
State of the rainforest

2014



State of the rainforest 2014

Editor: Ellen Hofsvang

Cartographer: Riccardo Pravettoni

Layout: GRID-Arendal

Contributors text: Frances Seymour, Miriam van Heist, Tasso Azevedo, David Hill, Kamilla Berggrav, Riccardo Pravettoni, Marine Gauthier, Siri Gilbert, Maria Guzmán-Gallegos, Bård Lahn, Christian Nellemann, Hanne Jørstad, Johan Knagenhjelm, Vemund Olsen, Lars Løvold, Nils Hermann Ranum, Ellen Hofsvang.

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Preface

Humankind can celebrate impressive progress in the last generation: People live longer, fewer children die, more people learn to write and read, and the percentage of people in extreme poverty has decreased substantially.

There are, however, two major areas where we have no reason to applaud: The escalating degradation of ecosystems, including loss of irreplaceable animal and plant species, and the escalating emissions of greenhouse gases.

The tropical rainforest is a thermometer of the state of the planet. More than half of the terrestrial plant and animal species live there. It is “the main biological library of the earth”. Most of the information in this library is not even known to science. The forests also contain and store enormous amounts of carbon. The yearly destruction of the tropical forests results in emissions of CO₂ equal to the emissions from all cars in the world. The library burns.

This is why the state of the rainforest concerns the whole world. Norwegians and people in other non-tropical countries may choose to live as if this did not concern them – but only for a while. As expressed by King Harald of Norway “If the rainforests disappear, they will not come back. Then the world will be an altered place to live”.

For the peoples who have lived in and of the rainforests for hundreds or thousands of years the destruction of the rainforest is already a matter of life or death. This publication is dedicated to them. Rainforest peoples speak close to half of all the languages in the world. They have knowledge both of the mysteries and the everyday necessities in the forests – a knowledge that is lost at an alarming rate. And they are the true guardians of the rainforests. Empirical studies show that where the indigenous peoples have control of their land, the forest will be better protected and sustainably used.

This is the third time that the Rainforest Foundation Norway has published a “The State of the Rainforest” report. This year’s edition has been a joint undertaking between Rainforest Foundation Norway and GRID-Arendal. The report has only been possible through contributions from local communities and civil society organizations in rainforest countries. The stories of how communities actively protect their forests underscore that solutions for the global problem of tropical deforestation must build on local experiences.

The report aims to give an overview of existing knowledge, presented in an accessible way – and to ensure that we see the whole forest, not only the trees. We hope the report will be useful for all people engaged in the protection of rainforest, whether you are scientist, journalist, activist, decision maker or a concerned citizen.



Dag Hareide
Executive Director
Rainforest Foundation Norway



Peter T. Harris
Managing Director
GRID-Arendal

Findings and main messages

■ Reducing deforestation is urgent.

Destruction of the rainforest and other tropical forests continue on a dramatic scale in spite of unprecedented global attention to the issue of deforestation and the role of forests in mitigating greenhouse gas emissions. The global figures for deforestation are contested: Two main sources of data, the FAO's Global Forest Resources Assessment (2010) and a remote sensing study by University of Maryland (2013), use different technologies and definitions of forest and display huge variation between figures (see section 2). We simply don't know how much rainforest is left on Earth, and how fast it disappears. Both sources agree, however, that tropical forests are being destroyed at an alarming rate. According to the FAO, 130 000 km² of the world's forests are lost every year, the majority in the tropics. Simultaneously, the University of Maryland calculates the annual loss of tropical forest to be 92 000 km². According to the latter, 1.1 million km² (three times the size of Norway) have been lost from 2000 to 2012. Dense tropical rainforests once covered around 18 million km² of Earth, but is now reduced to half of this size. Most of this forest was lost during the last 50–60 years, and rapid deforestation continues. Except for Brazil, which has reduced deforestation at a globally significant scale, other countries have not managed to show similar positive results on the ground – in the forest – in spite of political commitments.

Extensive degradation of tropical forests around the globe aggravates the problem. Intact, primary rainforests are through various forms of destructive activity transformed into secondary forests, which undermines the forests' health and ability to deliver ecosystem services – even if the forest cover may remain. There is a serious lack of political attention to this phenomenon, and data on the extent of forest degradation are even more scattered and unreliable than those on tropical deforestation.

■ Tropical rainforests are crucial for reaching international development goals.

The forest's ecosystem services and resources are essential for poverty alleviation, long-term food security and for solving the global environmental crises of biodiversity loss and climate change. We have known for a long time that tropical rainforests are extremely valuable, not least as habitat for half of the world's terrestrial species, but new and ongoing research continues to widen our understanding of the extent and importance of tropical forests for local and global development. The role of tropical forests for climate regulation, rainfall patterns and availability of freshwater, the connection between forest biodiversity, food security and

agricultural production, and their importance for the livelihood and cultural survival of indigenous peoples and other local communities all underscore that protection and sustainable use of the world's tropical rainforests need to be given much higher priority within international and national development strategies.

■ Low deforestation development is possible ...

The fact that deforestation trends are not uniform gives room for some optimism. There are variations across regions which clearly show that deforestation is not a necessary consequence of economic development. It is a question of political will and choice of economic strategy. The very encouraging development in Brazil, where Amazon deforestation has been reduced by three quarters – to 26 percent of the annual average between 1996 and 2005 – is the direct result of political decisions and demonstrates that forest protection is compatible with national economic growth and social development. In the Democratic Republic of Congo (DRC), deforestation rates have been relatively stable. This is in itself positive, as most observers feared a steep increase after the end of the second Congo war in 2003. Even in Indonesia, where more rainforest is being lost than in any other country, political attention and incipient policy change represent significant steps forward. At the international level, we see governments discussing measures and private sector corporations adopting no-deforestation policies to an extent that would have been considered totally unrealistic a few years back.

■ ... but the necessary changes are complex.

The direct and indirect causes behind the destruction of the rainforest are many and varied. Small-scale agriculture contributes towards deforestation on all rainforest continents, emerging as an important factor especially where deforestation rates are relatively low. The massive deforestation that has ravaged the Amazon and Southeast Asia over the last five decades is caused by large-scale actors, and illegality and crime play an important part.

Some 80% of all deforestation in South America from 1990 to 2000 was caused by cattle ranching and industrial scale agriculture. Explosive growth in plantations, increasing exploitation of forest areas for mining, infrastructure development, as well as both legal and widespread illegal logging is taking place in Papua New Guinea (PNG), Indonesia, and other countries in Southeast Asia and Oceania. Driving the development is a complex web of illegal and legal activities, legitimate political decisions intertwined with pervasive corruption and illegal resource extraction and trade.

Organized crime plays an increasing role in deforestation and illegal logging in all rainforest regions. This includes the illicit trade in endangered high-value species like rosewood, logging for timber, advanced laundering through plantation front companies targeting pulp and paper production in Asia, and control of the distribution of the rapidly rising charcoal trade, especially in Africa. The global value of forest crime, mainly commercialization of illegally logged timber, is estimated by UNEP and INTERPOL to be between USD 30 and 100 billion annually. By comparison, the global value of all official development assistance was reported by OECD to reach USD 134.8 billion in 2013. With the dramatic rise in organized forest crime, enforcement capacity will become essential to any success.

Few measures have been taken to address the role of companies or investment funds involved in tropical deforestation, whether they are domestic or trans-national actors. Within some sectors, including those representing major drivers of deforestation, the industry itself, responding to mounting pressure from civil society actors, consumers and public opinion, have adopted internal policies meant to exclude deforestation and human rights violations from their commodity chains. Such initiatives represent important contributions towards reduced deforestation. Voluntary actions should, however, be followed by the development of public policies and internationally agreed rules to regulate actors who continue to cause deforestation and degradation of the world's few remaining rainforests. Companies and investors genuinely interested in adhering to a no-deforestation policy can play an important part in combating forest crime and illegal trade in natural resources.

Lack of tenure rights contributes to deforestation in many rainforest regions and adds to the complexity. In Indonesia, for instance, millions of people, including 50-70 million indigenous peoples, depend on the forest. Yet, the state has claimed authority over most of the forest, granting licenses for forest exploitation to industrial companies at the expense of local communities who have for generations maintained the forest ecosystems. Last year, an historic decision by the country's constitutional court stated that customary

forests of indigenous peoples should no longer be classified as state forest, paving the way for a rights-based, sustainable rainforest management. Strengthening forest communities' rights to their lands, and developing forest management policies in close cooperation with the forests' inhabitants, should be given urgent priority in rainforest countries. This report tells five stories from five different rainforest countries, showing the important roles forest people can play in forest management.

■ Extensive rainforest destruction in the making.

The threats against the world's remaining rainforests are immense. Rainforest countries, which on the one hand have stated their political intention to reduce deforestation, on the other continue to develop plans for major infrastructure development and the expansion of plantations and extractive industries, all of which will increase deforestation.

A few examples from major rainforest countries illustrate this too well: Almost 75% of Peru's Amazon is covered by planned or operative oil-and-gas concessions. Indonesia intends to double the area for oil palm, and neighbouring Papua New-Guinea faces a comparable threat. Most of PNG's commercially accessible rainforests have been allocated for logging, and special licences to convert thousands of km² of forests to oil palm plantations are causing controversy in the country. In DR Congo, the moratorium on logging concessions has for many years been under pressure, and expected expansion of roads, mining, plantations and agriculture will lead to a steep increase in deforestation rates. Even in Brazil, laws protecting the rainforest and indigenous territories are under pressure. On top of the expected continued expansion of industrial scale agriculture, the sum total of planned infrastructure and extractive activities in Amazon countries are so extensive that they may impact half of the remaining Amazon rainforest (see section 3).

Unless governments and the key players responsible for forest destruction address and reverse these plans, the future of the world's remaining rainforests is grim.

Recommendations – urgent actions required to reduce tropical deforestation

National governments, both within their respective countries and collectively as the international community, should:

- a. Make forest protection an integral part of UN's new sustainable development goals, given the importance of forests for local and global sustainable development;
- b. Provide significant rewards to rainforest countries for protection of natural forests and ecosystems;
- c. Review plans for large-scale expansion of infrastructure, extractive industries and other economic activities in rainforest regions to ensure they do not threaten forest ecosystems and/or undermine the rights of forest communities and indigenous peoples;
- d. Combat forest crime through new regulations and increased law enforcement efforts targeting the full enforcement chain from customs control, investigation of money laundering and tax fraud to prosecution and increased international collaboration;
- e. Effectively regulate industries involved in rainforest destruction, and support private sector actors that develop and implement no-deforestation policies;
- f. Establish policies and regulations to avoid investments in companies and industries causing forest destruction;
- g. Ensure that forest peoples' collective rights to land and natural resources are included in international and national development plans, and respected in practice;
- h. Consult and cooperate in good faith with indigenous peoples in order to obtain their Free, Prior and Informed Consent in all matters that affect them and their traditional lands and resources;
- i. Work with forest communities and indigenous peoples in order to meet their development aspirations and create sustainable income opportunities compatible with the maintenance of forest and their culture and traditions;
- j. Improve global forest monitoring systems so that they effectively distinguish between various forest types and plantations and provide reliable information on forest cover and loss, including degradation and fragmentation, globally and at country and regional levels;
- k. Ensure that definitions of forests adopted by international institutions and countries distinguish between different forest types and natural forests and plantations, to avoid misleading reporting of forest cover and forest loss.



State of the rainforest 2014 • part 1

Importance of the rainforest and biodiversity



Why forests are critical for development

■ By **Frances Seymor** | Senior Fellow at the Center for Global Development, Washington, DC; Director General of CIFOR, the Center for International Forestry Research 2006–2012

Forests are more than a solution to climate change

The science is clear about two things. First, climate change poses a significant threat to human well-being, with developing societies and poor households most vulnerable to harm. The effects of extreme weather events, rising sea levels, food insecurity, water scarcity, and displacement will be felt disproportionately by poor communities who tend to lack essential infrastructure, rely more on natural resources for food and income, and with fewer assets, have a harder time coping with shocks.¹

Second, protecting the world's remaining tropical forests is an essential component of any strategy to stabilize the climate. Deforestation accounts for 11% of annual global greenhouse gas emissions, and the mitigation potential of forests is even greater due to the potential to reduce forest loss as well as to increase the carbon sequestered by forest regrowth.²

Emerging evidence increasingly supports two additional propositions. Forests make essential – and often invisible – contributions to development above and beyond their role in mitigating the emissions that cause climate change. Further, measures to protect forests can be aligned to advance rights, livelihoods, and governance objectives, multiplying the positive impacts of action, including action by and for affected communities.

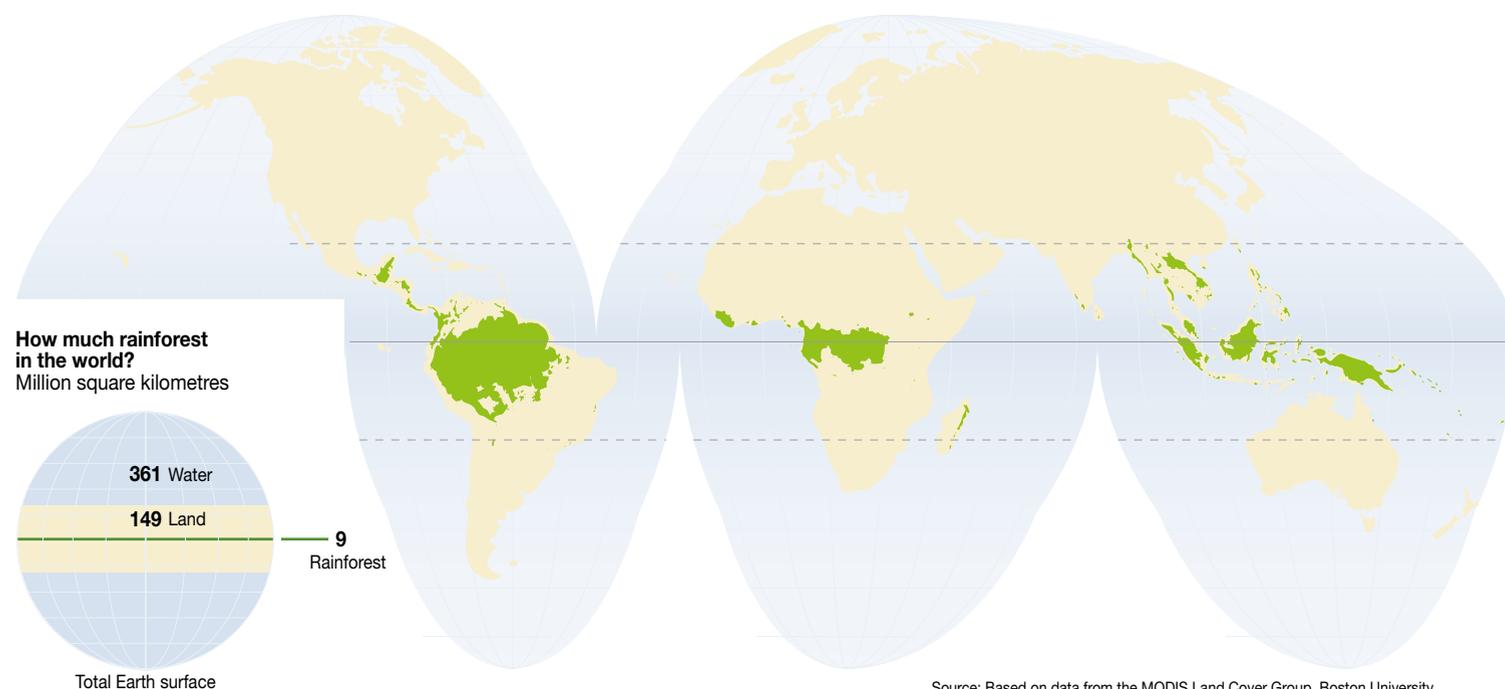
Forests contribute to rural livelihoods and broader development goals

Development planners often assume that commercial exploitation or conversion of forests to other uses are the best ways to boost national economic growth and rural incomes. But forests already make significant contributions to rural livelihoods and broader human well-being in ways not yet captured in national statistics. As a result, the losses of forest goods and services are seldom weighed against the potential benefits of intensive logging, mining, or conversion of forest lands to plantation agriculture. Yet the value of intact forests for the food security, energy security, health, and safety of societies throughout the tropics is becoming increasingly evident.

Food security is a top priority on development agendas, but the role that forests play – both directly via livelihood contributions and indirectly through ecosystem services that benefit agriculture – is often overlooked. A study published in 2014 revealed that households in and around tropical forests derive on average 21% of their income from the harvest of wild forest products. A third of this is in the form of forest foods such as wild fruits and bushmeat, which are often important for nutrition.³

Clearing forests for food crops could actually undermine food security by destroying the ecological infrastructure that supports

Small rainforest in a big world





agricultural productivity. Forests regulate water quality and availability by reducing runoff, filtering, and facilitating water recycling.⁴ New science suggests that forests play a much greater role in driving the water cycle at broader scales than previously thought, carrying moisture from oceans into continental interiors and essentially driving rainfall patterns.⁵

Energy security is also provided by forests. For communities without access to modern energy sources, forests provide fuelwood and charcoal. Forested watersheds supply water to reservoirs behind hydroelectric dams as well as to irrigation systems, and protect against erosion and sedimentation that shortens the useful life of such infrastructure. A recent study calculated that cloud forests, though covering only a relatively small area (4.4%) of relevant watersheds, supply 21% of the surface water to the reservoirs above dams in the tropics.⁶

Human health is supported by healthy forests beyond providing nutrition and clean water. For the majority of people in developing countries who rely largely on traditional medicine, access to forest plants and animals with medicinal properties is critical to well-being.⁷ And as deforestation is commonly achieved through intentional burning, and degraded forests are more vulnerable to wildfires, a significant benefit of maintaining intact forests is the avoided damage to respiratory health caused by smoke and haze.⁸

Human safety is also served by intact forests, which increase resilience to other extreme events in addition to forest fires. Complex root systems increase water infiltration and prevent erosion, helping to reduce both landslides and flooding. For coastal communities, mangrove forests intercept wave energy, providing some protection against storms and tsunamis.⁹ Further, many of the goods and services provided by forests are important for climate adaptation, by enhancing resilience to the extreme weather events that are expected to increase in frequency and severity with climate instability.¹⁰



Protecting forests can be aligned with rights, livelihoods, and governance objectives

The contributions of forests to development described above are of greatest value to the most proximate communities¹¹ who thus have the most to lose from forest destruction or appropriation of forest wealth by others. People in and around forests are thus essential partners in the struggle to protect forests for climate and development benefits.

Recognizing the rights of local forest stewards is a first step. State conservation efforts, sometimes legitimized by international support, have often come at the expense of local communities:¹² Indigenous communities empowered to exercise customary rights over forest resources are increasingly recognized as effective forest stewards. In the Xingu Indigenous Park in Brazil's Mato Grosso, local enforcement efforts have secured the borders of indigenous lands, despite pressure from ranchers, loggers, miners and other outside actors vying for control.¹³

Increased transparency and accountability are tools to fight deforestation as well as to improve governance more generally. While some deforestation results from intentional government policies, a significant proportion is due to illegal logging, encroachment into formally protected areas, and licensing of forest exploitation and conversion through corrupt practices.¹⁴ Elites are thus enabled to effectively privatize public assets, impose costs on downstream and local communities, and undermine respect for the rule of law. Civil society's response to Indonesia's forest fires in 2013 demonstrated the power of on-the-ground monitoring coupled with remote sensing technologies to detect illegal removal of forest cover, effectively pressuring government officials and corporate leaders to improve forest management.¹⁵

Forest protection efforts, designed appropriately, can thus be a triple win, safeguarding the rights and livelihoods of local communities while generating climate and development benefits for society at large.

The author would like to acknowledge the assistance of Sara del Fierro in the preparation of this essay.

Rainforest biodiversity – treasure under threat

“ *Modern rainforests pose riddle upon riddle: where do all these species come from, and how did they end up here?*¹⁶ ”

The biodiversity of the tropical rainforests is amazing. More than half of the 1.4 million species currently identified in the world are living in these ecosystems. And still, scientists are sure that the total number of different plants and animals is far more, probably 5–10 million.

Every year, botanists describe and classify about 2,000 new plant species. More than 1,000 species of orchids have so far been collected in the Malaysian state of Sarawak in Borneo. But even in Borneo, where the rainforests are relatively well-studied, just

somewhere between 15% and 35% of the existing species have been described by scientists. 17 different palm species were registered in Brunei in 1988 – only seven years later, the figure had risen to 140. As the most diverse ecosystem on earth, the tropical rainforest is brimming with unknown mysteries.

Since 2010, 441 new animal and plant species have been discovered in the Amazon,¹⁷ among them a growling monkey and an endangered poison dart frog in the rainforests of Guyana. In New Guinea, researchers are constantly discovering new species; more than 1000 in recent years. This includes over 100 orchids, 134 amphibians, 71 different fish (including a 2 meter long river shark) and 12 mammals.



The two countries with the greatest diversity of mammals are among the world's largest rainforest countries, Indonesia (670 species) and Brazil (648 species). According to an analysis by the IUCN Red List,¹⁸ Indonesia is also the country with the highest number of threatened mammals in the world. The fact that new species are still being discovered is a clear indication of the vast and unmapped biodiversity in the world's rainforests.

Why are there so many species?

In general, the diversity of plants and animals increases dramatically from the polar regions to the tropics. But we do not yet know why rainforests are so exceptionally rich in biodiversity. Is it due to inter-species struggle for specialization? Or is it a matter of the gradual accumulation of species under relatively stable tropical forest conditions over millions of years? Other theories hold that species evolve more rapidly in warm climates; that variations in micro-climate and periods where pockets of rainforest have been isolated in a drier or colder climate have fostered diversity; or that the geological changes that elevated lowlands to mountains (like the Andes) have stimulated the

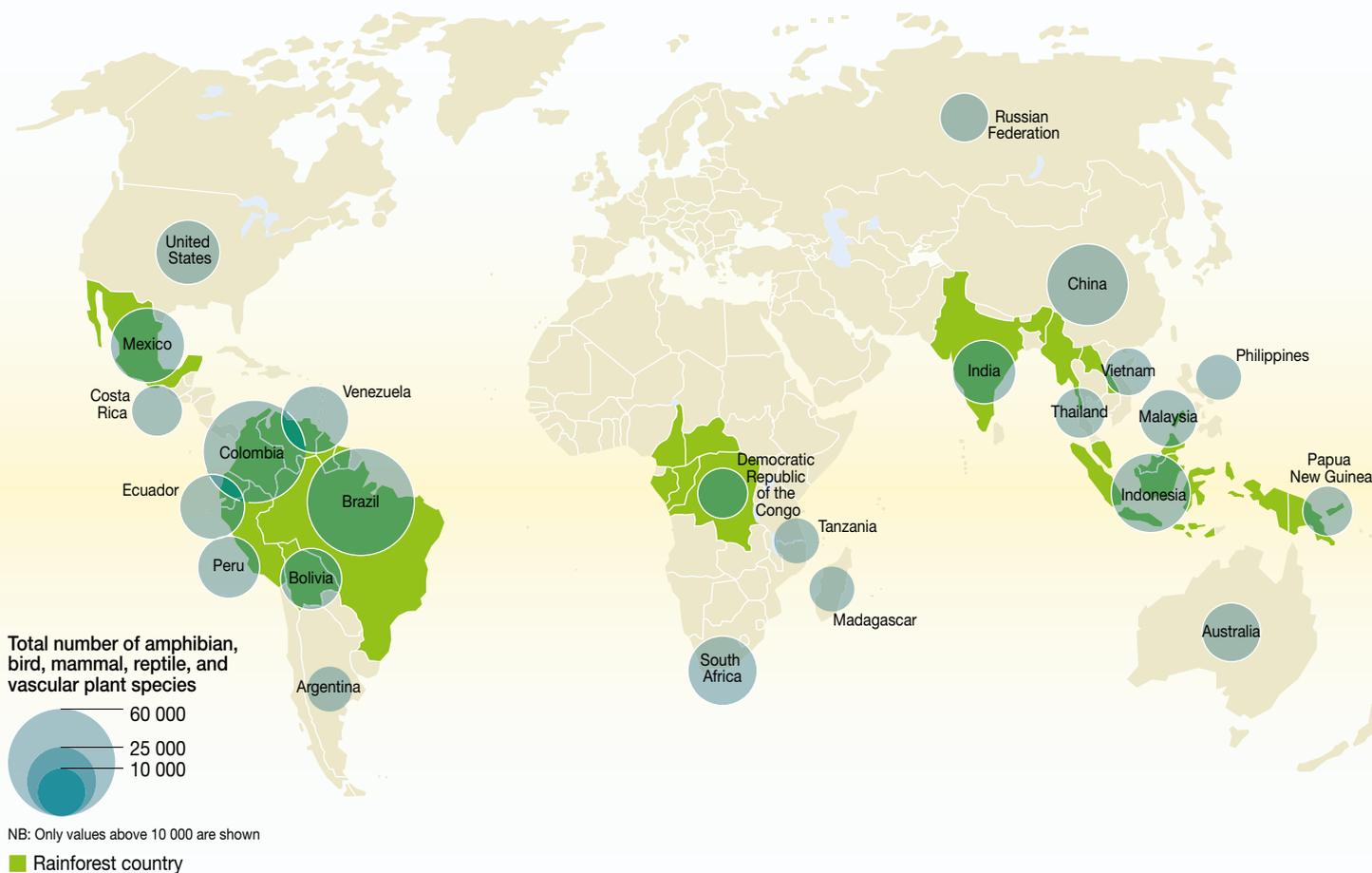
huge variety of plants and animals. The many theories are not mutually exclusive.¹⁹ Probably, all these factors have been involved in shaping the rich diversity of the world's rainforests as we know them today.

Human beings have also played a part in the interaction. In the Amazon there are traces of hunter-gatherer societies dating some 9000 years back, and of agricultural societies existing 4500 years ago. Human life has also been documented in the rainforests of Africa and Asia²⁰ dating several thousand years back in time. While species extinction thousands of years ago has been linked to human activity in some places, human activity is not necessarily synonymous with destruction. There are also signs that people, in the interaction with their environment, have actually strengthened species diversity. We may need to re-adjust our notions of rainforests as primeval, virgin tracts untouched by humans.

Disappearing diversity

The last time the golden toad (*Incilius perigrines*) was seen, was in a nature reserve in Costa Rica in 1989. The species of our planet

Biodiversity is concentrated in the rainforest



Source: Mongabay.com



are disappearing at a rate up to 1000 times faster than the natural extinction rate,²¹ and nobody knows which species will be lost next.

In the deep cloud forests in the highlands of Ecuador, a hitherto unknown mammal has managed to hide from researchers until 2013.²² The Olinguito (*Bassaricyon neblina*), which resembles a mix between a cat and a teddy bear, is related to the raccoon. The olinguito is a living proof that there is a lot we still do not know about the inhabitants of the world's tropical forests. Like many other known and unknown species in the cloud forest, the olinguito is endangered because its habitat is under pressure.²³ Australia's rainforests are also represented on the list of the most threatened species of the world: The newly discovered leaf tailed gecko (*Phyllurus gulbaru*), which has a variegated pattern and with an extremely broad tail as part of its 'camouflage uniform' is critically endangered.²⁴

Habitat destruction is the greatest threat to the great variation of plants and animals in the rainforest, and the main reason why so many species are on the brink of extinction. The Golden Toad, however, suffered a different fate. It became world famous as the first animal likely to have become extinct due to climate change. Although researchers still debate lively whether climate change actually caused the disappearance of this particular animal, it is generally agreed that climate change poses a threat to biodiversity and will lead to acceleration of the loss of species.

Wildlife on large rainforest islands like Madagascar and the islands of Southeast Asia, together with the peripheral zones of the world's rainforests, is particularly vulnerable. The IUCN's "red list" has listed 22,103 as threatened with extinction, based on assessment of more than 73,000 species. According to a recent



update,²⁵ over 90% of Madagascar's lemurs are threatened with extinction. The Brazilian²⁶ – the mascot of the 2014 FIFA World Cup – is in the category 'Vulnerable' as its population continues to decline.

Among the rainforest countries in Africa, Madagascar clearly stands out as having the highest number (873) of threatened species – both 'critically endangered', 'endangered' and 'vulnerable' plants and animals are included in this figure. Cameroon has as many as 636 species on this Red List,²⁷ whilst its giant rainforest neighbour DR Congo, has 322 registered. In Southeast Asia, the situation is clearly most critical in Indonesia and Malaysia, each with over 1200 endangered species. In the Amazon, the small country of Ecuador tops the list, with as many as 2292 of its plants and animals listed, more than its giant Amazonian neighbour Brazil (934).

On the positive side, at least we now know more about endangered species than before, and new technologies make it easier to monitor populations and identify threats. This puts us in a better position to take appropriate measures to halt the loss of biodiversity.

Important individuals

With so much diversity, does it really matter if a few species disappears? The question of the importance of individual species for the ecosystem is hotly debated among scientists. According to a 2013 study²⁸ of species-rich ecosystems, some species are extremely important for ecosystem functions. A part of the study examined tropical trees, more specifically the 662 species found in French Guiana, Suriname and Guyana. It found that rare species are far more important for the ecosystem than their numbers and distribution would suggest. One example is a tree only recently



What is a tropical rainforest?

We find tropical rainforests in all the equatorial regions of America, Africa, Southeast Asia and Oceania, extending between the Tropics of Cancer, and Capricorn; north to central Mexico and the Indian plains, south to the southern part of Brazil and the northern tip of Australia.

Occupying only 6 % of the earth's land surface, and in spite of the relative poor soil, they contain a larger diversity of plants and animals than anywhere else on earth. The rainforests have evolved over the course of 50 to more than 100 million years. They exhibit great variation in climate – from evergreen rainforests where there is minimal variation in precipitation and temperature, to rainforests with seasonal variations of drier periods. They also vary in habitat – from swamp to dry land; and in elevation – from lowland to montane rainforest and cloud forest. Rainforests share, however, some general characteristics:

Stable temperature: Around 20–25°C throughout the year.

Wet: Annual rainfall exceeding 2,000 mm; some places can get up to 10,000 mm (10 m) per year.

Dark: Only 2% of the sunlight falling on the upper canopy reaches the forest floor.

Nutrient-poor soil: The soil is often acidic and nutrient-poor, but there are variations.

Diverse: The abundance of animal and plant species is enormous. As many as 100 different tree species (types) can be found within one square kilometre. There are several millions of different animal species, and insects, reptiles, amphibians and mammals are especially well represented. The total number is unknown.

Layers: The emergent layer consists of very tall trees (up to 60–70 meters). The dense canopy layer further down absorbs most of the sunlight, but along the trunks and stems grow dense lianas, lichens, mosses, ferns and flowering plants. The air in the lower layer is stagnant and humid. On the forest floor, it is cool and shady. Between branches and twigs, seeds can survive for years, waiting for the right conditions to re-awaken.

described in the rainforest in French Guiana, the *Pouteria maxima*. With its thick bark and leaves, this tree is exceptionally resistant to fire and drought and thereby has an important buffer function for maintaining forest structure in a time of climate change.

The intricate interdependencies between species are illustrated by the Brazil nut tree (*Bertholletia excelsa*). These trees have particularly hard-shelled seed pods, which only the agouti – a large, forest-dwelling rodent with particularly strong teeth – is able to break. As the agouti stores the seeds in caches buried in the ground, some

of the seeds germinate and become the next generation of trees. Moreover, in order to produce the nuts, the tree is dependent on a specific species of large-bodied bees – Euglossine orchid bees. The bees depend for its part on other species for their reproduction: Unless the male bee covers itself with the scent of a specific orchid, it won't be able to attract the female. With such complex webs of interdependencies, it is no wonder that it has turned out to be impossible to grow the Brazil nut tree in plantations. But it also implies vulnerability: take away one species, and a whole chain of other plants and animals may be affected.²⁹

What do we get from the rainforest?

A gigantic sponge, a chemical factory or pharmacy, a supermarket, the lungs of the world, or our biological treasure-chest – the rainforest has been given many different names to describe its importance to humans and the global environment. Most of the services rainforests provide are given free of charge and are difficult to measure in monetary terms, although estimates of the value of services from rainforest ecosystems reach billions of dollars.

The people of the rainforest often describe the forest as a ‘supermarket’ that provides the wide range of foods, medicines and materials needed for life in the forest. The rainforests are of paramount importance for the several hundred millions of people living in or near them, including 60 million indigenous peoples who are wholly dependent on the forests for their material, cultural and spiritual well-being.³⁰ But the tropical forests of the world also provide ecosystem services of immense value regionally and globally: these include water and climate regulation, water purification, pollination and carbon storage. The rainforests of the Amazon, for instance, sequester carbon from the global atmosphere, regulate the water balance and flow of the entire Amazon river system, influence the patterns of climate and air chemistry with impacts beyond the continent.³¹

The Millennium Ecosystem Assessment divides forest ecosystem services into four categories: *Provisioning services*, such as wild foods, crops, fresh water and plant-derived medicines; *Regulating services*, filtration of pollutants by wetlands, climate regulation through carbon storage and water cycling, pollination and protection from disasters; *Cultural services*, like recreation, spiritual and aesthetic values, education; and *Supporting services* such as soil formation, photosynthesis and nutrient cycling.

Regulating services constitute a large part – two-thirds according to several studies – of the value of the tropical forest, and direct values like food, timber-based and other materials, represent a relatively smaller share. The comprehensive TEEB study (The Economics of Ecosystems and Biodiversity) shows how the benefits of protecting forests outweigh the costs. Maintaining this natural capital is important for the sustained provision of future flows of ecosystem services and to ensure long-term human well-being.³²

Water and climate regulation:

Rainforests are ‘sponges’ of global importance, essential for regulating water and rainfall in large parts of the world. Forests improve the quality of water by filtering it, and regulate the flow by storing water in the ground for gradual release. According to the FAO, some two-thirds of the water usable for humans flows through forested watersheds. The forest’s water regulation reduces the risks

of extreme flooding events or river dry-up during the dry season. This has important implications for food security, enabling downstream farmers to pursue agricultural production with less risk. According to the Millennium Ecosystem Assessment, the provision of drinking water is directly linked to the protection of ecosystems. More than two billion people today have an inadequate supply of drinking water – and their numbers could double in the next few decades.³⁴

Tropical forests serve as giant carbon storages. Healthy forests can help to buffer the impacts of extreme weather events, whose frequency and severity are expected to rise with continued global warming.

Food and fuel

Trees, in forests and on farmland, support bees and other pollinating insects, which in turn ensure the production of food grains and seeds for planting in future years. Forests play a crucial role as gene-pool reserves – including a large proportion of the agricultural crops cultivated around the world.³⁵ Crop genetic resources are the safety net vital for coping with pests and diseases, and for adapting future agriculture to a changing climate.

