

The Root of the Problem

WHAT'S DRIVING TROPICAL DEFORESTATION TODAY?

Timber and Pulp



Union of Concerned Scientists

Citizens and Scientists for Environmental Solutions



CHAPTER 7

Timber and Pulp

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FORESTS CAN BE A RENEWABLE source of materials. Most people use wood products every day—furniture, paper, plywood, building material, railroad ties, and newsprint are all made from wood. Unlike fossil fuels and metals, wood supply is renewable, and compared to steel, concrete, plastic, and brick, wood is a low-energy and low-emissions material for packaging and building, especially when it is not the cause of deforestation (Aulisi, Sauer, and Wellington 2008; Fruhwald, Welling, and Scharai-Rad 2003). There is a role for forest management to meet some of the global demand for these products; however, unsustainable wood harvesting has many negative environmental impacts. International trade in wood products creates a market worth billions of dollars per year, and some of the wood products are made from tropical trees extracted from primary forests or other unmanaged areas.

Wood is utilized across the world in many ways. Unprocessed wood is used mostly as a fuel (see Chapter 8). Processing logs usually leads to one of two materials: timber or pulp. Timber is made by cutting and sawing logs, and is used for products like furniture, railroad ties, plywood, utensils, tools, or as building material for bridges and buildings. The term “timber” is used differently across the world; in this chapter it refers to any solid wood product cut from a log. Pulp is the product of chemically treating wood, leaving only the fibers. It is used to make many kinds of paper including newspaper, writing paper, paperboard, and toilet paper; therefore, the industry is often referred to as “pulp and paper.” Both timber and pulp products can be recycled to various degrees, and many of the products listed above can be made from recycled material.

Global Demand for a Renewable Resource

The global market for wood and wood products creates pressure on tropical countries to destroy their forests



Wood can be used to produce timber or pulp, which is used to make paper

and produce cheap timber and pulp. This demand has increased logging (the cutting and removal of trees) of tropical forests and is a major driver of deforestation. If demand for furniture, paper, building materials, and other wood products continues to increase, primary tropical forests will likely remain at risk for logging.

Furthermore, logging can interact with other drivers of deforestation. In many instances logging creates partially cleared areas, which become accessible by logging roads, and can therefore be more easily converted to agriculture, preventing the forest from growing back. Logging and land use conversion are closely connected, because timber sales from logging may provide the money used to replace the forest with a new agricultural business or timber plantation. In other tropical forests, logging is used only to remove the dense forest so that agriculture can move into the area, leaving the trees to rot or be burned to make room for the new

field or pasture. On the other end of the spectrum are forests recovering from unsustainable practices. These secondary forests can help recover the lost tropical forest area, and in some cases be a source of timber. Secondary forests can be managed to supply products for generations, but doing so will require careful planning and management.

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Selective Logging: Unmanaged Demand for Valuable Trees

Degraded forests are areas where some kind of human action—usually logging, grazing, or fire—has affected the forest but the area has not been totally cleared. Degradation can mean loss of trees, shrubs, carbon, biodiversity, and soil nutrients, and in extreme cases can alter a forest for many decades. Forest degradation mainly occurs because there is a demand for wood products, and natural forests are being used, but not fully cleared, to supply these products.

In most cases, degradation begins with the removal of just a few highly valuable or useful trees per hectare, but the combination of tree removal and the associated damage to residual trees can destroy from 28 percent to as much as 62 percent of the trees in the forest (Gerwing 2002). This removal of only highly valuable species, without cutting the whole forest, is known as selective logging. Although tropical forests are richly diverse, relatively few of their tree species are used by the timber industry (Southeast Asia is an exception, as detailed in the section Production from the Tropics). Economically, it is important to have access to these select trees, yet the rest of the species are ignored because financially there is no reason to take them out of the forest. Since taking wood out of the forest costs money to put it on a truck, pay the driver, and pay for gasoline, there is no reason to remove trees that will not sell for at least as much as the costs associated with their removal and hauling.

The damage due to selective logging can dry out the forest and leave it more susceptible to fires and expansion of other extractive activities (Box 7.1), which cause further degradation. However, it is difficult to measure rates of forest degradation since either on-the-ground monitoring or analyses of high-resolution remote images are necessary (Asner et al. 2010). In recent years it has become clear that forest degradation

BOX 7.1.

