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Deforestation and Climate Change

Forest Area Key Facts &
Carbon Emissions
from Deforestation

Introduction

Deforestation has been an issue for decades, leading to massive loss of species and biodiversity. While governments and non-governmental organisations have worked hard to control it, there has never been a real motivation, or urgency to act until now.

Tackling the problem is complex and needs a coordinated global effort. So what's new now? Well the eyes of the world are now focussed on the issue, given it is widely acknowledged that deforestation is the third largest source of greenhouse gas emissions, generating between 15-20 per cent of overall carbon emissions. There is a real opportunity to get global cooperation through a new Kyoto Protocol that sets targets for reducing industrial emissions as well as emissions from deforestation and forest degradation. But only if politicians are prepared to make bold moves and act.

To help inform and focus discussions on the issues and relevant places, WWF has produced a series of fact sheets on deforestation and climate change in some of the world's key forest areas: the Amazon, the Congo Basin, the Forests of Sumatra and Borneo, Russia and Canada's Boreal Forests, and the forests of Australia and Madagascar. The fact sheets provide information on each of these forest areas, including deforestation rates and estimated carbon emissions from deforestation. Much of the information has been obtained through a literature review of publicly available information. It should be noted that there are gaps in the information available that made the task of putting together these fact sheets challenging. (See *annex on research challenges*.) And while we had aimed to produce fact sheets on as many key forest areas in the world as possible, the lack of data on carbon emissions from deforestation for specific forest areas hampered our efforts. We will need such basic data if these areas are to be ready for work on REDD (Reducing Emissions from Deforestation and forest Degradation).

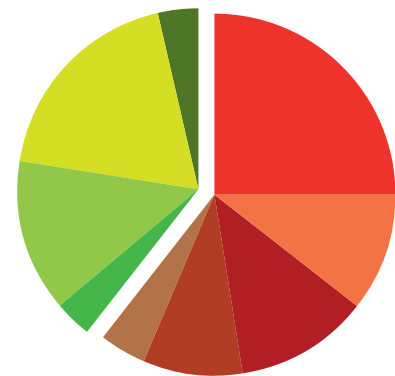
This companion document to the fact sheets, describes in general how deforestation contributes to climate change, and highlights some key issues covered in the fact sheets. Detailed references for the information here may be found in the forest area fact sheets.

- Over the past 30 years, the Amazon has lost more than 520,000 km² of forest. The loss continues at up to 27,000 km² annually since 1990, an area almost the size of Belgium.
- Recent estimates of rates of deforestation in Russia's forests are as high as 20,000 km² annually, comparable to the annual deforestation rate in the Brazilian Amazon.
- Central Africa has lost approximately 9.1 million hectares of forests between 1990 and 2000. Current estimates put the region's annual deforestation rate at nearly half a million hectares a year.
- Indonesia has lost vast areas of its peat swamp forests mainly through burning. Of the remaining 22.5 million hectares of peat swamp left, 9 million are drained, decomposing or burning.



Figure 1: Global greenhouse gas emissions in 2000, by source

Sector	MtCO ₂	%
Energy	24,722.3	60.6
Electricity & Heat	10,276.9	25.2
Manufacturing & Construction	4,317.7	10.6
Transportation	4,841.9	11.9
Other Fuel Combustion	3,656.5	9.0
Fugitive Emissions	1,629.3	4.0
Industrial Processes	1,406.3	3.4
Agriculture	5,603.2	13.7
Land-Use Change & Forestry	7,618.6	18.7
Waste	1,465.7	3.6



Source: WRI, CAIT, 2007.

The importance of forests

Forests purify our air, preserve watersheds and improve water quality and quantity, stabilize soil and prevent erosion, provide us with natural resources such as timber products and medicinal plants, and are home to many of the world's most endangered wildlife species. In addition, an estimated 1.6 billion people worldwide rely on forests for their livelihoods, with 60 million indigenous people depending on forests for their subsistence.

Another critically important function of forests increasingly and widely acknowledged now is that they help to protect the planet from climate change by absorbing carbon dioxide (CO₂), a major greenhouse gas.

Forests as carbon storehouses

It is now widely recognized that rising concentrations of so-called greenhouse gases (GHGs) are driving changes in the Earth's climate patterns, resulting in catastrophic weather events, such as hurricanes, heat waves, droughts and floods, and threatening plant and animal life.

Forests play a critical role in protecting the Earth from climate change and regulating climate patterns, as the trees – trunks, branches and roots – and even soil absorb and store CO₂, providing a natural reservoir for this GHG. In fact, the Earth's vegetation and soils currently contain the equivalent of approximately 7500 Gigatonnes (Gt) of CO₂ – that is more carbon than is contained in all the remaining oil stocks on the planet and more than double the total amount of carbon currently in the atmosphere.

However, when forests are destroyed or degraded by activities such as logging and conversion of forests to

agricultural land, they release large quantities of CO₂ and other GHGs, and become a significant (and, for some developing countries, a primary) source of GHG emissions and contributor to climate change.

Deforestation and climate change

Estimates on the contribution of deforestation to carbon emissions vary, but are commonly held to be around 19 per cent of global emissions – greater than those emissions produced by the whole of the global transport sector (Figure 1). The bulk of emissions from deforestation arises when land is converted to agricultural production, particularly if forests are first cleared with burning.

