



for a living planet

Borneo: Treasure Island at Risk

*Status of Forest, Wildlife and related Threats on the
Island of Borneo*



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Preface

The forests of Borneo are rapidly disappearing: A man-made disaster. A few decades ago the third largest island on our planet was still covered by a vast green carpet of lush rainforest. These forests are invaluable because of the diversity of unique plants and animals they harbour: Majestic species such as orang-utans, elephants and rhinos, to name but a few. Equally important: They are of critical value to people, both as a prized natural heritage and for the goods and services that they provide.

Today satellite images reveal that these forests have become a patchwork in many lowland areas and that some of the most biologically diverse formations, like the lowland rainforests, may become extinct within the next decade in the Indonesian part of the island. However, despite this situation, Borneo is the only place left where the Indo-Malayan forests of Southeast Asia could be conserved on a large scale, to maintain their ecological functions and retain the value they have for people. Vast stretches of forest can still be found in the mountainous interior of the island.

This report aims to give a comprehensive picture of the status of Borneo's forests and provides key information on one of the most prominent mammal species, the orang-utan. The report also analyses the most significant threats to Borneo's forests and wildlife and provides an outlook on what might happen if forest loss cannot be stopped. It contains a short description of the peoples of Borneo and reveals how important forests are for the rich cultural and social heritage of the island.

While working on this report, we felt more than ever that there is not much time left to save what remains. We hope that this report will motivate others, notably government and industrial stakeholders, to act while the window of opportunity is still open.

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Summary and Key Findings

Borneo, the third largest island on the planet, has until recent decades been a place that has experienced little of the environmental impact that often comes with human resource extraction. Borneo used to be covered nearly completely in forests and inhabited by species in an abundance and diversity very few places in the world could match. Even today there are up to 15,000 different flowering plants in Borneo. The island is also home to a large number of special animal species such as orang-utans, gibbons, clouded leopards, “pygmy” elephants and hornbills. Of more than 210 mammal species, 44 are endemic to Borneo. Between 1994 and 2004 at least 361 new species were discovered and new ones are constantly being found.

Humans may have arrived in Borneo more than 45,000 years ago and for tens of thousands of years they lived as hunter-gatherers before taking up swidden agriculture. During the vast majority of the time humans inhabited the island, they lived sustainably from what nature provided. The diverse indigenous people, known in Kalimantan as the Dayak lived in hundreds of tribes across the island. Over 140 languages are still spoken in Kalimantan alone while Sabah has over 50 languages and dialects, and Sarawak over 30.

Today Borneo’s nature is in crisis. Its rainforests are disappearing rapidly and illegal trade in wildlife is still a widely spread practice. The forests are used to feed the world’s hunger for timber and other non-timber products, while the land is used to feed the need for vegetable oils, and both forests and land make way for human settlement.

Despite its ecological importance, Borneo - its territory shared by Malaysia, Indonesia and Brunei - is often overlooked when the impact deforestation on ecosystems is considered. Yet it is one of the world’s areas with the highest deforestation rates. The main factors causing this rapid destruction of the forests are: large-scale conversion to plantations, illegal logging, and forest fires. Unlike in many other poorly developed regions, the rural population with its demand for agricultural land and other resources is not the main factor.

But having three national and six major provincial governments involved in land management results in

just as many differences as regards the assessment of environmental impacts.

Rights over land and forests in Kalimantan are yet to be resolved, and in many areas these two basic resources are in practice “open-access” with no legally valid owner; in these circumstances, forest loss can be effectively monitored only by remote sensing. In Malaysia, government administration of land is done mainly by ownership (which is normally very specific and clear) rather than by land cover, and despite the promotion of digital information & communication technology by the government, Malaysia issues land cover data primarily in out-of-date numerical tables, while keeping land cover maps confidential.

Ecosystems do not stop at border crossings and administrative boundaries. Being part of three countries with their own regulations, Borneo’s ecosystems are regarded differently in each nation. But it has become clear that the diversity of flora and fauna cannot be sustained if forests are divided into patchwork regions. Conservation requires the maintenance of very large areas of inter-connected forests. Otherwise thousands of species become extinct. In few places has this become as obvious as on Borneo.

About half of its natural forests have been lost and losses continue at a worrying pace. Never before has it been so urgent to protect what remains.