Degradation from Harvesting Non-Timber Forest Products

Communities that depend on forests can support their livelihoods in many ways beyond timber. The forest also produces fruit, seeds, medicine, meat, and oils—all known as non-timber forest products. In some cases the roads built for selective logging can increase access to remote forests, leading to unsustainable extraction of non-timber products and degradation of the forest (Laurance et al. 2006). For example, unsustainable hunting can degrade the forest because loss of animal species affects the entire forest system, changing seed-dispersal pathways, food webs, plant herbivory patterns, and populations of plant pests (Nasi and Van Vliet 2009).

On the other hand, sustainably sourced non-timber forest products can encourage forest protection and support community development policies and plans

(Kusters, Achdiawan, and Belcher 2006). For example, in Brazil large areas of the Amazon are specifically set aside as extractive reserves. In these areas the forest is protected from clearing, but communities are involved in managing and harvesting non-timber products, most often natural rubber. Such broad policies to protect the forest while allowing for production of non-timber forest products may be necessary to ensure that the income from products is not used, in turn, to log the forest (Escobal and Aldana 2003). In addition to non-timber forest products, incentive policies that include direct payments for environmental services, such as conservation management of forests, can be competitive with timber and agricultural products and simultaneously support forests and communities (Hardner and Rice 2002).

is a widespread problem in the tropics. For example, from 1972 to 2002, 2.9 million hectares in Papua New Guinea (almost 9 percent of the forests there) were selectively logged (Shearman et al. 2009). In addition, a detailed remote sensing study of the Peruvian Amazon estimated that degradation through selective logging accounted for 27 percent of the area disturbed by humans (Asner et al. 2010).

A recent global estimate using satellite imagery calculated land areas that were selectively logged between 2000 and 2005. It found that about 28 percent of the humid tropical biome in Asia and Oceania was selectively logged in this time period, compared with 20 percent in Africa, 18 percent in South America, and 5 percent in Central America and the Caribbean. Globally, this means up to 20 percent of the world's humid tropical forests were subjected to some wood removal between 2000 and 2005 (Asner et al. 2009).

In many cases although very few of the trees are removed by selective logging, it is still a step toward complete forest cover loss. In the Amazon, degradation leads to complete forest cover loss in subsequent years about 25 percent of the time, and globally between 1990 and 2000 28 percent of new agricultural land was created at the expense of degraded and secondary forests (Gibbs et al. 2010; Foley et al. 2007).

Through deliberate and careful efforts, degraded forests can be restored or managed for sustainable production. Restoration techniques include protecting the degraded forest from future unsustainable extraction, taking actions to prevent fires, and replanting key species (Elias and Lininger 2010).

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Industrial logging in the Amazon

Timber Cutting and Forest Clearing

Where Does It All Go?

Global gross annual output of wood is about 3.5 billion cubic meters (United Nations Environment Programme 2009). Table 7.1 lists annual production rates of many wood products, both globally and from the tropics. Comparing tropical production (column 3) with global production (column 2), it is clear that tropical logging produces only a small portion of the world's wood products. However, it is likely that greater production in the future will come from developing

Table 7.1. Annual Production of the Most Common Wood Products, 2009

Product	Global Production	Tropical Production ¹
Newsprint	32.6 Mmt	2.6 Mmt
Printing and writing paper	105 Mmt	15.3 Mmt
Plywood	80.3 Mm ³	13.3 Mm ³
Sawnwood (wood cut into boards, lumber, planks, etc.)	362,000 Mm ³	72.8 Mm ³

Wood is measured in cubic meters. A cubic meter (m³) is about 35 cubic feet—a volume that would make a very comfortable doghouse for a large dog like a Saint Bernard. Paper products, on the other hand, are measured by weight (FAO 2010). Note that the FAO data is self-reported by countries, and therefore, subject to error and non-comparability.

Mmt: million metric tons
Mm³: million cubic meters

1 Values compiled from available data for those countries included as tropical production countries in International Tropical Timber Organization 2009.