Many of the foods consumed worldwide originate from the rainforest. For instance, the fruits and palm hearts of acai palm have been used as food for at least 1000 years. Growing in low-lying areas of the Amazon estuary, this palm still has great economic importance. Other food species from the tropical forests of South America include avocados, Brazil nuts, various chillis, papayas and sweet potatoes. The oil palm originates from Africa; and from the Australasian rainforests the world has bananas, sugar cane and wide range of spices.³⁶ In developing countries, wood-based fuels are the dominant source of energy for more than two billion poor people.³⁷

Medicines and human health

Some 20–50% of turnover in the pharmaceutical sector today (USD 650 billion annually) derives from genetic resources.³⁸ In Africa, 80% of the population rely mainly on traditional medicines (plants and animals) for dealing with their health-care needs, according to the World Health Organization. One billion people worldwide depend on drugs derived from forests. Of the 52,000 medicinal plants used today, about 8% are threatened with extinction, according to the global TEEB study.³⁹

Human impacts on the environment have been associated with outbreaks of malaria, dengue, SARS, Ebola and other diseases. Intuitively, we might assume that species-rich environments would also foster an abundance of pathogens, and be a source



for the spread of disease. In fact, research has shown the opposite. Biodiversity loss causes the loss of an important ecosystem service: buffering the spread of infectious diseases to humans, animals and plants. The decline of biodiversity may lead to the more rapid emergence and re-emergence of infectious diseases.⁴⁰ The positive linkages between biodiversity and health are well documented, and the examples are many. In the Peruvian Amazon, mosquitoes associated with malaria were observed to bite people 278 times more frequently in deforested areas than in areas still predominantly forested. In Indonesia, communities living near Ruteng Park have fewer cases of malaria and dysentery, fewer school days missed due to illness, and less hunger associated with crop failure than similar communities without intact forests nearby.⁴¹

How much is it worth? Biodiversity in the world's tropical forests provides services of huge economic value, but is difficult to measure. Many estimates have been made, however, and the value amounts to trillions of dollars.⁴² What is even more difficult to express in monetary terms is how biodiversity contributes to ecosystem resilience – or the ability to continue providing services under changing environmental conditions – as natural insurance against shocks.⁴³

As rainforests are destroyed, the values and services they provide are threatened. The sustainability of nearly two-thirds of our planet's supply of ecosystem services may be in jeopardy.⁴⁴ This directly affects poor people today, and further degradation will make it harder to achieve development goals in the future.⁴⁵

The rainforest and climate change

Reducing the destruction of the world's rainforests is crucial if we are to limit global warming. About 11% of global emissions of greenhouse gases stem from deforestation. At the same time, rainforests can be severely affected by climate change. Habitat fragmentation and degradation increase the forests' vulnerability. It is uncertain exactly how rainforests will be affected by climate change, but we know that deforestation must be reduced in order to cut emissions and reinforce the resilience of the remaining forests.

Carbon bank and carbon sink

According to the FAO, the world's forests store around 650 billion tons of carbon; more carbon than what is found in the atmosphere. When forests are burnt or destroyed, the carbon is released as CO₂. When forests grow, either through expansion of forest area or because old forests become denser and more carbon-rich, they bind CO₂ and convert it to carbon in the form of wood and other biomass.

According to a study of the three large rainforest regions in the world – the Amazon, the Congo Basin and Southeast Asia – the world's rainforests contain 42% of all carbon stored in forests, even if they only account for 33% of the forested areas.⁴⁶ The carbon content of rainforests is thus significantly higher than for other forest types. The Amazon forest contains 176 billion tons of carbon (27% of all carbon in forests), more than the rainforests of the Congo Basin and Southeast Asia put together. Still, the peat forests of Indonesia top the list of most carbon per hectare of forest.⁴⁷ Peat forests are

increasingly being converted into plantations, and the magnitude of emissions resulting from this has global impact.

A source of emissions

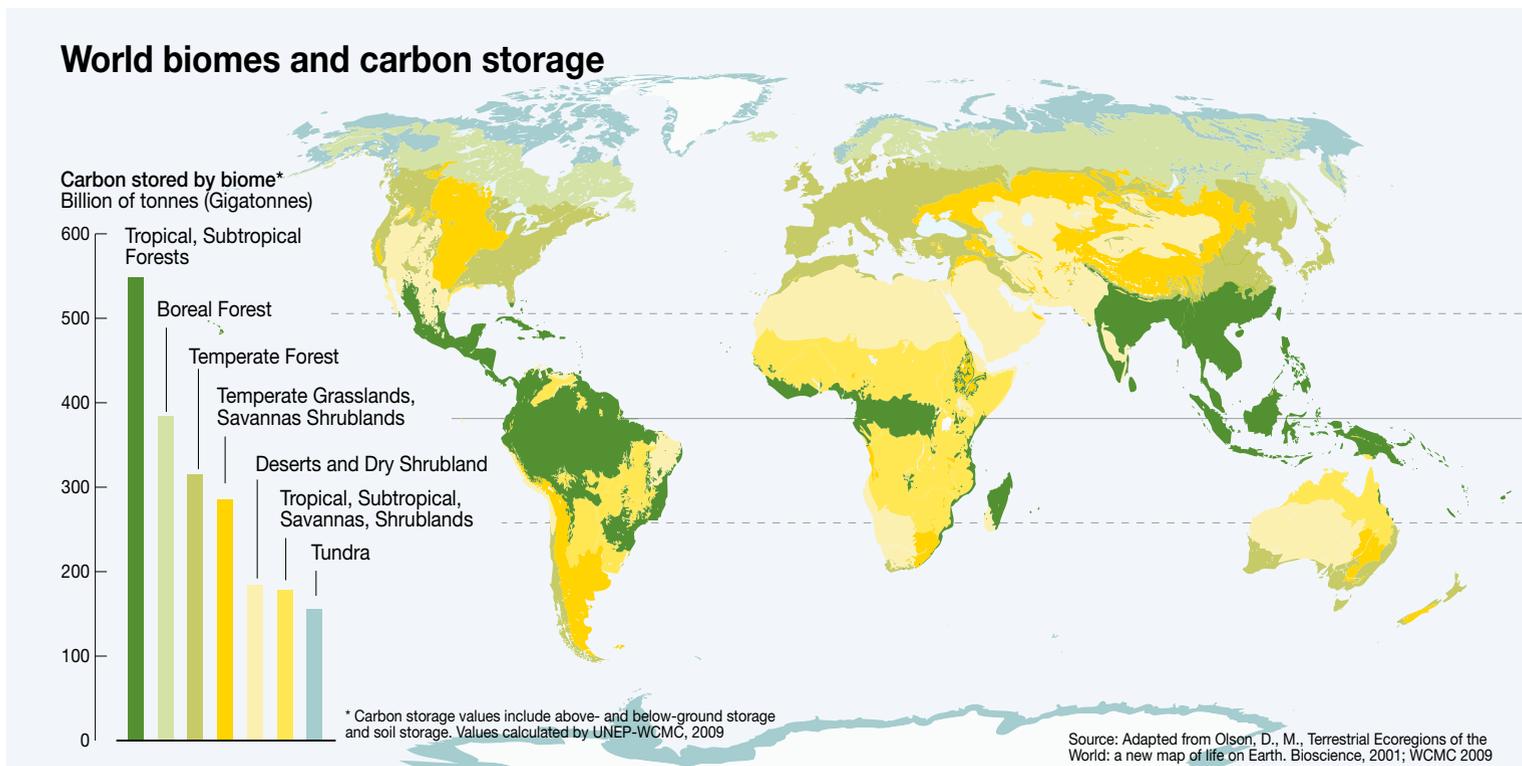
Brazil and Indonesia, two of the world's most important rainforest countries, have for decades had so massive emissions from deforestation that they rank among the world's largest emitters of greenhouse gases. Brazil has since 2005 succeeded in drastically reducing its rate of deforestation, thereby delivering the last decade's single-most significant contribution to reduced emissions globally.

In Indonesia, on the other hand, it appears that deforestation – and consequently the emission of greenhouse gases – has been increasing in recent years. For some rainforest countries, emissions from deforestation mean that their climate gas emissions per capita are on par with many industrialized countries. According to the World Resources Institute, Papua New Guinea, Brazil and Indonesia all have higher emissions per capita than Norway and France in 2011.⁴⁸

Emissions due to deforestation are somewhere in excess of 3 billion tons of CO₂. The newest estimates, including those used by the UN's Intergovernmental Panel on Climate Change (IPCC) indicate that deforestation currently accounts for 11% of global anthropogenic emissions of greenhouse gases.⁴⁹ However, data on emissions from deforestation are estimates – not exact science. Figures for the annual amount of forest that is destroyed are uncertain, and even less is known about how much forest is being degraded and the resulting emissions.



World biomes and carbon storage



Improved remote sensing and monitoring technology nevertheless means that figures for forest cover, carbon content and the emissions stemming from forest destruction gradually become more reliable.

In the 2007 IPCC report, emissions from deforestation were estimated to be 17%. The fact that the current estimate has been reduced to 11% does not primarily reflect reductions in deforestation, however. Greenhouse gas emissions from other sources have increased significantly, and methods for calculating emissions have developed.⁵⁰

Even if deforestation currently contributes relatively less to overall carbon emissions, it is still vital to reduce forest-related emissions to reach the international goals of limiting climate change to below two degrees centigrade. Halting the destruction of tropical forests is more important than the 11% share would seem to indicate. In addition to their role in regulating climate patterns and rainfall and absorbing and storing carbon, emissions from tropical deforestation may be reduced rapidly, as the Brazilian example demonstrates. Given the urgency of rapidly reducing emissions, and the time it will take to alter the global energy matrix from fossil to renewable sources – reducing emissions from deforestation is vital.

Climate change threatens the rainforest

Rainforests are vulnerable to climate change. Higher temperatures and less rainfall over a period of time can lead to drought in areas that usually have moist rainforest, as we have seen happen in the Amazon and Asia during recent years.⁵¹ Rainforest inhabitants describe that the climate is changing. Traditional signs indicating when to plant, for

instance, are no longer reliable, and although this is not systematic and scientifically produced knowledge, it corresponds to the changes being observed by researchers. The 2014 report from the IPCC states that both in South America and in Central Africa one can conclude with “medium certainty” that changes in rainfall, floods and droughts are related to climate change.⁵²

The geographical distribution of species is changing because of climate change.⁵³ There is an emerging debate about whether climate change has already led to the extinction of species, and about what level of climate change that may trigger large scale extinction.⁵⁴ The IPCC has previously assessed that as much as 30% of the world’s biodiversity could be threatened in a “medium scenario”, with temperature rise by more than 3 degrees centigrade.⁵⁵

The huge, densely forested areas of the Amazon, the Congo Basin – and to some extent Southeast Asia – have a direct impact on the planet’s systems for exchanging oxygen and humidity, producing rainfall and cloud formations. There is a lot of uncertainty regarding how climate change will affect this, but the consequences may be far-reaching. Both in the Amazon and in the Congo Basin the forests themselves generate a large part of total rainfall. If the forests are reduced to such an extent that their capacity to create their own rainfall is hampered, a tipping point will be reached that may have irreversible consequences. This mechanism is best understood in the Amazon, where the Andean mountain range prevents humidity from escaping west into the Pacific, driving rainfall north and south of the Equator. Reduced rainfall and cloud formation are bound to affect agricultural production within these regions, and the effect may reach other continents.

People in the rainforests



The world's tropical forests are home to millions of people who depend on the forest for their livelihood. Their cultures are often closely linked to the forest. Even in forests which are considered 'untouched wilderness', a closer look reveals how indigenous peoples have, for thousands of years, used and harvested from the forest, and contributed to the management and protection of forests and their resources. An understanding of the close relationship between local communities and the forests and its resources must be at the core of any strategy to protect the forests.⁵⁶

Estimates vary, but around 750 million – 1 billion people depend directly on forest ecosystems and agroforestry for parts of their fuel wood, food and fodder needs.⁵⁷ At least 60 million of the forest peoples are indigenous.⁵⁸ Forest-based indigenous peoples have strong social, cultural and spiritual bonds to their ancestral territories. If the forests disappear, these people lose not only their livelihoods, but also essential elements of their culture and identity.

In the Amazon, peoples living in voluntary isolation, or 'un-contacted indigenous peoples', are particularly vulnerable. These are relatively small groups with distinct languages and cultures, living in the forest and explicitly avoiding contact with the majority society (see Peru story, section 3). Without special measures and effective protection of their ancestral forests, these peoples may well not exist a few years from now.

Cultural diversity and land

Indigenous peoples are relatively few in number, approximately 370 million people⁵⁹ and constitute about 5% of the world population.

Still, their numerous ethnic groups represent the main cultural diversity of the world. The greatest number of indigenous peoples is found in the tropical forest regions.⁶⁰ A recent study on the correlation between areas with high biological diversity and high linguistic diversity further underscores the link between indigenous peoples and tropical rainforest.⁶¹ Some 70 per cent of the world's languages are spoken in the biodiversity hotspots, mainly tropical rainforests.

Land is where collective culture is being lived and shared, and where the transfer of skills from one generation to the next takes place. Land is linked to worldview and historic references, and certain places have spiritual and religious importance. Land is intrinsically linked to worship, collective knowledge, to male/female activities, to skills linked to food harvesting and medicine collection, house building, income generation, etc.

According to ILO Convention 169 on the Rights of Indigenous and Tribal Peoples (1989), indigenous and tribal peoples 'have the right to decide their own priorities for the process of development as it affects their lives, beliefs, institutions and spiritual well-being and the lands they occupy or otherwise use, and to exercise control over their economic, social and cultural development'(Article 7). Consultation with indigenous peoples should be undertaken through appropriate procedures, in good faith, and through the representative institutions of these peoples. Importantly, indigenous and tribal peoples also have a right to manage for themselves the land they use and depend on, expressed even



more clearly in the UN Declaration on the Rights of Indigenous Peoples (UNDRIP, 2007). Also other ethnic groups with firm bonds to the land have rights associated with land and land use.⁶² Their customary rights are based on their historical use of the forest. On the national level however, customary land rights are often found to be in conflict with formalized land rights, as established in national land registries.

Tenure

Most forest communities are characterized by collective management of resources, often in combination with individual plots of land to each family. Their land claims often involve a claim for collective land for the community, rather than individual rights to private land, and as such they are based in customary and ancestral rights.⁶³ Even if most of the world's tropical forests are used by local communities, the state is usually the formal owner. According to Sunderlin,⁶⁴ in the 30 most forested countries (containing 85 per cent of the global forest), governments control about 75 per cent of forest land. Only approximately 11 per cent of the forest is owned or designated for use by local communities and indigenous peoples.

The finding that there is less deforestation in areas where local people have their rights recognized shows that indigenous territories and collective rights to land for local communities can be effective measures against deforestation. A study by the World Bank's Independent Evaluation Group (IEG) shows that, globally, forest reserves that allow for sustainable use by local populations



are more effective than strictly protected areas focused exclusively on conservation. Most effective of all are the indigenous areas.⁶⁵ This is also supported by a recent report by RRI and WRI,⁶⁶ based on studies of legally-recognized community forests in 14 countries, including five Amazon countries as well as Indonesia and Papua New Guinea. The report finds that deforestation rates inside community forests with strong legal recognition and government protection are dramatically lower than in forests outside those areas.

Traditional knowledge and forest management

Several studies have argued that the indigenous peoples, through their practices, may increase the biological diversity within their lands, by management of landscapes and knowledge of a wide range of species.⁶⁷ As our examples show (see section 3), the lives of forest peoples is intimately linked to the maintenance of the forest and its biodiversity. Sacred forests, mountains or rivers, as well as managed patches of forest or gardens, can serve as vehicles for forest and biodiversity protection. Home gardens and agroforestry systems, common in tropical forests regions of the world, can function as human-made refuge areas for species of plants and animals, notably in areas heavily affected by deforestation.⁶⁸ Knowledge about rainforest resources help forest dependent societies to be prepared for crisis. Their knowledge about the resources in their environments, the extensive range of products and practices – small-scale agriculture, hunting and gathering, forest extraction, agroforestry, fishing, and handicrafts – results in the maximum utilization of landscapes, and low-intensity usage makes it compatible with forest protection.

Food in the forest – on tropical forests and food security

Protecting tropical forests and their ecosystem services is essential for maintaining the productivity and sustainability of food production systems worldwide. Agricultural expansion is, however, the single most important factor behind the clearance of tropical forests and it is often argued that the continued clearance of forest land for agriculture is necessary to feed a growing world population. Integrating tropical forest – and biodiversity considerations with food security strategies will be crucial to ensure sustainable food security, especially if priority shall be given to the poorest parts of the world population.

Poor people depend on forests

Globally, some 750 million – 1 billion people live inside relatively dense forests and largely depend on them for their livelihood.⁶⁹ People living inside, or close to, forests use the forest for a wide

range of purposes.⁷⁰ In varying degrees the forest provides them with food, fuel, building materials, fibres, medicines and fodder on a regular basis. Also for people affected by natural disasters, access to forests and forest resources may be the way to survive, and here reliance is greatest for those most heavily impacted and the poorest.⁷¹ The World Bank⁷² estimates that 90 % of the world's poorest people depend on forest resources. Land conflicts are common in rainforest areas, and are often caused by commercial actors, including for production of agricultural products such as palm oil or soy. This agricultural production, whether used for human consumption, as biofuel or in other products, often directly undermines the food security of the local communities losing their land. For people with minimal monetary income, forests are the source of well-being, the basis for their development. A recent comprehensive global study led by the CIFOR Poverty and Environment Network,⁷³ concludes that





income from natural forests and other natural areas accounted for 28 percent of total household income, nearly as much as crops. Also people living at a distance from forests are highly dependent on resources from the forest: 2.4 billion people use woodfuel for cooking, and 1.3 billion people live in homes where forest products are the main building materials.⁷⁴

The TEEB review estimated that ecosystem services and other non-market goods account for between 47% and 89% of the 'GDP of the Poor'.⁷⁵ 'GDP of the poor' is an attempt to measure and demonstrate the value of the goods and services that millions of poor people receive from nature, but which are not monetized, and thus not captured when standard GDP is measured. Sustainable management of natural resources – or natural capital – is a key to poverty reduction for a large part of the world's poor – as also reflected in the Millennium Development Goals, and discussions of new global sustainable development goals post-2015.

Increasing food production, maintaining forests

According to the FAO, 925 million people worldwide suffer from food insecurity.⁷⁶ Meeting future global demand for food without increasing the pressure forests and other ecosystems will require new approaches where natural systems and agriculture are integrated or mutually enforcing. Climate change is likely to

complicate matters further by affecting crop yields in many areas.⁷⁷ Increased production per hectare and agricultural expansion into fallow areas and degraded lands will be important. Some forms of productivity increase are easy to envision: Put two heads of cattle instead of one per hectare of pasture in the Amazon. Methods for increasing productivity and product diversity of smallholder agriculture in the tropics through agroforestry techniques are also well tested. Increased productivity is also at the heart of the big actors in agribusiness, but based on intensive use of fertilizers and pesticides. There are limits to how much production can be intensified, and how much forest can be cleared, before the effects on water, soil and climate warming threaten food production.

There is no single solution to the challenges of food security, and the distribution and consumption side of the issue will be just as important at the production side. How we deal with issues like global distribution of food, and the approximately one third of food produced that is lost or wasted, will have major impacts. Smarter food production, with greater emphasis on the effects on the ecosystems that supports agriculture, will play a significant role. Trees on farms and food from the forest will be part of this smarter food production – and smarter eating, where more nuts, roots, leaves and even insects may feature on the menu.

Food from the forest⁷⁸

Tropical forests provide an astounding variety and amount of food, and play a highly significant role as a source of food for some of the world's poorest people. Nutrient-rich forest foods also often form a critical supplement to otherwise poor diets.

Wild leaves, fresh or dried, are often used in soups, stews and relishes which accompany carbohydrate staples (such as rice or maize), adding flavour and nutrition. Leaves are a source of vitamins A and C, protein and micronutrients like calcium and iron, often deficient in diets of vulnerable communities. The protein content of baobab leaves, for instance, is around 14%.

Thousands of species of wild fruits are consumed worldwide. They represent a good source of minerals and vitamins, and may contribute significant quantities of calories. Seeds and nuts add calories, oil and protein to diets. Fats and oils are expensive for poor households to buy, and especially children need energy-dense food sources like nuts and seeds as they are important for the absorption of vitamins A, D, E and K.

Many forest plants have edible roots and tubers that provide carbohydrates and some minerals. In addition, roots and tubers are often central ingredients in traditional medicines. Mushrooms, gathered wild from forests and woodlands, are added to sauces and relishes for flavouring and are generally a good source for vitamin B, calcium and potassium. As several species contain proteins, they sometimes provide a substitute for meat. Indigenous peoples living in the rainforest have elaborate techniques for collecting honey from wild colonies. Honey is not only an attractive sweetener: it is also an important ingredient in many traditional medicines.

Wild animals and fish often form an important part of the diet of people living in or close to forests; for some people they are the only source of animal protein. In at least 62 countries worldwide, wildlife and fish provide at least 20% of the animal protein in rural diets. There is great regional variation in wild meat consumption.⁷⁹

State of the rainforest 2014 • part 2

Deforestation: Time for policy change



State of the world's rainforest

The Earth's most varied and most mysterious ecosystem, the tropical rainforest, has been reduced to half of its original size. Most of this loss has taken place over the past five to six decades. Despite increased awareness of the key role played by the tropical forests in solving the most urgent global environment and development challenges, the rate of tropical deforestation remains alarmingly high. Looking more closely at developments in the last five to ten years, however, we can note both significant policy changes and important examples indicating that it is indeed possible to avoid continued deforestation of the magnitude that has characterized recent decades.

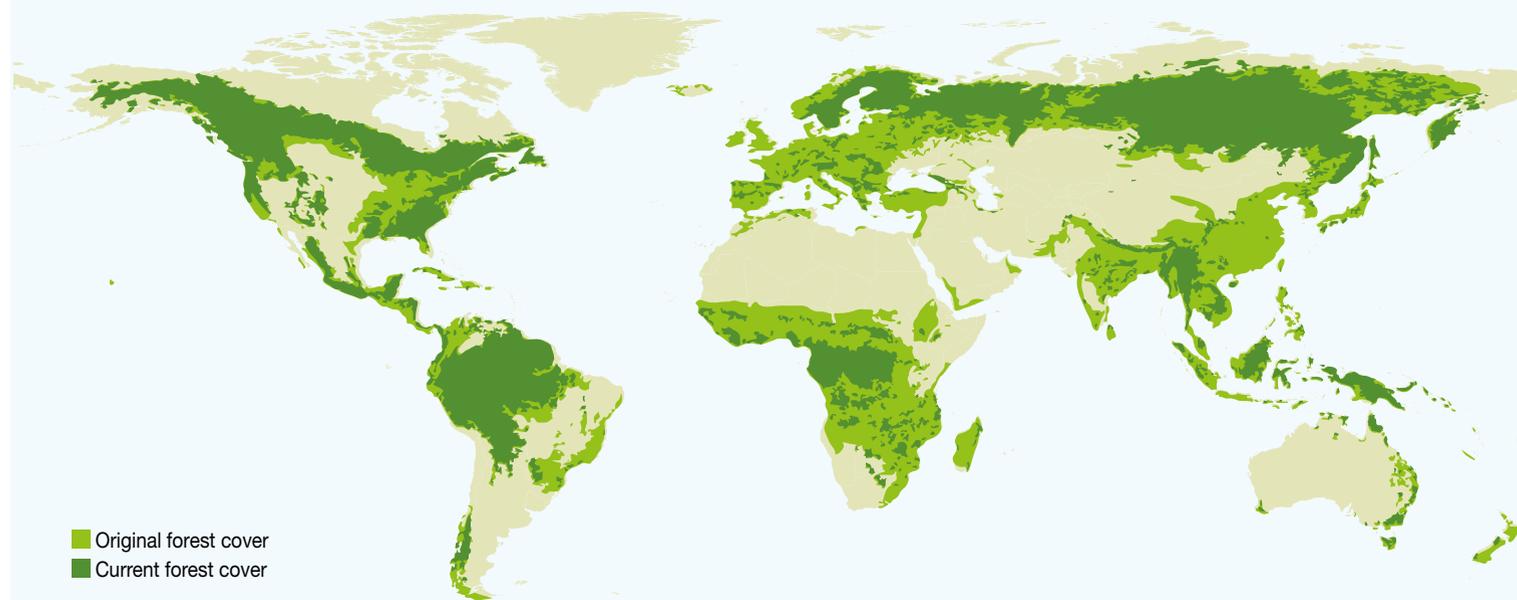
Brazil, the world's largest rainforest country, has reduced deforestation from an average of 19,500 km² annually for the period 1996–2005, to 5,800 km² in 2013. The Democratic Republic of the Congo (DRC), the world's second largest rainforest country, has kept deforestation rates low. DRC has maintained a ban on new logging concessions since 2002, to ensure that the concessions granted are consistent with its forest legislation. In Indonesia, the world's third largest rainforest country, the forests are under immense pressure. Although the international official forest statistics, the FAO's Forest Resources Assessment,¹ reported a significant decrease in Indonesian deforestation in the decade 2000–2010 compared to the previous decade, other reliable sources report increasing deforestation² (see section 3). On the political level, Indonesia has made reduced deforestation an

important goal, and necessary reforms in forest governance have been initiated, along with a moratorium on new deforestation concessions in significant parts of the forest. However, these policy reforms are opposed by powerful groups in Indonesia, and the effects remain to be seen.

Brazil, DRC and Indonesia are only three countries, but they hold some 60% of the world's remaining rainforests within their borders and represent the main rainforest regions of the world: the Amazon, the Congo Basin and Southeast Asia/Oceania. Looking closer at these countries, one will find on the one hand, that reduced deforestation is possible and compatible with economic development; and, on the other, that countries face significant challenges in seeking to shift over to a low-deforestation development path.

The tropical rainforest covers approximately nine million km² (about 6% of the terrestrial Earth),³ although one should be aware of significant uncertainty with regard to the extent of forest cover and differences in deforestation trends depending on methodology used (see following pages). The rainforest represents huge areas that provide livelihood for millions of people and habitats for an immense biological diversity. It also plays a vital role for global climate, rainfall and the water cycle. Still, the extent of the world's rainforest today is not larger than what would fit within the borders of the United States. Spread out along the Equator, it is

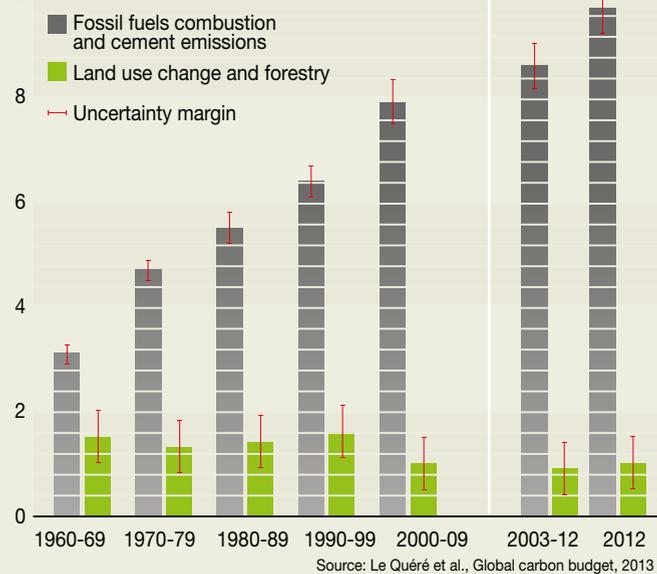
Global forest cover



Source: WCMC online database, accessed August 2014

Global Carbon emissions are increasing, emissions from forests are not

Average annual emissions per decade and last year available
Billion tonnes of Carbon per year



an increasingly fragmented and vulnerable ecosystem. Protecting the remaining large contiguous areas of rainforest is a global responsibility.

The three main tropical rainforest regions that remain – the Amazon (~5 mill km²), the Congo Basin (~2 mill km²), and Asia including

Papua New Guinea (~1.4 mill km²) – will have to be at the core of the world’s efforts to halt deforestation. Also mainland Southeast Asia, Madagascar and parts of West Africa and Central America have smaller, but important, areas left of the rainforests that once covered much of the land in these regions.

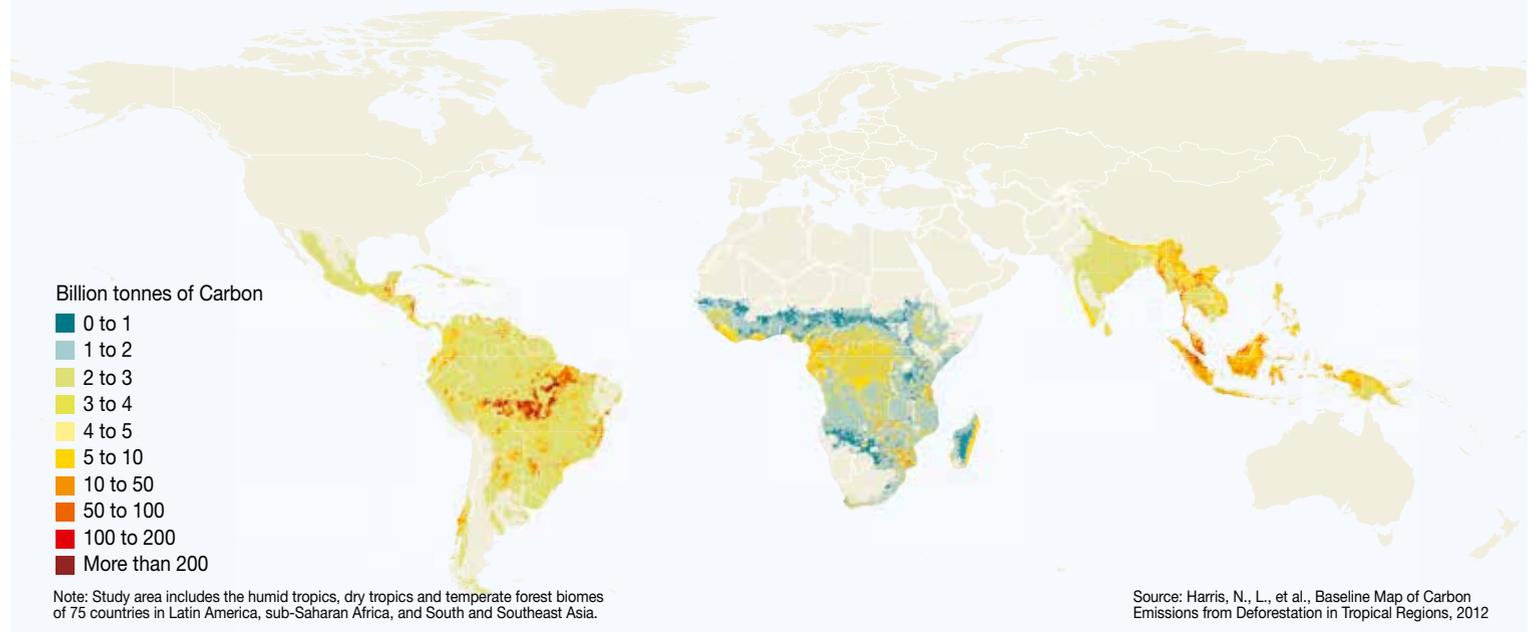
Primary forest – the original “jungle”

Primary forest, sometimes also referred to as ‘intact forest’, can be defined as a forest of native species where the ecological processes have not been significantly disturbed. Primary tropical moist forests, or rainforests, are the terrestrial systems with the highest diversity of species. According to FAO,⁴ some 36% of the world’s total forest area is primary forest (13–14 mill km²); 57% is naturally regenerated forest and 7% is plantations.

There is substantial uncertainty with regard to the accuracy of figures on primary forest, as the forest monitoring and reporting in many countries is poor.

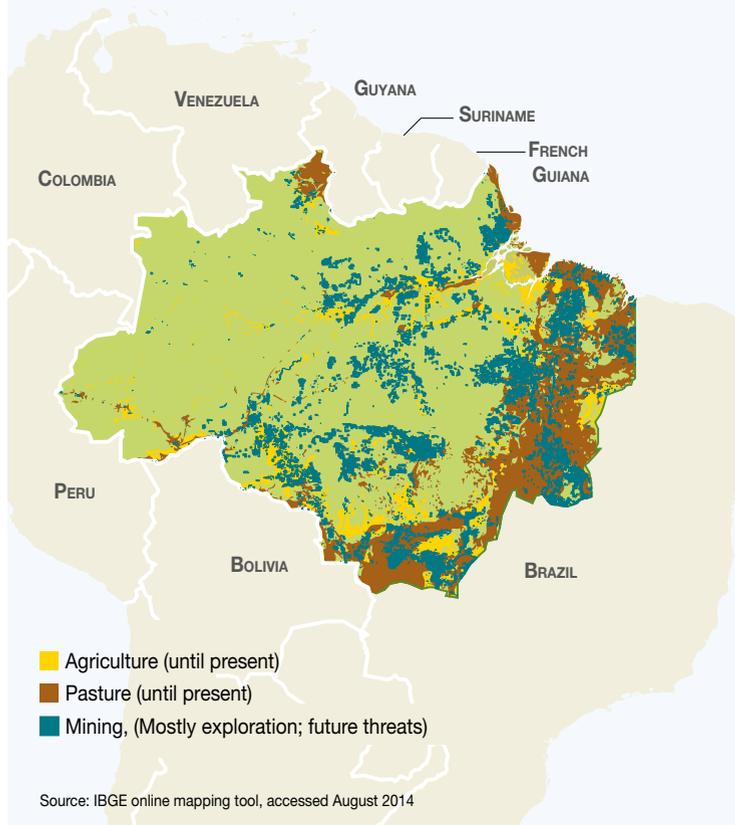
FAO⁵ reports that 400,000 km² of primary forest was lost or affected by human activity to the extent that it changed into secondary, or ‘naturally regenerated’, forest between 2000 and 2010. This data does not include a DRC, a major rainforest country.⁶ In its assessment of the main rainforest basins,⁷ FAO estimates 62% of the forests in these areas to be ‘primary forest’. A review of primary forest in different climatic zones, estimates the ‘equatorial’ zone – the rainforest region – to have just over 6 million km² primary forest.⁸ Not surprisingly, Brazil is on the top of the list of tropical countries, with 2.5 million km² primary forest – only Canada and Russia have

Carbon emissions from gross forest loss, 2000-2005

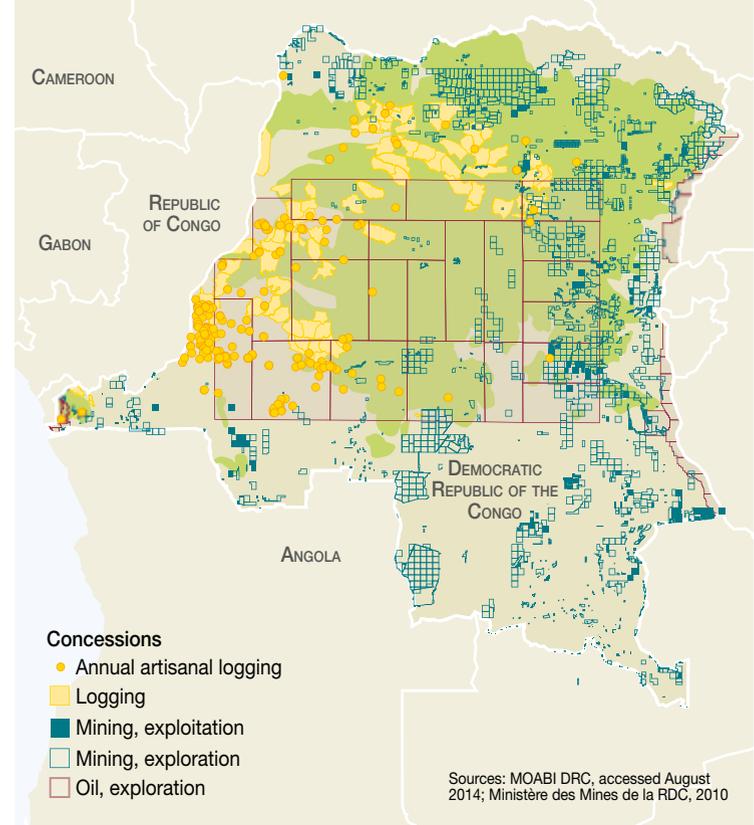


What threatens the rainforest?