While deforested land can be restored, species that depend on the diversity of old-growth forests for food and as their habitat cannot be replaced. In order to protect what is remaining and to use forest products in a sustainable way, providing a livelihood for the people living in the area, a new approach needs to be developed urgently.

The answer could be what has been named the *Heart of Borneo*, a cross-boundary area encompassing more than 20 million ha, a quarter of the island’s landmass. The initiative is designed to not only protect large areas of forests but to also provide water and food security as well as to support the cultural survival for the people of central Borneo. It is hoped that the adoption of this initiative by all stakeholders will save the island from the ultimate threat of deforestation and increased impacts from droughts and fires.

- In the mid 1980s the forest cover of Borneo was still at 75%. In 2005 only 50% of Borneo remained under forest cover. Between 1985 and 2005 Borneo lost an average of 850,000 ha of forest every year. If this trend continues, forest cover will drop to less than a third by 2020.
- The rate of deforestation in Kalimantan (the Indonesian part of Borneo) is increasing. Between 2000 and 2002 deforestation rose to 1.2 million ha a year. Together with the forest loss in Sabah and Sarawak (the Malaysian part of Borneo) this would amount to a total forest loss of 1.3 million ha a year. This is the equivalent of 148 ha every hour, 2.5 ha a minute.
- In 2001 the World Bank predicted that all lowland rainforests in Kalimantan (except for peat swamp forests) would disappear by 2010. Current available data and satellite imagery done for this report support the prediction of the World Bank, assuming that the deforestation rate observed for 2000 – 2002 continues unabated. In this case, the disappearance of lowland rainforests can be expected in the year 2012. Calculating with a more conservative long-term average figure (1985 – 2002) for forest loss in Kalimantan, the lowland forest may exist until 2018. The lowland dipterocarp rainforests are the biologically most diverse habitat on Borneo.
- It can be estimated that currently 55,000 orang-utans remain in numerous subpopulations on Borneo. Recent monitoring in Sabah shows that orang-utans are able to adapt to significant changes in their habitat, as over 60% of the Sabah subpopulations occur in commercial forest reserves outside protected areas. A projection of forest loss combined with remaining orang-utan habitats reveals that by 2020 abundance may be limited to only a few completely separated populations. These remaining populations will be too small and fragmented to ensure the long-term survival of the species.
- While nearly 7% of Borneo's land is in National and State Parks, illegal logging in these parks is still frequent in Kalimantan. In 14 out of 18 surveyed concessions, loggers illegally expanded their operations into protected areas in 2001
- East Kalimantan alone is believed to lose over € 75.5 million a year in business tax revenue due to illegal logging and illegal timber processing. Malaysian Borneo is frequently used as a trade route for illegal timber from Indonesian Borneo.
- The conversion of forest to oil palm plantations can be considered one of the biggest threats to the remaining forests on Borneo. In Malaysian Borneo, the average annual growth rate of oil palm areas was nearly 8% between 1998 and 2003 and over 1.6 million ha of oil palms now exist in Sabah and Sarawak. In Kalimantan the area used by palm plantations grew by 11.5 % to nearly a million ha in 2003.
- During the forest fires of 1997/98 over 6.5 million ha - an area twice the size of Belgium - were affected in Kalimantan. The smoke covered an area of 2,000 by 4,000 kilometres. The vast majority of land destroyed was in lowland forests and agricultural areas. Hundreds if not thousands of orang-utans were killed during the disaster. While an unusually strong El-Nino effect in that year also played a role, the fires were mostly man-made. During this period the fires on Borneo contributed significantly to global carbon emissions.

1. An Introduction to Borneo

1.1 Overview

“Hundreds of different species are native to Borneo, among them some of the most fancifully shaped and exuberantly tinted of all their strange, magnificent tribe.

Nowhere on earth is natural vegetation more lavish.”

Malcolm MacDonald, 1956¹

The third largest island in the world after Greenland and New Guinea, Borneo is situated in the equatorial region of the Pacific Ocean. It is ringed by the islands of Sumatra to the west, Java to the south, Sulawesi to the east and the Philippines to the north. With a landmass of nearly 740,000 square kilometres – more than twice the size of Germany - Borneo is sparsely populated by humans, but at the same time it is host to some of the most surprising and most diverse ecosystems on this planet.