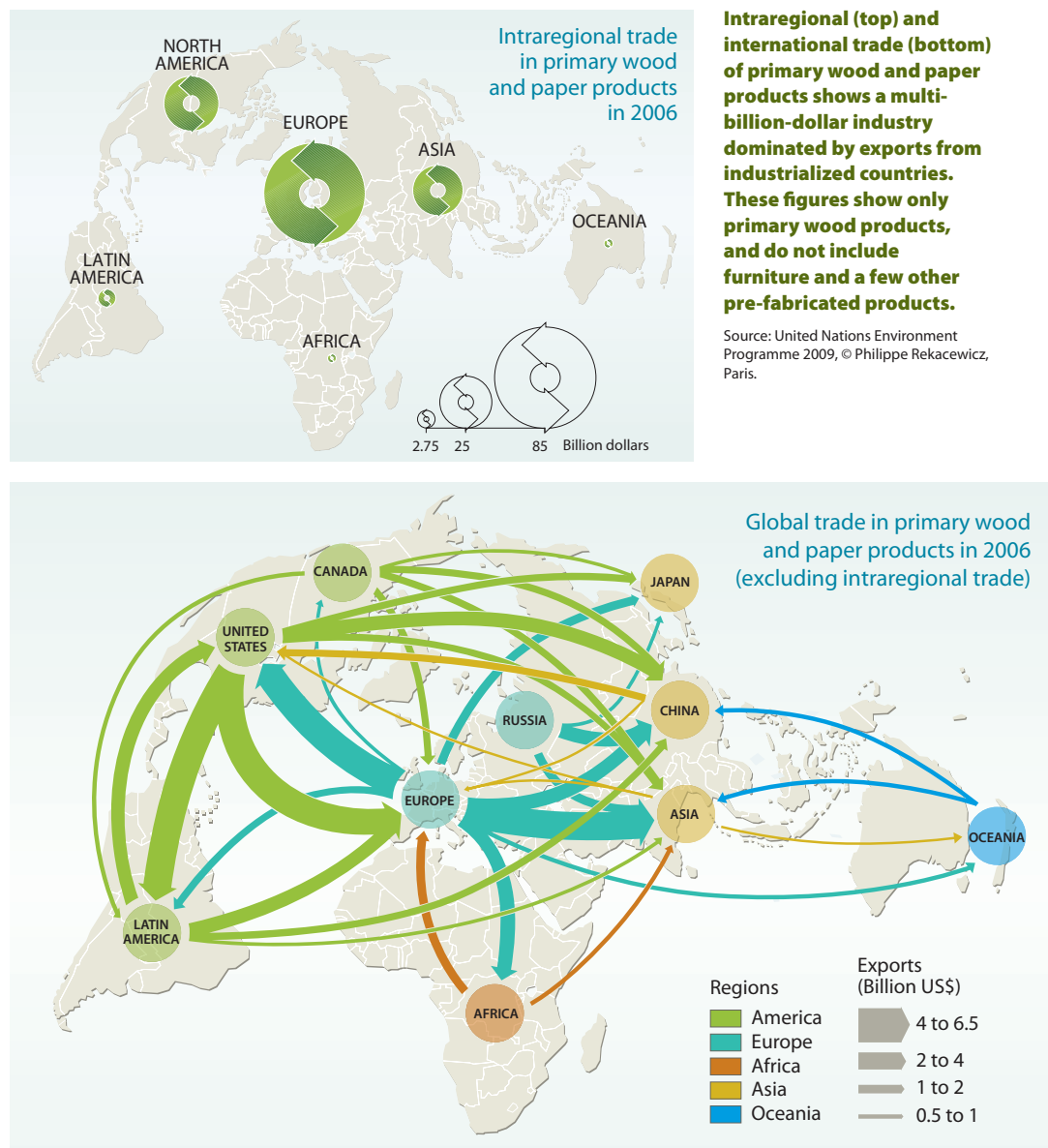
countries, since the rate of deforestation and plantation expansion is very low in North America and Europe, costs are lower in developing nations, and tropical climates are suitable for fast-growing trees (United Nations Environment Programme 2009).

Global trade of paper and primary wood products—including unprocessed logs and lumber that are not manufactured into secondary products like furniture or pre-fabricated houses—is a multi-billion-dollar business (Figure 7.1). In the United States many of these paper and primary wood products come from regional trade with Canada. Also, the growing demand in

rapidly industrializing nations (e.g., Brazil, China, and India) has and will likely continue to affect international trade (Whiteman 2005).

Secondary wood products (e.g., furniture) also create a demand for wood. In 2000, the top 15 exporters of furniture included six developing countries: Brazil, China, Indonesia, Malaysia, Mexico, and Thailand (Kaplinsky et al. 2003). However, some of this furniture is made from wood that was imported. China, for example, imported \$93.5 million worth of pre-cut wood from Brazil, \$85.4 million from Indonesia, and \$66.2 million from Malaysia in 2008 (FAO 2011).

Figure 7.1. Global Trade of Primary Wood and Paper Products, 2006



Most of the exports of furniture and other wood products go to Canada, the United States, Europe, Japan, Australia, and New Zealand. Together, these countries are responsible for 85 percent of global end-use consumption of logs (Contreras-Hermosilla, Doornbosch, and Lodge 2007). However, international trade of tropical hardwoods has been decreasing in the early years of the twenty-first century (Ghazoul and Sheil 2010).