Brazilian Amazon: Historic deforestation and today's threats



Democratic Republic of the Congo: Extractive industries



Indonesia: Logging and palm oil concessions



more. Only 22% of the world's remaining primary forest is within protected forest (IUCN category 1-VI), according to the review.

A recent analysis of 'Intact Forest Landscapes' (IFLs) by World Resources Institute and others⁹ warned that pristine forests are being degraded at an alarming rate. Over 1 million km², an area three times the size of Germany, has been degraded between 2000 and 2013, according to the study.¹⁰ 25% of the degradation was found in the Amazon Basin and 9% in the Congo Basin. The IFL, mostly primary forest, is assessing the remaining large forested wilderness areas, of which 95% is found in boreal and in tropical forest.

The tropical rainforest, with its incredible biodiversity, unique ecological services and vital importance for indigenous peoples and local forest-based communities is the main focus of this report. In parts of the report, the term 'tropical forest' is used, covering the continuum from flooded forest and mangroves on the one side, via rainforests and moist deciduous forest, to dry tropical forest on the other. This is both because these other tropical forest types are important in terms of development, livelihood issues and ecosystem services, and because available statistics are often based on this broader category. Tropical forest, including rainforest, represents approximately 45% of the world's forests (17–18,000 km²)¹¹

Secondary forests

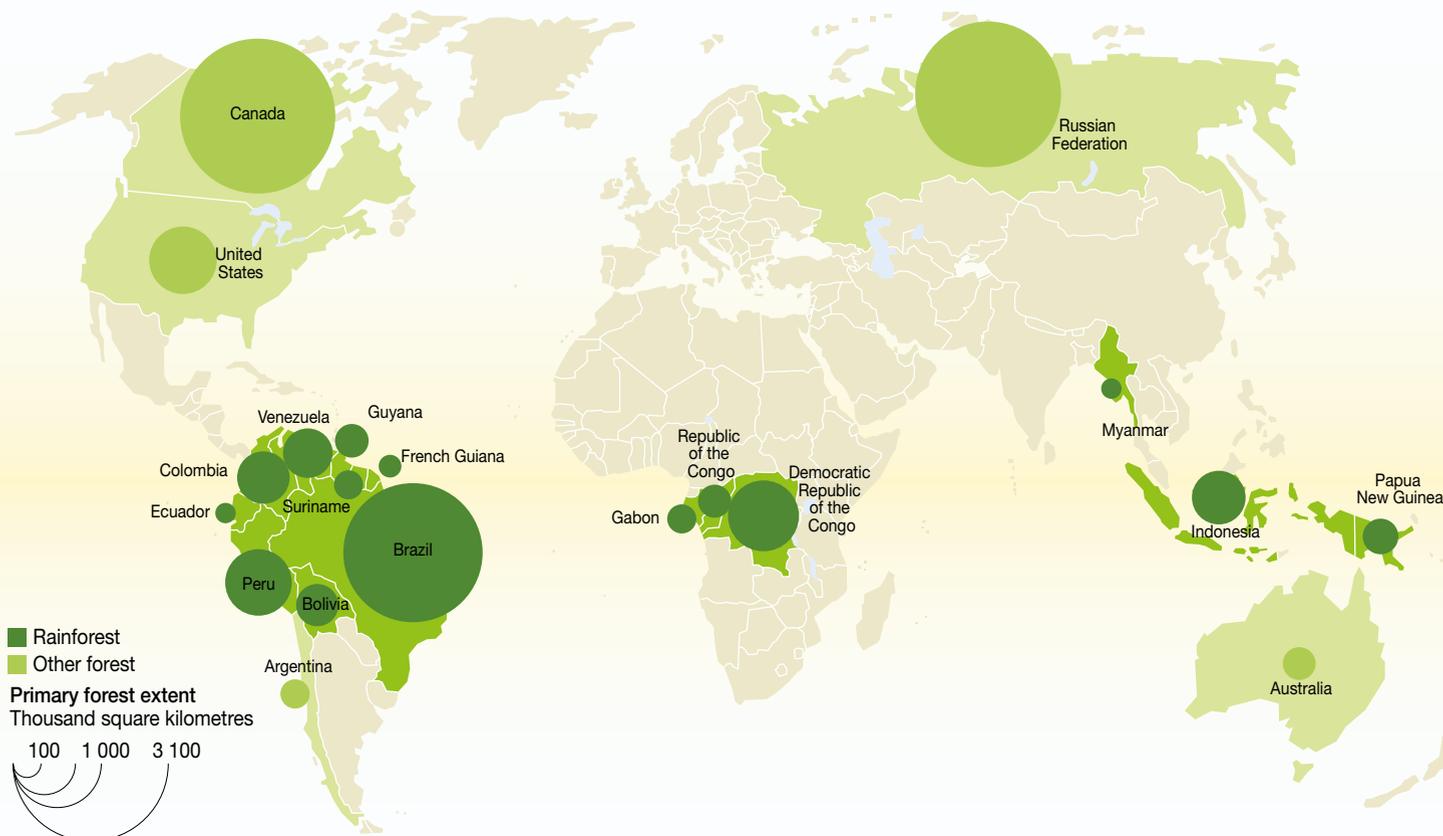
Clearly, protecting the remaining intact primary rainforest needs special and urgent attention. However, this does not reduce the importance of also protecting 'secondary' forest – forests that to varying degrees have been changed by human use. Given their ecological services and biodiversity, and as a source for livelihood and local development, these vital forests need protection and sustainable use.

The value of primary and secondary natural forests stands in sharp contrast to large-scale monoculture tree plantations. Plantations are based on one single species planted over a huge area, often fast-growing – and in many cases non-native – timber species. Plantations are in many calculations included as forest without regard to the environmental problems they represent. Plantations have low environmental value compared to the varied functions of natural forests, and often cause pollution or shortage of water, as well as forcing local communities to leave their land and give up traditional forest management practices.

Deforestation

It is surprisingly difficult to establish how fast the world's rainforest and other tropical forests are being deforested. Figures vary significantly from one source to another (see following article),

Primary forest top 20 countries

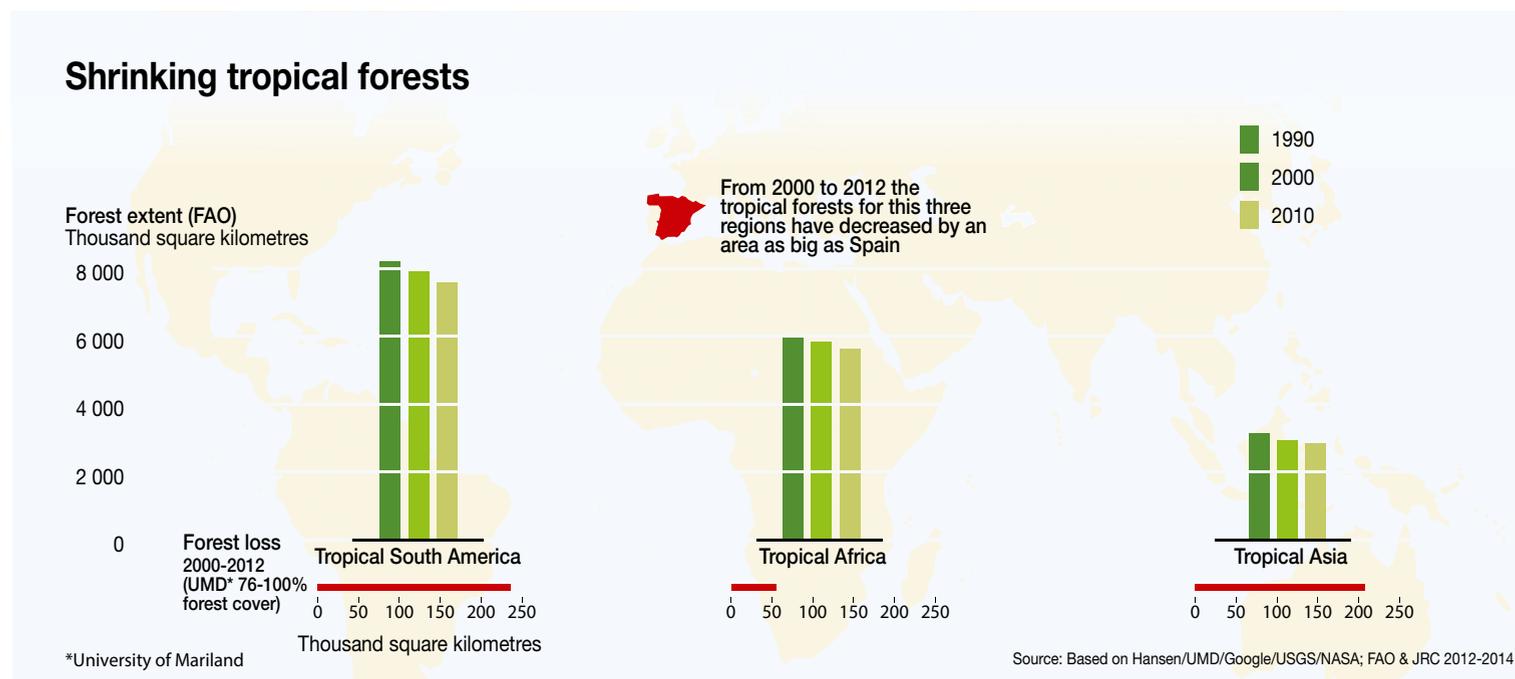


Source: Mackey, B., et al., 2014

depending on the methods used to monitor, and the definition of ‘forest’. Only a few rainforest countries, notably Brazil, have had reliable and transparent monitoring and reporting systems long enough for trend to be visible, but more countries are improving their systems.¹² However, it seems clear that the significant reduction in deforestation achieved in Brazil since 2005 is not matched by similar long-term trends in other major countries. According to some sources,¹³ increased deforestation in other tropical regions, both rainforest and dry tropical forest, more than outweighs the gains in Brazil.

According to a University of Maryland study,¹⁴ the loss of tropical forest was 1.1 million km² in the period 2000–2012. This equals an area about three times the size of Norway. Looking at the figures for dense tropical rainforest only (above 76% tree cover), we find that the tropical rainforest in South America was reduced by 4.2%, in Asia by 12.5%¹⁵ and in Africa by 2.8% from 2000 to 2012.

The FAO’s Forest Resources Assessment¹⁶ reports global deforestation to be 130,000 km²/year for 2000–2010, with most of this taking place in tropical forests. This figure includes more than 40,000 km²



Tropical forests are shrinking rapidly – but how fast?

Deforestation according to FAO

The FAO’s Forest Resources Assessment 2010 (FRA 2010) reports global gross deforestation to be 130,000 km² annually for the decade 2000–2010, and 160,000 km² for the previous decade 1990–2000. Out of this, forest in ‘rainforest basins’ (using a wider definition than used in this report) lost on average 63,000 km² annually (1990–2010). Other studies, and recently also a remote sensing study by FAO and JRC indicates that the deforestation rates reported by FRA 2010, although dramatic, may be too optimistic.

The remote sensing study by FAO and the European Commission Joint Research Centre JRC reports that global gross deforestation (reduction in ‘forest land use’) over the 1990–2010 period was 155,000 km² per year. The tropical forest area was reduced by 1.3 million km² in the same two decades, and as this figure is net change the deforestation figure would be even higher if one excluded plantations.

Deforestation according to the University of Maryland-study

In late 2013, researchers at the University of Maryland (UMD), led by Matt Hansen, published a study on global forest cover and forest cover change in *Science*. This data is used as the basis for the comprehensive forest monitoring base “Global forest Watch”, which was recently launched: www.globalforestwatch.org

There are important differences in methodology between FAO and UMD. One difference is that UMD registers tree cover at the time of registration, whereas FAO also considers the land use category – the purpose for which the area is used, for instance agriculture or forestry. The total loss of forest in the tropical climate domain 2000–2012 was 1.105.786 km² according to UMD, or an average of 92.000 km²/year in the tropical forest zone. The loss 2000–2012 equals more than three times the size of Norway.

Sources: FAO FRA 2010, FAO 2011, FAO&JRC 2012; 2014, Hansen *et al* 2013



of primary tropical forest lost annually. According to a 2012 remote-sensing study by FAO,¹⁷ the extent of tropical forest was reduced by 500,000 km² from 2000 to 2005.

The causes of deforestation and historical patterns of forest loss vary between regions. The tropical rainforests of the Amazon, much of Southeast Asia and Africa were still largely intact until the 1970s, unlike in Mesoamerica and South Asia where widespread deforestation and forest degradation had already taken place.¹⁸ ‘Intact forest’ does not mean that there has been no human impact (see section 1). Human settlements have been present in the world’s rainforests throughout much of human history, and in all regions scientists find traces of human interaction with the forest environment thousands of years ago. However, the rapid and extensive tropical deforestation and extinction of species of recent decades is unprecedented in human history, and threatens global prospects of development.

The Amazon represents more than 60% of the world’s rainforest. The recent sharp reduction in deforestation in Brazil has a clear impact on the deforestation rate for the whole Amazon region, which consists of nine countries.¹⁹ According to FAO,²⁰ Ecuador – a relatively small country, but with extremely high biodiversity – has experienced a dramatic rate of deforestation, with 1.8% lost annually from 2000 to 2010.²¹ According to other sources²² Colombia

has higher deforestation than Ecuador (see section 3). In Asia, Indonesia and Papua New Guinea have the largest remaining tracts of rainforest, sharing between them the unique rainforest island of New Guinea. The rate of deforestation in Papua New Guinea is reported to be stable (~0.48% annually), but extensive plans for logging, oil palm plantations and extractive industries threaten this trend. Indonesia is the country where most rainforest is being lost, but the rate of deforestation is contested (see Asia section).²³ In the Congo Basin the picture is mixed. The DRC, with 54% of the region’s rainforest, has maintained a moratorium on new logging concessions, and there are some signs of changes in forest policy to the advantage of local forest communities. Still, the gradual fragmentation and degradation of Congo Basin forests continue due to a complex set of drivers, and most studies indicate that deforestation is set to increase as a consequence of agricultural and plantation expansion, mining and other extractive industries.

Some of the closest neighbouring countries of the main rainforest nations in the Congo Basin, such as Nigeria, Uganda and Rwanda, have deforestation rates that are among the highest in the world.²⁴ In Southeast Asia, Myanmar, Cambodia and Vietnam (countries with both rainforest and dryer tropical forest), have very high deforestation; and in South America, Paraguay’s Grand Chaco dry tropical forest has deforestation rates that rank among the world’s highest, directly threatening the livelihood of indigenous peoples.²⁵

Forest degradation and forest fragmentation

Considerable attention is given to the deforestation of tropical forests and its devastating effects on societies, biodiversity and carbon emission. However, forest degradation and forest fragmentation also have adverse impacts on forest ecosystems and on the goods and services they provide, but receives less attention.

Forest degradation

Forest degradation is perceived differently by different actors: a 2009 survey found more than 50 definitions of ‘forest degradation’.²⁶ Most definitions focus on changes in the composition of tree species, loss of biodiversity, or long-term reduction in crown cover.²⁷ The most widely used definition is the rather broad one developed by a FAO expert meeting in 2002: *a reduction of the capacity of a forest to provide goods and services*.²⁸

The lack of a commonly agreed-upon definition may hamper conservation efforts. Policymakers need to have information about what degradation is, what causes it, and how serious the impacts are, in order to tackle the problem. International conventions, like the United Nations Framework Convention on Climate Change and the Convention on Biological Diversity, requires countries to report on their efforts to mitigate forest degradation. Without a suitable threshold defining ‘degraded’ and ‘non-degraded’ forest, it is difficult to report on the status and quality of forests.²⁹

It is hard to measure and estimate degradation on the global level, partly due to the lack of a common definition, and partly because it occurs in different forms and with varying intensity. However, in 2002, the International Tropical Timber Organization indicated that

up to 85,000 km² of tropical forest and forest land could already be regarded as degraded – a figure larger than the area of non-degraded tropical forest.³⁰

The underlying causes of forest degradation vary globally, and may be natural- (fire, storm, drought or pests) or human-induced (logging, grazing, fuelwood gathering, agriculture expansion). Selective logging is the primary cause in many areas, as in rainforests which are rich in attractive, high-value timber. According to research based on national data from 46 tropical and sub-tropical countries, timber extraction and logging are involved in half of the forest degradation in tropical countries.³¹ Fire, the other primary force driving forest degradation, is however also closely connected to logging. Once the canopy cover has been opened up, the forest floor is more vulnerable to drought and the spread of fire.³²

Even if degradation does not directly result in the complete loss of forest, the opening up of the canopy by selective logging and often road building, is often the first phase of a process that leads to deforestation – degradation transforms into slow-motion deforestation.³³ Studies have shown that degraded forests are considerably more likely than intact ones to over time be completely deforested,³⁴ and even selective logging may develop into complete forest loss.³⁵ One study from the Amazon showed that selective logging destroyed up to 62% of the trees in a forest, even if only the most valuable ones were directly harvested.³⁶ Forest degradation is also one of the major sources of greenhouse gas emissions.³⁷

Forest fragmentation

Forest fragmentation occurs when large areas of forests are split into smaller areas,³⁸ for example by roads or agriculture expansion. The ecosystem in the remaining forest blocks may be disrupted when plant species behaviour and the mix of species is altered with the changes in the habitat.³⁹ Plant recruitment, seed dispersal and seedling survival can be negatively affected.⁴⁰

Animal populations are also affected. When a forest area is reduced, it becomes more difficult for some species to breed or find food. In addition, ‘edge effects’ can cause further trials for the forest through drought, wind and fires. A study from the Brazilian Amazon shows that forest-fragmentation-related edge effects are one of the major causes of forest degradation. Large trees on the forest fringes succumb to wind- and drought mortality much faster than similar trees in the forest interior.⁴¹

A major task for global forest policy today is to restore and rehabilitate the huge areas of forest lands that have already been lost or degraded. This is essential for long-term food security, climate stability, biodiversity conservation and human well-being.



Why is ‘counting’ the forest so difficult?

The significant improvement, reduced costs and better availability of satellite monitoring technology and satellite photos have greatly impacted forest monitoring during the last decade. From a situation where the Food and Agriculture Organisation of the UN, The FAO, basically had a monopoly on global ‘state of the forest’ statistics, today research institutions and universities are increasingly challenging these statistics and methods.⁴² Better access to mapping and monitoring technology among civil society organizations and rainforest communities adds to the democratization of forest monitoring and reporting.

Problematic forest definitions

Although a major improvement, this development has in no way resolved the problems of forest monitoring. There are still huge challenges regarding the use and interpretation of satellite-image-based information. In many cases the data tell us little about the quality of forests: questions remain as to whether forests are partly degraded or damaged, natural forest rich in biodiversity or even forest plantation. Higher-resolution data have improved analyses, and a greater degree of ‘ground-proofing’ should gradually result in better and more valuable information.

The varying and sometimes highly problematic definitions of forest add to the problem of determining the extent of remaining forest and the rate of forest loss. There are more than one hundred definitions of ‘forest’ in use.⁴³ Some countries use several definitions simultaneously. Even UN agencies do not operate with the same definition. Moreover, the most widely used definition internationally – the FAO definition – is problematic because it is uniform for all types of forests. One criterion in this definition is that a ‘forest’ should have more than 10% canopy cover. It is highly misleading to apply the same definition, based on degree of canopy cover, for a dense tropical rainforest (which, if intact, will have close to 100% canopy cover) and for sparse savannah dry-land forest. For rainforest and other naturally dense forests, it leads to significant underreporting of forest loss.

Forests or plantations

Another problematic aspect of the FAO forest assessment is that deforestation is defined as ‘net deforestation’ – meaning that the national deforestation figure is not the extent of the deforested area, but the extent of forest loss minus the gain of forest. This may hide deforestation in large areas if the loss is offset by gains elsewhere in the same country. With regard to a tree plantation or other forms of industrial forestry where uniform tree cover is cut and re-planted, this calculation of deforestation might be accurate. But where old-growth tropical rainforest is cleared to give way for monoculture eucalyptus, acacia, teak or other plantations, the term ‘net deforestation’ conceals more than it reveals. In discussing

deforestation trends in tropical rainforest countries, it is more accurate to use figures for ‘gross deforestation’, or ‘forest loss’, noted above.

In late 2013, researchers at the University of Maryland (UMD), led by Matt Hansen, published a study on global forest cover and forest cover change in the highly-reputed journal *Science*.⁴⁴ The study has challenged the FAO as the main source of global forest statistics, and the UMD data are used by the Global Forest Watch (GFW) project led by World Resources Institute (WRI). UMD/GFW differs from the FAO in methodology, and any direct comparison of figures between the two systems is misleading. While the FAO statistics are based on national reporting within the broad FAO definition of forest, the UMD researchers measured tree cover from remote sensing, and tree cover dynamics (loss and gain). The most striking example of the differences in results from the two systems is found in the forest figures for Indonesia. Whereas the FAO states that current forest cover in Indonesia is 940,000 km², the UMD study reports a forest cover of 1,417,000 mill km² – 50% more forest than FAO. And whereas FAO reports significant reduction in the rate of deforestation in Indonesia, from –1.75% annually in the 1990s to –0.71% annually for 2005–2010, the UMD researchers find that deforestation is increasing dramatically: ‘Of all countries globally, Indonesia exhibited the largest increase in forest loss, with a low of under 10,000 km²/year from 2000 through 2003 and a high of over 20,000 km²/year in 2011 to 2012.’⁴⁵

What is a forest, exactly?

Both the FAO and the UMD calculations have shortcomings. The FAO figures depend on national reporting, which is very poor in many countries, and a highly problematic definition of forest (‘temporarily deforested areas’ count as ‘forest’, and ‘forest’ includes tree plantations, with the exception of agricultural plantations such as oil palm). By contrast, the University of Maryland study and GFW report ‘tree cover’ based on satellite data – which may be forest or other forms of tree cover, also in urban areas. All types of plantations are included (trees above 5 m tall); however, work is underway to refine the date and separate plantations from natural forest and the analysis based on this kind of data will improve.⁴⁶

How one defines ‘forest’ may have significant political and economic consequences. Choosing one definition over another can increase or decrease the officially recognized extent of forest, affecting legislation and management regulations. In a system with payment for ecosystem services – e.g. for carbon storage and reduced emissions from deforestation and forest degradation (REDD+) – the choice of definition can have huge impacts on the calculated level of emissions and carbon storage.⁴⁷

Brazil: Forest hero, but still a deforestation champion

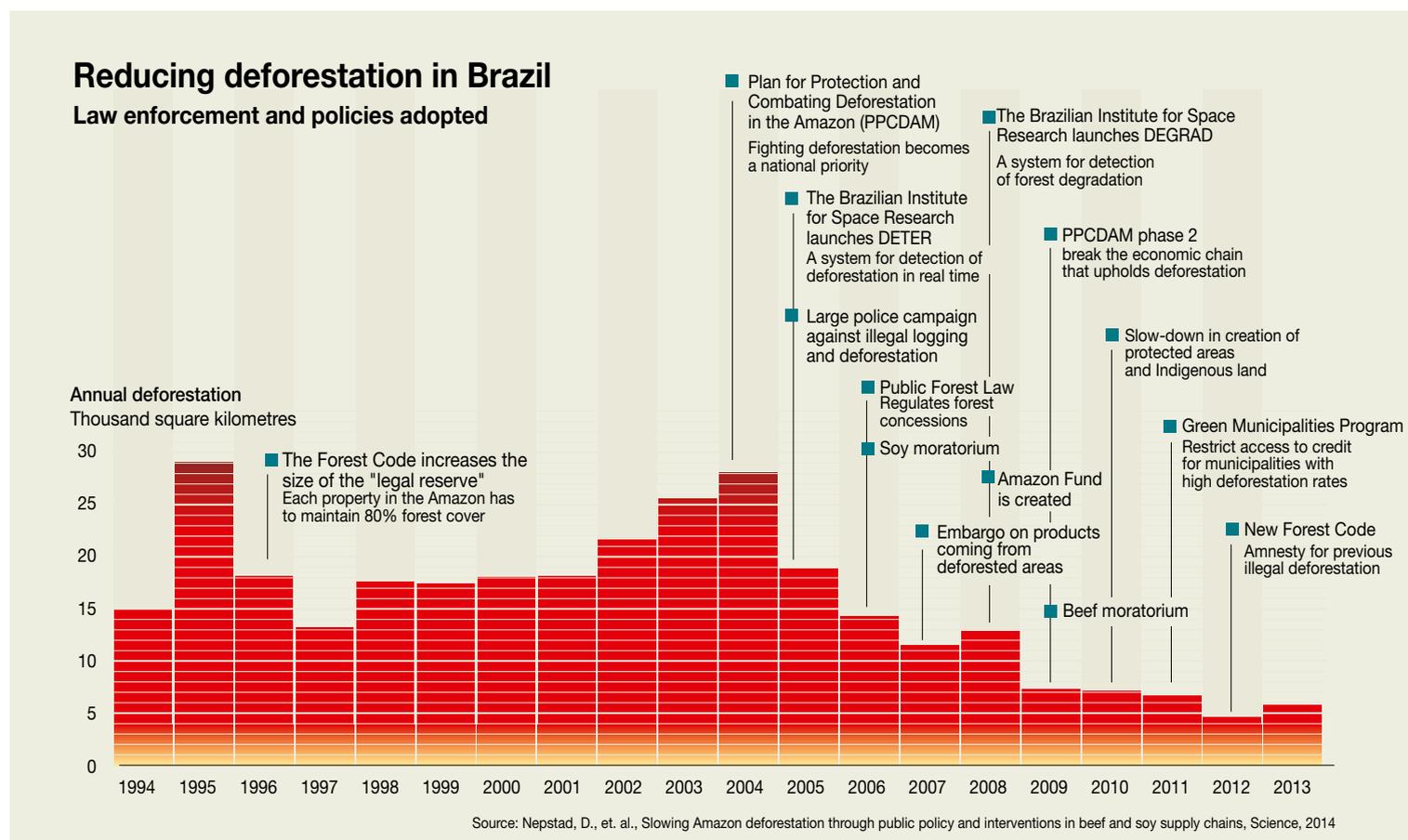
■ By **Tasso Azevedo** | *Tasso Azevedo is forest and climate consultant, former Director General, Brazilian Forest Service*

Brazil is the country with the second largest forest cover on Earth, more than 5 million km². Two thirds of the country's forest cover is concentrated in the Amazon, which still contains approximately 80% of the original forest. The country has an enormous forest area, but deforestation rates in the 1990s were worrying. Brazil was losing almost 1% of its forest area annually. In 1995, the first year for which we have data that allow calculation of deforestation in all biomes, the area deforested reached 54,000 km², an area bigger than Costa Rica. In the Amazon, deforestation that year reached an all-time high since measurements began; slightly more than 29,000 km².

Since 2005, however, deforestation rates have declined rapidly. In 2009, the last year for which there are official data for all biomes, deforestation fell to 17,800 km², and more recent estimates indicate a total deforestation of between 12 and 15 thousand km² in 2012. The greatest reduction in deforestation occurred in the Amazon.

Various studies published in recent years seek to identify the factors which led to such significant reduction of deforestation in a relatively short time. There is broad agreement that the following helped in reducing deforestation: implementation of the Plan for Protection and Combating Deforestation in the Amazon (PPCDAM); the economic framework for agriculture and cattle-raising activities; and initiatives from local governments, civil society and the Public Prosecutor's Office.

Let us look more closely at the PPCDAM. In 2004, just after the publication of the deforestation data for 2003/2004, fighting deforestation in the Amazon was declared a national priority. A task-force involving 13 ministries was created to elaborate a plan for combating deforestation. This plan, which became operational in March 2005, included actions within three areas: command and control (or law enforcement), regularization of land use and tenure, and incentives for sustainable economic activities.



Confiscated timber

On 2 June 2005, three months into implementation of the plan, the first of a series of mega-operations against illegal logging, deforestation and land-grabbing was conducted. It brought dozens of people to prison in one day, including civil servants. By the end of 2009, more than 700 persons had been imprisoned and over one million cubic meters of timber had been confiscated. Crucial to the success of these command and control operations was the involvement of the federal police, the Public Prosecutor's Office, and for operational and logistic support, the armed forces.

Also in 2005, the Brazilian Space Agency INPE launched its System for Detection of Deforestation in Real Time (DETER). Its monthly/ fortnightly information on pockets of deforestation significantly reduced the response time for law enforcement agencies to arrive at deforestation locations. In 2008 INPE launched a system for the detection of forest degradation (DEGRAD); which indicates areas at high risk of deforestation, thereby stimulating preventive actions. Especially important have been the transparency and openness that INPE provided regarding the data, which allowed the media and civil society to follow the issue closely. This process included the creation of independent monitoring systems, like the SAD system developed by the non-governmental organization Imazon.

Parallel to the strengthened law enforcement and improved monitoring, extensive efforts were initiated for the demarcation of indigenous territories and the creation of protected areas. Between 2005 and 2008 more than 500,000 km² of federal and state-level protected areas were created, more than 130,000 km² were declared indigenous territories, and another 170,000 km² of existing territories were granted final legal recognition. Reducing the amount of unassigned public forests in the Amazon served to reduce the speculation value of the land, and consequently the incentive for deforestation.

Between 2008 and 2009 there came strong pressures for relaxing the fight against deforestation. The level, which had dropped from 27 to about 11,000 km² stopped falling and threatened to increase. Then the second phase of PPCDAM was initiated, aimed at breaking the economic chain that upholds deforestation.

Municipalities with the highest deforestation rates in the region had their access to rural credits restricted. That forced them to reduce deforestation and initiate environmental regulation of rural properties in order to regain access to credits. Also a 'trade restriction' was established for illegally deforested areas, holding every link in the supply chain responsible if they acquired products from the restricted areas. During the same period pilots for creating a Rural Environmental Register that separated the issue of environmental compliance from the issue of confirmed land tenure, was initiated. This connection had





frequently been invoked by those who carried out deforestation: to obtain impunity they claimed that they could not be held responsible since they did not possess the title deeds to the land. A resolution approved by the National Monetary Council prohibited banks from supplying rural credits to ranches containing restricted areas and not engaged in processes for environmental compliance. Within the same framework, cattle from these restricted areas were confiscated in operations that became known as ‘Pirate Cattle’.

From 2006, the management of public forests in Brazil was regulated (Law 11.282) to increase sustainable forest management and introduce the system of forest concessions in the Amazon. As a consequence of the security provided by long-term concessions (normally 40 years) concession holders invest in monitoring and low impact logging techniques. The area under sustainable forest management tripled between 2003 and 2012.

The Amazon Fund

The Amazon Fund was created in 2008 to attract international donations for the results obtained in reducing deforestation, to be used for the protection and sustainable use of the forest. This provided incentives for all Amazon states to develop state plans for combating deforestation. Civil society organizations in partnership with municipalities scaled up initiatives with the Rural Environmental Register, payment for environmental services and the environmental regularization of rural properties.

These actions, and many others, are multi-institutional. They transform successful civil society pilot projects into large-scale public policies. Experience from civil society was fundamental for raising the level of ambitions within the team that led the process for implementing the PPCDAM. A good example is the bold initiative

of the ‘Pact for zero deforestation in the Amazon’, elaborated in 2007 by civil society and subsequently involving the private sector, the Public Prosecutor’s Office and then state governments, with implications for the soy and cattle supply chain.

The reduction of deforestation rates in Brazil would, however, not have been possible without a series of institutional frameworks created during the 15 years which preceded the Constitution of 1988. These include the creation of the National Environmental Policy, the National System for Protected Areas, the Forest Code (in its version prior to 2012), and the PRODES system.

Between 2009 and 2013, reduced activities and less political innovation in the fight against deforestation brought marked slowdown in the pace of reduction. Between 2004 and 2009, deforestation had fallen 73%, but between 2009 and 2013 the corresponding figure was only 22%. In 2013 deforestation rose slightly (28%) compared to 2012, but was still less than 6000 km², almost 80% below 2004.

Since 2010 there has been a series of setbacks in policies that support the important decline in deforestation in Brazil. This negative development has included changes to the Forest Code that reduce the areas protected by law in rural properties, stalling of the creation of indigenous lands and protected areas, and the systematic reduction of protected areas to allow for expansion of infrastructure projects.

How to get back on track

On the positive side, between 2005 and 2012 when there was a decline in deforestation in Brazil, the country saw its economy grow at almost double the rate of the years of record deforestation between 1995 and 2004. At the same time, Brazil also experienced a drastic reduction in poverty and a strong growth in agricultural production.

Despite the decrease, Brazil today still has the largest annual deforestation of all countries of the world. Our challenge is not only to prevent deforestation from rising again, but to get back on track towards ending the loss of native forest cover in the country.

For this to happen, the following initiatives will be crucial:

- Extend the annual monitoring of deforestation (PRODES) and the detection of deforestation in real time (DETER) to all biomes.
- Complete the Rural Environmental Registers and their Plans for Environmental Recovery of all Brazilian properties.
- Establish a programme of financial incentives for maintaining standing forest.
- Reopen the process to expand and consolidate protected areas in all biomes.
- Promote forest-based economy by increasing the area under sustainable forest management and doubling the areas for sustainable use.
- Promote the regeneration of 600,000 km² of degraded pastures, combined with the restoration of forest cover in critical areas.



Is REDD+ saving the world's rainforests?

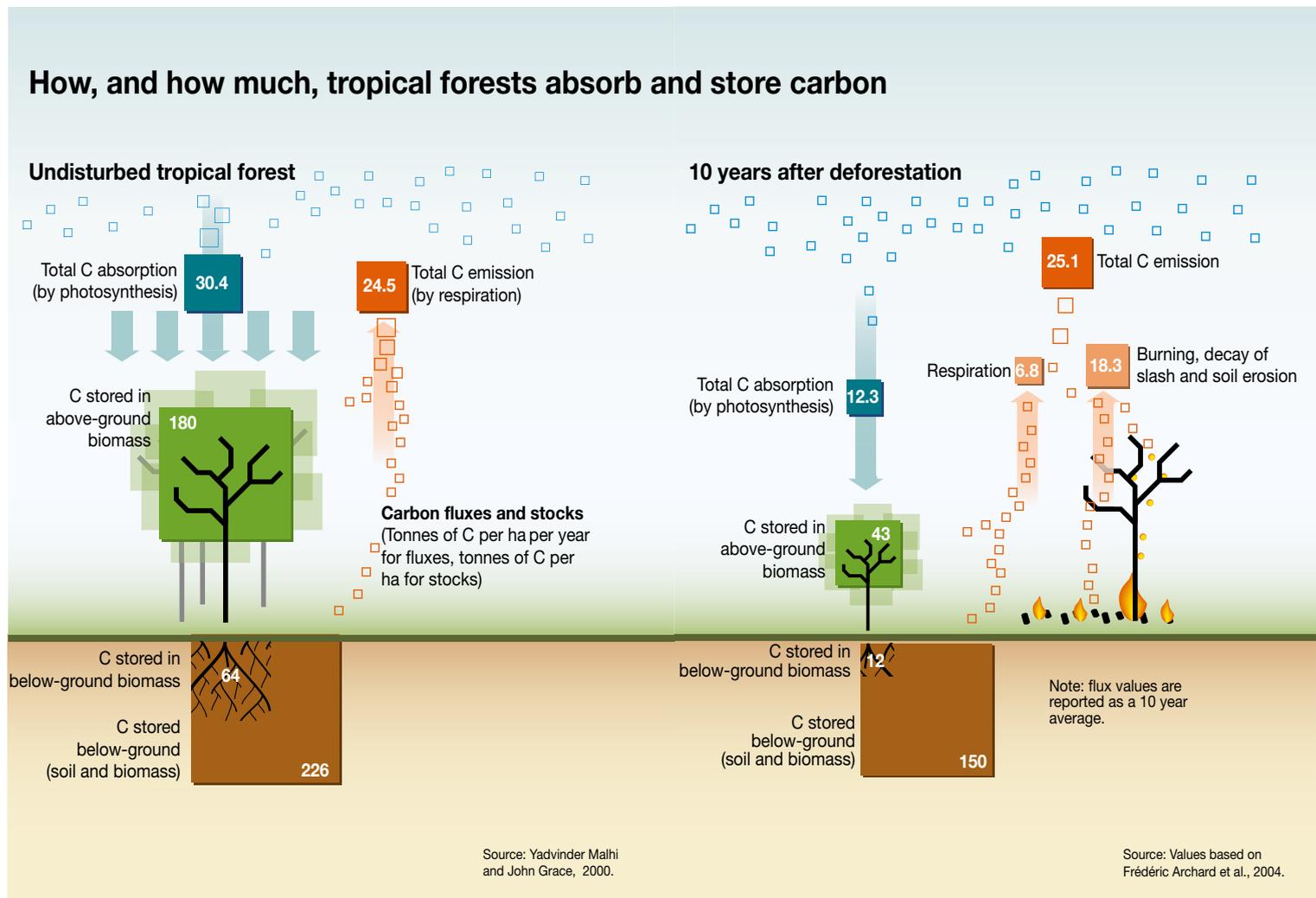
The idea of paying rainforest countries to reduce deforestation has gained a prominent role in international efforts to address climate change. Under the label of REDD+, billions of dollars are being channelled towards the protection of tropical forests. But – is this making a difference?