Borneo’s territory is divided amongst three nations: In the north-west the independent sultanate of Brunei Darussalam (usually abbreviated as Brunei) covers less than 6,000 square kilometres (about twice the size of Luxembourg). Brunei itself is divided in half by Malaysia’s largest state, Sarawak (covering 124,500 square kilometres), which is located along the northwest coast of the island. Sabah is the second Malaysian state (72,000 square kilometres) and covers the north-eastern tip of Borneo. However, the largest part of Borneo with more than 500,000 square km² belongs to Indonesia and is called Kalimantan. Kalimantan is divided into the four administrative provinces of East Kalimantan (Kalimantan Timur), South Kalimantan (Kalimantan Selatan), Central Kalimantan (Kalimantan Tengah) and West Kalimantan (Kalimantan Barat). The Indonesian part of Borneo is more than twice as large as Malaysia’s territory and nearly one hundred times the area of Brunei. The provinces of Kalimantan cover just over 28% of Indonesia.

See map section, “District Boundaries of Borneo”, pp. 26-27

With over half of the landmass situated below 150m in altitude, Borneo seems surprisingly flat. Yet there are also significant mountain ranges, which run along the centre of the island on a northeast-southwest axis.

However, most of Borneo’s mountain peaks do not exceed 2000m in altitude. The central mountain range is made up of the Iran Mountains and the Müller Mountains from which several spurs reach out to the west (Kapuas Hulu Range, Hose Mountains) the south (Schwaner Mountains) and to the east (Meratus Mountains). With 4,101 meters, Mount Kinabalu in Sabah is the highest peak, not only in Borneo but in all of Southeast Asia.

A network of large rivers constitutes the main routes for communication and transport. The three longest rivers in Indonesia are located on Borneo: the Kapuas (1,143 km), which is roughly as long as the Rhine, flows to the west coast, the Barito (900 km) flows south and the Mahakam (775 km) whose estuary is on the east coast.

With most human settlements concentrated on the rivers and coastlines (most of the lowlands are poorly drained and swampy), detailed, reliable maps and topographical data for Borneo are still hard to come by.

While the origins of Borneo’s geology are still being debated, it seems clear that the area surfaced from the ocean 15 to 20 million years ago when tectonic movements resulted in the creation of Borneo’s mountains. There is evidence that Borneo’s climate used to be much more seasonal than it is today and the lower sea levels of the past allowed for the migration of plants, animals and humans from places further north such as Thailand. It is assumed that about two million years ago the sea levels were so low that all the major islands of the region (Java, Borneo, Sumatra, Bali and Palawan) were connected by land tongues. At that time the climate is believed to have been cooler than it is today, but still significantly more stable than it was in other places of the world. Therefore only 11 of the 200

¹ Malcolm MacDonald: *Borneo People*; 1956, Jonathan Cape London

large mammal extinctions worldwide in the Pleistocene occurred in South East Asia.² Archaeological excavations at Niah - a huge cave with a floor area of almost 10 ha in the northern part of Sarawak- showed that only one species (the giant pangolin, that lived in the area 32,000 years ago) is now extinct (though this does not include the extirpation of species by human activities such as hunting and deforestation).³

Today's climate in Borneo is, governed by the proximity to the equator, moist and tropical with a temperature ranging from 25°C and 35°C in the

lowland areas. Borneo has two monsoons: the “dry” monsoon (May-October) and the “wet” monsoon (November –April). All of Borneo lies within what is called the ever wet zone that has at least 60mm of rainfall every month.

In fact, there are very few months in Borneo with less than 200 mm of rainfall. Gunung Mulu National Park has as much as 7,000 mm of rain in a year. By comparison, Germany averages about 790 mm per annum.