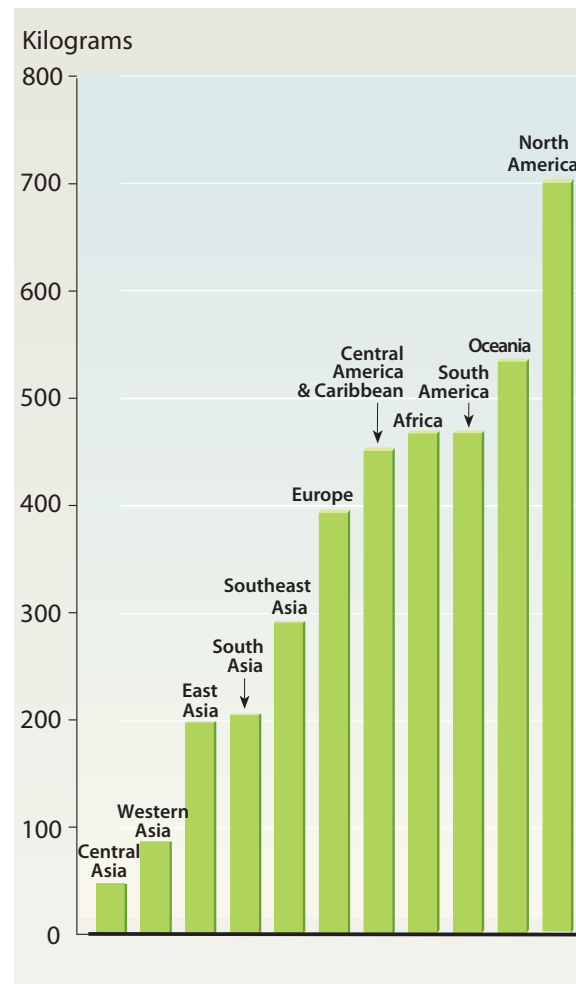
Over the past decade the largest increase in demand for forest products has been in pulp and paper. Current demand in Asia is so high that even though production within the region is growing, it is still a net importer (Aulisi, Sauer, and Wellington 2008). Pulp and paper is a big business, even in developing coun-

Timber and pulp are becoming an important part of the economies of many tropical nations. However, there is very little benefit to the communities losing their forests. Large, often multi-national, forest product companies leave very little income from logging in local communities.

tries. Integrated paper product companies, which own their entire value chain from the forests to the chemical treatment and paper production facilities, are increasingly important. In 2006 Oji Paper of Japan had the highest revenue among global integrated paper product companies at \$10.4 billion. The fifth and sixth highest were Asia Pulp and Paper of Singapore at \$4.4 billion and Suzano of Brazil at \$1.4 billion (Aulisi, Sauer, and Wellington 2008).

Over the past few decades there has been a general shift in production and demand of wood products. In the past most demand came from developed countries, and this was met through domestic or regional production, but now new countries are cutting their timber to meet the increasing global demand for wood products, as well as the growing demand within their own countries (Ghazoul and Sheil 2010). For example, global production of paper and paperboard increased by 40 percent worldwide from 1996 to 2005, while consumption of paper and paperboard products from the United States dropped by 7 percent just between 1999 and 2003 (Ince and Buongiorno 2007). There were similar trends in consumption and export of U.S.

Figure 7.2. Per Capita Wood Consumption by Region, 2004



North American wood use is highest and Asian is lowest, with similar mid-level consumption rates in Europe, Africa, and Latin America.

Source: United Nations Environment Programme 2009, ©Philippe Rekacewicz, Paris.

wood products, with pulp, lumber, plywood, logs, and wood chips peaking in the late 1990s and now declining.

Therefore, at the same time that demand is growing in rapidly expanding economies like China, the demand of developed countries (Figure 7.2) now benefits from a supply chain by which low-price tropical logs become low-price global furniture and paper. However, there is very little benefit to communities losing their forests. Large, often multi-national, forest product companies leave very little income from logging in local communities (Larson and Ribot 2007). Timber and pulp are becoming an important part of the economies of many tropical nations as they are, or have been, in



Truck carrying logs out of the Malaysian rain forest

developed countries. For example, timber exports make up 5 percent of Indonesia's exports, 4 percent of Brazil's, 2 percent of Malaysia's, and 1 percent of Thailand's, but fully 24 percent of Gabon's. In the United States, by comparison, forest products account for about 2 percent of exports.²

Production from the Tropics

Over the past few decades both timber and pulp production have increased in Asia, Latin America, and other regions outside of the traditional areas of North America and Europe (Aulisi, Sauer, and Wellington 2008). Still, tropical countries make up only a small portion of total global exports (Table 7.1 and Figure 7.1).

