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POLICY BRIEF

NATURE.ORG/CLIMATECHANGE | JUNE 2009

KEY POINTS

- Including forest degradation is essential to a robust REDD framework that accounts for the major sources of forest carbon emissions.
- The magnitude of emissions from forest degradation represents at least 30% of total emissions from the forest sector.
- Credible and affordable methods for measuring the major forms of forest degradation exist.
- Effective strategies for reducing emissions from forest degradation are available.

Don't Forget the Second "D"

The Importance of Including Degradation in a REDD Mechanism

Including Degradation is Critical

While deforestation is often the main focus of discussions on land-based greenhouse gas emissions, forest degradation is also a significant source of emissions. Degradation generally refers to the gradual reduction of biomass within the forest without resulting in land use conversion. Within this gradual process, forests can remain degraded for a long time before being converted to other uses. Therefore, policies that address deforestation rates will not automatically capture degradation. Failing to explicitly include degradation in REDD frameworks could thus leave considerable amounts of forest-based emissions unaccounted for. In some cases, forest degradation may result in combined carbon losses of the same magnitude as deforestation.[1,2]

Additionally, degradation is often an important precursor for deforestation. Figure 1 illustrates a common cycle of increasing degradation that eventually leads to the complete conversion of land to other uses. By explicitly dealing with degradation, a REDD mechanism could stop this progression and preserve forests largely intact, before they have suffered the degrading impacts of the activities shown in the figure. This not only prevents emissions, it is also critically important for preserving biodiversity. Finally, incorporating degradation into a REDD framework is also critical for channeling incentives to the diverse range of stakeholders involved in the spectrum of activities that determine the fate of forests and their carbon emissions. It is therefore critical that policies on REDD include forest degradation.

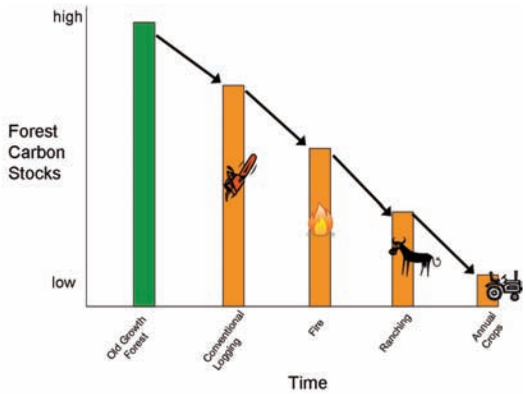

Figure 1

Forest transitions often start with degradation before complete conversion. The phases and timing of these transitions depend upon location. For example, in Indonesia, oil palm or other tree crops may replace ranching.

Figure 2

An example of a forest that has suffered degradation.

What is Degradation?

The United National Framework Convention on Climate Change (UNFCCC) and the Intergovernmental Panel on Climate Change (IPCC) employ a minimum crown cover criterion of 10% to differentiate between forests and non-forests. If crown cover is reduced below this threshold, deforestation has occurred. Forest degradation, on the other hand, occurs when the carbon stock of a forest is reduced below its natural capacity, but not below the 10% crown cover threshold. This means that the term "degradation" refers to activities that destroy up to 90% of the forest. This level of destruction can result in substantial amounts of emissions that will not be addressed within a mechanism that includes only deforestation, as currently defined.

Sources of Emissions from Degradation

The major sources of human-induced degradation are:

- **Timber harvesting**: Timber harvesting leads to degradation through the direct removal of trees, through collateral damage to live trees by logging equipment and skid trails, and by increasing the effects of drought, windthrow, and fire in forest fragments.
- **Fire**: Human-induced fire, often associated with agricultural clearing, can escape into forests, resulting in reduction of forest carbon stocks. Ecologically appropriate prescribed burning would not be considered degradation since it often leads to no net loss of carbon stocks or even to an increase of carbon stocks in the long-term.
- **Fuelwood harvesting**: Significant reductions in forest carbon stocks can result from fuelwood harvesting either (i) by individuals, where population pressure is strong, sustainable practices are not used, and alternative fuels are not available, or (ii) due to commercial felling of large trees for direct sale to urban areas or for the production of charcoal.

The Magnitude of Emissions from Degradation

While papers exist that report estimates for emissions from the individual sources of degradation listed above, a comprehensive estimate of overall global emissions from degradation does not yet exist. Very preliminary research estimated that a minimum of 4.4% of total tropical emissions from deforestation result from degradation.[3] However, this study notably did not account for emissions from most forms of selective logging, understory fire, or fuelwood harvesting, which are considered to be the main sources of degradation emissions. More recent studies using the latest techniques estimate that degradation represents a significant proportion of emissions from the forest sector:

- Selective logging in the tropics is conservatively estimated to contribute 0.51 GtC globally per year, or 30% of emissions from deforestation.[4]
- Recent logging impacts in the Brazilian Amazon cover an area about the same as deforestation, and account for 20% of forest carbon emissions in that region.[5]
- During El Niño years, carbon emissions associated with understory fire in the Brazilian Amazon have caused 10% to 45% of total forest carbon emissions.[6]
- In Africa, the annual rate of area degraded is almost 50% of the rate deforested.[7]
- While very little information exists about emissions from fuelwood harvesting, it accounts for 40% of global removals from forests,[8] and is therefore likely to be a significant source of emissions.

Credible Methods for Measuring and Monitoring Degradation Exist

Recent scientific advances now allow for efficient, cost-effective, and reliable remote detection of logging and fire across large areas. While older techniques were unable to detect logging and fire activity within forests, these new methods allow countries to reliably and affordably map the extent of these activities. Two methods, in particular, utilize sophisticated analysis of free and publicly-available Landsat data to detect impacts of logging and fire.