Figure 1: Administrative map of Borneo © WWF Germany



² Lord Medway: *Phenology of Tropical Rainforest in Malaya*; Biol. J. Linn. Soc 4:117-146, 1972

³ MacKinnon K., Hatta G., Halim H. and Mangalik A.: *The Ecology of Kalimantan*; Oxford University Press, 1997

1.2 A land of plenty

1.2.1 Flora

Borneo's flora is amongst the most diverse and plentiful to be found anywhere. The reason for this is the island's unique geological and climatic history that encouraged the development of such incredible diversity. Thousands of plants, many of them unique, are to be found in Borneo's forests:

There are up to 15,000 different flowering plants in Borneo.⁴ There are also more than 3,000 species of trees, including 267 species of dipterocarps (large rainforest trees that produce valuable timber and resins) which are considered the most valuable group of commercial timber species in the region. Of these 155 are endemic to Borneo. In comparison Germany is home to only 66 species of trees, six of which are endemic.⁵

Most plant species in Borneo can be found in forest habitats. There are mangrove, peat swamp and freshwater swamp forests, lowland dipterocarp forests, ironwood forests and hill dipterocarp forests. Borneo is also home to the largest heath forests in Southeast Asia.

But the forests of Southeast Asia and especially Borneo are disappearing fast. Between 1985 and 1997 some 20 million ha of forest was destroyed in Indonesia (about 1.5 million ha per year, more than half the area of Germany), most of it lowland forest below 300m where more than 60% of all rainforest species occur.⁶ In the mid 1980s Borneo's forests still covered 71% of the island. This number dropped to a mere 54% by 2000.⁷

In Kalimantan especially the situation is dire. While in 1985 nearly 40 million ha were still forested (75% of the total land mass), by 2002 this number had dropped

to less than 27 million ha, just over half of the landmass.⁸

The World Bank predicts that by 2010 all lowland forests in Kalimantan, outside protected areas, will have disappeared.⁹

Mangroves

In the shallow area where land and sea meet, one finds the very unique ecosystem of mangrove forests. True mangroves have a number of features that help them thrive in this boundary zone including adaptations for mechanical fixation in loose soil, breathing roots and air exchange devices, as well as specialized mechanisms for dealing with excess salt concentrations. Mangroves are the only true viviparous plants, meaning that the seed remains attached to the parent plant and germinates into a protruding embryo (propagule) before falling from the tree.¹⁰ Mangrove forests exist in approximately 117 countries, covering an area of 19 to 24 million ha. They have the highest level of productivity among natural ecosystems, and provide several vital ecosystem functions. The continued exploitation of mangroves worldwide has led to habitat loss, changes in species composition, loss of biodiversity and shifts in dominance and survival capability. Mangrove forests once covered three-fourths of the coastlines of tropical and subtropical countries, but today less than 50% of that remains, and half of the remaining forests are degraded. At the same time, there is still a lack of scientific knowledge concerning the function and characteristics of mangroves.¹¹

⁴ MacKinnon K., Hatta G., Halim H. and Mangalik A.: *The Ecology of Kalimantan*; Oxford University Press, 1997

⁵ European Forest Institute: *Forest Resource of Germany* <http://www.efi.fi/fine/resources/germany3.html> accessed April 28, 2005

⁶ The World Bank: *Indonesia: Environment and Natural Resource Management in a Time of Transition*, February 2001

⁷ Stibig H.J. and Malingreau J.P.: *Forest Cover of Insular Southeast Asia Mapped from Recent Satellite Images of Coarse Spatial Resolution*; *Ambio* Vol. 32 No 7, Nov. 2003, Royal Swedish Academy of Sciences, 2003

⁸ Holmes, D.A.: *Indonesia - Where have all the forests gone?* Environment and Social Development East Asia and Pacific Region. World Bank Discussion Paper. Written 2000, published June 2002 and Fuller D.O., Jessup T.C and Salim, A.: *Loss of Forest Cover in Kalimantan, Indonesia, since the 1997-1998 El Niño*. *Conservation Biology*, pp.249-254 Volume 18, No1, February 2004

⁹ The World Bank: *Indonesia: Environment and Natural Resource Management in a Time of Transition*, February 2001

¹⁰ Rey J.R. and C. Rutledge R.: *Mangroves*; University of Florida, Institute of Food and Agricultural Sciences, undated

¹¹ Upadhyay* V.P., Ranjan R. and Singh J.S.: *Human-Mangrove Conflicts: The Way Out*, *Current Science*, Vol. 83, No. 11, 10 December 2002