Half of all the carbon stored in the world's forests is found in tropical areas. Deforestation and degradation of these tropical forests is the main reason why forestry and land use account for 10–15% of the world's total human-induced CO₂ emissions.⁴⁸ To achieve the deep reductions in greenhouse gas (GHG) emissions necessary to avoid dangerous climate change, protecting tropical rainforests is imperative.

This was the starting point for an idea launched by the forest-rich countries of Papua New Guinea and Costa Rica in 2005, later known as 'Reducing Emissions from Deforestation and Forest Degradation

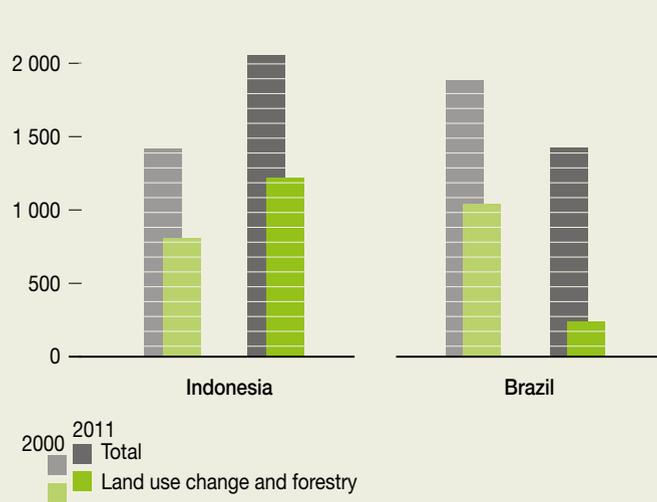
in Developing Countries' (REDD+). Through REDD+, developing countries are to be provided with financial incentives for protecting their forests. It was argued that this could provide a relatively quick and inexpensive way of achieving sizable cuts in greenhouse gas emissions.⁴⁹ Economic analyses indicated that action to reduce emissions from deforestation could be substantially cheaper than many other measures for reducing greenhouse gas emissions – some estimates put the cost at no more than 1 to 2 USD per tonne of CO₂.⁵⁰

REDD+ became an important part of the UN-led negotiations on a new international climate change treaty. However, a range of difficult questions had to be negotiated: How should emissions from deforestation be measured to qualify for payments? How to calculate 'avoided emissions'? How could social and environmental concerns, such as biodiversity or the rights of forest dependent peoples, be safeguarded? And, not least, where should the money come from carbon markets that would allow rich countries



Selected anthropogenic carbon emissions in Brazil and Indonesia

Million tonnes of CO₂ equivalent per year



Source: World Resources Institute, CAIT

or companies to pay for forest conservation to offset their own emissions, or through other mechanisms like international funds or development aid?

Varieties of REDD

While UN negotiators have been struggling with these questions, various initiatives have already emerged under the banner of REDD+. The World Bank has established two funds to support developing countries, through which 45 countries are currently receiving funding to prepare plans and programmes for REDD+ participation.⁵¹ Among them are important rainforest nations such as Peru, DR Congo, Indonesia and Papua New Guinea. The UN-REDD programme (UNEP, UNDP and FAO) is supporting national REDD+ strategies in 18 countries. Additionally, some countries have entered into bilateral REDD agreements, such as the agreements between the government of Norway and the governments of Brazil, Indonesia and Guyana (see box on Norway's International Climate and Forest Initiative). Finally, several private companies and large NGOs are developing 'REDD+ projects' on a local or regional scale, including traditional conservation projects as well as projects aimed at selling carbon credits from avoided greenhouse gas emissions.



The Norwegian International Climate and Forest Initiative

In 2007, Rainforest Foundation Norway and Friends of the Earth Norway proposed that the Norwegian government should commit to contributing substantial finance to reduce deforestation in developing countries. At the 2007 UN climate conference in Bali, then Prime Minister Jens Stoltenberg announced that Norway would commit up to around USD 500 million annually to such efforts, through the 'Norwegian International Climate and Forest Initiative' (NICFI).

Through NICFI, the government of Norway has signed several bilateral agreements promising financial contributions to developing-country efforts to reduce deforestation. The most notable agreements have been with Brazil, Indonesia and Guyana, but funding is also being provided for countries such as Ethiopia, Vietnam and Mexico.⁵² In addition, Norway is among the main contributors to World Bank and UNEP/UNDP/FAO initiatives on REDD+, and has contributed substantial funding to various NGOs and research institutions for their work on REDD+ and deforestation issues.

In some countries, for example in Indonesia⁵⁹ important results have been achieved through Norway's funding, and in other countries the results so far have been more questionable.⁶⁰ The NICFI initiative has made Norway the largest contributor to REDD+ efforts internationally.⁶¹

All these approaches currently go under the name of REDD+, but their practices vary greatly. This makes it difficult to analyse precisely what REDD+ is, and what it has achieved. A few trends can nevertheless be distinguished.⁵⁶

First, while the underlying assumption for many REDD+ initiatives has been that the money required to incentivize reduced deforestation would be generated mainly through carbon markets, most current REDD+ efforts are financed by public funds – generally counted as official development assistance (ODA). In total, various public sources are estimated to contribute around USD 3 billion annually to REDD+ and related efforts, while the carbon market so far contributes only some 140 million.⁵⁷

Second, while the idea of REDD+ is to pay for results in the form of actual, measurable reductions in deforestation and forest degradation, most of the finance so far has gone into the preparatory phases: preparing strategies and plans for future results-based payments, reforming laws, building systems for monitoring deforestation, smaller-scale pilot projects, etc. Few countries have moved to the phase where they are paid per tonne of CO₂ emissions they actually reduce.⁵⁸

Third, much of this ‘readiness work’ has shown that the barriers to reducing deforestation might not simply be a lack of economic incentives, as implied by the original idea of REDD+.⁵⁹ It has become clear that if REDD+ is to be successful, attention must be paid to a wide range of social and political issues – including forest governance, and recognition of the rights of indigenous peoples and local communities. This has led to discussion on whether REDD+ should support not only emissions reductions but also wider ‘non-carbon’ benefits, such as strengthened land rights for indigenous peoples, improved livelihoods for communities, and conservation of biological diversity.⁶⁰

Experience on the ground indicates that where this broader approach to REDD+ has been chosen, potentially significant results have been achieved. In Indonesia, for example, the REDD+ process and the support pledged from the government of Norway have resulted in concrete policy changes, including a moratorium on new forest concessions in primary forest and peat lands and strengthened government coordination on forest policy. In other countries, among them the Democratic Republic of the Congo, REDD+ processes have given civil society and indigenous peoples a greater role in forest policymaking, opening the door for improved policies to fight deforestation in the future.

Only carbon?

However, there is reason for concern, as other REDD+ initiatives are still proceeding on the basis of a narrow focus on carbon emissions, with insufficient attention to the broader political context of deforestation. Some programmes, such as certain REDD+ initiatives from the World Bank, seem to be rushing into results-based payments for emissions reductions in a manner that sidesteps inclusive consultation processes and fails to implement social and environmental safeguards adequately.⁶¹

With discussions now underway on a new international climate change agreement for the period after 2020, it is not yet clear whether REDD+ will move toward a narrow focus on greenhouse gas emissions in order to attract future funding from carbon markets, or whether lessons from previous ‘readiness work’, showing the need for a broader approach, will be taken on board. As the bulk of funding for REDD+ is likely to come from public sources in the foreseeable future, policymakers would be well advised to accept that if the protection of tropical forests is to be effective in the long run, it must build on the rights of indigenous peoples and local communities, and must recognize the full range of benefits (carbon and non-carbon) that these forests provide.

State of the rainforest 2014 · part 3

People who protect forest



The Amazon

CHALLENGE

Protecting the world's largest rainforest in a region with rapid economic development

The Amazon forest spans more than five million km² and is by far the world's largest rainforest area,¹ representing some 55–60% of all rainforest. The well-known reduction of deforestation in Brazil since 2004 is globally significant, and demonstrates that controlling deforestation is possible with resolute government action and compatible with economic development. The situation in the Amazon varies, however, from consistently very low deforestation rates in the Guyana Shield region, to deforestation peaks of more than 11,000 km² for a single state in a single year (Mato Grosso in 2004) at the height of the soy boom.² In Peru, the second largest Amazon country, deforestation rates have been lower than in many other rainforest countries, but recent reports show alarmingly high rates of forest

degradation.³ In all Amazon countries large-scale development plans represent major threats to the rainforest and the traditional occupation and use of natural resources by indigenous peoples. A recent assessment concludes that the accumulated pressure from infrastructure such as roads and dams, and extractive activities for oil, gas and minerals – but not including the pressure from agriculture and logging⁴ – may cause as much as half of the Amazon forest to disappear in the near future.⁵

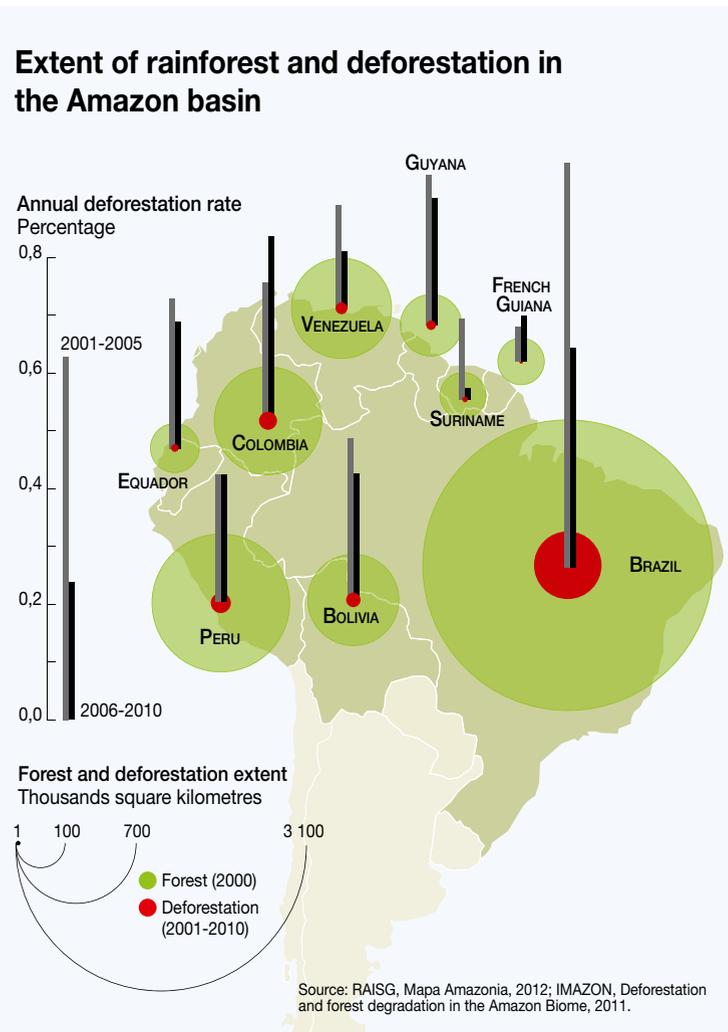
Biological richness and thousands of butterflies

As the largest area of dense tropical forest, the Amazon has unique importance. The Amazon river carries more water and drains a larger



area than any other river. 2,500 species of fish are recorded, more than in the Atlantic Ocean.⁶ The Amazon rainforest exchanges vast amounts of water and energy with the atmosphere, creating half of its own rainfall and affecting the climate at a regional scale, well beyond the rainforest.⁷ It stores 90 billion tonnes of carbon.⁸ By its impact on climate, deforestation in the Amazon may affect agricultural production on regional and even intercontinental scale. The Amazon rainforest is home to the greatest variety of species on terrestrial earth. The region itself is diverse, with distinct characteristics in flora and fauna linked to altitude or climate zone. 30,000 plant species are registered in Brazil, and as many as 4,200 species of butterflies in Peru – considered a world record.⁹ This biological richness has its cultural correspondence. The Amazon is home to some 385 different indigenous peoples,¹⁰ still speaking more than 300 languages.¹¹ Officially recognized indigenous territories make up a total of 1.6 million km², or 21.1% of the Amazon. Another 500,000 km² is either occupied by indigenous peoples, being claimed by them, or in the process of recognition, which could bring the sum total of indigenous territories up to 27.5%.¹² Two thirds of the recognized indigenous territories (68%) are to be found in Brazil, corresponding roughly to Brazil's 64% share of the Amazon region.

Comparing continents, South America is undoubtedly world champion when it comes to indigenous peoples' rights. Great advances in legal frameworks and recognition of collective territorial and cultural rights have been made since the 1970s, and also the willingness to undertake international commitments has grown. Between 1991 and 2002 the six major Amazon countries ratified the legally binding ILO Convention 169 on indigenous and tribal peoples, whereas neither Guyana, Suriname nor France (for French Guyana) has done the same. All nine countries, however, have endorsed the UN Declaration on the Rights of Indigenous Peoples from 2007. Yet, realities on the ground may differ substantially from rights on paper. Strong political influence from economic interest groups involved in deforestation, like the agribusiness lobby in Brazil and the oil and gas sector in Peru, impact directly on the opportunities for exercising rights. Studies indicate that it is becoming increasingly dangerous to defend human rights and the environment in the Amazon, as the race for natural resources intensifies.¹³ In the Brazilian Congress there is reported to be 83 registered proposals for legislative bills threatening indigenous rights and territories,¹⁴ almost 75% of the Peruvian Amazon is already opened for oil and gas concessions,¹⁵ and the present regimes in Bolivia, Ecuador and Guyana have proven to





be highly intolerant of divergent opinions from indigenous peoples and environmental organizations.

Champion of forest destruction

In absolute figures, the Amazon region has been the champion of forest destruction since the 1970s, and Brazil has always been responsible for the lion's share of this development. Given the continental size of the Amazon forest area, however, other regions and countries have deforested much larger percentages of their remaining forests. From 2000 to 2010 the Amazon lost 216,000 km², an area equivalent to 90% of the United Kingdom.¹⁶ In spite of this, dense humid forest still covered more than 5.8 million km² in the Amazon basin in 2010.¹⁷ It must be added, though, that a significant proportion of this forest has been affected by human activities, displaying varying degrees of forest degradation.

Deforestation dynamics varies considerably between Amazon countries. Brazil has consistently had the highest rates in the region, driven by politically stimulated occupation of the Amazon and expansion of cattle ranching; more recently followed by industrial scale soy cultivation. This is why the drastic reduction of deforestation in the Brazilian Amazon since 2004 is so significant. The average deforestation for the last two years (2012–2013) was 5,200 km², implying an 81% reduction compared to 2004, and a 74% reduction compared to average annual deforestation 1996–2005. Deforestation in the other Amazon countries has generally been relatively low, and almost non-existent in French Guyana and Suriname. In Peru, with the region's second largest rainforest area, deforestation has until recently been relatively modest, although serious forest degradation is widespread, not least due to legal and illegal logging. The signals from Peru are mixed. There are some encouraging signals that Peru may be taking positive steps regarding forest protection, but on the other hand the environment legislation was recently weakened in ways that will lower the barriers for exploitation of forest. The fact that almost three quarters of the Peruvian Amazon is covered by oil and gas concessions and that wildcat gold-digging is spreading rapidly and without control, indicate that deforestation is likely to increase in the coming years.¹⁸ Ecuador has historically had high deforestation rates, and although we have witnessed an innovative, but unsuccessful, attempt to mobilize substantial international support for keeping part of the country's oil reserves in the ground and protecting the globally significant biodiversity hotspot Yasuni, recent signs indicate that deforestation may increase in Ecuador. Colombia has displayed higher deforestation rates than the Amazon average from 2000 to 2010, and conflicts over resource extraction and development models have plagued Bolivia during recent years, where government plans are not always in line with the country's international environmental rhetoric. Guyana has always had low deforestation rates, but the tendency is towards a slight increase, largely due to the expansion of gold mining.

It is well documented that indigenous lands in the Amazon function as effective barriers against deforestation.¹⁹ Deforestation

is generally low inside indigenous territories, comparable to that of strict protection nature reserves, and far lower than in non-protected forest areas. There are, however, also contrasting examples of high deforestation within some indigenous territories, especially in the absence of supportive government policies.²⁰ Understanding the interaction between deforestation dynamics at the local level and the incentives for protection that can be provided through public policies is important. Indigenous peoples have varying approaches to resource use and forest management. The examples on the following pages, from the border area between Brazil and Peru, show some of this variation.

Challenges ahead

The Amazon region is rapidly being “integrated” through ambitious infrastructure projects, including roads, waterways, and energy transmission lines. Huge hydropower plants and large-scale investments in extraction of minerals, oil and gas are increasingly causing major environmental and social impact.²¹ Both infrastructure and extractive projects depend largely upon external financing or credit – external in this context often means Brazilian (through the Brazilian Development Bank, BNDES) or Chinese capital.

Roads represent a special challenge in the Amazon. A number of studies over the years have documented a clear link between road building and deforestation, demonstrating how nearly all deforestation occurs within a few tens of kilometres from roads. This is also clearly visible on maps; the infamous Brazilian “arch of deforestation” follows the main trans-Amazon highways. The most recent study, however, highlights the fact that there is an extensive network of unofficial roads in the Brazilian Amazon and concludes that as much as 95% of all deforestation occurs within 5.5 km of a road or within 1 km of a navigable river.²² Although the deforestation risk associated with roads are well known, there is a glaring lack of preventive measures to control land speculation, unregulated logging and land-grabbing along roads. Between 1975 and 2004 the official highway network in the Brazilian Amazon increased from 29,400 km to 268,900 km²³ – accompanied by increasing deforestation. The transoceanic highway in the western Amazon, inaugurated in 2011 and linking the state of Acre and the departments of Pando in Bolivia and Madre de Dios in Peru with each other and with harbours on the Pacific, facilitating exports to Asia, seems bound to repeat such historic mistakes.

Many more roads are planned, and with improved access the natural resources of the Amazon are becoming even more attractive to investors. It is imperative, then, that investors adopt no deforestation policies and that governments prepare their infrastructure projects with full-scale environmental assessments and implement serious mitigating actions, like regulating tenure, establishing protected areas and making social investments, before construction works are initiated. Forest destruction following roads is not a law of nature, but a proof of negligence.

Brazil: Where indigenous peoples plan their own future

In the state of Acre in the southwestern Brazilian Amazon, all indigenous lands are titled and recognized by the state. The long-term security this provides has allowed the indigenous population to develop systems for resource management based on their own culture and traditions, while also incorporating new needs and aspirations.

‘For the past 15 years, the state government of Acre has supported a policy where the value of forests has been recognized and where great efforts have been made to achieve sustainability’, explains Marcos Catelli Rocha, who works at Comissão Pró-Índio do Acre (CPI-Acre). Acre has a long history of strong social movements who support forest conservation. Comissão Pró-Índio do Acre, the Indigenous Teachers’ Organization of Acre (OPIAC), the Organization of Indigenous Forestry Agents in Acre (AMAAIAC) and associations representing the indigenous territories have all been central actors in promoting public policies for sustainable forest-based livelihoods.

Restoring ancestral lands

The rainforests of Acre have since time immemorial been inhabited by indigenous peoples, and the forests and landscapes have co-evolved with their societies. A central management practice was the “roçados”, temporary cultivated spaces with high genetic variation. Due to the eviction of people from their lands, enslavement, and internal land conflicts, people either abandoned their “roçados” or stopped cultivating plants that grow slowly. With recognized territories, they now know they can stay, and the practice of making “roçados” for cultivating different types of plants and species has gained renewed strength.

Living in geographically defined territories has brought new challenges, however. Illegal logging, drug trafficking, road construction, cattle ranching and expansion of agro-industrial production put pressure on the surroundings. Population growth combined with new expectations and desires among the younger generations result in pressure on the territories’ resources. In the villages, people have started discussing how they can control and manage their territories in viable ways, based on their own culture but also satisfying new needs.

Francisca Oliveira de Lima Costa, the president of OPIAC, explains: ‘You know, we do not live in isolation. We also depend on things produced outside the territories. New children are born, they need food. We know we are rich in resources, but we have to be careful so we do not end up generating scarcity. Plant nurseries, where we can produce for sale on a small scale, is an example of how we can get income to buy what we need.’

As a response to these concerns, OPIAC and CPI-Acre initiated the Education Programme for Indigenous Agroforestry Agents in 1996.

The programme has created an arena where different indigenous groups share their knowledge about cultivating practices, discuss problems related to resource use, and learn new agroforestry practices. Thanks to the work of the agroforestry agents, new species, including highly valued fruit trees, have been introduced in the roçados, and degraded areas have been restored.

Time for indigenous governance

A priority for the indigenous organizations, CPI-Acre and also for Acre’s government the last decade has been to map the indigenous territories and develop resource management plans (MAP 1). The indigenous management plans form part of the state’s land-use plan, where the territory of Acre is divided into geographical zones: indigenous and traditional peoples’ territories, forest conservation areas, production forest for timber and other products, and areas for agriculture.

‘The management plans are the expression of how we want to live. The old ones, the pajées [shaman/wise men], the families, women and men, the school children and teachers have all been involved in developing these plans. They show the resources we have in our lands, and establish the rules we, the inhabitants of these lands, have agreed upon. Each plan is different, and it is important that the different natural environments and the autonomy of each indigenous group are taken into account’, says Francisca Oliveira de Lima Costa.

‘In the development of the management plans, education and the role of the indigenous agroforestry agents have been central’, adds Josias Pereira Kaxinawá, the president of AMAAIAC. ‘We are now 159 indigenous agro-forestry agents who belong to 13 indigenous groups. Each territory has its own agents working in the villages. Together with the villagers, they have mapped natural features of the territories, how the families use existing resources, and resources and areas which are under pressure’ (Photo 1 or 2). The maps and the plans are important instruments for the governance of the indigenous territories.

Francisca and Josias agree that the policies of the Acre government’s have been favourable for these processes. The government created a fund for elaborating management plans and for implementing projects defined in these plans. The indigenous agro-forestry agents received scholarships for several years. However, implementing the management plans has also posed challenges.

‘The state institutions in charge have tended not to take existing management plans properly into account, and not sufficiently involve the communities and the agro-forestry agents. In the territory of my people, the Arara, the government started projects that we have never agreed to. And just as in other territories, those projects failed, notes Francisca. For instance, chicken were distributed to all indigenous



We have been able to bring the turtles back to the river, tells Benki Piyanko from the Ashaninka Association of the Amônia River in Acre

territories. But the chickens depended on food not available locally, and most of them died.

‘The Acre government lacks the knowledge necessary to understand the special features of the territories’, explains Marcos Catelli Rocha from CPI-Acre. For Josias Pereira these shortcomings underline the importance of involving the villagers and the indigenous forestry agents.

‘The Acre state must value the training, knowledge and experience of the indigenous forestry agents, recognize them as professionals, and allocate public resources to employ them’, he says.

Need for coherent, locally adjusted policy

Lack of coordination between different government policies is a major problem. ‘Each ministry works within its little box. Even the promising National Policy for Territorial and Environmental Management of Indigenous Lands (PNGATI) may become a useless paper unless better coordination is achieved’, says Vera Olinda from CPI-Acre, referring to a decree passed by the federal government in 2012.

She continues: ‘Also national policies, such as the social welfare program Bolsa Familia, maternity benefits and retirement pensions, can have unintended consequences for the villagers and the sustainability of the territories. Whole families have to make long and expensive trips to the cities in order to collect their social benefits. Since the payments often do not even cover the costs of the journey, people usually stay for three months, in order to receive the next payment before going back home. Their fields and plant nurseries

are left unattended, and children are taken out of school. These new social benefits are undoubtedly important, and they bring much-needed income redistribution in Brazil. However, they are not well adapted to local indigenous realities, and they generate new social inequalities and dependencies’, she concludes.

In Acre, the demands voiced by social movements’ for coherent policies and better coordination are slowly influencing public policies. One example is the regional school meals. National policies specify that at least 30% of the meals provided at schools should be supplied by small farmers. In Acre this is happening, with benefits for the indigenous peoples. The cooperative Ayôpare, representing Ashaninka families of the Indigenous Territory Kampa of the Amônia River, has an agreement with the municipality, which buys what the families produce and uses it in school meals. All the families benefit, and the agreement with the municipality supports a whole value chain - from production, and commercialization to consumption - and ensures fair redistribution of benefits. The policy also contributes to reducing rubbish and waste from industrial food production, which is a growing problem in the indigenous territories.

For the indigenous peoples of Acre, having secure territories is the basis for establishing sustainable development strategies. They are now struggling to promote coherent policies that reinforce what has already been achieved, and as OPIAC president Francisca de Oliveira de Lima Costa puts it, it simply does not make sense to separate economic, environmental and education politics from each other. They are all intertwined.

On both sides: Indigenous communities along the Peru-Brazil border



Peru: Watching the gates to isolated Amazon tribes

■ By David Hill

It was after dark and we were at Arlindo's. A wood fire was burning, with three saucepans on the boil. Some people were standing, others sitting on the edge of or leaning against the house's raised floor – about a metre off the ground and made of caipirona wood from the forest. There were just two things on the floor: a candle and a baby. Beyond, hanging from the ceiling, it was a mosquito net where Oliver, as the baby was called in Spanish, would soon sleep with his parents.

Talk was lively. Arlindo waggled Oliver's arms – 'the future mayor!' – And the community headman spoke of the sugarcane juice they had started producing. 'Very smooth, not strong, not like how they make it in the factory.' There were discussions about the weather and plans for the morning, and jokes at the expense of Portuguese-speakers and the missionaries who had once played such a key role in the community but were no longer around. 'We're all sinners here', Arlindo said, laughing.

Dinner was served by his wife: plantains, rice, manioc and fish. The men ate first, and then Arlindo's wife and her companion, in their long, flowing cushma gowns. Music started up from another house – a Brazilian band, ironically – and then Arlindo's wife began to dish out sweetened hot milk mixed with oats brought upriver from the only town in the region, Breu.

Five minutes' walk away is the community 'control post'. Built in 2008, it helps to stop outsiders entering their territory – called Dulce Gloria – but the main intention is actually to prevent loggers, narco-traffickers and others from entering the Murunahua Reserve further upriver. The reserve was established in 1997 with the stated intention of protecting almost half a million hectares in one of the remotest parts of Peru's southeast Amazon, home to indigenous peoples living in 'voluntary isolation' – although no concrete means of doing that had been implemented at the time.

As Arlindo explains, 'this post is located at a strategic point for protecting the reserve, as well as our own territory.'

The post offers a commanding view of the river Yurúa. It has its own boat, radio and office – although neither the satellite phone nor internet is working yet. Arlindo believes the post is still doing its job. The only people who go upriver are Ashéninka from two settlements between here and the reserve – but he thinks loggers will try to enter in the future.

Currently the post employs two people. One is the coordinator, a Shipibo man called Pedro Monteluisa Romaina, who moves between Dulce Gloria, Breu and Pucallpa – the latter is a 50-minute plane flight from

Protecting the lands of indigenous peoples living in isolation

The *Territorial Corridor of the Pano, Arawak and Other Unidentified Indigenous Peoples Living in Isolation and Initial Contact* consists of more than 80 000 square kilometres of tropical rainforest in southeastern Peru and Brazil, covering several nature protection areas and indigenous lands in both countries.

The Territorial Corridor is home to six known indigenous groups or sub-groups of peoples living in isolation, and six that have recently been contacted, in addition to an unknown number of unidentified peoples. The area is of high ecological value, and comprising Manu National Park, Upper Purus National Park and the headwaters of several important rivers, including tributaries of the Amazon.

Threats to the Territorial Corridor and the people living here include oil and gas extraction, logging, infrastructure development, gold mining, drug trafficking and evangelism.

The indigenous people's movement in Peru and its allies in Brazil work to promote integral rights-based management of the entire area.

Indigenous-led control and vigilance in Peru

Peru has established five Territorial Reserves for indigenous peoples living in voluntary isolation. In addition five reserves have been proposed by the indigenous peoples' movement and are currently awaiting the government's decision.

In the absence of protection efforts from the Peruvian authorities, the indigenous peoples' movement has established a system of vigilance and control surrounding the Territorial Reserves, with financial support from Rainforest Foundation Norway. The system currently consists of ten watch-posts, some of them still under construction. The post personnel watch over the rivers leading into the reserves, prevent people from entering, and collect evidence of indigenous peoples living in isolation within and around the reserve borders.

All these posts are located in the villages of indigenous peoples, and are managed by the indigenous peoples themselves through their representative organizations (see Huertas Castillo, 2014).



*Coordinator Pedro
Monteluisa Romaina
at the control post*

Breu. Pedro has been involved with the post since it began operating. He says they conduct patrols about twice a year and believes the system is working well, but stresses the need for more agents and logistical support.

The other staff member is a ‘protection agent’, Arlindo’s brother Enoc, who lives full-time at the post with his family. Enoc’s main duties involve watching the river, using the radio, and recording anything relevant in a log-book.

‘We don’t let any outsider enter, in order to avoid conflict with the aislados, he says. ‘The reserve is not to be interfered with. The aislados – ‘the isolated ones’ – ‘have the right to not be disturbed in their territory.’

What if someone tries to enter?

‘We don’t let them. We tell them there are aislados there and they’re not prepared for contact with outsiders. They’re very vulnerable to any disease.’

Are most people happy about the post?

‘There are some who don’t agree. It’s my responsibility to make people realize why we need it.’

Enoc regrets not having enough fuel to make regular patrols. He says that he himself hasn’t seen the aislados, but others have – particularly the people living in one of the settlements upriver, Selva Virgen.

‘Always in summer, in the turtle egg season. That’s when they see them.’

Arlindo took me up to Selva Virgen. There could be few better travel companions than Arlindo. He was young, but had already been Dulce Gloria’s headman and now presided over ACONADYSH, an indigenous organization representing many Yurua communities, including the Ashéninkas, Yaminahuas, Amahuacas and some Chitonahuas. These people had up until the 1990s lived in isolation from the world around. When they were contacted, about 50% of the members of the communities died from diseases.

It was a few hours by canoe. Selva Virgen proved to be tiny: just a few houses and families, gathered around Hector Rios Mañaningo and his brother Bernardino. A drum was hanging in Hector’s house and he banged it with mock ceremony. Also on display was a rucksack: Hector reached into it, pulled out a mobile phone and shouted, ‘Hello?’ before breaking into peals of laughter.



ACONADYSH president
Arlindo Ruiz Santos doing
the cooking



Dulce Gloria community
member and Ashéninka
woman Rosa Pacaya Ruiz



An Ashéninka woman
in Nuevo Eden
preparing masato

But what he had to say about the aislados wasn't a laughing matter. He had been living in the settlement three years and seen them every summer.

'They've turned up every year. They come to take stuff. Machetes, axes, pots, whatever they find lying about.'

Hector said he had had three distinct encounters: 'Chitonahuas' stealing some of his possessions; another group, 'Mashco-Piro', cutting tobacco plants; and then, last year, both groups turning up within 24 hours of each other – with a 'Chitonahua' woman heavily pregnant. The latter spent eight days in the vicinity, and on the third day the pregnant woman gave birth.

'They were walking around right here. One of them left a machete behind.'

How many were there? What did they look like?

'Men, women and children. They're tall, painted yellow ...'

The Murunahua Reserve is one of just five reserves established for aislados in Peru, and would be one of 10 if the government accepted proposals for another five. Evidence for establishing reserves for aislados

has been collected over many years – but pressure from loggers and the oil and gas industry, combined with little or no political will, has made protecting the aislados' a tremendous challenge. Funding for the Dulce Gloria post comes from the regional indigenous organization ORAU, supported by the Rainforest Foundation Norway. The Peruvian state has not spent a single sol on it.

The ORAU president, Josué Faquín Fernández, a Shipibo man, says that serious challenges remain when it comes to protecting the Murunahua Reserve. There are posts on other rivers, but one, the Inuya post, is 'full' of loggers and narco-traffickers.

'It was very tough at first,' he explains when we meet in Pucallpa. 'The loggers and narco-traffickers threatened to kill us and burn down the post. But we were smart. We made sure the local population participated. Now the local population is committed to help protect the reserve.'

Recently a new, major threat has arisen. The government wants to create an oil and gas concession which would include areas bordering the reserve used by the aislados. 'We respect their habitat and their culture, and we have the responsibility and obligation to protect them,' Josué explains. 'They live in the forest, and the forest is their market. That's how they live.'