The potential for forests to become even greater sources of carbon emissions due to deforestation and degradation is massive. Examples can be found from forest areas across the globe, including Russia's boreal forest, the forests of the Congo Basin, and Sumatra's peat swamp forests.

Deforestation is continuing at an alarming rate. Once distributed over half the planet, forests now cover only a quarter of its land surface – and forest loss, particularly in the tropics, is continuing at an alarming rate. Figures released by the UN Food and Agriculture Organisation (FAO) in 2005 indicate that the rate of natural tropical forest loss is about 13 million hectares each year – equivalent to 36 football fields a minute. Beyond the tropics, there has been a significant loss of old-growth forests and the replacement of natural forests and woodlands with single-species plantations that provide few of the environmental, ecological and social benefits of native forests.

While afforestation and reforestation are important, and helpful for supporting reduced emissions in many

Forests and the Carbon Cycle

A natural carbon dioxide cycle keeps the amount of this greenhouse gas in our atmosphere in balance. Decaying plants and animal respiration release natural CO₂ into the atmosphere, where it stays for about 100 years. It is removed from the atmosphere by

photosynthesis in plants and by dissolution in water (for instance, in the oceans).

The amount of naturally produced CO₂ is almost perfectly balanced by the amount naturally removed. But changes, no matter how small, can upset this equilibrium.

The Amazon - carbon sink and source

The Amazon forests store 90-140 billion tons of carbon, equivalent to 9-14 years of current global, annual, human-induced carbon emissions. There are, however, concerns that these forests could become a net source of CO₂ rather than a sink (storage). Deforestation and forest degradation in the Amazon are already releasing the carbon into the atmosphere. Current rates of deforestation imply an estimated carbon release of around 200 million tons a year.

A Ticking Time-Bomb in Russia's Boreal Forest

One of nature's best defenses against climate change, the world's largest frozen peat bog in Russia's western Siberia, is melting. The sudden melting of this million square kilometer bog (the size of France and Germany combined), could unleash billions of tonnes of a greenhouse gas called methane (20 times as potent as CO₂) into the atmosphere.

A Vast Carbon Store-House in the Forests of the Congo

While not currently a large global source of carbon emissions, the potential for dramatic increases in carbon emissions from deforestation in the Congo Basin is massive. The forests here are estimated to contain between 25-30 billion tonnes of carbon in their vegetation alone. This is equivalent to about 4 years of current global anthropogenic emissions of CO₂. Over half of this carbon is stored within the Democratic Republic of Congo's forests, making it the world's fourth largest forest carbon reservoir.

CO₂ in Sumatra's Peat Swamps

The peat swamps of Sumatra, Indonesia, play a major role in regulating global climate. Together with Indonesia's other peat swamps, they store more CO₂ per unit area than any other ecosystem. But peat swamp degradation is resulting in massive carbon emissions. Every year, Indonesia emits 6.5 times as much CO₂ from degraded peat swamps as it does from the burning of fossil fuels. If peat swamp emissions are included, Indonesia ranks among the world's top 10 polluters.

places, stopping deforestation and forest degradation is more urgent from a climate perspective. It takes decades for a sapling to grow and absorb the amount of carbon that is released when a mature tree decays.

Forest protection – a key to fighting climate change

Reducing deforestation and degradation is a highly cost-effective way of reducing GHG – one that can be done immediately if the drivers of deforestation are addressed strategically. If done right, it can also benefit biodiversity conservation and people.

Forests play a critical role in the carbon cycle as they store carbon, and exchange it with the atmosphere through photosynthesis and respiration. They are also sources of atmospheric carbon when they are disturbed by natural or human causes, such as fire and conversion.





The second phase of the Kyoto Protocol should include mechanisms that recognise and provide incentives for REDD, while ensuring that REDD-related emissions are truly additional to industrial emission reductions. The REDD approach should be science-based, rigorous and address a range of accounting issues, including establishment of baselines, assessment of rates of degradation and how to account for them, and verification of emissions reduction.

Countries need to develop national frameworks to tackle forest-based emissions. WWF is supporting REDD activities in developing countries, including capacity building. WWF is also developing high standards for REDD initiatives to ensure that they are sound and well-implemented, benefit local livelihoods and respect the rights of indigenous people and other local communities.

Reducing deforestation and forest degradation must be part of the solution to the global climate problem. WWF's Climate Solutions report indicates that if emissions from deforestation and forest degradation are not curbed, the likelihood of success in preventing dangerous climate change is drastically reduced.

Forests and Climate Change - a vicious circle?

While forests play an important role in mitigating climate change, they also are impacted by climate change. The Intergovernmental Panel on Climate Change (IPCC) estimates that at least one-third of the world's remaining forests may be adversely affected by changing climate. Impacts include forests becoming drier, leading to more and severe forest fires, and more vulnerable to pests and diseases. In extreme cases, previously forested areas could become grassland, steppe or desert. Dying or degraded forests in turn release the carbon they store to the atmosphere.

We need to boost forests' resilience and resistance to climate change by implementing adaptive measures. These include avoiding forest fragmentation, preventing conversion to high-intensity forestry, and maintaining natural disturbance regimes such as fires.



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