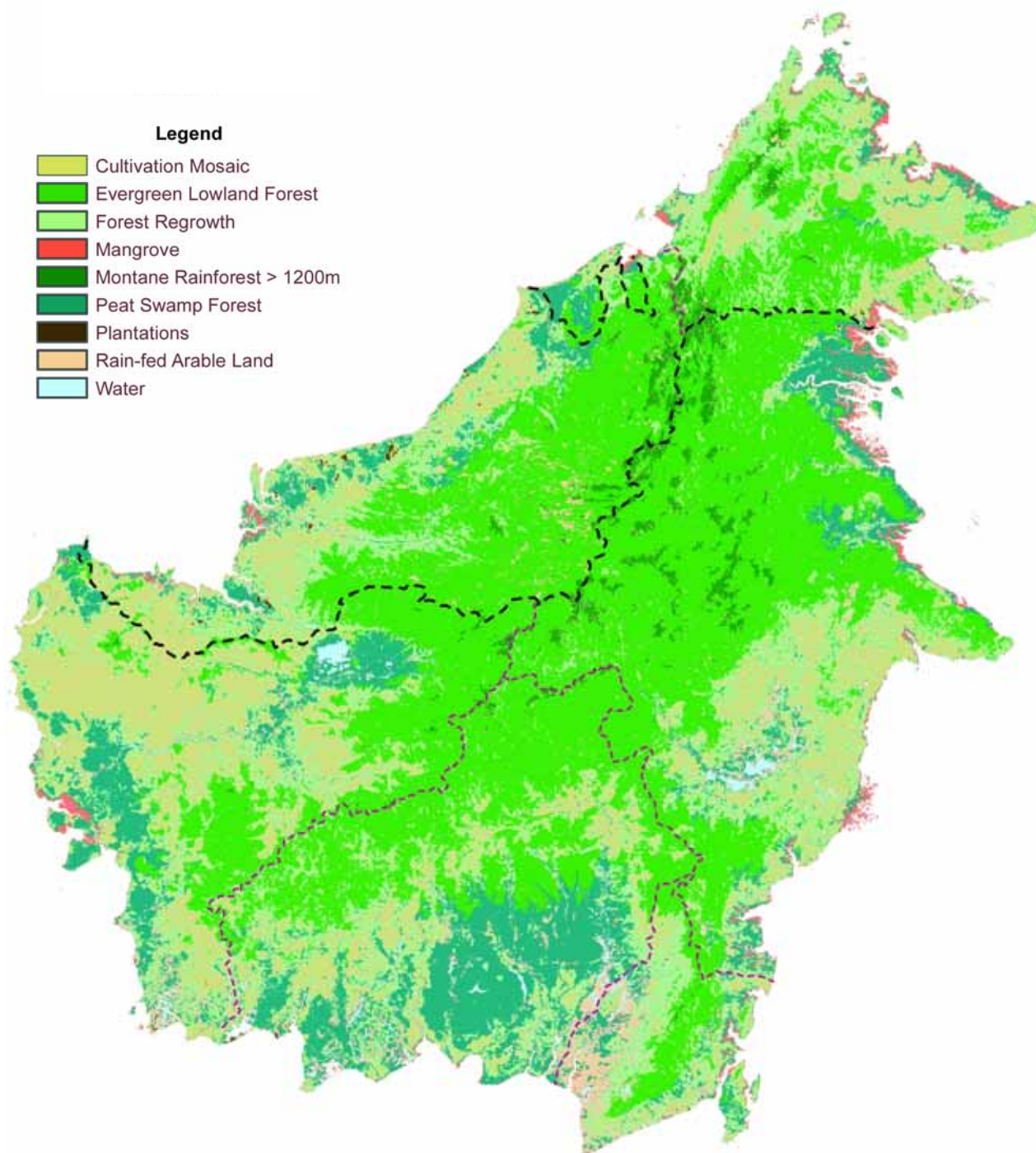


Figure 2: Major vegetation types of Borneo

Source: Langner A. and Siegert F.: *Assessment of Rainforest Ecosystems in Borneo using MODIS satellite imagery*. Remote Sensing Solutions GmbH & GeoBio Center of Ludwig-Maximilians-University Munich, in preparation, June 2005. Based on 57 single MODIS images dating from 11.2001 to 10.2002 with a spatial resolution of 250 m

