Drivers for change

UN-REDD Programme's Linda Rosengren considers the role of agricultural expansion and REDD+ when it comes to determining deforestation…

Every year approximately 13 million hectares of forest – an area as big as Portugal – are deforested, resulting in mass emissions of carbon dioxide into the atmosphere.[1] This contributes approximately one-fifth of the total global greenhouse gas emissions.[2] Forests are not only crucial for the world's carbon cycle; tropical forests also contain at least two-thirds of the world's terrestrial biodiversity and maintain a range of ecosystem services hard to evaluate in monetary terms.[3] There is, moreover, strong evidence that trees outside forests also play a crucial role in supporting sustainable livelihoods and promoting food security. An estimated 1.6 billion people, more than 25% of the world's population, rely on forest resources for their livelihoods, and of these almost 1.2 billion live in extreme poverty.[4]

The inclusion of a financial mechanism referred to as Reducing Emissions from Deforestation and Forest Degradation (REDD+) within a post-2012 United Nations Framework Convention on Climate Change (UNFCCC) treaty is currently under negotiation. Under a REDD+ scheme, developing countries that reduce their rate of deforestation and forest degradation resulting in a reduction in carbon emissions from the forestry sector would be paid carbon offsets by industrialised countries that are obliged to offset their greenhouse gas emissions. REDD+ provides a unique opportunity to give a monetary value to the carbon stored in standing forests. Until now, income from the forestry sector was mainly derived by extracting timber and non-timber forest products, and from converting the land to other uses such as pasture for cattle ranching or crop cultivation.

For any REDD+ scheme to be successful, these drivers of deforestation, especially in the agricultural sector, must be understood and addressed.

Understanding deforestation drivers

Deforestation drivers can be divided into so-called 'immediate' and 'underpinning' drivers. The underpinning drivers of an increased pressure on forests are[5] (see Fig. 1):

- Demographic factors, such as population growth, population density and migration;

- Economic factors, such as market growth, economic structures, commodity booms;
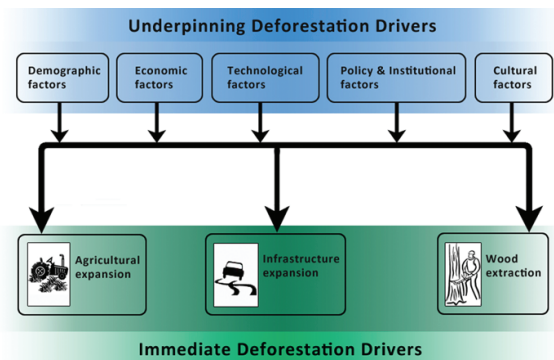

Fig. 1: The flow chart describes the interaction between the two levels of deforestation drivers; the so-called underpinning and immediate deforestation drivers[6]

- Technological factors, such as agro-technical change;

- Policy and institutional factors, such as conservation, climate and development policies, tenure rights, corruption, mismanagement, access to credit; and

- Cultural factors, such as public values, household behaviour.

Actual cutting of the trees is due to the so-called 'immediate' deforestation drivers. Agriculture expansion is the most important immediate deforestation driver.[7] Infrastructure development and wood extraction also contribute to deforestation but not to the same extent. All three drivers are, however, closely interlinked. In the
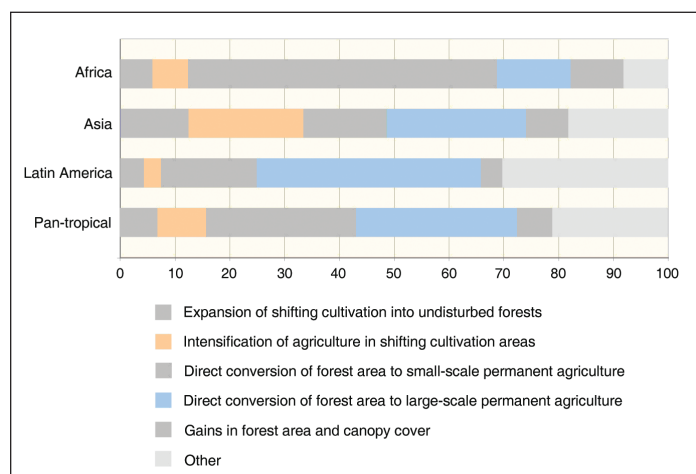

Fig. 2: Deforestation drivers per region between 1980 and 2000 expressed in %[10]

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Moema Mills sugar cane field in Brazil

tropics during the 1980s and 90s, more than 80% of new agriculture land came from intact and disturbed forests.[8] In Africa, forest degradation is caused mainly by small-scale farming and fuel wood collection, while in Latin America it is driven more by large-scale agriculture, especially extensive cattle production. In the Asia-Pacific region, deforestation drivers are more diverse but the agriculture sector is still the most important (see Fig. 2).[9]

Agriculture in focus

A growing global population increases the demand for new land to produce food, feed and fuel. The decision of a farmer to cut the forest and plough the land often depends on a complex matrix of underlying deforestation drivers as explained above. The ground rule is, however, simple: in most cases the farmer will choose to do whatever will bring him the largest financial gains. Easily accessible areas with fertile soil in areas permitting rainfed agriculture or areas with sellable tree species are generally cleared first.[11]

Higher prices for farm outputs generally induce forest conversion. The impact of a price increase depends on the agriculture system applied: extensive cattle production requires more land than intensive vegetables cultivation. Likewise, higher timber prices put pressure on old growth forests but create at the same time incentives for reforestation.[12] In the case where the farmer has an opportunity to earn a wage in a neighbouring farm, plantation or town, there is less incentive to use forests for subsistence farming or low value crops.[13]