Central Africa's rainforests

CHALLENGE Managing rich forest resources to benefit poor communities

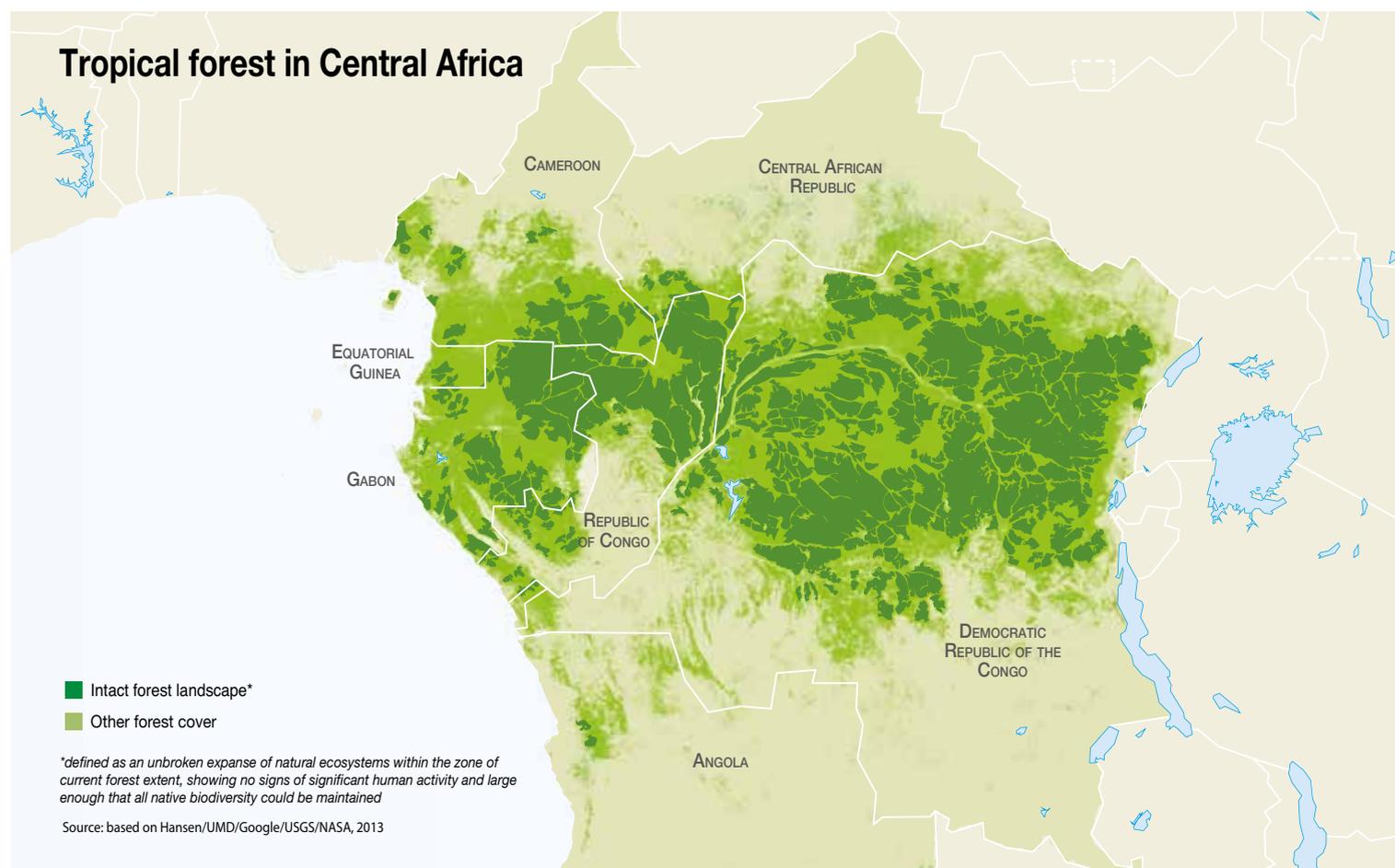
The Congo Basin rainforest in Central Africa is the second largest rainforest in the world and most of the 90 million people living in the region depend upon it for their livelihood. Deforestation in the Congo Basin has historically been relatively low, compared to other major rainforest regions, partly because decades of conflict have kept the forests off limits for major industrial exploitation.

According to most sources, deforestation has been relatively stable the last few years in the region as a whole. There has been some recent positive development with regard to forest policy. A moratorium and a review on logging concessions in Democratic Republic of the Congo (DRC), strongly advocated by civil society, has slowed down the expansion of industrial logging. There are also signs of increased attention to the role of local communities in forest management. In August 2014, a long awaited decree granting forest concessions to local communities was signed in DRC. This is considered a mile-

stone towards a legal and formal recognition of the rights of forest communities to customary land.²⁴ Recently, a law on basic principles of the rights of Indigenous Pygmies Peoples was submitted to the National Assembly in DRC. The law was drafted by a group of 50 parliamentarians with support from civil society organizations.²⁵ The challenge for the Congo Basin rainforest countries is to build on these positive achievements, and establish forest policies that can hinder the increase in deforestation predicted for the coming years.

Varied ecology

The Congo Basin comprises a variety of ecosystems. The northern forests have a hot, dry season, whereas the forests of the western parts of the region have a cooler, dry season. Rainfall and temperature patterns vary greatly. The Congo Basin rainforests generate between 75% and 95% of their own rainfall: if the forest cover is significantly reduced, the local climate will be dramatically affected. The region's



forest has high carbon content compared to the average amount of carbon stored in tropical forests, and globally the Congo rainforest represents about 25% of the total carbon stored in tropical forests.²⁶

Central Africa's rainforest is home to vast numbers of plant and animal species, but formal scientific knowledge about these plants and animals is still limited. The region has some 400 recorded mammal species, 1,000 bird species and probably more than 10,000 plant species (of which 3,000 are endemic). The threatened forest elephant, lowland gorilla, chimpanzee, bongo and okapi have attracted world attention but scientists are continually recording new species.²⁷

People depend on forest

More than 75 million people live in the Congo Basin region; the majority are dependent on the forest and forest ecosystems for their food, medicines, and livelihood. The indigenous pygmy peoples (the numbers of how many they are vary), are entirely dependent on the forest for their livelihood and culture. The forest peoples of the Congo Basin have vast knowledge of the flora and fauna which should be acknowledged as a valuable resource in all efforts aimed at sustainable management of the rainforest.

Bushmeat and fisheries from the forests provide crucial protein sources for around 30 million people living in these forested areas. Forest products, whether directly consumed or traded, provide a substantial portion of income for the local population. The forests also constitute an important safety net in countries where poverty and undernourishment are highly prevalent. Studies estimate that at least 500 plant species and 85 animal species are harvested, many of which are used for several purposes, for food, oils and medicinal plants.²⁸

Extent of forest and deforestation trends

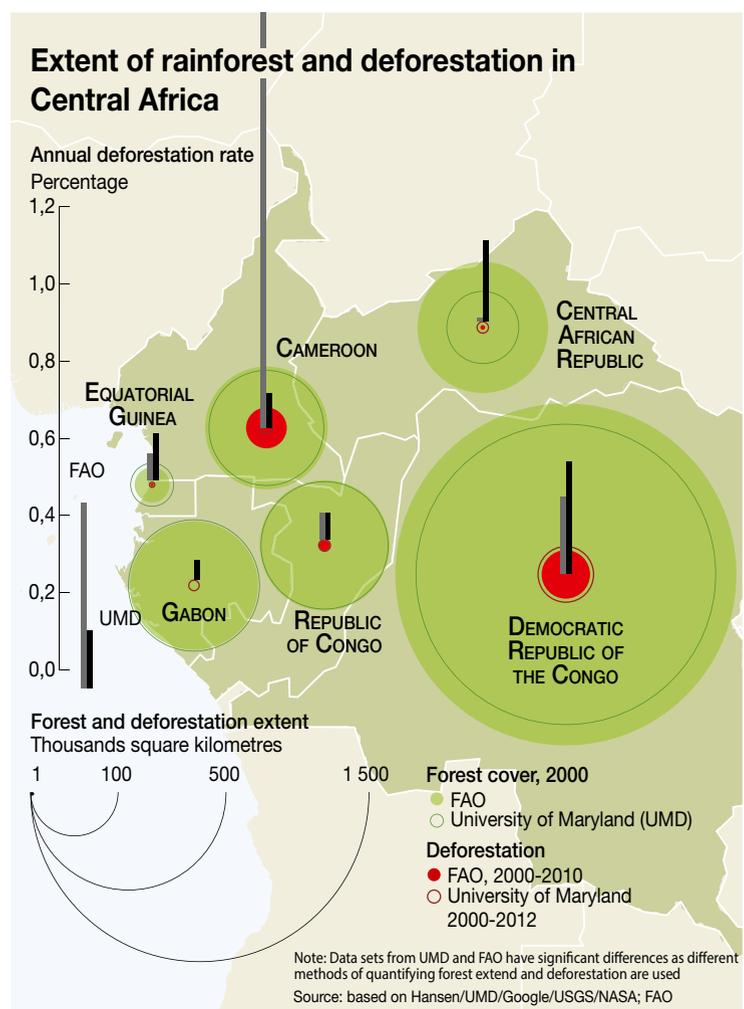
The Congo Basin is the world's second-largest tropical rainforest, covering approximately 2 million km². While the rainforests of West Africa and Madagascar are heavily degraded, with only patches of the original forest left, large areas of the rainforest in the Congo Basin are still intact. This is particularly the case for the "forest giant" of the region, DRC, which has almost 20% of the world's remaining rainforest within its borders. According to the FAO,²⁹ 51% of the forest in DRC and 65% of the forest in Gabon is primary forest and, whereas the other Congo Basin countries have lower percentages. These figures are highly uncertain, however.³⁰ Deforestation in the Africa's rainforests in other areas than the Congo Basin is extremely high. In West Africa deforestation rates are three times as high, and in Madagascar nine times as high.³¹ The FAO reports a relatively low deforestation rate in the "Congo Basin rainforest region" at an annual net loss of -0.23% for 1990-2010.³² The loss for DRC is slightly lower, at -0.20% annually over the past two decades.³³ The FAO figures are disputed, however. A recent World Bank report on the Congo Basin³⁴ shows a doubling of annual deforestation in the period 2000-2005 (0.28%), compared to the previous decade.³⁵ A study by the University of Maryland³⁶ reports forest loss in the region's dense tropical rainforest (76-100% tree

cover) of approximately 0.25% annually in the period 2000-2012, but far higher deforestation when less dense forest is included.

The data on deforestation is conflicting, and it is generally agreed that there is a need for better monitoring and analysis of the Congo Basin rainforest. Most studies predict an increase in deforestation in the Congo Basin in the years to come.

Threats

There is controversy about what the major drivers of deforestation in the Congo Basin are, and a lack of reliable data. Compared to other rainforest regions, small scale agriculture is a relatively more important deforestation factor in the Congo Basin, especially in densely populated areas. Most experts see expansion of agriculture and plantations, roads and extractive industries as the major challenge. Roads are among the most robust predictors of tropical deforestation,³⁷ as they open up areas for large scale exploitation.³⁸ Urbanisation causes pressure on forests due to demand for timber and charcoal from the towns and cities.³⁹ According to the FAO, 'With escalating prices of minerals, fuel and food, mining and large-scale land acquisition for oil palm and cash crops appear set to become the leading causes of deforestation in Congo Basin in the forthcoming years.'⁴⁰





Logging and mining is expected to increase in the region. The Congo Basin countries have 440,000 km² of forest under logging concessions – a fourth of the total dense lowland forest area.⁴¹ Logging has thus far been mainly selective, targeting a few high-value species. There is a lack of reliable information about the extensive degradation taking place.

In recent years DRC has reviewed its logging concessions to make sure logging is in line with the forest law. Prior to 2002, the government had allocated 455,000 km² to logging concessions. With the new forest law, almost half of the concessions were cancelled, and a moratorium on new industrial logging concessions was put in place. In 2005, the government opened for conversion of the remaining logging concessions to new licences, and companies applied for logging of 220,000 km². As of 2011, 125,500 km² had been approved as suitable for logging.⁴²

Mining is, as logging, expected to increase. Numerous conflicts have already emerged between conservation priorities, mining and logging concessions, and the livelihood of local populations.

Forest policy

The weak state structures in the Congo Basin pose particular challenges compared to those facing other rainforest regions. DRC has a long history of dictatorship and was from 1990s until 2003 ravaged by wars and internal conflict. The governance and administrative system is weak. Establishing the democratic and participatory governance necessary for rights-based, sustainable forest management will take

time. Civil society organisations in the DRC have struggled for more than a decade to make the country's new forest law from 2002 benefit forest people, and have advocated a transparent and participatory forest policy. Significant achievements have been made by pressuring government and international agencies to pay more attention to the social and environmental effects of industrial logging.

Also the DRC's neighbours in the region have experienced decades of autocratic rule, conflicts and widespread corruption. The weak governance has had great impacts on forest management. Gabon, Congo and Cameroon have a long history of land conflict between logging interests and local forest communities. In general, forest policies have been dominated by logging and resource extraction (petroleum and minerals), and by conservation approaches which have resulted in people being denied access to the forests they have traditionally used.

Thousands expelled from their land

20% of the Congo Basin forest is classified as productive forest, 12% is set aside for conservation and 10% for multiple use, including community forestry. The remaining 58% has not been classified.⁴³ Conservation areas have been a prime source of conflict in the region. Traditionally, the approach taken by conservation organisations and governments has been strict nature conservation, excluding people living in the forest or utilising forest resources for their livelihood. Thousands of people have been expelled from forest areas in DRC because of conservation initiatives. Many people now live in the border areas of national parks, unable to obtain land. As the case study from Itombwe shows (see following pages), a participatory and inclusive approach to forest conservation is necessary.

The Congo Basin countries export a significant quantity of tropical timber. Five countries in the region are working with the EU to develop systems against illegal logging under the EU FLEGT initiative.⁴⁴ DRC exports around 500 000 cubic metres of timber per year, 80–90% of which is sent to Europe. Cameroon is Africa's largest exporter of tropical hardwood to the EU, most of which is sawn timber that goes to Italy and Spain. The Central African Republic has only 5.4 million hectares of forest, yet the forest sector contributes 40% of the country's export earnings. Gabon and Republic of the Congo both have timber as the second most important export product after oil. The main export markets are Europe and China.

The DRC, Congo, Gabon, Cameroon and the Central African Republic are all involved in REDD+ initiatives through the World Bank or UN-REDD. Properly designed REDD+ initiatives have the potential for great success given the high carbon content of the Congo Basin forest. In order to succeed, lessons must be learned from the past decade of struggle over forest policy and community rights. Mapping and recognition of community rights prior to allocation of forest areas for either exploitation or conservation measures, including REDD+ initiatives, is essential in order to reduce the risk of future land conflicts and forest mismanagement.

Identifying the clans' rights

Preliminary identification of the customary rights of communities of Botwali under the zoning process



In DRC, participatory mapping was initiated by civil society organizations in reaction to vast, centralized land allocation processes threatening local communities and indigenous peoples' customary land rights. Participatory mapping proved to be a very adequate tool,

enabling the communities to identify their rights and claim them. RFN and partners have been cooperating since 2006, improving mapping technology, implementing it in various contexts, including in the Itombwe forest reserve.

Source: Participatory mapping conducted by Réseau Ressources Naturelles, DRC. Research and GIS cartography by Barthélemy Boika, 2013

DR Congo: Forced to leave their land – demand conservation where people matters

A dense, lush, biodiversity-rich contiguous rainforest lies in the Itombwe mountain range in South Kivu, on the eastern margins of the Democratic Republic of the Congo. It is inhabited by an incredible variety of birds, reptiles, mammals big and small, and fish in the abundant rivers. And by men and women whose livelihoods depend on the forest.

Maria Masambi Musenge is a Pygmy woman whose family now lives in Bionga, a village in the Itombwe range. 'I used to live in Kahuzi-Biega' [Kahuzi-Biega National Park], she explains, 'but my family was chased out of the park. We came to Itombwe, where we found an indigenous community who welcomed us. However, in 2005, they were forced to flee yet again because of the growing instability in the area. Thus, they left the heart of Itombwe forest for Bionga. Maria's story is sadly only one of many.

The village of Bionga, sits at the edge of the forest in the Mwenga sector, just a few kilometres away from the road that connects the shores of Lake Kivu to the southwest. It is a 'mixed' village where local majority Bantu communities live in the hilly terrain with alongside the indigenous Pygmy population, who have had to leave their lands in the forest.

'I used to live in the forest, it was a good place. I had everything I needed for my life: animals, plants and respect from other communities. But after the armed groups arrived, I had to leave the forest', confessed Muganza Mukuninua, president of the indigenous community of Bionga. Conflicts between various armed groups are a threat to the people – especially the indigenous groups who used to live deeper in the forest – and the endangered animal species living there. The unstable situation of South Kivu and the conflicts between Rwandan militias and Congolese armed groups have forced thousands of Pygmies to leave the dense forest and settle in more accessible villages, for protection. The establishment of protected forest areas and political instability are the main reasons for the internal displacement of Pygmies in this part of the Democratic Republic of the Congo.

A new participatory approach

When the Itombwe Protected Area was set up in 2005 by the Congolese conservation authority, a simple announcement meeting was held, with no prior consultations with indigenous and local communities. This led to strong local opposition against the project. 'We feared that conservation would steal our forests', explains one member of the Bionga community. 'We trusted neither external organizations nor forest investors.' 'We knew very well about the importance of conservation for the country and for the world. But what was there for us in all this?', adds a representative of the community. In the face of such strong local opposition, the conservation approach had to be changed in order to incorporate the population – and their traditional conservation

knowledge has proven to be the key to project success. Indeed, the community knows the forest better than anyone, and is proud of the expertise of its trailsmen: 'ICCN (Congolese Institute for Nature Conservancy) has its forest guards, but we have our own trailsmen (...). We master the forest. When NGOs come, we can help them identify the trees, the traditional medicinal plants as well as explain their uses ...'

The 'cadre conjoint', a consortium consisting of representatives of the WWF, WCS, the Congolese Institute for Nature Conservancy (ICCN) and Africapacity, a local civil society organization, was set up to coordinate participatory activities for defining the outer and inner boundaries of the protected area and its internal zones. With the input and support of the 'comités de base' (local representative committees), the communities are actively involved in discussing and defining the limits of the reserve, making sure that a continuation of their cultural and socio-economical activities in the forest is guaranteed. 'We need to be informed and involved in the decisions made about this forest, because we depend on it. We live thanks to its meat, fish, caterpillars, mushrooms, fruits and medicinal plants. We need to be granted access to these resources', explains a group of villagers in Bionga. The information collected by the local cartographers is analysed, and maps of the reserve are produced. These maps are taken back to the communities for validation. 'In the past, conservation methods knew no local community participation. It was non-existent. But now, local people are involved. The success of conservation in Itombwe will depend on the active participation at all stages of the process by the local and indigenous communities. These communities are ready to pursue this involvement', concludes Richard Miniota, territorial president of the comité de base for Mwenga sector, which includes Bionga.

'After being chased out from the Kahuzi-Biega park, we went back to the [Itombwe] forest because that is how we want and need to live. If the forest disappears, it will be catastrophic', continues Maria. Forest conservation and indigenous people's land rights are the two key elements in Itombwe. Maintaining an intact forest protects the livelihoods of indigenous peoples and local communities, and integrating the traditional knowledge of these indigenous communities in protected area management contributes to more efficient conservation.

'Plants and animals are everything'

As primary users of the rainforest ecosystem and its services, indigenous peoples and local communities have a deep relationship with it: they need the forest, and the forest needs them. 'The forest gives us medicinal plants, food, wild honey, building material like lianas, it provides life for the animals we hunt and the plants we gather. And we also have agricultural fields and fish ponds within the forest',



the villagers explained. Hunting, harvesting and some agricultural activities are carried out daily in the forest and neighbouring areas. The ecosystem services that the local people benefit from goes beyond the goods that the forest provides. As the group of trailsmen from Bionga put it: ‘The air in the forest is different from in the village, it’s better for the body. There is a closeness, a special psychological dimension about being in the forest. We feel at ease here, and whoever is used to it will always have the urge to come back to the forest.’ ‘In the forest we find the resources to send our children to school’, adds a group of women in the village of Kakolokelo, close to Bionga.

Kakolokelo is located right on the road. It was established there by the government, which displaced indigenous peoples from the forest to more accessible areas, within the framework of a vast national education campaign. However, the forest is quite far away from the houses in Kakolokelo, and this poses several challenges for the villagers. For example, only the youngest and strongest carry on hunting activities today. ‘We learn hunting through traditional knowledge handed down from our fathers and we hunt following that tradition. A good hunter uses his spear and his dog. The older member goes first and then the little brothers follow, so that they can learn how to track, how to kill, and how to get the meat from the animal’, a group of young villagers told us.

‘Musombo!’

For indigenous groups and local communities, traditional knowledge and practices are how they protected the forest. Several practices from the past are still utilized as conservation management tools in the

forest, and there is a generally high awareness of the importance of preserving the ecosystems to maintain sustainable livelihoods. ‘We can’t kill gorillas, leopards, lions, eagles and jackals. We can’t cut sacred trees like the Mwatati, Kilondolondo, Bigoa, Musuku ... everyone knows that!’ exclaims the assembly of comité de base members in Mwenga.

During the period of gestation for forest animals, called Pombo, it is forbidden to hunt or set up traps. The traditional hunting ban is respected by the communities. Between February and April it is forbidden to discharge any chemicals into the rivers, as this is the period when fish move from big rivers to smaller streams to spawn. Moreover, sacred sites serve as the equivalent of nature reserves, as no or very limited human activities are allowed there. The ancestral cultural practice of Lusembe strictly forbids cutting trees in these areas or in riparian zones.

These traditional practices of species conservation are threatened by other hunting methods which disregard traditional conservation practices. ‘Many animals disappeared. ‘The “calibre 12” [referring to armed groups with 12-caliber rifles] started hunting them and the animals fled. Now there are fewer of them, and they are less accessible’, says an old Pygmy in Kakolokelo.

The traditional chief, the Mwami, plays a central role in establishing conservation rules and exceptions to these. When a Mwami puts a ban on something, the community must respect it. Infringement of traditional interdictions is punished by the Mwami, who is empowered to inflict musombo on the transgressor. In the traditional



context Musombo is like a ‘spiritual’ death penalty, where both the individual and the family come to experience increased mortality and severe misfortunes. Only the Mwami can revoke the punishment for such rule infringements.

‘We want community conservation’

The local communities and the indigenous groups feel it is important to maintain these traditional forest management practices. As Richard Miniota argues, ‘ICCN [the national conservation authority] can’t be everywhere. We need to set up a system of co-management between local communities and the authorities.’

This is a crucial aspect for the next steps of the Itombwe participatory process. The DRC national conservation law in its present form does not include co-management of protected areas. The outer limits will soon be defined and validated out of this unique participatory

experience. The next step of integrating the communities in the protected area management will be a critical one: ‘We want community conservation. If you come with other forms of conservation, even recognized by the land tenure law, we will oppose. We will conserve as our ancestors used to conserve. The rights of local populations must be recognized and respected’, declares Richard Miniota.

Community conservation needs to be acknowledged within the Nature Conservation Law, so that Itombwe can become the first example of a community-based natural reserve that benefits both the environment and the rights of the local communities. Local communities from Bionga, like their neighbours, are already preparing for this, gathering in management committees and keeping alive their traditional knowledge despite the difficulties. It is now the duty of national and international civil society organizations to push community conservation forward.

Communities dependent on forest resources in Bionga



Infrastructure

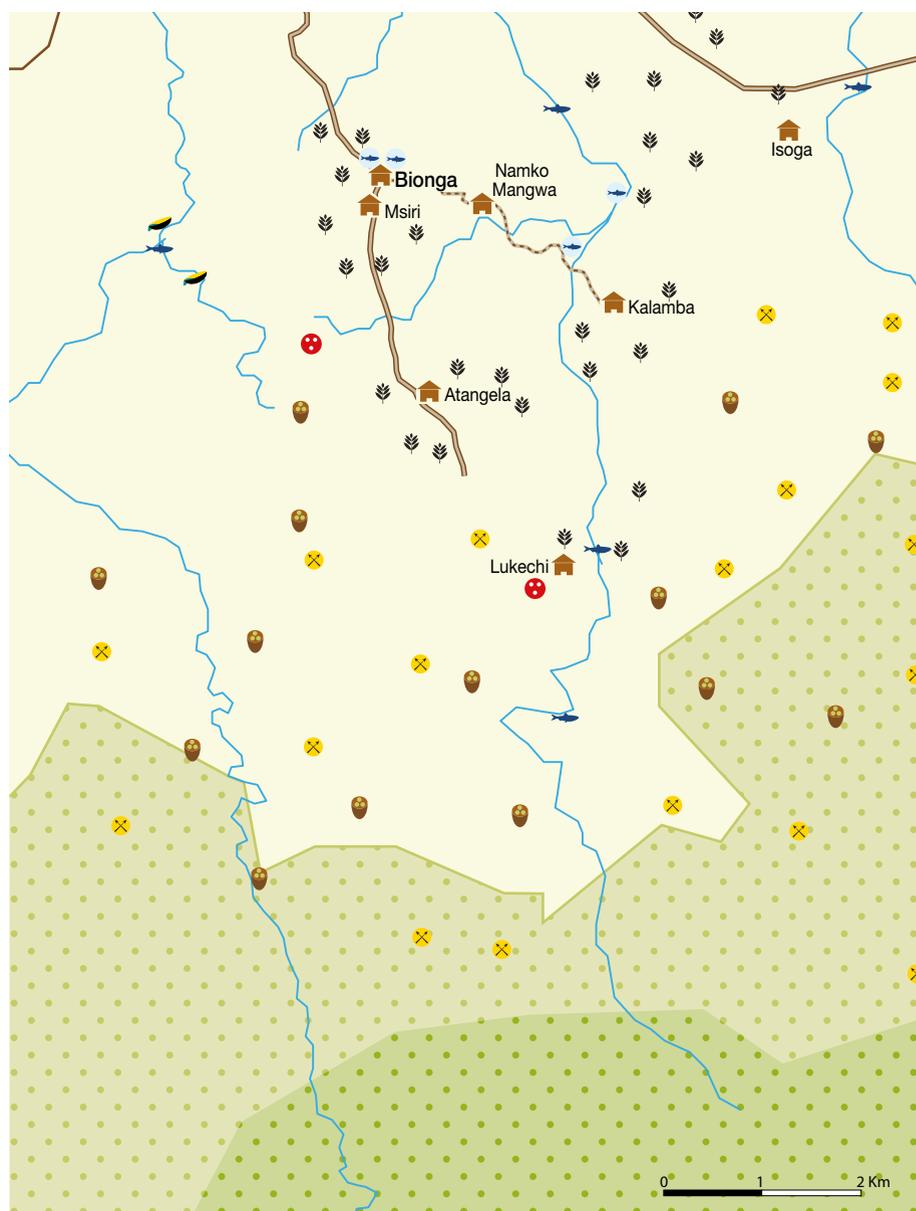
- Village
- Road
- Trail

Itombwe Natural Reserve

- Proposed reserve limit
- Proposed multiple use zone
- Proposed zone with integral protection

Activities in the forest

- Hunting
- Agriculture
- Artisanal mining
- Gathering
- Fishing
- Fish pond
- Sacred site



Source: based on a map by Blaise Mudodosi, 2010; information by local communities in the chiefdom of Wamuzimu with technical support from the Laboratory of Indigenous Peoples, Africapacity and Rainforest Foundation Norway

Southeast Asia and Oceania

CHALLENGE

Diverse rainforests changed into uniform industrial plantations

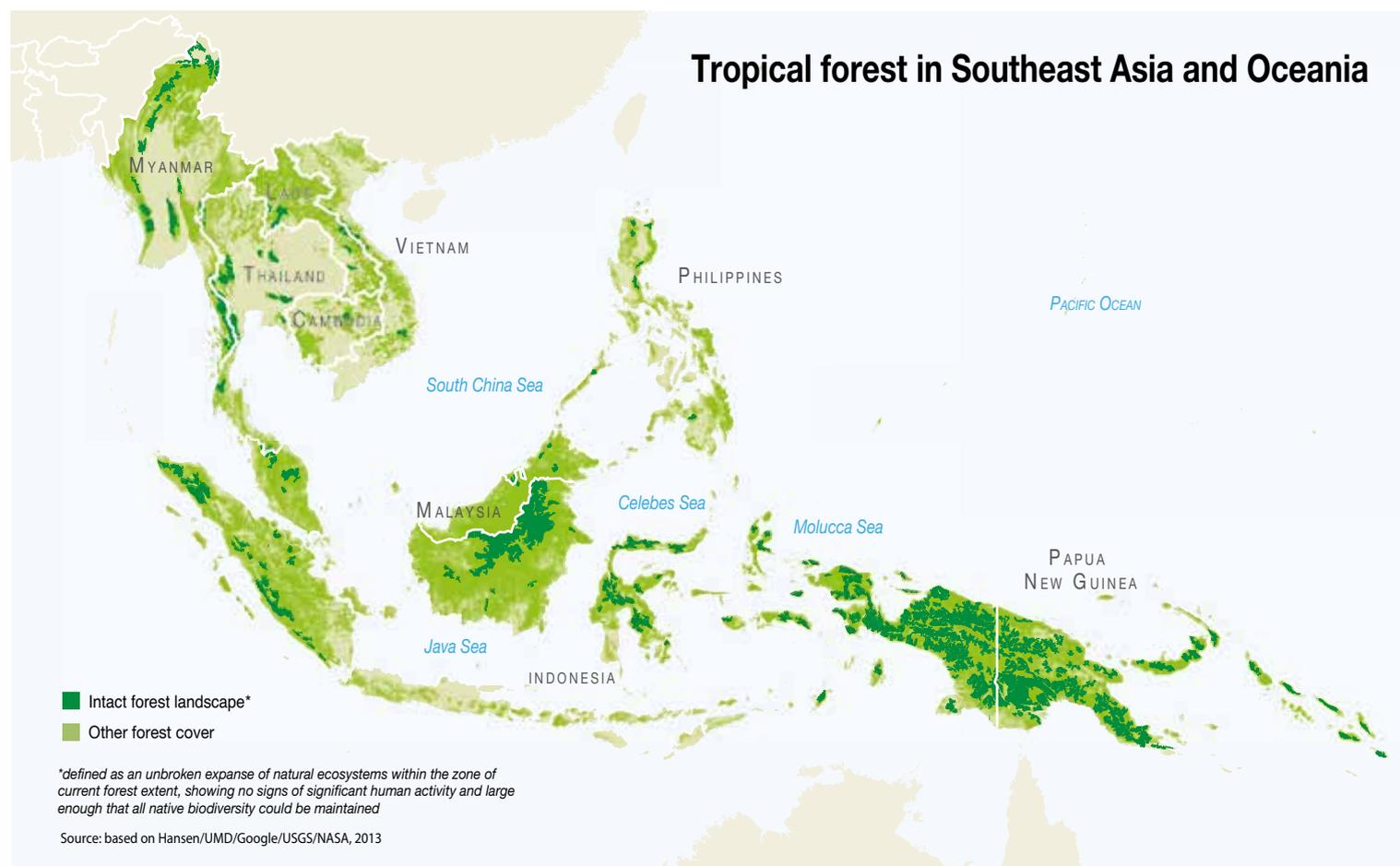
The rainforests of Southeast Asia and Oceania are under immense pressure. This rainforest region has lost a larger proportion of its original forest cover and has higher deforestation than any of the other main rainforest areas. At the same time, more people depend upon the tropical forest resources of Southeast Asia than any other place. The policy of core rainforest countries, Indonesia, Malaysia and Papua New Guinea (PNG), has been to allow an explosive expansion of plantations, logging and mining in the rainforests during the last 3–4 decades. This is taking its toll not only on Asia's last remaining tropical rainforests, but also undermining the development prospects for the large part of the population who depend upon forest resources.

Diverse rainforest

Southeast Asia and Oceania is an extremely diverse rainforest region with regard to types of forest and deforestation patterns, forest policies and the situation for forest dependent communities. In

Indonesia, about 40 million people are living within 'state forest' without a legal right to use the resources,⁴⁵ although some recent developments may improve the situation (see below). The situation in Papua New Guinea is very different. Quite unique compared to other major rainforest countries, the forest land is owned by the local communities and their land rights are inscribed in the Constitution. In both countries, however, there are serious conflicts over land between local communities and large scale industrial actors that want to exploit resources like timber or minerals, or convert forests into oil palm or timber plantations.

A significant part of the forest in this region grows on thick, carbon-rich peat land. Destruction of this forest is particularly concerning, both with regard to the loss of unique biodiversity and extremely high emissions of greenhouse gases. The peat swamp forest is important for water supply, flood regulation and is rich in biodiversity. More



than 3000 plant species are registered in the peat forest of Southeast Asia, among them the economically valuable tropical hardwood species Ramin and Light Red Meranti.⁴⁶ When drained or burnt, the peat releases enormous amounts of greenhouse gasses into the atmosphere. There are 250 000 km² peat land in Southeast Asia,⁴⁷ 60% of the world's *tropical peat swamp forest*. 200 000 km² is found in Indonesia, and smaller areas in Malaysia and Myanmar. Indonesia – with the largest rainforest area, unique biodiversity, numerous indigenous peoples and a national population of 250 000 million people, impacts the whole region.

Indonesia

Thick smoke regularly covers large parts of Indonesia, causing smog and poor air quality in cities and towns all through Malaysia and in Singapore. The haze, caused by burning Indonesian tropical forest, visualizes the extremely rapid forest loss in the region. This year's decision by Singapore to hold the actors causing the fires economically responsible for the consequences, however, may be seen as indication of increasing political will to handle the problem of deforestation.⁴⁸

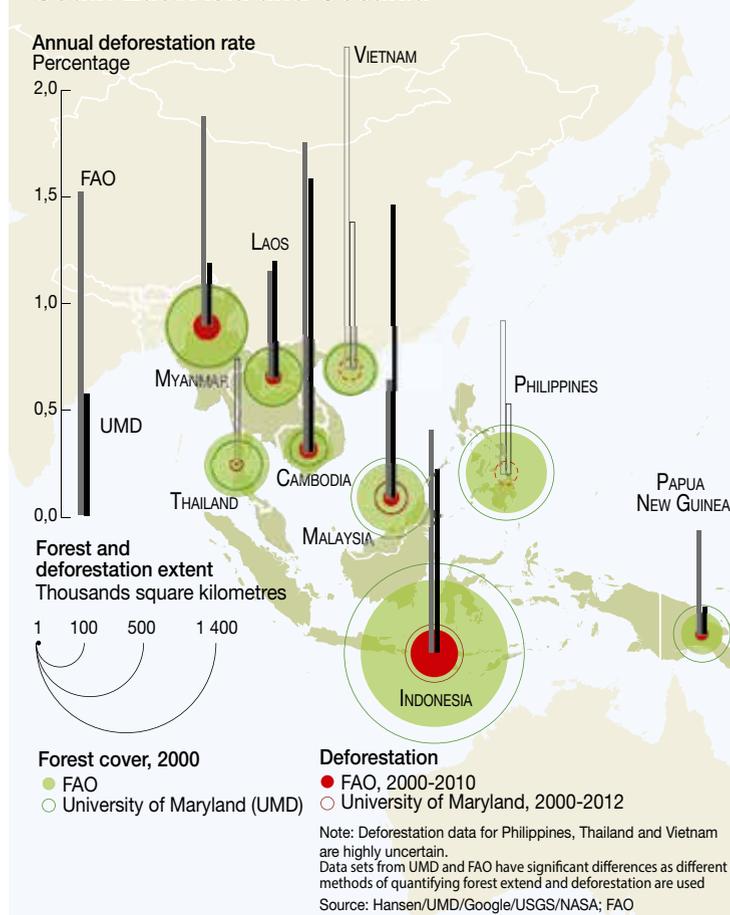
It is hard to find reliable forest statistics in Indonesia, and there are huge variations regarding extent of existing forest and deforestation trends, depending on the source used (see p.86).⁴⁹ There is little doubt, however, that Indonesia's deforestation is among the highest of all rainforest countries.⁵⁰ The country's current annual forest loss is 6,850 km² according to FAO,⁵¹ and almost twice as high according to a study by the University of Maryland (UMD). Even if one uses the FAO figures, considered too low by most sources, Indonesia loses more forest than the Brazilian Amazon in spite of the latter being a more than three times bigger forest area.⁵²

Looking closer, the deforestation on main rainforest islands gives even more reason for concern. In Sumatra, the lowland rainforest is almost gone, and large-scale commercial actors are increasingly targeting the remaining carbon rich swamp and peat forest. Borneo, shared between Indonesia's Kalimantan (72%), Malaysia and Brunei, has lost 30% of its forest in the last 40 years.⁵³ Kalimantan has the second largest remaining rainforest area in Indonesia, after the Land of Papua, the Indonesian part of the island of New Guinea.⁵⁴

Establishment of large scale plantations for cash crops such as oil palm and fast-growing timber species are the main drivers of deforestation in Indonesia, as it has been through the last decades. Logging and mining operations also cause significant deforestation and forest degradation.⁵⁵ The loss of tree cover is mainly taking place in natural forest, and according to a 2014 assessment 40% of the loss is occurring within areas where the government has restricted or prohibited clearing.⁵⁶ This is a clear indication of a forest management regime characterized by widespread illegal activities and lack of enforcement of political decisions on forest protection. Indonesia is one of the world's largest exporters of tropical timber, the main



Extent of rainforest and deforestation in South East Asia and Oceania





export destinations being China, the EU, Japan and Korea. A recent agreement (VPA) with the EU is aimed at stopping illegal logging, but the effect remains to be seen.⁵⁷

Indigenous peoples (masyarakat adat) are recognized by the Indonesian Constitution, but this has not been reflected in other laws and regulations. Thus, the rights of indigenous peoples and other forest communities have in practice been very weak. A Constitutional Court decision from 2013 may improve this significantly, if it is followed by changes in regulations and policies. The Court ruled that forest communities' traditional, 'adat', forest should not be considered 'state forest', as has been the case until now. This may strengthen indigenous peoples' and forest communities' rights to their traditional land. A major effort is now underway by indigenous peoples and Indonesia's national Human Rights Commission to conduct hearings into abuses of traditional land-rights, as one important step on the long way to implementation of the Constitutional Court ruling.⁵⁸

Reduction of deforestation rates in Indonesia is a question of governance.⁵⁹ Historically, forest management in Indonesia has been characterized by widespread corruption, and use of forest concessions as a means of securing political support for people in power. Indonesia's outgoing President, Susilo Bambang Yudhoyono, committed to reduce emissions from deforestation significantly, and this was manifested through a one billion USD bilateral REDD+ agreement between Indonesia and Norway. As a part of the cooperation, important reforms are initiated in the forest sector. A significant step was the 2011 moratorium on new concessions in primary forest and peatland. The moratorium was renewed in 2013, but Indonesia's high deforestation rate shows that the impact on the ground has been slow. The implementation of forest reforms in Indonesia is influenced by the power struggle between those who support changes, and powerful commercial and political groups gaining from continued deforestation. The reforms

initiated, however, signals political will to reform forest governance and to take measures against uncontrolled deforestation. As this publication goes into print, Indonesia's Vice President has just launched a program to recognize and protect indigenous peoples as part of Indonesia's REDD+ program.