Borneo mangrove forests are found mostly on river deltas and along most of Borneo's coastline. It is thought, that originally there were 1,580,000 ha of mangrove forests in Kalimantan alone. Human activities such as logging threaten the mangroves to the point of extinction. In 1980 it was estimated that 95% of Kalimantan's mangroves were allocated for timber

concessions while less than 1% was protected in reserves.¹² It was estimated, that one third of the total area of mangroves in Kalimantan, or 1.3 million ha,

¹² MacKinnon K., Hatta G., Halim H. and Mangalik A.: *The Ecology of Kalimantan*; Oxford University Press, 1997

had been cleared by 1993.¹³ In 2002 just over 1.2 million ha of mangrove forests could still be found in Borneo.

The distinctiveness of mangroves derives not only from their uniqueness in being able to survive in such a radical environment but also from the vast range of sustainable products inherent in them. Mangroves have traditionally provided fuel wood and food products for families, charcoal for local use; tannin was extracted from the bark for use in the leather industry. They also provided fishing equipment such as poles for traps, fishing floats, and fuel for smoking fish. There are household products that can be made from mangroves such as glue, hairdressing oil, toys, incense and mosquito repellent. Sugar, alcohol, cooking oil, vinegar, tea substitute, fruit, leaves and paper have all been traditionally made from mangroves. However, with the emergence of large-scale logging, the multiple sustainable uses of mangroves have largely been reduced to wood production.

Peat Swamp Forests

Mangroves are not the only wetland areas of immense value to the biodiversity of Borneo and threatened by excessive human activities. Freshwater swamp forests and peat swamp forests are similarly found close to the coastlines, but unlike mangroves they also occur on the shores of lakes. There are large areas of these forests around the Mahakam Lakes and the Kapuas Lakes, hundreds of kilometres inland from the mangroves of the coast. Freshwater swamp forests receive a lot of minerals from river floodwaters, while peat swamp forests are rain-fed and receive less organic materials and nutrients. Therefore peat swamp forests are less rich in species, although these forests would still be considered very diverse and rich in most other places of the world. Despite their importance for many rare plants and animals such as orang-utans and proboscis monkeys, few of these forests have been protected. Peat swamp forests in Borneo can be prone to forest fires when the upper layer of the peat dries out and starts to smoulder. Such fires produce high emissions of particulate matter, CO, and other compounds of incomplete combustion, which makes them particularly hazardous for the respiratory system. These fires can

¹³ The World Bank: *Indonesia: Environment and Natural Resource Management in a Time of Transition*, February 2001

persist for several months and cause the typical haze often seen in dry seasons.

As with mangroves, commercial interests clash with the natural environment in this ecosystem. Especially Ramin, a light timber found in peat swamp forests and used for billiard cues, window blinds, furniture, picture frames and tool handles attracts logging companies. In April 2001 the government of Indonesia declared a moratorium on the logging and export of Ramin which was recently listed in Appendix II of the CITES convention (the Convention on International Trade in Endangered Species of Wild Fauna and Flora) thereby regulating the trade in this material (international trade in specimens of Appendix-II species may be authorized by export permit or re-export certificate; unlike Appendix I no import permit is necessary). Nevertheless Ramin is still being logged and smuggled to Malaysia where no such moratoria exist.¹⁴

By 1981 only 2.5% of peat swamp forests and 5.4% of freshwater swamp forests were protected in Borneo.¹⁵ In Malaysia, peat swamp forest is the most important wetland type, both in terms of area and biodiversity. Peat land accounts for approximately 75% of the total wetland area, covering about 1.45 million ha, more than 80 per cent of which is located in the East Malaysian state of Sarawak. Sarawak's estimated 1.24 million ha cover 13% of the state's total land area. In the other East Malaysian state of Sabah, remaining peat swamp forest areas are relatively small, although biologically significant. In Brunei there are extensive peat lands but a lot of the marginal, mixed swamp forest has been damaged. Interior forest types (including the *Shorea albida* forests, a species of dipterocarp known locally as "Alan") still remain in good condition. Indonesia's Kalimantan also has extensive peat lands, but vegetation data is patchy. In West Kalimantan, the information on swamps largely focuses on freshwater wetlands rather than peat-forming wetlands, although both the Danau Sentarum and Gunung Palung wetlands do contain areas of peat swamp forests.¹⁶