Compared with other regions, logging as a direct driver of deforestation is most important in Southeast Asia (Rudel et al. 2009). Indonesia is the leading example of how powerful timber and pulp companies and illegal logging have caused deforestation. Unlike other tropical forests, many parts of Indonesia have very high densities of commercially valuable species, making wholesale logging much more profitable than in other parts of the world (Curran et al. 2004). Many

of the tropical forests of Southeast Asia are dominated by trees of the dipterocarp family (Dipterocarpaceae), which is found almost exclusively in this region. This family of trees is dominant and widespread over much of Indonesia, Malaysia, southern Thailand, and part of the Philippines, where it accounts for the majority of the biomass. Logging dipterocarps can be very successful because many of the species that compose the family can be grouped together (e.g., as "meranti") for logging, production, and marketing (Primack and Corlett 2005). Furthermore, markets in Indonesia accept a wide range of logs from many species, sizes, and quality (Corlett 2009). Finally, palm oil plantations, a common enterprise for which land is converted, require years rather than months to start generating income. Timber income helps support businesses during this lag time.

Timber and palm oil concessions from federal and regional governments play an important role in deforestation in Indonesia. Currently all Indonesian forests fall into one of three use categories: production (about 56 percent), protection (about 26 percent for protecting ecosystem services), and conservation (about 18

2 These values were calculated by comparing FAOStat export values with the International Trade Centre's Trade Performance values (<http://www.intracen.org/menus/countries.htm>).

percent for protecting their intrinsic value) (Arnold 2008). In the production category, the government allows deforestation and land use conversion, but even protected areas are subject to illegal logging (Broich et al. 2011; Curran et al. 2004).

While logging is particularly important in Southeast Asia, there are other regions where timber and pulp are driving deforestation as well. In Brazil, the timber industry, both legal and illegal, is extensive but often overshadowed by high levels of forest conversion caused by other drivers of deforestation (see Chapters 4 and 5) (Lawson and Macfaul 2010). While traditionally timber has not been an important driver of deforestation in Africa (Fisher 2010), it may be growing in importance. In Central Africa,³ 30 percent of the forest is under logging concessions, including 45 percent of Gabon's land area. This means the areas planned for logging could change over in the next decade (Laporte et al. 2007; Laurance et al. 2006). In the Democratic Republic of the Congo, logging roads are expanding at a rapid rate and commercial logging for valuable timber species, like African mahoganies, is expected to increase in the future (Laporte et al. 2007). However, a recent analysis concluded that increasing government management of timber land planning in South America and Central Africa could promote sustainable forest practices by providing financial incentives to keep land areas forested over the long term (Karsenty et al. 2008).

Illegal Logging

Some of the wood production from the tropics occurs as illegal logging, which includes removing trees from protected areas, failing to pay taxes and fees for timber, cutting protected species, stealing wood from the rightful owners, and/or removing more timber than allowed from a given area. Illegal activities can occur anywhere along the production chain that transforms a standing tree to a wood product like furniture or paper (Contreras-Hermosilla, Doornbosch, and Lodge 2007). Illegal logging is difficult to track but is generally considered to be about 40 percent of all logging in the tropics (Contreras-Hermosilla, Doornbosch, and Lodge 2007). In response to a survey, local experts and government officials in five tropical countries estimated that the extent of illegal logging was 70 percent of overall log production in the Brazilian Amazon, 60 percent in Ghana and Indonesia, 35 percent in Cameroon, and 25 percent in Malaysia (Lawson and Macfaul 2010).

However, these same officials also thought that, compared with agriculture and legal commercial logging, illegal logging was not the most important cause of forest clearing.

The actors in illegal logging can vary by region and country. In Indonesia evidence suggests that these illegal activities are conducted by large-scale timber industries that have depleted their legal allocations or by palm oil producers looking to expand plantation area (Lawson and Macfaul 2010). Similarly, in other parts of Asia large-scale industries are common agents of illegal logging (Contreras-Hermosilla, Doornbosch, and Lodge 2007).

Optimistically, there is some evidence that illegal logging is decreasing in the tropics due to media attention, consumer campaigns by nonprofit organizations, private sector efforts, and international policies. Unfortunately, in some areas it may also be due to the fact that so much of the forest has already been deforested. Overall, compared with peak rates, a new analysis estimates that degradation was avoided on 17 million hectares of forest between 2000 and 2009 because of reduced rates of illegal logging (Lawson and Macfaul 2010).