Papua New Guinea

Papua New Guinea has one of the world's most significant tropical wilderness areas. With about 10,200 endemic plant species, the island of New Guinea clearly rates as a globally significant reservoir of biodiversity.⁶⁰ Papua New Guinea is also a country of enormous cultural diversity; its 7 million people speak more than 800 languages.

Despite its rich natural resources and significant government revenue from large-scale extractive industries, the country is almost at the bottom of UNDP's Human Development Index. Social indicators such as education, life expectancy and maternal and child mortality rates are among the lowest in the Asia-Pacific region.⁶¹

According to the FAO, PNG has 287,000 km² of forest, and the annual deforestation has been less than 0.5% the last two decades. But also in PNG there is substantial uncertainty with regard to extent of forest and deforestation rates. The "State of the Forests report for Papua New Guinea" from 2008 estimates the forest to be 330 000 km², and concludes that that between 1972 and 2002, 29,000 km² of forest had been lost. The current deforestation rate was estimated to be as high as about 1.41% per year.⁶²

Commercial logging causes 48.2% of the forest loss, and extensive clear-felling, often followed by the development of plantations, is now a major characteristic of forest management. In many areas, it is largely unregulated. Logging operations has been characterised as "wasteful, with little regard for forest ecology, ecosystem function or silvicultural practices which reduce impact and enhance regeneration." Strip mining and other intensive mining developments also creates



serious pollution problems and forest loss. In PNG, shifting cultivation has been practiced through centuries, in which relatively small areas of forests are cleared for transient crop cultivation, and later abandoned to natural regeneration. However, the extent and intensity of clearing for subsistence agriculture is increasing substantially, and subsistence agriculture causes about 46% of the forest losses according to the study by Sherman.⁶³

Carbon emissions from land use, land use change and forestry (LULUCF) make the country one of the highest per capita emitters in the world.⁶⁴

As mentioned above, most of the land (97%) in PNG belongs to the local communities. The constitutional rights are a basis for local protection of the forest, but not a guarantee against land-grabs. In many parts of the country, communities experience heavy pressure to give up their rights to land from extractive industries and plantation companies. Due to a fairly impartial legal system, local land-owners have on many occasions taken legal action against intruders on their land, and gained support through court rulings.⁶⁵ This enables communities to take a common stand against extractive industries and logging companies, who target the valuable resources of the PNG rainforest (see story on following pages).

Myanmar

Myanmar has extensive areas of dense humid forest and Asia's last significant areas of natural teak forest.⁶⁶ The country contains some of the most biodiverse areas in mainland Southeast Asia and new species are continuously discovered. Yet, the country's wilderness is so far poorly explored by scientists. The most biodiversity rich areas are found in the forested and rather inaccessible border areas where most of the 135 ethnic minorities live. New political signals, where sustainable management of the country's rich natural resources is stated as an explicit goal, gives room for some optimism. Myanmar's National Biodiversity Strategy and Action Plan (NBSAP) from 2011



provides a national framework for action with regard to community and civil society involvement and participation in the management of protected areas and biodiversity. A ban on export of raw timber was imposed in March 2014. According to Global Forest Watch, approximately 15,000 km² forest disappeared between 2000–2012, much of it logged illegally.⁶⁷

World record in forest loss

The development in Malaysia in recent decades illustrates the magnitude of the conversion process taking place in the region. Once densely forested, the country has lost most of its natural forest cover to oil palm and other plantations. Malaysia's part of Borneo, Sarawak and Sabah provinces, had the world's highest rate of forest loss between 2000 and 2012, and only 22% of original natural forest is left.⁶⁸ Malaysia's forest loss occurred in its densest forests, which generally store the most carbon and which are the habitats of endangered orangutans, pygmy elephants, Sumatran rhinos,⁶⁹ and clouded leopards. The main driver of deforestation is palm oil plantations.⁷⁰ The indigenous Penans of Sarawak are fighting an uphill battle to protect the remaining patches of rainforest, and their rights as the original inhabitants of the area.

The pressure on forests in Southeast Asia and Oceania will continue if strict measures are not taken to regulate the operations of plantation companies and extractive industries in natural forest areas. Malaysia, According to the FAO, it is estimated that with continued conversion of forest, between 13% and 42% of the species will be lost in Southeast Asia by 2100.⁷¹ In a recent regional assessment of forest cover of Southeast Asia and Papua New Guinea, the forest extent is estimated to 2.68 million km² in 1990, and the forest loss between 1990 and 2010 to 320,000 km² – approximately the size of Norway. The study confirms that the conversion of forest to cash crops plantations, such as oil palm, is the main cause of forest loss, with logging and the establishment of monoculture forest plantations as other major drivers of deforestation.

Indonesia: A view from the forest

Marisa village in Morowali Nature Reserve, Sulawesi

The sun is just rising, but the shrill non-stop crowing of the energetic cock and the cackling of his enthusiastic hens make it impossible to sleep. Outside, village head Apa Rauf's house, the village is already wide awake. In front of his house, Budi's cousin is making a new thatched roof from slim rattan leaves. Meters above us, Mirna's brother is balancing carefully, as he grapples with the long tree stems to make the roof structure for a new house built with materials from the surrounding forests. It will be constructed in the traditional way, with the floor more than a meter above the ground.

Mirna is waiting for us in the kitchen. She is about to cook breakfast in her open fireplace and wants to show us how she prepares snails. Her son watches quietly with a serious look on his face while his mother tells us about her life in the forest.

Yes, she has tried life outside the forest. She attended school - and that was fine. But she didn't like life there, she explains. It was in one of the small towns down by the coast. It was noisy and polluted.

'Here inside the Morowali forest I've got what I need and life is better', Mirna says. But she wants her son to go to school and learn more than what she and her husband can teach him.

Although it is too late in the day, and too dry anyway, Mirna shows us how she plants rice in the burnt soil between branches and roots. The Tau Ta'a Wana practice shifting cultivation, as they always have

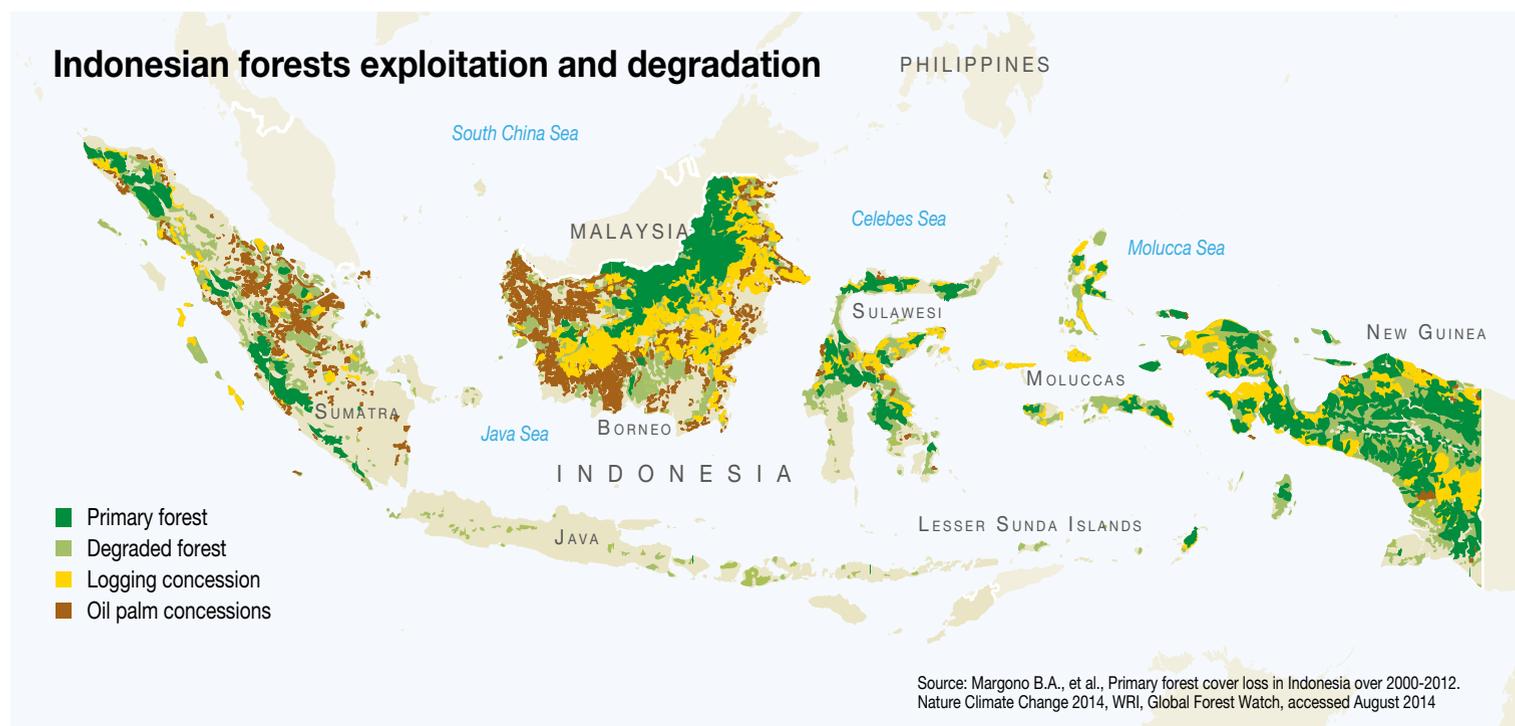
done. They have gardens in different parts of the forest, practicing long rotation circles. Many of the villagers have left to attend to their crops and vegetables several hours' walking distance from the village.

Medicines on the doorstep

Next to the 'rice fields' we meet Apa Sudin, one of the community's experts on medicinal plants. Some species grow on their doorstep. Apa Sudin shows us remedies for fever, healing wounds, for stomach pains and headaches.

Walking around the village, we are impressed at every turn wide range of plants and animals made use of, and the skills the Tau Ta'a Wana show in how to utilize the various plants and animals. These aren't skills they learnt from the town school - or picked up from the TV in the corner of Apa Rauf's hut, connecting the village to mainstream Asia's world of soap opera through a satellite dish. This is knowledge passed on from generation to generation, accumulated through the Tau Ta'a Wanas' long history as a forest people.

Dressed in a clean white shirt, looking ready for office work in Jakarta, Budi enthusiastically demonstrates the traditional art of using the blowpipe as a hunting weapon. He then leads us into the forest. Only a few hundred meters away from the clearing he points out some rattan and starts to explain the usefulness of this multi-purpose plant. Among other things, it can be woven into baskets or mats, furniture, used in house construction, or sold in the local market.



‘Mostly, we gather the same plants and hunt the same animals as our parents and grandparents did, but a few mammals and some plants are getting more difficult to find. Like the vulnerable babirusa, also known as pig-deer’, Budi explains.

Permission to live

In contrast to many forest people living inside the conservation areas of Indonesia, these families have permission to live here. Apa Rauf travelled all the way to Jakarta to argue for their traditional rights in the area. They want permanent permission to live here, but were only able to get it for 25 years. There are still people who want them out of the forest – some because they think it is better for these families to ‘develop’ and move to modern villages, others because they think it will protect the forests. But having witnessed the vast monoculture palm oil plantations eating their way into the forest along the coast, it is evident that the forest is threatened by far more powerful actors than the Tau Ta’a Wana.

Sulawesi’s forests are worth protecting. Seen from the air, the island resembles a sprawling octopus, with its green, forest-covered arms stretching in all directions. The long geographic isolation has given Sulawesi high plant endemism, distinct forest types which provide habitats for the highest number of endemic mammals in Asia, and numerous endemic birds. Mammals found only here include the endangered mountain anoa (*Bubalus quarlesi*), the vulnerable babirusa (*Babirusa babirusa*) and the amazing sailfin lizard (*Hydrosaurus amboinensis*), which is up to 90 cm long with a tail twice the length of its head and body put together! Sulawesi almost balance on the Wallace line, an area of biological discontinuity between Asia and Australia. It made up of two ecoregions: lowland rain forest, and montane rainforest dominated by oaks and chestnuts.

The island has extensive forest cover, but large parts of the lowland forest are degraded and the impact of logging, open-pit mining and plantations is evident along the coast.

Salisarao village, outside the nature reserve

The view is green from Salisarao village, which lays half a day’s walk from Marisa. Hillside after hillside with forest stretches towards the coast. On the horizon, however, we can see palm oil plantations gradually taking more land and replacing the biodiversity-rich natural forest with monoculture. Representatives of the palm oil industry have already visited the village, trying to get their hands on the land. The people of Salisarao told them to leave and hope they will not return.

‘No, we don’t want sawit (oil palm). They need such big areas, they take all the land. There will be no room for gardens’, Indo Laku explains as we rest by her family’s hut. She is spokesperson for the village. Her daughter, Laku, teaches in the village school. There are no government schools in these forests. The Skola Lipu ‘forest school’ is facilitated by the NGO Yayasan Merah Putih (YMP), a partner organization of Rainforest Foundation Norway. The school has built new confidence in the village.

‘Our children should be smart’

‘In the government school, people looked down on us because we are forest people, and because we are not Muslims’, the young teacher Laku explains. In Skola Lipu it is more than reading and writing on the curriculum. They are also thought about the area where they live and about plants and animals in the forest. ‘We want our children to be smart, to learn how to read and write and not be tricked by outsiders’, Laku insists.



Mirna



Apa Rauf and daughter



*Salisrao Lako
teacher with son
and father*

Her mother agrees, as she knows what it feels like to be tricked. The village where she used to live lost much of its land to a palm oil plantation. ‘We did not have the power to protect our land. We believed the government would control the plantations, so they couldn’t expand onto our lands. But the government just told us that the land had been given to the company, and that we had to leave’, she recalls, with anger in her voice. Her family even had a title to the land.

Indo Laku is not the only one who has encountered the world of oil palm. Apa Serli returned to the forest village with his family a few years ago, after experiencing life as a plantation worker: ‘Life is very hard in the plantations. The workers have to work so hard they almost die, and the pay is very low’, he tells us. Like Indo Laku, he prefers to cultivate gardens, and get what else the family needs from the forest. Indo Laku also has vast knowledge about medicinal plants, and the other villagers often ask her for advice. ‘I learned from my father and the elders’, she tells us. ‘This is our forefathers’ land, and we want to keep it for our forest and our gardens. When the sawit people came, they told us to sell the land and said it would make us rich, like them.’

‘Didn’t you want to get rich?’ I ask. They laugh, and go on to explain: ‘Life in the forest is happier. The company said we could continue to live here, but that would be inside the plantation. It would be hard to live without the forest and the gardens. We need rattan, and we need food from the forest. This is our life.’

Senamat Ulu, Central Sumatra

In the landscape of Sumatra, one can see the full impact of large scale forest exploitation and conversion of forest to plantations – the same development that was starting to crawl inland from the coast in Sulawesi. Most of Sumatra Island’s lowland rainforest is gone. Increasingly, the forests in carbon rich peat swamps are targeted for large scale deforestation and conversion by plantation companies.

Forest communities in the once densely forested Sumatra face a strikingly different reality than the forest people of Sulawesi. Monoculture tree plantations and oil palm dominate the landscape. For the 220 families in Senamat Ulu village, the challenge is to protect what is left of natural forest in between the plantations, and to find ways to improve living conditions based on sustainable management of the local resources.

Down by the river which runs through the village, a waterwheel is turning slowly as the water flows by. ‘It generates electricity for a handful of households. There is no pollution, no noise and almost no maintenance costs’, Datuk Rio, a village leader, explains. The alternative is a diesel generator if one can afford it. A bit further down in the village, we meet Razi, who has found another solution for energy supply. In the garden behind his house he has installed a biogas plant, where he produces gas for cooking, made from dung from the village cows and buffaloes. In the kitchen his wife turns on the gas and explains how she appreciates not having to cook in the midst of the dense smoke from an open fire place. As we continue the walk through the village, we pass the handicraft center where locally available resources are used to make beautiful handbags and baskets, and the site where a micro hydro plant is being installed.

Watching the forest

The families in Senamat Ulu are farmers and forest people, who practice agroforestry - mixing trees and crops on their land. They depend upon forest resources for a number of everyday needs, and as in Sulawesi rattan is used for a wide range of purposes. Medicinal plants are collected from the forest and cultivated in their gardens.

The villagers’ technical inventiveness and knowledge and creativity in forest use is matched by an ‘administrative creativity’ – necessary to navigate Indonesia’s complicated administrative framework of forest management categories, forest permits and concessions in search of ways for the village to maintain control over their traditional forests. There is no recognition of the rights of local forest communities and indigenous peoples to their traditional areas. Forest belongs to the state in Indonesia, and often logging or mining concessions, or licenses for plantations, are granted before communities’ use of the forest is taken into consideration.

‘We have established a village forest, and it is approved by the government. This means that we set aside some of our forest for conservation and for protection of the watershed. We have rules for the use of the forest and a committee to oversee the rules’, Datuk Rio explains. ‘Protection forest’ is a category that is recognized by the government. Getting forest areas registered for protection is one way for the villagers to retain control over some of their forests.

A recent ruling in Indonesia’s Constitutional Court creates hope that in the years to come, collective rights for indigenous peoples or traditional forest communities can be recognized in some traditional lands. The



Datuk Rio explains about rubber collection and processing

Court decided that what is called 'adat forest', or traditional forest, in the forest classification system, should not be considered part of the vast state forest, 'hutan negara'. To what extent this ruling will strengthen forest communities' rights in practice remains to be seen.

Urgent

For people in Senamat Ulu it is urgent to secure their rights to the forest. The reason is clearly visible in the landscape, as we climb the hill constituting much of the village's traditional forest. The view to the neighboring hills reveals vast oil palm plantations, stretching into the horizon. Further down on the hillside opposite us we can see large scars in the landscape where an industrial rubber plantation is being established. Parts of the forest land taken by the rubber company belong to Senamat Ulu village, but the company refuses to

negotiate. As they control the bulldozers the villagers can only watch the forest disappear. All they can do is keep trying to get the company management to listen to them.

As we climb further up the hill, the diverse forest around us is increases in density. The forest is strictly regulated by the village committee, and no one is allowed to take trees without permission.

The striking difference between the village forest and the plantations on the hills around it, illustrates the choice faced by Indonesia's government: To continue the rapid conversion of the remaining rainforest into monoculture plantations. Or to work with local communities to find ways in which to combine development needs with the protection of the rainforest.

Local perspectives in rainforest research

■ By **Miriam van Heist** | *Miriam van Heist has extensive experience from Indonesia, and has co-directed a conservation research station in Bwindi Impenetrable National Park, Uganda*

If our goal is to conserve rainforest biodiversity and to support the local people, we should ask those people what is important to them when planning conservation.

Spending months in villages in East Kalimantan with researchers from the Center for International Forestry Research (CIFOR), we found that the local people supported ‘conservation’ – but on their own terms and with goals they recognize. For example, our attitude survey showed that remote villagers, townspeople and civil servants alike agreed that the forest needed protection, and supported land-use planning that provided for the needs of local people, kept the water clean and conserved flora and fauna. Such agreement provides a shared basis for conservation planning backed up by local support.

Asking is easy

Local people were often pleased to be asked what mattered to them and why, and could tell us about species and places in the forest that provided food, building materials, medicine and income, or had particular cultural significance. Other parts of the landscape were important too: fields and fallows, former villages, rivers and swamps. Scoring these different land and forest types for various categories showed what was most valued by women and men, young and old. Field trips guided by local informants helped us see the landscape, soil and vegetation through their eyes and understand the value of the species found there.

Mapping with communities was particularly instructive: people showed their detailed knowledge of the landscape, sites and resources. We learned the local names of locations and heard related stories and



descriptions, like ‘we used to live here till the village flooded. We still go back to harvest fruits and visit graves’, or ‘this area is sacred to us and should not be entered without our permission’. Mapping guided our fieldwork and helped us in discussing land management across the village lands and beyond. We left the maps in public areas and would often find people discussing them and adding details. People took pride in their knowledge, and the maps became valued products which we left with each community. These maps played an important role in discussions about future land use, among themselves and with outsiders.

Asking local people makes better conservation

Knowledge of what is important to local people can guide more effective conservation planning and actions. That is particularly so when synergies exist between local needs and aspirations and global conservation aims. But it is also better to know incompatibilities in advance, so that at least some conflicts can be avoided and compromises sought.

The people of Mamberamo regency, West Papua, are fiercely protective of their land. Large tracts of undisturbed forest remain; only small areas have been cleared for growing crops. Customary regulations and taboos to protect sites and resources are still respected. The people consider themselves rich because they can find all they need in the natural environment. They also welcome some recent developments and a school and health centre in the village. But they do not want to lose control over their land, they do not want to see their forests disturbed, and with it their children’s options for the future.

Spending sufficient time with local people helps to build the trust needed for conservation efforts to be possible and effective. When Conservation International announced they had found several hitherto undescribed species on an expedition to the Foja Mountains of West Papua in 2005, those discoveries would have been impossible without permission and participation from the local communities, who consider the mountains sacred and protect them from any incursion by outsiders.

We found in West Papua that our attitude ‘local people are the experts: ask them what is important to them’ made people proud and confident. Sharing some things from our perspective, like showing pictures of Birds of Paradise or Tree kangaroos and explaining that they are found only here, nowhere else in the world, raised their interest.

Asking is the right thing to do

Asking local people what is important to them, and giving their priorities due weight in democratic decisions about conservation, is ethically the right thing to do. Far too often, it is the local people who suffer most from forest degradation and destruction, and yet they are not consulted before logging, industries or even conservation projects take over their traditional forests.

One example from my own experience is the history of Bwindi Impenetrable National Park, Uganda – now a well-protected UNESCO World Heritage Site, known for mountain gorilla trekking and bird viewing. However, when the park was created in the early 1990s, the Batwa forest dwellers who still lived in the forest and depended on hunting and gathering were expelled. Most of them have become landless squatters, cut off from their traditional livelihoods, living in destitute conditions and dependent on charity and tourist hand-outs. Such sacrifices for conservation should not be expected from anyone: no charity or compensation can make up for the loss of identity. We need ways to achieve conservation that do not harm local people and turn them into conservation victims.

Working with local people is a process that will necessarily have different outcomes in different places. We need to understand and engage with local needs and priorities to be able to make site-specific choices. We need to accept that there is no ‘one size fits all’ plan– and that may require an attitude shift on the part of conservation practitioners.



Papua New Guinea: Villagers told the loggers to leave

On a patch of grass in a village in the Gildipasi area in Madang Province, Papua New Guinea (PNG), stands a row of eight palm-like shrubs with green, red and purple foliage. They are known as tanget in the local language. Following the ritual invocation of ancestral and nature spirits, these shrubs were planted by representatives of clans from four Gildipasi villages to seal the renewal of their agreement to protect their remaining intact forest.

‘Now the bulldozers and chainsaws are gone. And the wildlife has returned. Wallabies, cassowaries and lizards are back in the forest, and eels, prawns and crabs are in the rivers again’, says John Natu, a member of the community.

Ejecting the loggers

This story would have been very different, had it not been for the community’s decision to stand up to the outside actors who

approached them, wanting to get to their forest. Like many landholders in PNG, where almost all the land is held under customary title by indigenous communities, villagers in Gildipasi have seen intensive logging cause ecological and social damage. Following negotiations – which members of the community say were based on false promises – a Malaysian-owned logging company obtained consent from local elders to start logging in the area in the late 1970s.

‘They promised to build schools, water supplies and a road’, explains Peter Bunam. He is chairman of the Gildipasi Planning Committee, established in 1984 as part of widespread reactions to the impact of logging operations on the local community.

‘But none of that ever happened. Soon we saw that they were destroying sacred sites and scarring the landscape. Their machines scared the wildlife away, and brought foreign types of weeds that spread into our gardens’



Tokain village, Gildipasi

Other members of the community tell how alcohol and drug abuse accompanied the logging operations.

Peter Bunam continues: 'When they started to wash their machines in our rivers, polluting them with oil and grease and destroying our water system, we had enough.' 'We realized we'd been tricked, and we set about retaliating', adds John Natu.

In the end, after furious youths blockaded a logging road in 1987, the logging company packed up and left.

Increasingly, one hears the stories of small landholders in PNG choosing to resist the advances of the logging, mining and palm oil industries. They oppose the directives issued by colluding authorities, and seek instead to pursue self-reliance and environmental management based on traditional principles and land use practices.

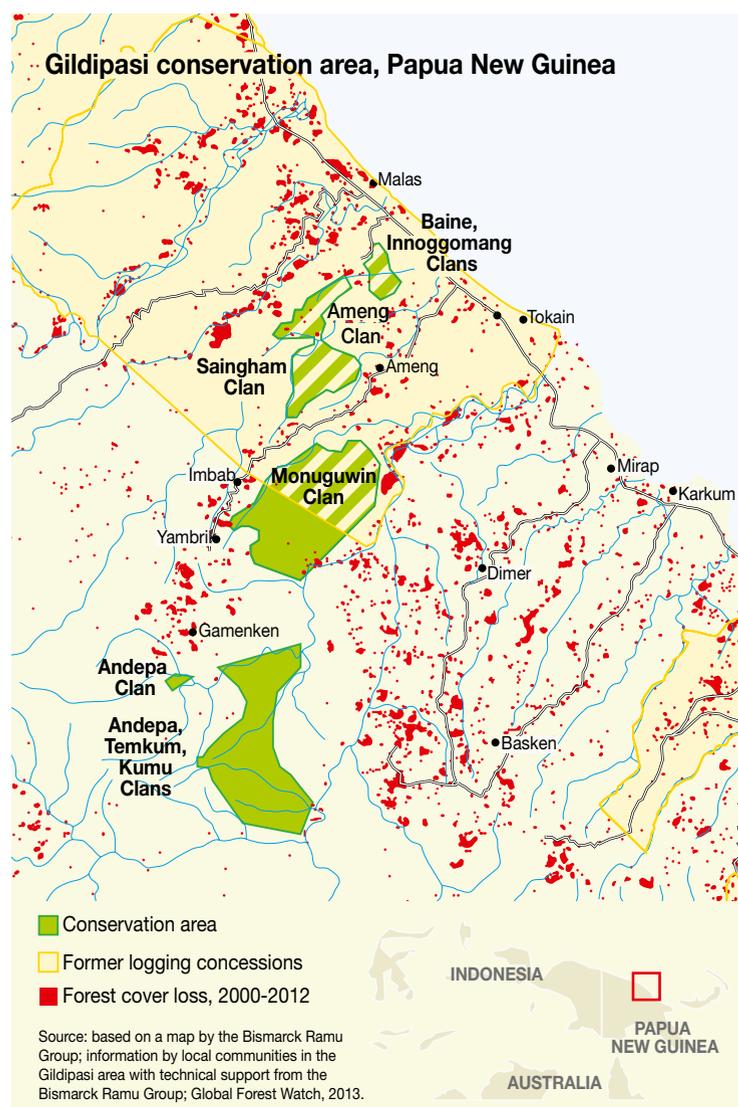
Community-driven planning

Certain that the logging companies would eventually return, villagers

after some years approached community facilitators from the Bismarck Ramu Group (BRG) for support in protecting what remained of their forest. Founded in 2000, the BRG is an organization that assists customary landowners in community planning, advising them in the development of resource management and conservation strategies that foster economic self-reliance and harmonize with local social needs. BRG bases its work on local values, histories and practices, and the right of land custodians to determine their own future.

With the BRG as a facilitator, the Gildipasi Planning Committee laid the foundations for a community-managed conservation area. This process included negotiations between clans on boundaries, and careful mapping of boundaries, using local knowledge of the landscape and GPS technology. It also involved drawing up a conservation deed that includes access arrangements and rules to be applied in case of transgressions, usually a fine.

When the agreement was signed by three local clans in July 2003, the conservation area comprised 1,000 hectares. Since then, the deed



has been renewed twice, with neighbouring clans adding their forests to the conservation area – bringing the total protected area to 2,000 hectares of ecologically rich primary forest.

The traditional concept of conservation

‘Management of the area is based on the ‘traditional concept of conservation’, explains Yat Paol, community activist and former BRG campaigner.

‘In line with our traditions, the demarcated part of the forest is strictly taboo and off limits to everyone for the duration of the conservation deed. The ancestral and nature spirits that were ceremonially invoked to seal the deed are seen as guardians and upholders of the taboo and thus the agreement.’

Those who hunt, fell trees or make bush fires inside the protected area face disciplinary action from the Conservation Committee, the rules on violations being informed by both traditional and modern penal systems. Punishment may take the form of a fine – one pig, for instance – or community work.

‘The land gives us life’

Outside the conservation area, family garden plots in the forest, managed in line with traditional agroforestry practices, provide staple foods like bananas, taro and sweet potatoes. Such practices have also been adapted for the cultivation of cash crops like cocoa and coconut, with the BRG providing advice on how to improve production and marketing techniques. These income-generating activities are helping to improve livelihoods and cover the costs of health care and education.

‘The land gives us life, and we get our strength from the forest’, Peter Bunam concludes. ‘We think the traditional ways are best. Because of outside pressure, people started dropping them, but with self-reliance, our life like this can continue – and that is what we want.’

Due to their special cultural significance in PNG, the target plants (*Cordyline fruticosa*) in the Gildipasi village stand as a powerful metaphor for the local clans and their connection with their land. They embody the revival of customary practices as part of local strategies for tackling the challenges posed by outside pressures for exploitation and commodification of forest resources.



Magubem village, Gildipasi

State of the rainforest 2014 • part 4

Drivers of deforestation



Why are tropical forests disappearing?

When tropical forests disappear, there is rarely a single cause – a combination of closely related direct and indirect factors bring about deforestation and forest degradation. Complicating the picture further is the fact that the drivers behind forest destruction vary significantly from one continent to the other. While cattle and soy production are responsible for the deforestation of large areas of rainforest in the southern and eastern Amazon, the palm oil industry and logging are key drivers in Indonesia and Malaysia. In the Central Africa region, small scale agriculture has long been an important deforestation factor, while commercial logging is a major driver behind forest degradation.

The global demand for commodities, mainly agricultural products, including food, animal fodder, and biofuel, but also timber products, minerals, oil and gas, is the key underlying driving force for deforestation and forest degradation today. It fuels forest conversion for permanent cultivation, cattle ranching and the establishment of plantations. It has become increasingly clear that commercial and export-oriented agriculture is rapidly replacing smallholder agriculture as a key driver of deforestation.¹

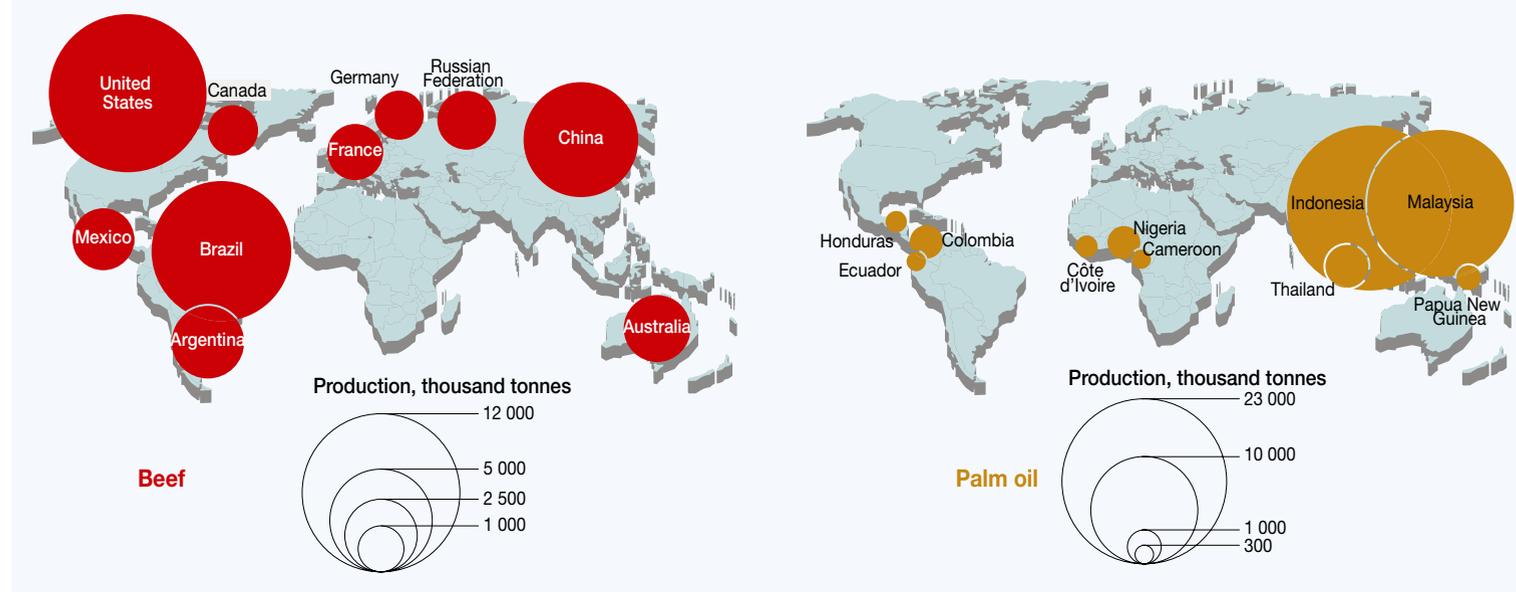
In recent decades, more than 80% of new agricultural land has come from forested areas.² Conversion of forests into agricultural land accounts for over 50% of the deforestation in tropical and subtropical countries over the past decade.³ Other sectors, such as logging, road construction or mineral extraction often play a major role in forest degradation, opening up new forest areas which are later turned into agricultural land.