¹⁴ Environmental Investigation Agency 2004, *Profiting from Plunder: How Malaysia Smuggles Endangered Wood*, <http://www.eia-international.org/cgi/reports/report-files/media67-1.pdf>

¹⁵ MacKinnon, J and MacKinnon K: *Review of the Protected Areas System in the Indo-Malaysian Realm* 1986, IUCN

¹⁶ Page S.: *Biodiversity Information On Peat Swamp Forest In S.E. Asia, STRAPEAT status report: Strategies for*

Freshwater swamp forests are much more diverse than peat swamp forests. In Kalimantan this kind of forest used to comprise about 7% of the natural vegetation cover of the land.¹⁷ In the late 1980s it was believed that less than 2% of Kalimantan was still covered by freshwater swamp forest.¹⁸ In 2002 there were close to ten million ha of peat swamp forests left in all of Borneo.¹⁹

Dipterocarp Forests

Moving inland from the swampy coastal area one soon finds oneself in the most astounding of ecosystems on Borneo, in the Dipterocarp Forests.

But, as is often the case, the most ecologically important ecosystem is also the most commercially attractive. This is also the case with the lowland rainforests of Borneo. These forests are also called lowland dipterocarp forests, named after the family of plants to which most of the large trees in these forests belong.

In the richest formations 10% of all trees and 80% of all emergents are dipterocarps.²⁰

These forests once covered most of Borneo and despite logging, fires and conversion to plantations they are still most widespread on the island. To thrive they require well-drained land. They commonly exist up to an altitude of 1,000 meters above sea level (asl).

The dipterocarp forests are the most luxuriant and diverse of all plant communities on Borneo. Usually two-thirds or more of the upper-canopy trees are of species, which individually do not comprise more than one percent of the total number. Tropical lowland rainforest has the greatest number of species of any rainforest formation globally. This is partly due to the

very large number of species of trees of all sizes, but also due to the extreme wealth of the other life forms.²¹

At least three-quarters, if not more, of the forests of Southeast Asia are dipterocarp forests. In Malaysia, for example, dipterocarp forests form about 85% of the forested areas.

These trees often exceed 45 meters in height and are the most valuable source of timber on Borneo. Today lowland forests are fragmented and few large tracts of intact forest survived. The largest can be found in the protected areas of Gunung Palung Nature Reserve (West Kalimantan), Kutai National Park (East Kalimantan), Niah National Park (Sarawak) and the Danum Valley Conservation Area (Sabah). One of the most common tree species to be found in lowland rainforests is the Borneo ironwood or Belian (*Eusyderoxylon zwageri*). Because of its characteristics (being very durable and dense) and not needing treatment, this timber is in high demand for bridges, roof tiles and pillars for houses. Above 500 meters in altitude these forests are home to the parasitic *Rafflesia* plant, which is known to produce the world's largest flower, which can grow up to one meter in diameter.²²

Dipterocarp forests are old by any standards. Fossil pollen from dipterocarps in Sarawak have been dated back 30 million years.²³ Researchers also revealed the incredible diversity of trees in the rainforest when they discovered 240 different plant species growing within one ha.²⁴ A remarkable feature of the dipterocarp family is that its plants flower so rarely and irregularly. Flowering only occurs at intervals of 5 to 9 years, sometimes even longer. It is believed that flowering is triggered by a period of drought after a non-flowering year. Suddenly an enormous mass of flowers appears on every member of one species, closely followed by the trees of another species. Usually, wide-spread fruit growth follows in turn. The *tengkawan* or *illipe* nuts are obtained from some Borneo *Shorea* species, which grow along streams. The nuts are collected by local

implementing sustainable management of peatlands in Borneo, 2002

¹⁷ MacKinnon J. and Artha M.B.: *National conservation plan for Indonesia; Vol 5*, FAO, Bogor, 1981

¹⁸ Regional Physical Planning Programme for Transmigration, Directorate Bina Program, Indonesia 1985, 1987, 1988

¹⁹ Langner A. and Siegert F.: *Assessment of Rainforest Ecosystems in Borneo using MODIS satellite imagery*. Remote Sensing Solutions GmbH & GeoBio Center of Ludwig-Maximilians-University Munich, in preparation, June 2005