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Logging and the Other Drivers of Deforestation

Demand for wood products can also interact with other drivers of deforestation. In these cases forests are cleared, logs are used, and the area is not retained as forest, but for agriculture. This can occur in two ways: selective logging as a step toward changes in land use or wholesale clearing of a forest with the explicit goal of conversion to agriculture.

Selective logging usually leaves the rest of the forest somewhat degraded, and therefore, easier to clear for crop or pasture. In the Brazilian Amazon, selectively logged areas are four times more likely than unlogged areas to be fully cleared in subsequent years (Asner et al. 2006). In other areas, particularly in Southeast Asia, logging makes it financially possible to convert the land to another use. In these cases, timber sales provide initial income to the businesses clearing the

3 Cameroon, Central African Republic, Equatorial Guinea, Gabon, Republic of Congo, and Democratic Republic of Congo

land, allowing them to convert the land to agriculture for a slow-growing crop such as palm oil. These areas where two sources of potentially substantial revenue provide the impetus for land use change (timber and palm oil) are of particular concern because preventing deforestation by providing incentives for alternatives may be especially difficult and expensive (Fisher et al. 2011).

Finally, in many areas the forest is cleared without timber production. Between 1990 and 2000, intact, undisturbed forests were the source of 55 percent of new agricultural land in the tropics (Gibbs et al. 2010). While in some cases the logs from these forests were

When plantations are planted to restore degraded areas and then managed in a sustainable way, they may serve to meet the growing global demand for timber and pulp.

sold, there are many instances in which these forests were simply cut and burned to create crop or pastureland—other factors, not wood products, were the drivers of the deforestation (see Chapters 4, 5, and 6) (Lawson and Macfaul 2010; Fearnside et al. 2009).

Meeting the Demand for Forest Products: Is Sustainability Possible?

The focus of this chapter so far has been degradation or clearing of primary forests—those that are relatively undisturbed and considered native, natural, wild, tropical forests. However, wood production in the tropics can also come from plantation forests deliberately created for extraction. Forest plantations are simply any area with planted trees, and can range from industrial-scale rows of identical trees to small patches of many different hand-planted species (although the first approach is much more common). Plantations can have both benefits and drawbacks, depending on how they are managed and where they are located. When planted to restore degraded areas and subsequently managed in a sustainable way, they may serve to meet the growing global demand for timber and pulp.

Industrial Plantation Forests

Across the tropics about 1.4 percent of the land area is covered with forest plantations. In Africa the proportion is 0.3 percent and in Latin America 0.4 percent,

but in the Asia-Pacific region it is almost 5 percent (International Tropical Timber Organization 2009). In the Asia-Pacific region, India and Thailand make up 90 percent of the plantation area, and in Latin America, Brazil accounts for 65 percent.

However, plantation area is rapidly expanding in the tropics. Between 1999 and 2005, the total area of tropical plantations increased at an average rate of 8.6 percent per year (9.4 percent in Asia and the Pacific, 8.8 percent in Africa, and 4.3 percent in Latin America and the Caribbean) (International Tropical Timber Organization 2009). In some countries where deforestation occurred decades ago, plantations were later established in order to increase forest cover. Examples include India, Thailand, and Ghana.

Plantations can produce almost any wood product, and often the trees grow very quickly. In the tropics 24 percent of the monoculture plantations are eucalyptus, 18 percent are pines, 17 percent are rubber, 17 percent are teak, and 9 percent are acacias (International Tropical Timber Organization 2009). *Eucalyptus* is a fast-growing genus that is generally used for pulp and building material. Pine plantations are used most often for building materials and pulp. Rubber plantations are used for rubber and latex as well as wood products like building materials. Some acacia species grow quickly and are used for pulp and paper. However, other species of acacia as well as teak grow more slowly, producing stronger woods that can be used for furniture, beams, and other higher-end wood products. Additionally, some tree plantations are used for non-wood products, like palm oil, rubber, and gum arabic (see Chapters 3 and 6).

It is difficult to determine how much of the world's wood products come from plantations; however, there are indications that production is moving away from primary forests and onto plantations (FAO 2010). India is an example of a country that has increased plantation area and wood production, while keeping most of its remaining primary forests intact (FAO 2010).

As a tool for reforestation, plantations can be beneficial. They can prevent soil erosion, combat desertification, and maintain water quality (Pokorny, Hoch, and Maturana 2010). However, replacing primary forests with monoculture production plantations has many negative environmental impacts. First, monocultures do not provide the same diverse, complex habitat as primary forests, thus reducing levels of animal and plant diversity (Brockerhoff et al. 2008). Also, substituting plantations for primary forests increases carbon

dioxide emissions since young, small trees replace the large, old, carbon-rich ones (Liao et al. 2010). Finally, in some cases plantations need intensive management, requiring much water and fertilizer. This can augment water scarcity problems, and fertilizer runoff can cause local pollution (Kennan and Van Dijk 2010).