Changes in the global diets, or food consumption, is a main reason why agriculture is a major direct cause of deforestation.⁴ Higher consumption of animal products, like meat, eggs and dairy products, which are more resource-intensive to produce, requires a larger amount of land and resources to feed the same number of people.⁵ The growing export of food products, including beef, soy and palm oil, to industrialized countries with meat-oriented diets requires more and more land for cultivation.

Economic factors like rising market prices for cash crops encourage the conversion of forests to agriculture. As an example, persistently high prices for palm oil globally have led to a quadrupling of the area covered by palm oil plantations over the past decade in Indonesia.⁶ Low domestic costs for land and labour, as well as ‘deforestation-friendly’ agricultural subsidies or tax breaks are often significant underlying deforestation drivers.

Logging in tropical forests often starts with extraction of a few, highly valuable species. Once the most valuable lumber has been removed, the area may be clear-felled, sometimes burned, and converted to agriculture or monoculture timber plantations.⁷ This way, logging is often the first step in a deforestation process. Even selective logging where only a few valuable trees are cut down can cause serious forest degradation and, after some years, end in complete forest loss. Extractive industries and infrastructure development, such as transportation networks, hydroelectric dams, oil and gas, and mining projects, are both direct and indirect drivers

Deforestation drivers

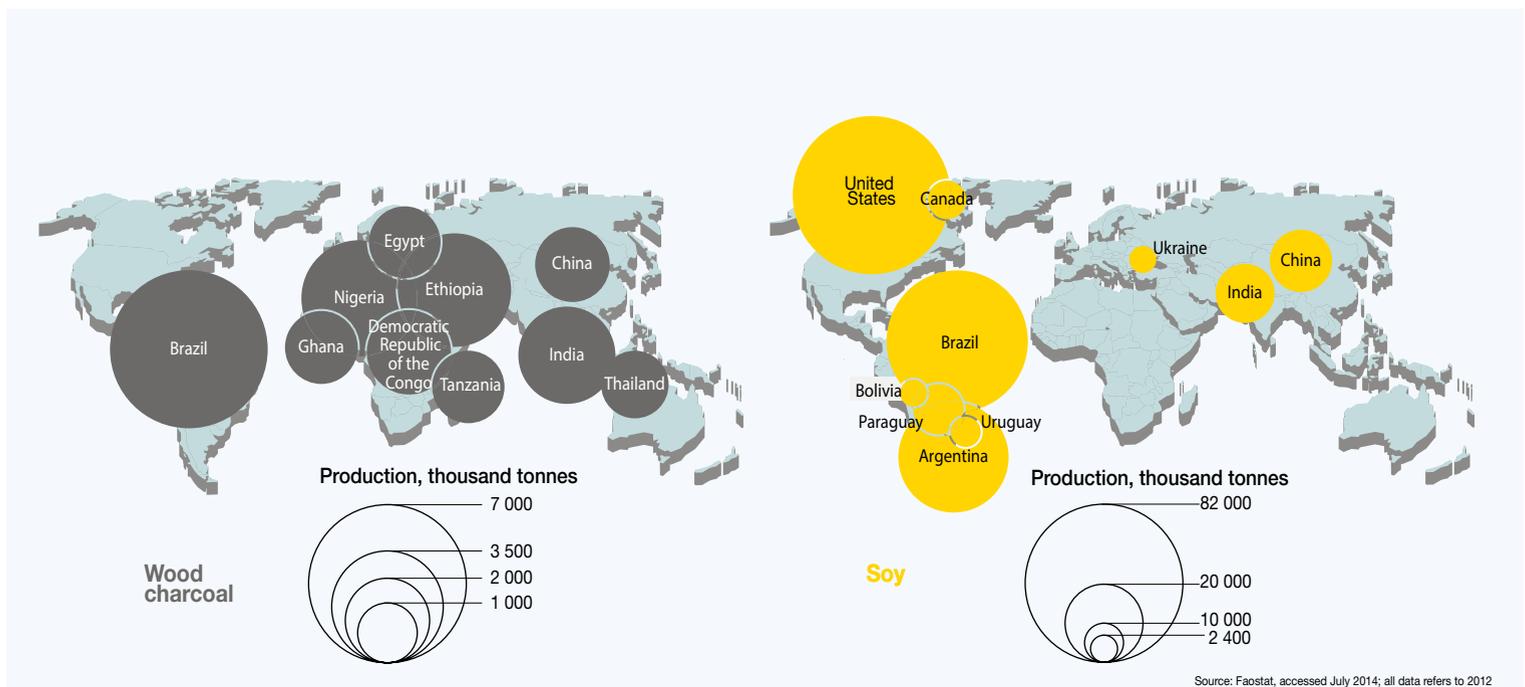




of deforestation. In general, rainforest areas are rich in minerals and hydrocarbon resources. Mining and drilling operations lead to both deforestation and land conflicts in many parts of the world, Indonesia and Peru being two important examples.

Finally, unclear tenure hampers sustainable management of forest areas in many tropical countries. Weak or unclear property and access

rights increases conflicts over land, and indigenous peoples with customary rights often lose in situations where there are competing land claims or illegal land grabs.⁸ In some weak states, such as Papua New Guinea, the state frequently awards logging or plantation concessions to commercial operators without the prior consent or consultation of affected local populations. Weak governments, widespread corruption and low transparency are common in many tropical forest countries.





Palm oil

Indonesia and Malaysia are the leading suppliers of palm oil, accounting for approximately 85% of the global production of the world's cheapest edible oil.⁹ In addition to being a component in food, palm oil is used in a range of products, including cosmetics, industrial products, animal feed and increasingly in biofuels.¹⁰ The area occupied by oil palm cultivation has expanded by around 43% worldwide over the past 20 years.¹¹ Today, palm oil represents around one third of global vegetable oil use.¹² High demand in the global market, with India and China as major importers, and high levels of domestic consumption are reasons behind this growth. In 2009, the government of Indonesia announced plans to double its production of palm oil to 40 million tons by 2020.¹³

The production of palm oil comes with high costs. The rapid expansion has destroyed enormous areas of primary and secondary forests, as well as carbon-rich peatlands, and is the key driver of deforestation in Southeast Asia. A surface area of more than 7 million hectares has already been turned into monoculture oil palm plantations in Indonesia.¹⁴ It is estimated that the planned expansion will require an additional area larger than Switzerland.¹⁵ Conversion of forests

to monoculture plantations leads to significant loss of biodiversity, extinction of endangered species and release of greenhouse gases. It also causes numerous conflicts between – companies, governments and local communities, and sometimes even between and within communities. Indonesia's extensive palm oil production has made it one of the world's top greenhouse gas emitters.

As a response to the past 5–10 years' massive public criticism of the palm oil industry, several large producers and traders of palm oil (e.g. Wilmar, Golden Agri Resources, Cargill) have recently adopted policies and committed to standards that limit their palm oil use to oil that has been produced without contributing to deforestation, destruction of peat land and human rights' abuses. The Roundtable on Sustainable Palm Oil (RSPO) was created with 10 members in 2004, and has grown to more than 1500 members in 2014. Still, palm oil certified by the RSPO standards only account for 16% of the global production of palm oil (as of March 2014).¹⁶ It will be important to monitor closely whether the various policy initiatives and the RSPO certification scheme will contribute to reducing the negative impacts of palm oil production, including deforestation.



Soy

Soybean cultivation took off in the 1990s, and has since then grown rapidly, becoming one of the main threats to the forests in the southern Amazon region. From 1994 to 2008, soybean production in Brazil increased by approximately 135%.¹⁷ During the deforestation peak from 2000 to 2005, it was estimated that one-fourth of the deforestation in the Brazilian Amazon was caused by the expansion of soybean cultivation.¹⁸ Most of the global soy crop is processed into animal feed, for which there has been a rising demand in Europe and Asia, especially China.

Large soy monocultures threaten biodiversity, destroy soil fertility, pollute fresh water and displace local communities. Even more important is the indirect impact of soy production on rainforests. Soy expansion has driven up land prices and encouraged infrastructure projects that entail forest clearing, and a comprehensive study from 2011 indicates that soy expansion in existing cattle pastures displaces ranchers into frontier forest areas, triggering new deforestation.¹⁹ The moratorium on soybean expansion into the rainforest, introduced in Brazil in 2006, significantly reduced the sector's direct role in deforestation.²⁰ However, the moratorium is under considerable pressure from the Brazilian agribusiness industry, and has only been renewed for one year at a time, last through January 2015.

The soy industry has developed certification schemes to try to deal with social and environmental concerns related to soy production; the two most widely known are ProTerra and Round Table on Responsible Soy (RTRS). However, both of these are fairly new and have had limited impact so far.



Cattle

The cattle industry became the symbol of the large-scale destruction of the Amazonian rainforest in the 1990s. Driven largely by growth in production of beef, for both domestic and international markets, the cattle herd stocks in the Amazon region tripled from 1990 to 2008.²¹ Brazil has become one of the world's largest beef exporters, and today the cattle industry is responsible for between 61 and 75% of the rainforest destruction in the Brazilian Amazon.²² It is estimated that production must increase by 70% by 2050 to meet the demand for beef from the global population.²³

Cattle ranching is an attractive option; it demands little investment and often gives high returns. In Brazil, forest land and labour are cheap, particularly in the north, and maintenance costs are low. It is a low-risk investment compared to cash crops, which are more vulnerable to pests and price fluctuations. Clearing forests and placing cattle on the land is also a way to gain title to the land in Brazil. There have been no incentives for ranchers to intensify production; approximately one cow per hectare has demanded large areas and entailed huge environmental costs. The Brazil case also makes evident how various drivers may interact, when the lucrative soy production expands into areas previously used for cattle, pushing ranchers to clear forest for new pastures.



Timber, pulp and paper

Global demand for wood and wood products is a major driver of tropical forest degradation and subsequent deforestation, particularly in Latin America and Southeast Asia.²⁴ Although deforestation in Central Africa has been slower, not least due to long lasting conflicts, conditions are changing and a growing proportion of the region's forests outside of protected areas are coming under logging concessions. According to a recent World Bank study, a fourth of the Congo Basin's lowland dense forest area is under industrial logging concessions.²⁵

Demand for timber is projected to triple globally by 2050,²⁶ which will mean even greater pressure on the rainforest. It is often argued that plantations can help reduce the pressure on natural forests;²⁷ and if established beyond forest areas or on degraded lands, this can be true. In practice, however, plantations are very often established in rainforest areas and on recently logged or degraded forest lands, adding to the total pressure on forests. Production of paper and paperboard is a rapidly growing industry, with paper products increasingly exported to expanding economies in Asia, like China.²⁸ Today around 40% of all harvested wood is processed to make paper and paperboard.²⁹

In some key producer countries for tropical timber, it is estimated that illegal logging accounts for 50–90% of the production.³⁰ In some

countries, like Papua New Guinea, logging companies efficiently circumvent national laws, using agricultural licenses to extract timber, without planting crops afterwards.

As a response to the concerns over global deforestation, a number of different certification systems have been established to promote better forest management. However, even the most recognized certification body, the Forest Stewardship Council (FSC), has been criticized for serious breaches in their monitoring process, leading to violations of their own standards.³¹

Both the US and the EU has established systems aimed at excluding illegally logged timber from their markets. The EU Forest Law Enforcement, Governance and Trade (FLEGT) Action Plan from 2003 uses so-called Voluntary Partnership Agreements (VPA) between the EU and timber-exporting countries outside the EU. Under the VPA, the timber-producing country develops systems to verify that its timber exports are legal, and the EU agrees to accept only licensed imports from that country.³² In the US, the century old Lacey Act, aimed at protecting wildlife, was amended in 2008 to include timber and timber products, holding US importers responsible if they import illegally logged timber. Positive as they are, it is still too early to judge the impact of these new legal and political approaches on logging practices and the international timber trade.



Small-scale farming and charcoal production

Small-scale farmers,³³ not least those practising shifting cultivation, were previously often seen as main agents behind tropical forest loss. Although there is growing agreement that large commercial agricultural enterprises and extractive industries pose the greatest threat to the tropical forest, small scale farming is still a driver of deforestation – and in many places an important one. The sustainability of slash and burn cultivation depends on demographic pressure, available area for fallow and choice of cultivars. Whereas the rainforest has coexisted for centuries with slash and burn under conditions of subsistence agriculture and extensive available areas, modern day slash and burn is not necessarily equally benign to the forest. In Central Africa, competition for land, poverty and lack of tenure rights combine to make small-scale peasants an important deforestation factor. Extensive charcoal production also contributes to deforestation in Central Africa, and with growing demand both in urban centres and from export markets outside the region charcoal production seems set to increase.³⁴



Roads, mining and drilling

Infrastructure development and extractive industries, such as hydroelectric dams, oil and gas, and mining projects, are major drivers of deforestation. Infrastructure development opens up forest areas, initiating and accelerating a process of gradual forest degradation. New roads make the rainforest accessible to legal and illegal logging, land speculation, agricultural expansion and mining. In the Brazilian Amazon, for example, a new study reveals that 95% of deforestation has occurred within 5.5 kilometers of roads or 1 kilometer of a navigable river.³⁵ The price rise for gold and other metals in recent years has led to a sharp growth in legal and illegal mining in the Amazon.³⁶ Today, areas under planned and active mining concessions in total cover a 21% of the Amazon's surface.³⁷ In Indonesia, the mining industry is a key indirect driver of deforestation. The country has quadrupled its coal production in ten years (from 100 to 400 million tonnes a year) and has become the world's largest exporter of coal.³⁸ In addition to the direct consequences of mining operations, the mining industry normally have major socio-environmental impacts far beyond the mining site, a problem largely ignored by the industry. Mining and drilling areas often overlap with indigenous territories, and these operations therefore seriously affect some of the most vulnerable and forest dependent people.³⁹ Also, hydropower development is proceeding at a historically unprecedented pace in the region. More than 400 dams are planned or under construction in the Amazon basin.⁴⁰ Large dams often have severe and irreversible environmental and social impacts, inundating large areas of land, displacing thousands of people.⁴¹ In the Western Amazon, drilling for oil and gas has increased massively in the past five to six years, and today 84% of the forested areas of Peru is dedicated to oil production.⁴²

The path to a forest destruction-free investment portfolio

Norway's Government Pension Fund Global is the biggest sovereign wealth fund in the world. With its heavy investments in the industries that destroy rainforests, the Fund has the opportunity as well as the responsibility to reduce forest destruction by exerting influence on the companies in its investment portfolio.

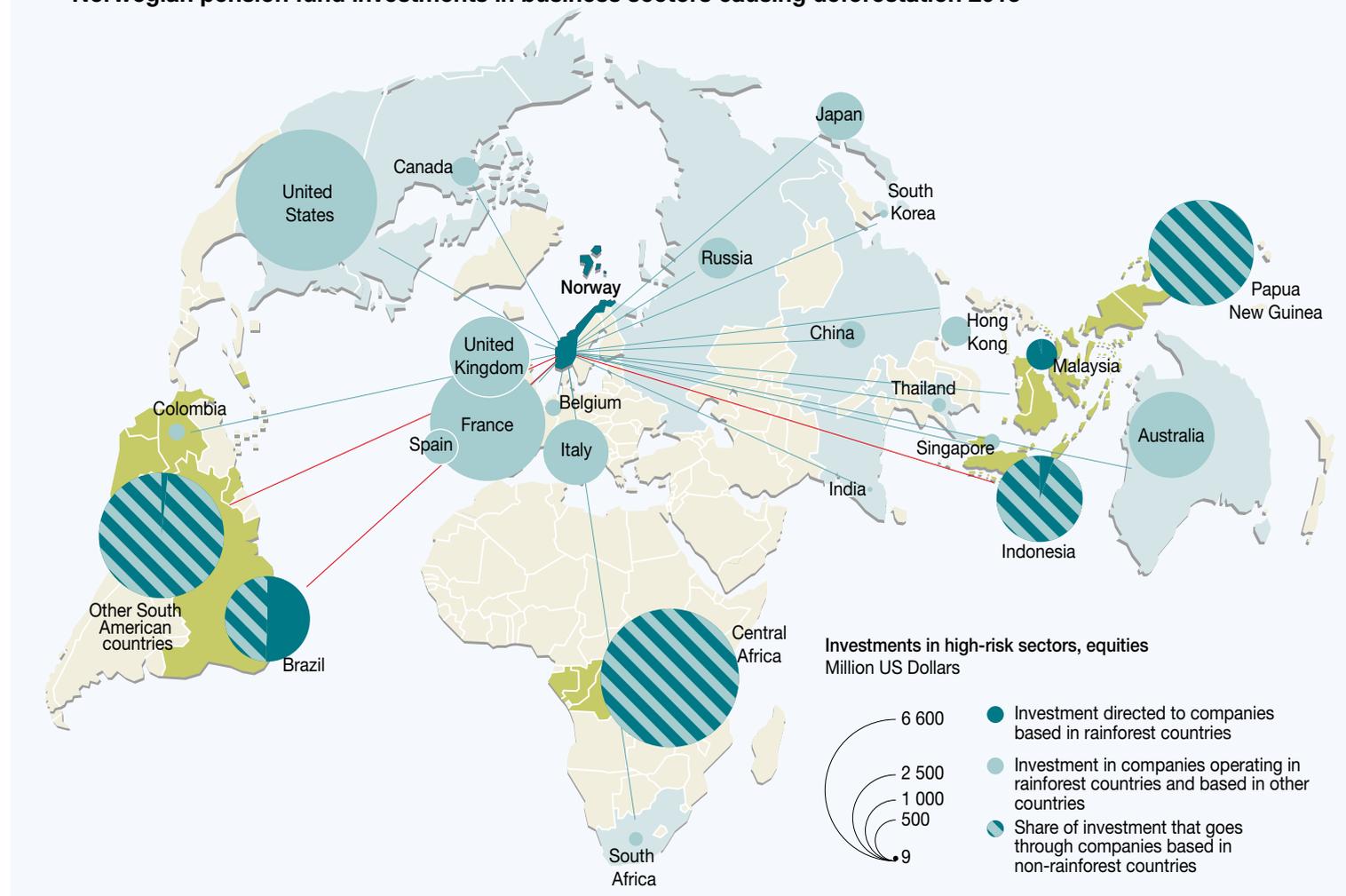
The main drivers of tropical forest destruction are commercial companies that exploit natural resources found in forest areas – like timber, minerals or oil – or clear forests to use the land for agriculture – like palm oil, soy and cattle ranching.⁴³ The banking and finance sector indirectly contributes to forest destruction by providing the capital that makes it possible for companies to exploit

forest resources. Therefore, a very effective approach to reducing forest destruction can involve getting financial institutions to adopt no-deforestation policies, and to place demands on the companies they invest in or lend capital to.

Norway's Government Pension Fund Global (GPF) is a good example. The GPF is the world's largest sovereign wealth fund, with a value of more than USD 800 billion. It invests at least USD 21 billion in industries that constitute the greatest threats to the world's rainforests.⁴⁴ The GPF has investments in at least 88 companies that conduct operations in tropical forest areas and that belong to the industries of oil and gas, palm oil, soy, mining, cattle

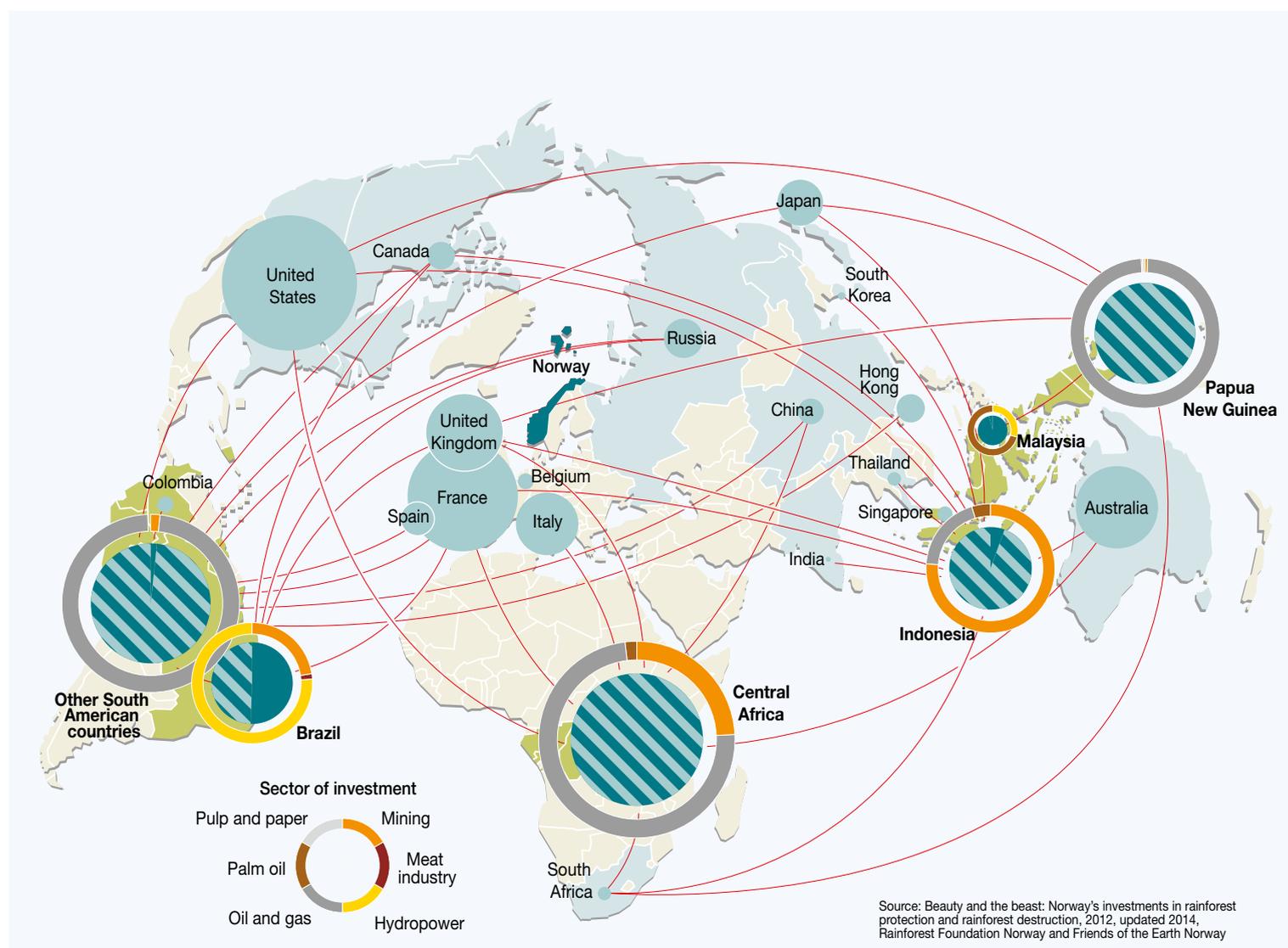
Risky business

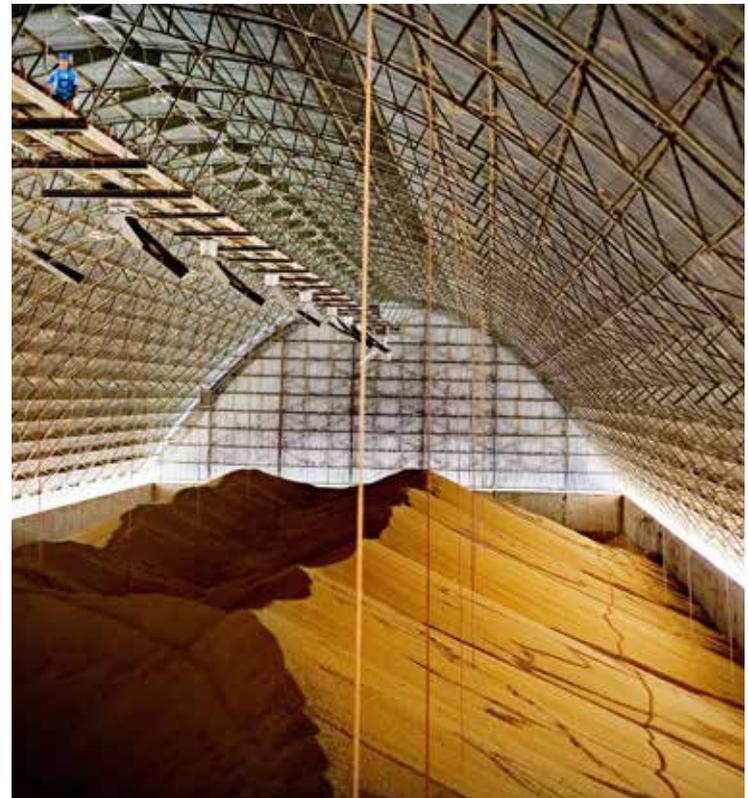
Norwegian pension fund investments in business sectors causing deforestation 2013



farming, logging, paper and pulp and dam construction. Moreover, these figures refer only to the industries that directly cause forest destruction – not traders, producers of refined commodities, transport, insurance, banks and finance and other sectors that are indirectly involved. The GPFG has investments in all these indirect deforesters as well. Precisely because it is involved in every part of the value chain, the Fund is uniquely placed to reduce forest destruction by exerting influence on its investees from various sectors.

The stated ambition of the GPFG is to act as a responsible investor, operating under a set of ethical guidelines decided by the Norwegian Parliament. The Fund is managed by a branch of the Central Bank of Norway, called Norges Bank Investment Management (NBIM). An independent Council on Ethics investigates possible breaches of the guidelines by individual companies, which may lead to exclusion from the Fund’s investment universe. Among the companies that have been excluded are several mining and logging companies found to cause serious environmental damage in rainforest areas, including Barrick Gold, Samling Global, WTK and Ta Ann.⁴⁵





Rainforest Foundation Norway has for years advocated that the GPFNG must reduce the impacts of its investments on tropical forests systematically, not merely by excluding a few worst cases. With the release of the report *Beauty and the Beast: Norway's investments in rainforest protection and rainforest destruction*⁴⁶ in 2012, the issue was placed on the national agenda. During a hearing in Parliament in June the same year, the then Minister of Finance, Sigbjørn Johnsen of the Labour Party, announced that he had requested Norges Bank (central bank of Norway) to consider how tropical forest destruction could be included in the Fund's 'active ownership' work. A few months later, Norges Bank included tropical deforestation as a priority issue under its strategy for climate-change risk management. The first result/action/implementation of this policy change came in early 2013, when the GPFNG declared that it had divested itself of all its shares in 23 palm oil companies whose business models were not deemed sustainable. The GPFNG believes that long-term financial sustainability depends on social and environmental sustainability, and the massive deforestation caused by the palm oil industry in Southeast Asia was seen as a liability.

The announcement sent shock waves through the industry. Unfortunately, the GPFNG failed to specify the basis for deciding which companies to divest itself of. This caused considerable confusion, as it was not clear that all the divested companies were worse than the palm oil companies the GPFNG continued to invest in. By not providing a transparent decision based on clearly defined criteria, the Fund missed an opportunity to encourage all palm oil companies to improve. Nevertheless, since the GPFNG's announcement, there

has been movement towards greater sustainability in the sector, with several large companies adopting no-deforestation policies.⁴⁷

While taking on tropical deforestation as a priority issue was laudable, the GPFNG has still not set a specific, time-limited goal for reducing forest destruction in its investment portfolio, or put in place the tools necessary to achieve that goal. A systematic strategy of engagement should be based on a set of guiding principles that specify the Fund's expectations to companies whose operations may have an impact on forests, as well as criteria and methodology for assessing both the real and the potential impact of portfolio companies on forests. Through the use of tools such as shareholder resolutions, voting guidance and dialogue with companies, investees should be encouraged to report on forest impact and set targets for reduced forest destruction. Companies for which forest destruction is an integral part of the business model should be removed from the Fund's portfolio, as well as companies that after extended engagement fail to make progress towards the stated goals. To maximize effectiveness, the GPFNG should engage not only with companies that directly cause forest destruction, but also with off-takers and finance providers.

Just as the recommendations from the Council on Ethics are routinely followed by a large number of investors internationally, the GPFNG's efforts to reduce forest destruction by exerting influence on investees could potentially become best practice in the investor community. Whether this work will succeed depends on how seriously the GPFNG takes the issue, now and in the future.



Forest crime

By Hanne Jørstad, based on the UNEP-INTERPOL report: “The Environmental Crime Crisis”;
Editors Christian Nellemann, Rune Henriksen, Patricia Raxter, Neville Ash and Elizabeth Mrema

The illegal trade in natural resources is a growing global concern that threatens the environment, human well-being, security and sustainable development. A recent report by UNEP estimates that the monetary value of all transnational organized environmental crime is between USD 70 and 213 billion annually.⁴⁸ The higher figure is nearly double that of the global Official Development Assistance of about USD 135 billion. Environmental crime includes illegal logging, poaching and trafficking of animals, illegal fisheries, illegal mining and illegal dumping of toxic waste. Out of these five key areas within environmental crime, forest crime (including illegal logging and processing) has by far the largest losses in revenue. The annual value of forest crime is an estimated USD 30–100 billion, equivalent to 10–30% of the total value of the global timber trade.⁴⁹

Forest crime impacts negatively on the social security, environmental resources and economy of affected countries. The illegal trade in timber per definition operates outside of government regulations and management, thus depriving the national economy of significant revenues.⁵⁰ Tanzania reportedly lost USD 58 million in 2004–2005 due to unpaid timber royalties.⁵¹ Criminal organisations undermine the rule of law, weaken government enforcement functions and spread corruption within the military and amongst politicians.⁵² Deforestation deprives local communities of their resource base, especially indigenous peoples who solely depend on forests for their livelihood.⁵³ Local communities are further harmed by criminal groups through corruption of officials, fraud, money laundering, extortion, threats of violence and murder.⁵⁴

The majority of illegal logging takes place in the tropical forest of the Amazon, Central Africa and Southeast Asia. Recent studies reveal that illegal logging accounts for as much as 50–90% of the total production from some of the key tropical forest countries.⁵⁵ The US, EU, China and Japan receive over 80% of all illegally logged wood globally.⁵⁶

The four most common forms of illegal trade of forest products are: illegal exploitation of high-valued wood species such as rosewood and mahogany; illegal logging of timber for sawn wood, building materials and furniture; illegal logging and laundering of wood through plantation and agricultural front companies to supply pulp for the paper industry; and utilisation of the unregulated wood-fuel and charcoal trade to conceal illegal logging in and outside protected areas, and conduct tax evasion and fraud.⁵⁷

Forest crimes are conducted in numerous ways. Primary methods of illegal logging and timber laundering include the falsification of logging permits; bribing forest officials, police and the military in order to obtain logging permits; logging beyond concessions;

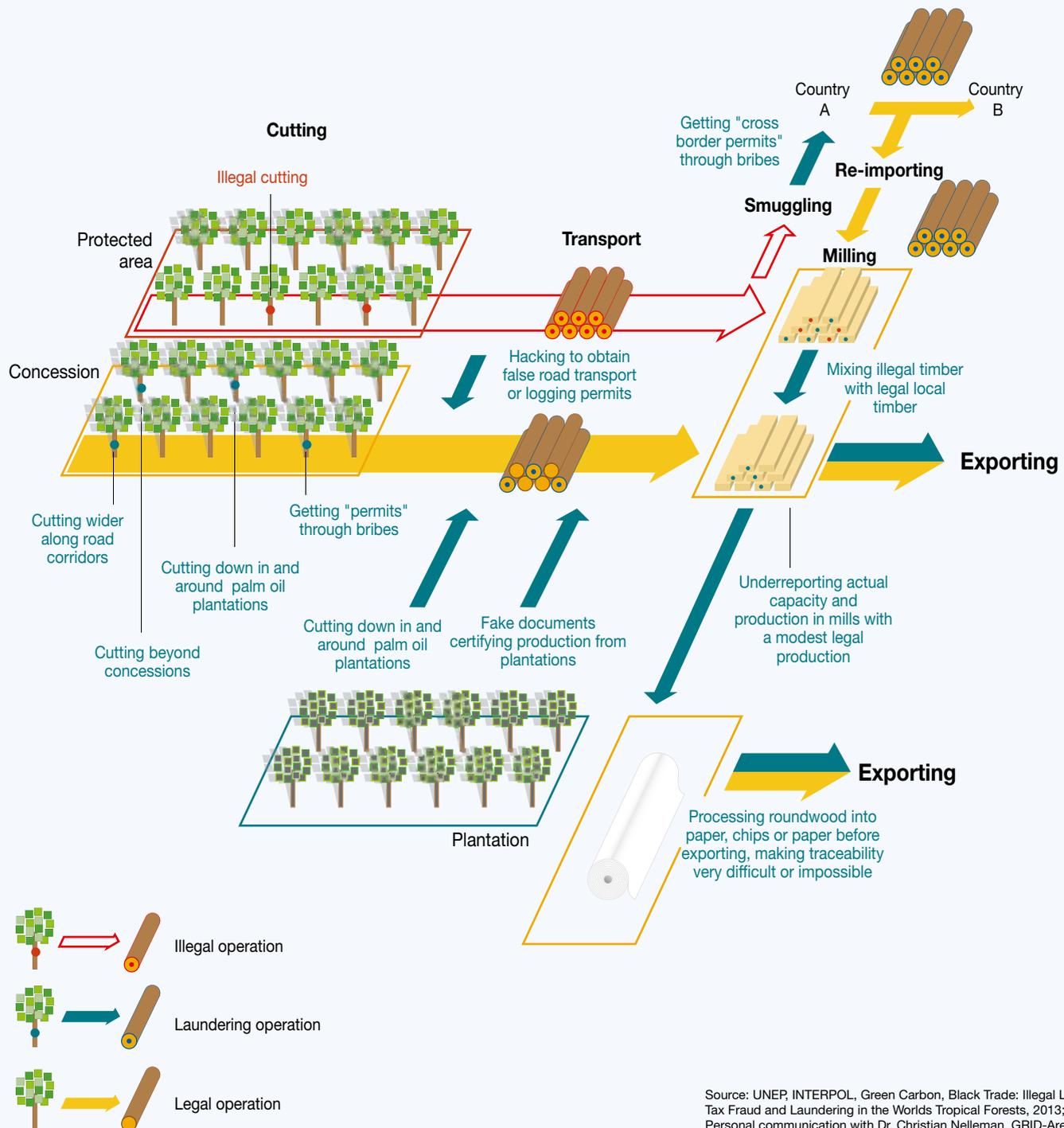
hacking government websites to obtain permits for higher volumes or transport; or by establishing roads, ranches, palm oil plantations or forest plantations, and mix illegal timber with the legal timber during transport or in mills.⁵⁸

Laundering illegal timber and wood products – the process of transforming illegally logged timber into ostensibly legal logs – is the most common way that illegal logs are transported, processed, exported and manufactured.⁵⁹ By doing so, timber or wood products avoid certification schemes and other established efforts to fight illegal imports. Some plantations are established simply to cover up for logging, and are declared bankrupt after clearing. This method gives companies access to governmental subsidies, legal permits to sell timber and opportunities for extensive tax fraud. In Indonesia the amount of timber logged through plantations increased from 3.7 to 22.3 million m³ from 2000 to 2008. The fact that only a fraction of these established plantations are operational indicates large-scale laundering of illegally logged wood.⁶⁰

While the focus on illegal tropical wood has primarily been on roundwood, sawn wood and furniture products, findings reveal that the largest share enters countries as paper, pulp or wood chips. An estimate suggests that between 62–86% of all illegal tropical wood imported to the US and EU comes in these forms.⁶¹ Amongst all wood products, it is hardest to determine origin – and hence detect if it’s from an illegal source – of paper and pulp. While the origin of roundwood is fairly easy to detect, it takes scientific analysis of fiber samples to identify the source of pulp and paper, creating favourable conditions for illegalities with high profits and low risks.⁶² A paper from an EU-based producer may very well derive from a conflict zone in Africa.⁶³

