. CIFOR, Bogor, Indonesia.

8 Paquette, A. and Messier, C. 2010 The role of plantations in managing the world's forests in the Anthropocene. Frontiers in Ecology and the Environment, 8(): 27–34; Putz, F.E. and Romero, C., 2012. Helping curb tropical forest degradation by linking REDD+ with other conservation interventions: a view from the forest. Current Opinion in Environmental Sustainability, 4. http://dx.doi.org/10.1016/j.cosust.2012.10.003

9 Campbell, B. 2009. Beyond Copenhagen: REDD+, agriculture, adaptation strategies and poverty. Global Enviromental Change, 19(4): 397–399; DeFries R. and Rosenzweig C. 2010. Toward a whole-landscape approach for sustainable land use in the tropics. Proc Natl Acad Sci USA, 107:19627-19632.

10 Romjin, E. *et al*. 2012 Assessing capacities of non-Annex I countries for national forest monitoring in the context of REDD+. Environmental Science & Policy. 19–20, pp. 33–48. http://dx.doi.org/10.1016/j.envsci.2012.01.005.

This fact sheet was produced by CIFOR as part of the CGIAR Research Program on Forests, Trees and Agroforestry. This collaborative program aims to enhance the management and use of forests, agroforestry and tree genetic resources across the landscape from forests to farms. CIFOR leads the program in partnership with Bioversity International, CIRAD (Centre de coopération internationale en recherche agronomique pour le développement), the International Center for Tropical Agriculture and the World Agroforestry Centre.