Restoring Degraded Forests and Reforesting Abandoned Land

Regeneration of degraded forests and reforestation of abandoned fields provide ways to increase tropical forests in places that have already experienced degradation and deforestation. Once reforested, these areas also may play an important role in meeting global demand for wood products, and managing these forests for production can reduce pressure on primary forests. According to the Global Partnership for Forest Landscape Restoration (2009) there are over 200 million hectares of degraded forest or abandoned land in the tropics that could easily be restored.

Mixed-species secondary forests can provide ecological diversity and complexity while supplying wood products (Lamb 1998). Managing these forests will require careful planning regarding where, when, and how to harvest; how to smooth the transition between the species planted in secondary forests and those remaining in primary forests (to improve biodiversity across the entire landscape); and making sure that sustainable management activities are profitable and incentivized (see the summary of relevant literature in Elias and Lininger 2010).

Mixed-species secondary forests can be very productive, and can be deliberately planted on highly degraded sites that cannot naturally regenerate. A study in tropical Australia compared mixed-species plantations and monoculture plantations, finding that most species were more productive (grew more quickly) when planted in mixes than in monocultures (Erskine, Lamb, and Bristow 2006). In addition, mixed-species and complex plantations provide ancillary benefits for animal biodiversity, protection against insect and pathogen attacks, and diversity of wood production.

Recent evidence indicates that substantial amounts of logging can move into other countries from developing countries working to decrease their own logging and increase their forest cover (Meyfroidt, Rudel, and Lambin 2010). Therefore, production from secondary forests, especially those on degraded lands, as an alternative to importing wood may be a critical step in protecting primary forests across the globe.

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The Forest Stewardship Council is a voluntary certification program providing timber producers with the opportunity to meet globally approved standards of sustainable management

Sustainable Management of Tropical Forests

It is likely that wood production from tropical forests will continue to grow over the next several decades. Therefore, to ensure that production does not lead to further destruction of tropical forests, wood products should come from either secondary forests or plantations, and demand growth rates should be slowed.

Strategies

Because tropical deforestation is meeting a global demand for wood products, it is likely that international policies and practices will be needed to adequately address this issue (Meyfroidt, Rudel, and Lambin 2010). Currently two international policies are in place or being developed that may help address timber as a driver of deforestation. Some of the 2008 amendments to the U.S. Lacey Act aimed to ensure that timber supply chains are legal by establishing the first ban on importing illegally sourced wood products (Environmental Investigation Agency 2008). The European Union is working on similar policies (Gulbrandsen and Humphreys 2006). Also in development are programs for direct voluntary, government, or commercial payments for conservation and sustainable management of tropical forests. Two of the most well known are payment for environmental services (PES) programs and reducing emissions from deforestation and forest



Doug Boucher

Reduced-impact logging practices include vine cutting, which prevents vines from pulling down trees that should remain standing

degradation, plus related pro-forest activities (REDD+) (see Chapter 11). These kinds of initiatives may provide income to local communities equal to those of timber concessions (Hardner and Rice 2002).

Reducing demand for tropical wood products may also help minimize pressure on these forests. Replacement—using a different species to create the same product—can be a useful tool in reducing pressure on primary forests. This can promote the use of species found in natural secondary forests or those that can be grown in plantations instead of species from primary forests. Often this simply requires changing consumer

demand, but in other cases it may require research to determine how the properties of some species, such as strength, can be replicated by secondary forest or plantation species. Consumers can also purchase products with certification seals from an array of organizations that provide third-party verification of sustainable practices (see Chapter 11).

Recycling wood products has increased significantly over the past two decades, and with political support will continue to do so (Whiteman 2005). Improvements in recycling technology, availability, and financial support have increased, and can continue to increase, recycling efforts, which can further reduce pressures on primary forests.

On managed forests reduced-impact logging techniques may also support conservation. Practices for reduced-impact logging include training loggers, carefully identifying trees to log, cutting fewer trees, using animals (rather than machinery) to remove logs, and harvesting only under favorable soil-wetness conditions (Putz et al. 2008).

Improvements in recycling technology, availability, and financial support have increased, and can continue to increase, recycling efforts, which can further reduce pressures on primary forests.

Successes

There are success stories showing the feasibility of sustainable management of tropical forests. In Mexico, communities balance production and conservation. Forests here provide economic value from both timber and non-timber forest products such as coffee. They are also managed in such a way that protects biodiversity and provides for production over the long term (Bray et al. 2003). Community forestry has been successfully practiced in other countries as well, including Bolivia, India, Nepal, and the Philippines.