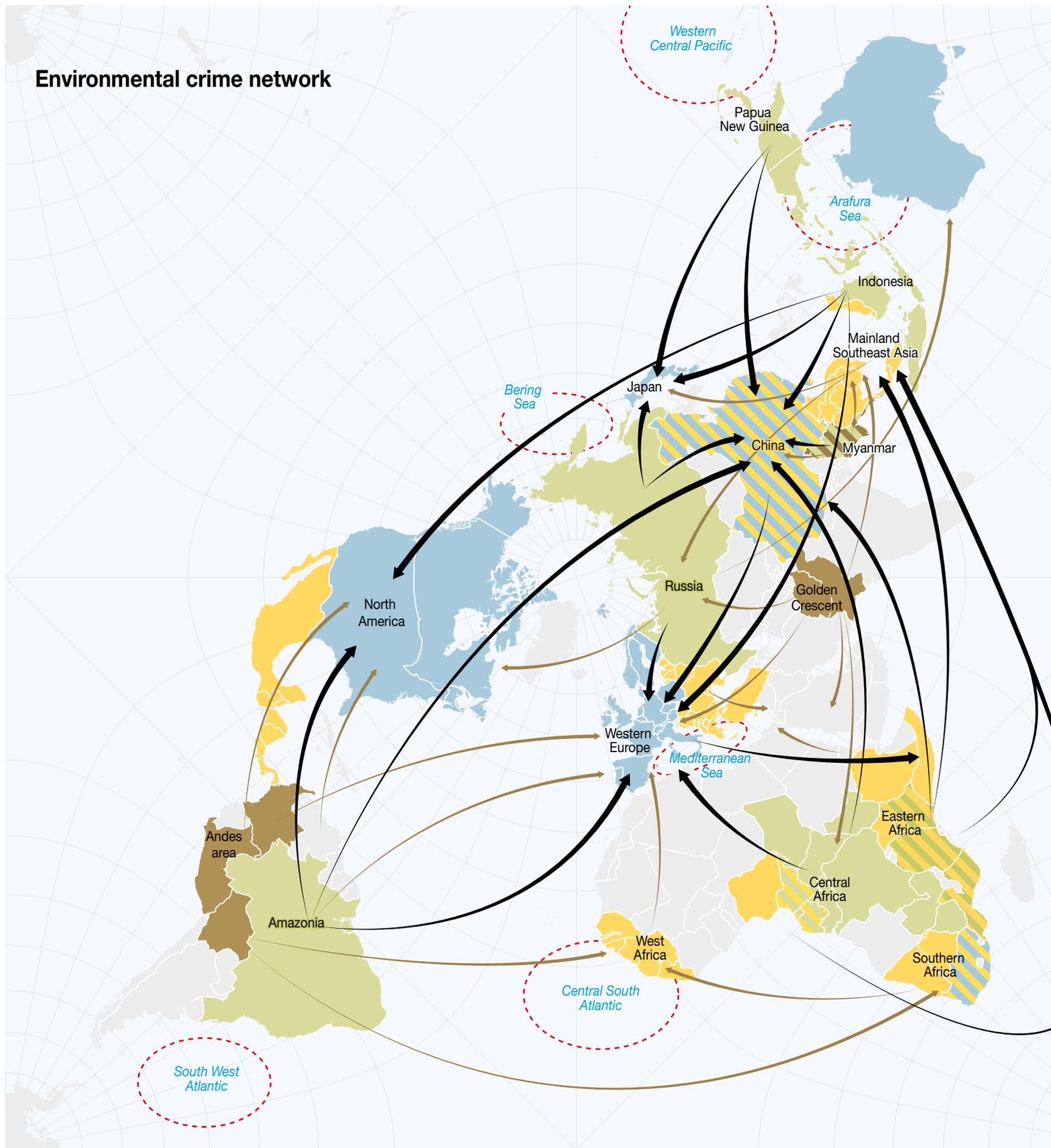
Forest crime in Africa, especially the illegal and unregulated charcoal trade, has close ties to organized crime, militias and terrorist groups.⁶⁴ A growing demand for wood charcoal due to a rapidly growing urban population, and the absence of regulation is an open invitation for non-state armed groups to take control of the trade. An estimate suggests that the illegal charcoal trade alone causes a loss of USD 1.9 billion in revenues to African countries annually.⁶⁵ Armed groups across Africa create income through controlling and claiming taxes along roads, ports, strategic trade points and border crossings. At a roadblock in the Lower Juba Region, Al Shabaab has been able to make up to USD 8–18 million annually from taxation of charcoal trucks.⁶⁶ The illegal trade and export of charcoal from Somalia has an estimated value of between USD 360 and 384 million per year.⁶⁷ Militants in DRC are estimated to make USD 14–50 million annually on road taxes.⁶⁸ For African countries with ongoing conflict, including Mali, the Central African Republic, DR Congo, Sudan and Somalia,

Illegal logging and log laundering



Source: UNEP, INTERPOL, Green Carbon, Black Trade: Illegal Logging, Tax Fraud and Laundering in the World's Tropical Forests, 2013; Personal communication with Dr. Christian Nelleman, GRID-Arendal

Environmental crime network



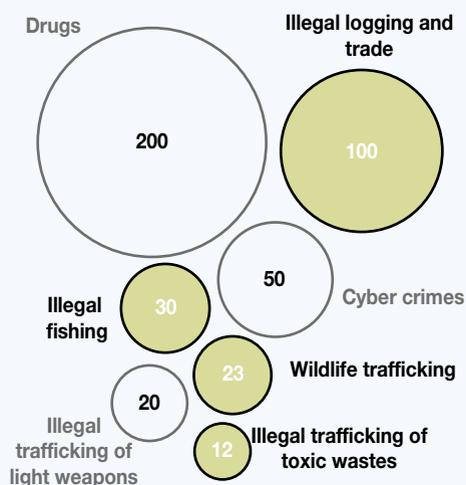
New and old trafficking routes

-  Environment-related illegal trafficking. Includes wood, wildlife, animal parts (i.e. ivory, rhinoceros horns and fur) and wastes
-  Main illegal, unreported and unregulated fishing areas
-  "Traditional" illegal trafficking. Includes heroin, cocaine and human beings
-  Main destination country
-  Main transit country
-  Country of origin of "traditional" illegal trafficking
-  Main country or region of origin of environmental-related illegal trafficking

Sources: UNODC Annual Reports 2010 e 2013; WWF-Australia; Globaltimber.co.uk, Estimates of the percentage of "Illegal Timber" in the imports of wood-based products from selected countries, 2007; TRAFFIC; FAO; World Ocean Review Report 2013; Michigan State University, Human Trafficking Task Force; Greenpeace, The Toxic Ship, 2010; National Geographic press review.

A growing sector

Annual revenue, higher estimates
Billion dollars



Sources: TRAFFIC; FAO; UNODC; Global Financial Integrity

a conservative estimate is that militant and terrorist groups may profit by USD 111–289 million annually.⁶⁹ Demand for charcoal is expected to triple over the next decades. It is crucial to gain a better understanding of the charcoal trade in order to establish control and hinder armed groups profiting.

The global community has gained a better understanding of the scale and nature of environmental crime over the past years. This is evident through the decisions of international bodies such as CITES, ECOSOC, the UN Security Council, UN General Assembly, INTERPOL, and WCO.⁷⁰

There are several initiatives established to restrict the import of illegal tropical wood. These include certification schemes, such as the FSC, and voluntary trade agreements, including the United States of America's Lacey Act and the European Union's FLEGT programme. While these are important mechanisms for establishing collaboration and joint interventions to counter import of illegal timber, there is an urgent need to strengthen law enforcement capacity, involving the entire enforcement chain from customs to police up to the justice systems.⁷¹ The International Consortium on Combating Wildlife Crime (ICWC), which was established in 2010, is such a body. It operates on a global scale, bringing together CITES, INTERPOL, UNODC, The World Bank and WCO.⁷²

There are several positive examples of initiatives operating on a national level that have been successful in reducing transnational environmental crime. The Brazilian government has invested in a broad enforcement effort to reduce illegal logging by targeting the entire criminal chain. As a result, deforestation rates in the Brazilian Amazon were at its lowest in 2012 since monitoring started in the late 1980s.⁷³ In Tanzania, INTERPOL and UNODC have trained over 1000 rangers resulting in several arrests at the crime scene.⁷⁴

Another successful initiative has resulted in several prosecutions for illegal logging in Indonesia. In 2012 UNODC trained financial investigative and anti-corruption agencies in anti-money laundering measures. This resulted in The Financial Investigative Unit being able to detect highly suspicious transactions that proved to be linked to timber smuggling. The suspect was found guilty and sentenced to eight years imprisonment on the back of evidence which proved that USD 127 million had passed through his accounts.⁷⁵

In order to combat transnational environmental crime it is crucial to invest in law enforcement efforts, environmental legislations, anti-corruption initiatives, alternative livelihoods as well as consumer awareness. While much has been accomplished in the past years, forest crime will continue to exist unless the risk of being prosecuted increases and opportunities to profit from it are reduced. A wide range of stakeholders need to be involved. This includes environmental, enforcement and development sectors, as well as stakeholders involved in security and peacekeeping missions.

Notes

1. Importance of the rainforest and biodiversity

1. IPCC 2014a.
2. IPCC 2014b.
3. Angelsen et al. 2014.
4. Brandon forthcoming 2014.
5. Ellison, Futter and Bishop 2012.
6. Mulligan and Saenz 2013.
7. Hamilton 2004.
8. Mullan forthcoming 2014.
9. Koch et al. 2009; Barbier et al. 2011.
10. Locatelli 2010.
11. Mullan forthcoming 2014.
12. See, for example, Peluso 1993.
13. Nepstad et al. 2006.
14. Lawson forthcoming 2014.
15. Parker 2013.
16. Ghazoul, Jaboury and Douglas Sheil 2010.
17. <http://www.theguardian.com/environment/2013/oct/23/purring-monkey-vegetarian-piranha-amazon-species>
18. <http://www.iucnredlist.org/initiatives/mammals/analysis>
19. Ghazoul and Sheil, 2010.
20. Hunt, C.O., Rabett, R.J., 2013).
21. Stuart L. Pimm et al. 2014.
22. State University of New York, College of Environmental Science and Forestry: International Institute for Species Exploration. Top 10 new species 2014 <http://www.esf.edu/top10/04.htm>
23. <http://smithsonianscience.org/2013/08/olinguito/>
24. <http://www.iucnredlist.org/details/178371/0>
25. <http://www.iucn.org/?14964/IUCN-Red-List-raises-more-red-flags-for-threatened-species>
26. KEITH, D. A., et al. 2014
27. IUCN Red List (accessed august 2014) http://cmsdocs.s3.amazonaws.com/summarystats/2014_2_Summary_StatsPage_Documents/2014_2_RL_Stats_Table5.pdf
28. Mouillot D, et al. 2013
29. Butler, Rhett (2014): 'Symbiotic relationships in the rainforest'. <http://rainforests.mongabay.com/0203.htm>; Hagen, Arild (2009) 'Amazonas – en hyllest til livet' Regnskogens tilstand. Oslo: Norwegian Rainforest Foundation
30. FAO 2014
31. Foley et al 2007
32. TEEB 2010
33. Ibid
34. Millennium Ecosystem Assessment 2005
35. FAO 2011c
36. Ghazoul and Sheil 2010
37. FAO 2011
38. CBD 2009
39. TEEB 2010
40. <http://www.teebweb.org/wp-content/uploads/2013/01/TEEBcase-Biodiversity-and-Health.pdf>
41. CBD 2009
42. De Grot 2012 places value of ecosystem services in tropical forest between 1581 and 20,851 2007-\$/ha. The median value of 2355 would give a monetary value above 2 trillion dollars for 9 million km² rainforest.
43. TEEB 2010
44. UNEP 2013 (GEO 5)
45. UNFF 2012
46. FAO 2011 includes a total of 30 countries, more countries than just the key rainforest countries we refer to in this report.
47. Saachi et al. 2011
48. See WRI's CAIT 2.0 (Ref.: [http://cait2.wri.org/wri/Country%20GHG%20Emissions?indicator\[\]=Total GHG Emissions Including Land-Use Change and Forestry&indicator\[\]=Total GHG Emissions Including Land-Use Change and Forestry Per Capita&year\[\]=2011&sortIdx=1&sortDir=desc&chartType=geo](http://cait2.wri.org/wri/Country%20GHG%20Emissions?indicator[]=Total%20GHG%20Emissions%20Including%20Land-Use%20Change%20and%20Forestry&indicator[]=Total%20GHG%20Emissions%20Including%20Land-Use%20Change%20and%20Forestry%20Per%20Capita&year[]=2011&sortIdx=1&sortDir=desc&chartType=geo))
49. IPCC 2014b

50. UCS 2013
51. Black, R 2011
52. IPCC 2014 b
53. http://news.mongabay.com/2011/0323-species_migration.html
54. IPCC 2014c p. 15.
55. Science Daily 2014 <http://www.sciencedaily.com/releases/2014/02/140226074522.htm> and CD, T et al. (2004)<http://www.ncbi.nlm.nih.gov/pubmed/14712274>
56. The text is based on the report Rights-based rainforest protection, Rainforest Foundation 2012, by Siri Damman and Ellen Hofsvang.
57. FAO 2014
58. According to a report by special rapporteur for UN Permanent Forum on Indigenous Peoples, Vicky Tauli Corpus, the number is 200 million. See Forest Peoples Program, 2012, footnote 18.
59. IWGIA website: <http://www.iwgia.org/culture-and-identity/identification-of-indigenous-peoples>
60. Sobrevila, C. 2008.
61. Gorenfloa L.J., Romaineb S., Mittermeierc R.A., and Walker-Painemillad K. 2012
62. General Comment No. 23: The rights of minorities (Art. 27): 08.04.1994. CCPR/C/21/Rev.1/Add.5, General Comment No. 23. <http://www.unhcr.ch/tbs/doc.nsf/%28Symbol%29/fb7fb12c2fb8bb21c12563ed004df11?Opendocument>
63. For further discussion of this, see Introduction; (Eds) Sikor, T. and Stahl J., 2011.
64. Sunderlin, W.D., 2011.
65. Nelson A., Chomitz K.M., 2011.
66. Securing Rights, Combating Climate Change: How Strengthening Community Forest Rights Mitigates Climate Change. Rights and Resources Initiative and World Resources Institute. July 2014. <http://www.wri.org/securingrights>
67. Victor M. Toledo. (Undated)
68. Ibid., note 47
69. FAO 2014
70. UNFF 2012
71. See e.g. study from East Kalimantan, Indonesia, before and after severe flood: N. Liswanti, D. Sheil, I. Basuki, M. Padmanaba and G. Mulcahy, Falling back on forests: How forest-dwelling people cope with catastrophe in a changing landscape, International Forestry Review, Vol 13, no 4. 2011.
72. World Bank 2002.
73. CIFOR, papers can be downloaded here: <http://www1.cifor.org/pen/publications/pen-paper-download-registration-form.html>
74. FAO 2011 and The World Bank, 2004
75. TEEB 2010
76. FAO 2011c
77. UNEP 2013 (GEO 5).
78. This section builds on FAO 2011c 'Forests for improved nutrition and food security' <http://www.fao.org/docrep/014/i2011e/i2011e00.pdf>
79. Ghazoul and Sheil 2010

2. Time for policy change

1. FAO 2010
2. Hansen, M. C. et al. 2013 www.sciencemag.org/content/342/6160/850
3. Asner 2009; FAO 2011
4. FAO 2010 Several countries lack data for primary forest.
5. FAO 2010
6. FAO 2010
7. FAO 2011
8. Mackey, B. et al 2014
9. The Greenpeace GIS Laboratory, University of Maryland and Transparent World, in collaboration with the World Resources Institute and WWF-Russia. Available at <http://www.intactforests.org/>
10. <http://www.wri.org/news/2014/09/>
11. FAO 2010
12. Peru: <http://news.mongabay.com/2013/0613-peru-deforestation-tracking-system.html> DRC: <http://www.un-redd.org/Newsletter43/DRCNFMStabid/131881/Default>
13. Hansen et al. 2013 and Mongabay <http://news.mongabay.com>

com/2013/1114-global-forest-map.html

14. Ibid.
15. This includes all tree cover, including plantations. See Margono et al 2014 for figures for natural forest.
16. FRA 2010
17. FAO & JRC. 2012.
18. Ghazoul, Jaboury and Douglas Sheil 2010
19. Countries: Bolivia, Brazil, Colombia, Ecuador, Guyana, Peru, Suriname, Venezuela + the territory of French Guyana.
20. FAO 2011
21. FAO 2010
22. RAISG 2012
23. The government of Indonesia is currently working to improve forest monitoring, supported by Norway's climate and forest initiative.
24. FRA 2010
25. <http://www.wri.org/blog/2014/03/5-overlooked-deforestation-hotspots>
26. Lund, H.G. 2009. Cited in FAO 2011 (p 1).Resources Assessment Working Paper 177ResassessmentWorkingPaper
27. Thompson et al 2013.
28. FAO 2002.
29. Simula, M., 2009.
30. Simula, M., and Mansur, E., 2011.
31. Hosonuma et al. 2012.
32. Gerwing 2002.
33. FAO, UNEP and UNFF 2009.
34. Union of Concerned Scientists 2011.
35. Ibid.
36. Gerwing 2002.
37. Simula, M et al. 2011.
38. FAO et al 2009 (p. 11).
39. Ghazoul, Jaboury and Douglas Sheil 2010.
40. Ibid.
41. Ibid.
42. I.e. Hansen et al. 2013 and the Global Forest Watch project (www.globalforestwatch.org).
43. Romijn, E., J. H. Ainembabazi, A. Wijaya, M. Herold, A. Angelsen, L Verchot, D Murdiyarso. 2013.
44. Hansen, M. C. et al. 2013
45. Ibid.
46. See Margono et al. 2014 for Indonesia
47. Ibid.
48. Ciaia, P., C. Sabine, et al. 2013. Cited in Stocker et al. 2013.
49. Angelsen, A., and McNeill, D. 2012.
50. Stern, N. (Ed.) 2007.
51. The Forest Investment Program (FIP) supports REDD+ work in eight countries, while the Forest Carbon Partnership Facility (FCPF) includes 44 developing-country participants in its two funding streams (the Readiness Fund and the Carbon Fund). See http://www.climateinvestmentfunds.org/cif/Forest_Investment_Program and <http://www.forestcarbonpartnership.org/>
52. See NICFI's official webpage, <http://www.regjeringen.no/en/dep/kld/kampanjer/the-governments-climate-and-tree-project.html?id=733947>
53. For a broad evaluation of the results of the NICFI initiative, see Norad 2014.
54. Almås, O., Anselmo, L. et al. 2014.
55. Streck et al. 2012.
56. For a fuller discussion of some of these trends, see Angelsen and McNeill, 'The evolution of REDD+.'
57. Streck, C. and Parker, C., 2012. Cited in Angelsen, A et al. (eds.) 2012.
58. The most notable exception being Brazil: the government of Norway is paying Brazil, through its Amazon Fund, for results obtained in reducing deforestation emissions from the Amazon, based on USD 5 per tonne of reduced CO2 emissions. (Payments from Norway have not exceeded NOK 1 billion per year, though, although Brazilian emissions reductions have "entitled" Brazil to receive substantially larger contributions from the international community).
59. Karsenty, A. and Ongolo, S. 2011.
60. R-SWG 2013.
61. FERN and FPP 2014.

3. People who protect forests

1. RAISG 2012a: 5,36 million km² (2000), FAO 2011: 5,86 million km² 'dense humid forest'
2. INPE 2014 (<http://www.obt.inpe.br/prodes/index.php>)
3. CIFOR: <http://blog.cifor.org/20927/despite-enthusiasm-for-redd-deforestation-in-peru-continues#.Us7YZ7Cx7cs> and Mongabay: <http://news.mongabay.com/2013/0613-peru-deforestation-tracking-system.html>
4. Not included for lack of comparable data covering the whole region; see RAISG 2012a pp. 6, 14-15.
5. RAISG 2012a <http://raisg.socioambiental.org/mapa#english>
6. GEO Amazonia
7. UNEP 1013 (GEO 5)
8. Ibid
9. UNEP and ACTO 2009
10. RAISG 2012b http://raisg.socioambiental.org/system/files/AMAZON2012_english.pdf
11. Aikhenvald 2012
12. RAISG 2012b
13. RFN 2014
14. Ibid.
15. Stevens et al. 2014
16. Deforestation Brazil: Imazon 2011; other countries: RAISG 2012c <http://raisg.socioambiental.org/system/files/mapaAmazonia2012-deforestation%5Bing%5D.pdf>
17. FAO 2011, Table 5, p. 62
18. CIFOR, 09 January 2014 The economic and political conditions in Peru favour an increase in deforestation, despite the country having set a target of zero net deforestation by 2021, a new study shows. More: <http://blog.cifor.org/20927/despite-enthusiasm-for-redd-deforestation-in-peru-continues#.Us7YZ7Cx7cs>
19. Stevens et al. 2014
20. RAISG 2012a, p. 59; Stevens et al. 2014 p. 4
21. Little 2014
22. Barber et al. 2014
23. UNEP and ACTO 2009
24. Victorine Che Thöner 2014 www.regnskog.no/en/rainforest-news/africa/long-awaited-decree-granting-forest-concessions-to-local-communities-finally-signed-in-the-democratic-republic-of-the-congo.
25. <http://forests-iiisd.org/news/un-redd-discusses-legal-protection-of-indigenous-rights-in-the-drc/>
26. de Wasseige C. et al. 2012.
27. Ibid.
28. Congo Basin - State of the forest 2010
29. FAO 2011
30. Ibid.
31. Mayaux P et al. 2013
32. "Region" defined as Angola, Burundi, Cameroon, Congo, CAR, DRCR, Gabon, Eq.Guinea, Rwanda and Sao Tome & Principe, with in total 3 mill km² rainforest and other tropical forest within their borders.
33. A study by the European Commission's Joint Research Centre, reporting gross deforestation in the rainforest of Central Africa as low as 0.11 percent annually. See Mayaux et al. 2013.
34. Megevand, Carole. 2013.
35. <http://www.fao.org/news/story/en/item/153735/icode/>
36. Hansen 2013
37. Megevand 2013
38. Mayaux et al. 2013
39. Ibid
40. FAO 2011
41. Megevand 2013
42. Increasing dforestation is also supported by Bayol N, et al. 2012
43. FAO 2011
44. <http://www.euflegt.efi.int/drc/>
45. Nepstad et al 2006
46. http://peat-portal.net/aemages//File/Publications/peatmap_FA_

OL_201302_A3.pdf

47. Lo, J. and F. Parish 2013.
48. <http://www.wri.org/news> “Singapore’s New Haze Pollution Law “A New Way of Doing Business” Statement - August 05, 2014 <http://www.parliament.gov.sg/sites/default/files/Transboundary%20Haze%20Pollution%20Bill%2018-2014.pdf>
49. The Indonesian government is currently developing a forest map and better forest monitoring systems.
50. A sharp reduction in deforestation in Indonesia reported from 2008 in the FAO FRA 2010 is not confirmed by other sources, and the Indonesian government themselves are using higher deforestation numbers than reported to FAO.
51. FAO FRA 2010: table 3, annual rate 2005-2010
52. Brazil 2013 : 5,843 2012 estimate (see Brazil article). Indonesia: annual average 2005-2010 is 6,850 km² (FAO FRA 2010).
53. Gaveau DLA, et al 2014
54. For more details on deforestation of natural forest in specific regions in Indonesia, see Margono 2014
55. FAO 2011; Wakker 2014; H.-J. Stibig et al 2014; FWI, GFW and WRI 2002
56. Margono 2014
57. <http://www.euflegt.efi.int/indonesia>
58. <http://www.rightsandresources.org/news/rri-coalition-supports-nation-wide-inquiry-into-abuse-of-indigenous-peoples-land-rights-in-indonesia/>
59. See Aman <http://www.aman.or.id/en/2014/08/08/indigenous-peoples-rights-and-redd/#.VAcBpdKKDuU>; CIFOR <http://www.cifor.org/library/3476/preventing-the-risks-of-corruption-in-redd-in-indonesia/>
60. J.C.Z. Woinarski
61. http://www.cifor.org/publications/pdf_files/infobrief/3443-infobrief.pdf
62. Shearman et al. 2008; J.C.Z. Woinarski 2010
63. Shearman et al. 2008.
64. http://www.cifor.org/publications/pdf_files/infobrief/3443-infobrief.pdf
65. See Rights-based rainforest protection p. 27-29, RFN 2012
66. According to FAO, approximately one third (100 290 km²) of the total forest area (317 730 km²)
67. <http://news.mongabay.com/2014/0424-morgan-myanmar-ban.html#RltsXvuVx2v5qfvt.99>
68. Gaveau DLA, et al. 2014
69. <http://news.mongabay.com/2013/1115-worlds-highest-deforestation-rate.html#sc9Z32T3hsg8TiBu.99>
70. Stigib, H-B, et al 2014
71. FAO. 2011
72. Stigib, H-B, et al 2014

4. Drivers of deforestation

1. FAO, UNEP, and UNFF 2009.
2. Gibbs, H. K., Ruesch A.S, Foley, J. A., Ramankutty, N., Achard, F and Holmgren, P. 2010.
3. Ibid.
4. FAO et al., 2009.
5. Union of Concerned Scientists 2011.
6. FAO 2008. Cited in FAO et al. 2009.
7. Union of Concerned Scientists 2011.
8. Rainforest Foundation et al. 2012.
9. RSPO 2013.
10. Rautner, M., Legget, M., Davis, F., 2013 (p.13).
11. UNEP 2011.
12. WWF 2012.
13. Bahroeny 2009.
14. World Bank 2010.
15. Wicke, Birka et al., 2008. Cited in Gingold, B., 2010.
16. http://www.rspo.org/en/who_is_rspo
17. ECORYS 2010. Cited in Regnskogfondet et al. 2012 (p. 12).
18. Morton, et al. 2006. Cited in Regnskogfondet et al. 2012 (p.12)
19. Arima et al. 2011.
20. Union of Concerned scientists 2011.
21. Barreto et al. 2012. Cited in Regnskogfondet et al. 2012.
22. Mahly Y., Roberts, J.T., Betts, R.A., Killeen T.J., Li, W., Nobre C.A. 2008. Cited in, UNEP et al. 2009 (p. 22).
23. Ibid.
24. Union of Concerned scientists 2011.
25. Megevand 2012.
26. WWF 2012.
27. Union of Concerned Scientists 2011.
28. WWF 2012.
29. Ibid.
30. INTERPOL – World Bank 2009. Cited in Nelleman, C., INTERPOL Environmental Crime programme (eds) 2012.
31. Moog, S., Spicer, A. and Böhm, S. 2014.
32. <http://www.euflegt.efi.int/vpa-countries>
33. ‘Small-scale farming’ here includes subsistence farmers and semi-subsistence farming.
34. Union of Concerned Scientists 2011 (p. 3).
35. Barber et al. 2014.
36. RAISG 2012.
37. RAISG 2012.
38. <http://www.worldcoal.org/resources/coal-statistics/>
39. RAISG 2012.
40. Little P.E 2014.
41. International Rivers 2008.
42. RAISG 2012.
43. Union of Concerned Scientists 2011.
44. <http://www.regnskog.no/en/rainforest-news/global/the-norwegian-government-pension-fund-global-gpfg-invests-130-billion-norwegian-kroner-in-rainforest-destruction>
45. http://www.regjeringen.no/en/sub/styrer-rad-utvalg/ethics_council/Recommendations/Recommendations/recommendations-on-environmental-damage.html?id=614304
46. Regnskogfondet et al. 2012.
47. <http://chainreactionresearch.com/2014/03/26/the-chain-mars-general-mills-colgate-palmolive-orkla-all-move-to-end-deforestation/>
48. UNEP and INTERPOL 2014.
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51. INTERPOL and World Bank 2009.
52. Ibid.
53. FAO 2012a
54. Hiemstra-van der Horst, G. 2011.
55. INTERPOL-World Bank 2009.
56. UNEP and INTERPOL 2012.
57. UNEP and INTERPOL 2014.
58. UNEP and INTERPOL 2012.
59. UNEP and INTERPOL 2014.
60. UNEP and INTERPOL 2012.
61. FAO 2014a.
62. UNEP and INTERPOL 2014.
63. UNEP and INTERPOL 2012.
64. UNEP and INTERPOL 2014.
65. FAO 2014b.
66. UNSC 2013.
67. Ibid.
68. UNEP and INTERPOL 2010.
69. UNEP and INTERPOL 2014.
70. Ibid.
71. UNEP and INTERPOL 2012, and 2014.
72. CITES 2014.
73. UNEP and INTERPOL 2014.
74. Ibid.
75. Ibid.

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Tables

RAISG								
	Forest extent, 2000 km ²	Forest extent, 2010 km ²	Total deforestation, 2001–2005 km ²	Annual deforestation, 2001–2005 %	Total deforestation, 2006–2010 km ²	Annual deforestation, 2006–2010 %	Total deforestation 2001–2010, km ²	Total deforestation, 2001–2010 %
AMAZON								
Bolivia	307,123	299,441	4 187	0.28	3 404	0.22	7,682	2.50
Brazil	3,111,159	2,942,085	109,462	0.70	59,612	0.38	169,074	5.40
Colombia	428,498	416,512	5,170	0.24	6,816	0.32	11,986	2.80
Ecuador	88,361	86,225	1,171	0.26	965	0.22	2,136	2.40
Guyana	140,411	137,123	1,800	0.26	1,488	0.22	3,288	2.30
French Guiana	79,916	79,414	210	0.06	293	0.08	502	0.60
Peru	700,738	685,764	7,365	0.22	7,674	0.22	14,974	2.10
Suriname	130,719	129,589	938	0.14	191	0.02	1,130	0.90
Venezuela	370,567	365,372	3,375	0.18	1,820	0.10	5,195	1.40
TOTAL	5,357,492	5,141,525	133,678	0.50	82,263	0.30	215,967	4.00

Note: For the Amazon region we use RAISG as our main source, not FAO and UMD, as we consider the RAISG numbers to be the most reliable.

Source/based on: RAISG: Amazonia 2012. Protected areas. Indigenous territories. (Available from <http://raisg.socioambiental.org/system/files/mapaAmazonia2012-deforestation%5Bing%5D.pdf>), and IMAZON 2011. Deforestation and forest degradation in the Amazon Biome (<http://www.imazon.org.br/publications/other-publications/deforestation-and-forest-degradation-in-the-amazon-biome-1>)

FAO							UMD			
	Forest extent, 2000 km ²	Forest extent, 2010 km ²	Dense humid forest, 2010 km ²	Total deforestation, 2000–2010 km ²	Annual deforestation, 2000–2010 km ²	Annual deforestation, 2000–2010 %	2000 (76–100% tree cover) km ²	Tree cover loss (76–100%) 2000–2012, km ²	Annual tree cover loss (76–100%) 2000–2012, km ²	Annual tree cover loss (76–100%) 2000–2012, %
AFRICA										
DRC	1,572,490	1,541,350	1,086,380	31,140	3,114	0.20	1,190,506	40,821	3401.8	0.29
Gabon	220,000	220,000	216,350	0	0	0.00	230,775	1,469	122.4	0.05
Congo	225,560	224,110	170,930	1,450	145	0.06	214,202	1,819	151.6	0.07
Cameroon	221,160	199,160	146,260	22,000	2,200	0.99	174,702	1,981	165.1	0.09
CAR	229,030	226,050	43,020	2,980	298	0.13	68,765	1,714	142.8	0.21
Eq. Guinea	17,430	16,260	16,220	1,170	117	0.67	24,513	349	29.1	0.12
TOTAL	2,485,670	2,426,930	1,679,160	58,740	5,874	0.24	1,903,463	48,153	4012.8	0.21

Source/based on: FAO's FRA 2010, UMD (2013)

FAO							UMD			
	Forest extent, 2000 km ²	Forest extent, 2010 km ²	Dense humid forest, 2010 km ²	Total deforestation, 2000–2010* km ²	Annual deforestation, 2000–2010* km ²	Annual deforestation, 2000–2010* %	2000 (76–100% tree cover) km ²	Tree cover loss (76–100%) 2000–2012, km ²	Annual tree cover loss (76–100%) 2000–2012, km ²	Annual tree cover loss (76–100%) 2000–2012, %
ASIA										
Cambodia	115,460	100,940	31,600	14,520	1,452	1.4	58,431	8,884	740	1.3
Indonesia	994,090	944,320	627,170	98,600	9,860	1.0	1,411,892	145,795	12,150	0.9
Laos	165,320	157,510	42,060	7,810	781	0.5	144,908	9,417	785	0.5
Malaysia	215,910	204,560	155,070	11,350	1,135	0.6	272,365	44,862	3,739	1.4
Myanmar	348,680	317,730	100,290	30,950	3,095	1.0	274,434	9,514	793	0.3
PNG	301,330	287,260	235,804	14,070	1,407	0.5	396,660	6,076	506	0.1
Philippines	71,170	76,650	38,200	–5,480	–548	–0.7	141,108	5,569	464	0.3
Thailand	190,040	189,720	23,570	320	32	0.0	110,454	6,612	551	0.5
Vietnam	117,250	137,970	37,980	–20,720	–2,072	–1.5	106,971	8,744	729	0.7

Source/based on: FAO's FRA 2010, UMD (2013)

* For Indonesia, we use Government of Indonesia (Gol) figures for deforestation 2000–2010, as they are more recent and more in line with other sources than FRA 2010. The figures were provided by Rhett Butler, Mongabay.com. As the sources differ, the trend is uncertain (see also main text). Figures for deforestation 1990–2000 and 2000–2010 are based on statistics published in 2013. For extent of forest in Indonesia, we have used FRA 2010, as this is reasonably in line with newer Gol figures (see <http://theredddesk.org/countries/indonesia> and CIFOR (2012)) 91.098 million hectares.



The tropical rainforest is a thermometer of the state of the planet. More than half of the terrestrial plant and animal species live there. It is “the main biological library of the earth.” Most of the information in this library is not even known to science. The forests also contain and store enormous amounts of carbon. The yearly destruction of the tropical forests results in emissions of more CO₂ than all cars in the world. The library burns.

This is why the state of the rainforest concerns the whole world. Norwegians and people in other non-tropical countries may choose to live as if this did not concern them – but only for a while. As expressed by King Harald of Norway “If the rainforests disappear, they will not come back. Then the world will be an altered place to live”

For the peoples who have lived in and of the rainforests for hundreds or thousands of years the destruction of the rainforest is already a matter of life or death. This publication is dedicated to them.

Rainforest Foundation Norway supports indigenous peoples and traditional populations of the world’s rainforests in their efforts to protect their environment and secure their customary land rights. RFN was established in 1989, and today we work with local environmental, indigenous and human rights organisations in 11 rainforest countries in the Amazon region, Central Africa, Southeast Asia, and Oceania. RFN is an independent foundation, and part of the international Rainforest Foundation network, with sister organisations in the United Kingdom and the USA.

GRID-Arendal aims to create environmental knowledge enabling positive change. This is achieved by organizing and transforming available environmental data into credible, science-based information products, delivered through innovative communication tools and capacity-building services targeting relevant stakeholders. GRID-Arendal also collaborates with the United Nations Environment Programme (UNEP), supporting informed decision making and awareness-raising through: Environmental information management and assessment; Capacity building services; and Outreach and communication tools, methodologies and products.

For enquiries, contact:
Rainforest Foundation Norway
Mariboegate 8, 0183 Oslo
Tel. (+47) 23 10 95 00
rainforest@rainforest.no
www.rainforest.no