The Carnegie Landsat Analysis System (CLAS)[5] offers a fully automated and standardized method for evaluating the "fingerprint" of satellite images to determine logging sites across large areas of forest. This system has been used successfully in Brazil to identify areas that have been selectively logged.[5] The Souza et al. method takes an additional step to identify forest degradation not only from logging but also from understory fire.[9] This method is currently being tested over large areas in Brazil.

Complemented by centuries-old field methods for determining carbon stocks (e.g., soil sampling and tree measurements), these new approaches can reduce the time, expense, and uncertainty associated with measuring and monitoring degradation.

Very sophisticated, yet more costly, methods have also been developed to overcome challenges associated with cloud cover and the need to ground-truth satellite imagery with labor-intensive field observations. Lidar-based methods combined with software developments are able to measure tree canopy structure (e.g., crown diameter, height) to estimate biomass with many fewer ground measurements and are being piloted across the country of Panama. Radar-based approaches have been developed to reliably penetrate areas with cloud cover and also take canopy structure measurements. While these techniques are still prohibitively expensive for most users, prices are dropping rapidly.

Strategies to Reduce Degradation

Effective strategies for reducing emissions from forest degradation exist and many have been employed for years to protect standing forests. Strategies that are currently available to address degradation on the ground include:

Reduced Impact Logging

Reduced impact logging (RIL) involves techniques, such as directional felling and cutting of vines from trees, to minimize damage to surrounding areas. Several studies reveal that RIL methods may directly decrease carbon emissions per unit of wood extracted by 30% to 50%[10,11,12] based on metrics like residual tree damage and mortality and the amount of area/soil disturbed by logging. As an example, RIL resulted in 43% lower committed emissions as compared to conventional logging in Malaysia.[13]

Figure 3

Logs certified by the Forest Stewardship Council (FSC). © Ami Vitale

Forest certification

Forest certification incorporates RIL and can produce additional carbon benefits due to social and environmental provisions. The direct and indirect carbon benefits from Forest Stewardship Council (FSC) certification, for example, include the following:

a. Harvest levels are reduced to sustainable levels within production forests;

Figure 4

Prescribed burning in pine forests of Belize in order to reduce the risk of catastrophic fire. © Ron Myers

Figure 5

Agroforestry can provide food, income and fuelwood through more sustainable land-use systems. © Mark Godfrey

b. More biomass is retained through identification of conservation zones, special management zones, High Conservation Value Forests, and stand-level provisions that call for leaving more trees on-site;
c. Social conflicts, which often lead to degradation, are reduced through requirements regarding tenure and use rights, provision of community benefits, stakeholder outreach, and dispute resolution;
d. Carbon impacts from unauthorized encroachment and extraction, illegal logging, or from wildfire and pest/disease outbreak are reduced through management systems, personnel training, monitoring programs, and mitigation measures put into place as part of certification.

Fire Management

Integrated Fire Management (IFM), is an approach to address the problems and issues posed by both damaging and beneficial fires within the context of the natural environments and socio-economic systems in which they occur, by evaluating and balancing the relative risks posed by fire with the beneficial or necessary ecological and economic roles that it may play in a given conservation area, landscape, or region.[14] IFM can be used to reduce carbon emissions in fire-dependent ecosystems by maintaining natural fire regimes (thereby preventing catastrophic events) and in fire-sensitive ecosystems by preventing understory fires.

Improved Forest Governance

Deforestation and forest degradation throughout the tropics are caused by a suite of inter-related factors stemming from poor forest sector governance. Solutions to these complex challenges include:

a. Administrative Responsibilities: Simplifying decision-making and providing resources to appropriate authorities to ensure compliance with forest policies.
b. Institutional Capacity: Providing government agencies with the manpower, skills, equipment and financial resources to implement and enforce laws.
c. Cross-Sector Collaboration: Instituting mechanisms for inter-agency policy-making, planning and implementation, as many land use sectors have direct impacts on each other (e.g., forestry and agriculture).
d. Data/Information Management: Utilizing new technologies to provide accurate and timely information on forest resources and incorporate a more comprehensive suite of forest values.
e. Transparency: Employing open decision-making processes and providing information to stakeholders on use rights, management planning and harvest.

Fuelwood Management

Several strategies exist that are geared to alleviate the degrading pressures of fuelwood collection, which is a major driver of degradation and deforestation in several developing countries. The negative impacts of fuelwood collection can be mitigated through a variety of land management and improved cooking regimes,including:

1. Agroforestry: Employing systems that combine trees and shrubs with crops and/or livestock to create more diverse, productive, and sustainable land-use systems that can provide food and income as well as fuelwood.
2. Afforestation/Reforestation: Planting trees on cleared or degraded lands to provide a new source of fuelwood for communities.
3. Windbreaks and windrows: Strategically planting trees or woody shrubs to protect crops from wind damage, improve productivity, and provide a source of fuelwood.
4. Fuelstoves: Replacing wood-burning stoves with models that burn other fuels, such as methane from agricultural waste, can reduce the need for fuelwood while improving indoor air quality.

Conclusion

Degradation is a major source of greenhouse gas emissions and an important precursor to deforestation. Including forest degradation is essential to a robust REDD framework that credibly accounts for the major sources of forest carbon emissions. Reliable and affordable methods now exist for measuring and monitoring the major forms of forest degradation and effective strategies for reducing emissions from forest degradation are currently available and in use around the world.

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