Technological improvements of agriculture practices, such as the introduction of a genetically improved plant species that yield more crops or mechanised ploughing systems, may either increase or decrease pressure on forests.[14] In order for the new technologies to be adopted by farmers, they usually make agricultural work less labour-intensive, which may lead to increased unemployment. These unemployed people may clear new land in forest margins to produce food. Improved technologies may also attract more people to an area in case farm profit improves along

with the introduction of the new technology. In-migration may also increase pressure on forest frontier areas. However, intensification of agriculture systems may decrease the pressure on forests in some instances but may also lead to increased greenhouse gas emissions. An example of this are policies that subsidise fertilisers. An increased use of fertilisers could not only lead to higher yields but also to augment greenhouse gas emissions from the fertilisers.

The above reflect just some examples of many scenarios of deforestation drivers. The dynamics will depend on the type of agriculture system, level of development, remoteness from markets, commodity booms, etc.

A value on standing forest through REDD+

Demand of agriculture products is expected to increase by approximately 50% by 2050, thus continuing the pressure on forest areas.[15] Tropical countries will be called on to meet much of this demand of increased agriculture products, and so it is critical to establish an economic mechanism, such as REDD+, to place value on standing forests.

REDD+ will generate incomes from the offsets created when emissions from the forestry sector are reduced. It is still not established whom the final beneficiaries of the REDD+ credits will be, but tenure rights will likely be a fundamental component in determining this. REDD+ incomes will need to exceed the so-called 'opportunity cost' of cutting down trees, and this opportunity cost will vary from country to country. For example, the opportunity cost in Brazil to substitute cattle ranching is considerably higher than the opportunity cost for subsistence farming in Tanzania as Brazilian large-scale cattle ranching is more profitable. In the present cap and trade scheme under the Kyoto Protocol, the value of a carbon credit is the same globally no matter the origin, and the value fluctuates over time. Assuming the same scheme would be applied to REDD+, it would have implications in which countries REDD+ credits would be profitable to produce. Other factors such as political stability, incentives, and level of

development and infrastructures may also determine in what country it would be more profitable to apply REDD+.

If a country estimates that it will be worth adapting it, then supporting national policies need to be put in place that provide incentives to diminish pressure on forests. These incentives could be targeted at supporting sustainable agriculture through market oriented or technological incentives taking into consideration the local deforestation drivers. There is many times a trade-off between forest conservation and poverty reduction goals, which will be a challenging task to deal with. There is no single formula to guarantee a successful REDD+ scheme. Solutions need to be tailored not only on a national but also on a sub-national level to meet the specific deforestation drivers in the area in question.

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Young Massai woman carries fuelwood collected near Mount Neru in Tanzania

Conclusions

Agriculture is the main deforestation driver in the world and is linked to a number of other deforestation drivers such as population growth, commodity booms and technological improvements. It is difficult to make general conclusions on the causes of agriculture expansion and they need to be observed on a case to case basis.

REDD+, a climate change mitigation mechanism, offers a unique opportunity to put a monetary value on standing forests. In order to maximise the benefits of the REDD+, deforestation drivers need to be analysed and understood. As the agriculture sector is the main deforestation driver, it needs to be taken into consideration when drafting national REDD+ strategies. Designing suitable incentives that diminish pressure on forests without jeopardising poverty reduction objectives is a complicated puzzle that needs to be carefully analysed so that both sustainable livelihood and climate change goals are achieved.

[1] Global Forest Resources Assessment 2010: Key Findings Food and Agriculture Organization of the United Nations, Rome, Italy

[2] Climate Change 2007: Synthesis Report. Contribution of Working Groups I, II and III to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change. IPCC, Geneva, Switzerland

[3] Gardner T, Barlow J, Chazdon R L, Ewers R, Harvey C A, and Sodhi N S, 2009. Prospects for tropical forest biodiversity in a human-modified world. Ecology Letters, 12: 561-582

[4] A revised forestry strategy for the World Bank Group. Washington DC. USA, The World Bank 2001

[5] Geist H J and Lambin E F, 2002. Proximate Causes and Underlying Driving Forces of Tropical Deforestation. BioScience. Vol. 52 No. 2. p. 143-150

[6] Ibid

[7] Ibid

[8] Gibbs H K, Ruesch A S, Achard F, Clayton M K, Holmgren P, Ramankutty N, Foley J A, 2010. Tropical forests were the primary sources of new agriculture land in the 1980s and 1990s. PNAS Early Edition

[9] Global Forest Resources Assessment 2000. FAO

[10] Ibid

[11] Chomitz K M, 2007. At Loggerheads? Agriculture Expansion, Poverty Reduction and Environment in the Tropical Forests. The World Bank

[12] Ibid

[13] Angelsen A and Kaimowitz D, 1999. Agriculture Technologies and Tropical Deforestation. CABI Publishing in association with CIFOR

[14] Ibid

[15] Gibbs H K, Ruesch A S, Achard F, Clayton M K, Holmgren P, Ramankutty N, Foley J A, 2010. Tropical forests were the primary sources of new agriculture land in the 1980s and 1990s. PNAS Early Edition

Coxhead I and Demeke B, 2004. Panel Data Evidence on Upland Agriculture Land Use in the Philippines: Can economic Policy Reforms Reduce Environmental Damages? American Journal of Agriculture Economics 86 (5): 1354-60

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