Voluntary certification programs provide timber companies with the opportunity to meet globally approved standards of sustainable management. One of the largest certification programs, the Forest Stewardship Council (FSC), has a specific set of criteria for managing tropical forests that is currently used on 16.7 million hectares of tropical forest (Forest Stewardship Council 2011). Voluntary certification programs are unlikely to solve deforestation problems

alone; however, they can support government initiatives (Ebeling and Yasué 2009) and provide consumers with an opportunity to affect forestry practices. In the future, certification programs could be expanded to include impacts on a variety of issues of concern to consumers, including application of reduced-impact logging, protection of clean water and biodiversity, sustainable replanting techniques, and local community involvement.

Consumers and activists have also been able to put pressure directly on companies causing deforestation. Campaigns exposing the fact that illegal logging and commodities like palm oil are causing deforestation in Indonesia have had a significant impact on industry. Illegal logging appears to be decreasing, and large producers of palm oil have pledged to stop producing in newly deforested areas (Greenpeace International 2011; Lawson and Macfaul 2010).

Future Growth

International demand for wood creates a market worth billions of dollars per year, some of which is supplied

through logging of primary tropical forests. Because supply from developed countries continues to fall while demand grows globally, it is likely that pressure on tropical forests will continue over the next couple of decades, causing degradation from selective logging as well as complete forest clearing. The timber and pulp industries are growing as drivers of tropical deforestation, and if demand continues to increase they can become even more important. However, sustainable production from forests is possible.

There are opportunities to reduce the pressure for deforestation and forest degradation caused by timber and pulp production in the tropics. First, increasing recycling, product replacement, and consumer awareness can help reduce the global demand for wood products from primary tropical forests. Second, production from restored and reforested areas provides an opportunity to supply wood while protecting primary forests. By managing forests on degraded land or abandoned agricultural land, tropical countries can continue to supply wood products while reducing pressure on their primary forests.



Logging in Guyana

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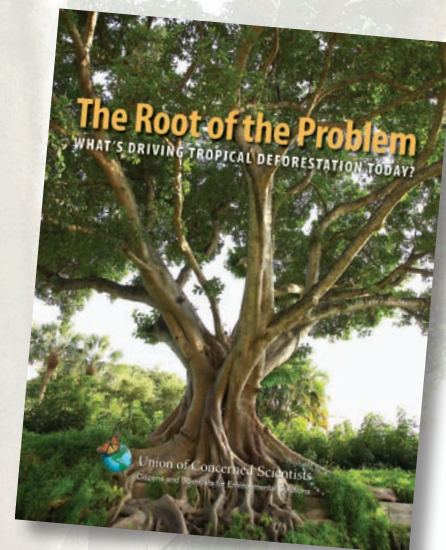
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The Root of the Problem

WHAT'S DRIVING TROPICAL DEFORESTATION TODAY?

Deforestation and forest degradation have been occurring for thousands of years. Both are important sources of global warming pollution, as well as threats to biodiversity and the livelihoods of forest peoples. Thus it is important to understand the causes of these changes—the “drivers” of deforestation.

In this report we focus on the economic agents that currently play a critical role in deforestation, as well as agents that have played a historical role in deforestation (to determine their role today).



Background and Context

- Chapter 1: Introduction
- Chapter 2: Population and Diet
- Chapter 3: Tropical Forest Regions

Agents of Deforestation

- Chapter 4: Soybeans
- Chapter 5: Cattle and Pasture
- Chapter 6: Palm Oil
- Chapter 7: Timber and Pulp
- Chapter 8: Wood for Fuel
- Chapter 9: Small-Scale Farming and Shifting Cultivation

Solutions and Successes

- Chapter 10: Successes
- Chapter 11: Development without Deforestation

The full report, executive summary, and chapters are available online (in PDF format) at www.ucsusa.org/whatsdrivingdeforestation.

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About the Union of Concerned Scientists

The Union of Concerned Scientists (UCS) is the leading science-based nonprofit working for a healthy environment and a safer world. UCS combines independent scientific research and citizen action to develop innovative, practical solutions and to secure responsible changes in government policy, corporate practices, and consumer choices. More information is available about UCS at www.ucsusa.org.

About the Tropical Forest & Climate Initiative

The Tropical Forest & Climate Initiative (TFCI) is a project of the UCS Climate and Energy Program. TFCI analyzes and promotes ways to cut global warming pollution by reducing tropical deforestation. To learn more about this work, visit www.ucsusa.org/forests.

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