²⁰ MacKinnon K., Hatta G., Halim H. and Mangalik A.: *The Ecology of Kalimantan*; Oxford University Press, 1997

²¹ T.C Whitmore *Tropical rain forests of the Far East*; Oxford University Press, Oxford, 1985 (2nd edition)

²² Payne J., Cubitt G., Lau D. and Langub J.: *This is Borneo*; New Holland, 2001

²³ Muller, J.: *Palynological Study of Holocene Peat in Sarawak*; 1970; Proceedings of the symposium on humid tropics vegetation, UNESCO

²⁴ MacKinnon K., Hatta G., Halim H. and Mangalik A.: *The Ecology of Kalimantan*; Oxford University Press, 1997

people and can fetch high prices since the fat of the nuts is ideal for the manufacture of soap and candles.²⁵

Dipterocarps can reach up to 60 metres in height, and it is this height combined with their low weight that makes many species of this family commercially attractive. In 1986 it was believed that only 69% of the original lowland dipterocarp forest cover remained on all of Borneo, with only around 3% being protected at the time.²⁶ In 2002 nearly 30 million ha of lowland dipterocarp forest remained in Borneo.²⁷



Figure 3: Segama Forest Reserve, Sabah © WWF / S. J. Yorath

²⁵ Mariu Jacobs *The Tropical Rainforest*; Springer Verlag, Heidelberg, 1988

²⁶ MacKinnon, J and MacKinnon K: *Review of the Protected Areas System in the Indo-Malaysian Realm* 1986, IUCN

²⁷ Langner A. and Siegert F.: *Assessment of Rainforest Ecosystems in Borneo using MODIS satellite imagery*. Remote Sensing Solutions GmbH & GeoBio Center of Ludwig-Maximilians-University Munich, in preparation, June 2005

Montane Forests

When one moves higher up the mountains, the plant and animal life changes. Emerging at roughly 900 to 1,000 meters, these are Borneo's montane forests, sometimes growing at an altitude of up to 3,300 meters. They usually have a much lower canopy height (less than ten meters on upper montane forests, which are sometimes referred to as elfin forests) and dipterocarp species are replaced with trees belonging to the beech family, which also comprises the temperate genera of chestnut and oak. There is also a decrease in biomass and the leaves of the trees are much smaller. The mountains where these forests occur are often covered in cloud and thick moss is frequently found on trees and rocks. The fauna is also different on these mountains, where there is often a lack of shelter and food as well as a more challenging climate. Fewer species of plants and animals are found in the montane forests, compared to the lowland rainforests that surround them. However, these high altitude islands in a sea of lowland dipterocarp forests have produced a unique and rich set of species, derived from both Asian and Australasian families, making them one of the most diverse montane habitats on Earth.²⁸

In 2002 of the original 2,270,000 ha of montane forests²⁹ 1.6 million ha remained, corresponding to 70% of the original size.³⁰

Heath Forests

Heath forest is the most distinctive and easily recognisable of all lowland rainforest formations. In Borneo this forest is commonly known as *kerangas* after the Iban term for land that will not grow rice. These forests can be found along the coastal areas as well as further inland where they grow predominantly on sandstone plateau.³¹

²⁸ WWF Ecoregion Profiles: Borneo Montane Rainforests http://www.worldwildlife.org/wildworld/profiles/terrestrial/im/im0103_full.html , accessed 15 April 2005

²⁹ MacKinnon, J and MacKinnon K: *Review of the Protected Areas System in the Indo-Malaysian Realm* 1986 IUCN

³⁰ Langner A. and Siegert F.: *Assessment of Rainforest Ecosystems in Borneo using MODIS satellite imagery*.; Remote Sensing Solutions GmbH & GeoBio Center of Ludwig-Maximilians-University Munich, in preparation, June 2005 and MacKinnon J., MacKinnon K.: *Review of the Protected Areas System in the Indo-Malaysian Realm*, IUCN, 1986

³¹ MacKinnon K., Hatta G., Halim H. and Mangalik A.: *The Ecology of Kalimantan*; Oxford University Press, 1997

Until recently it was believed that heath forest soils were less fertile than others and that extreme nutrient shortage was the reason why many heath forest plants have small, very leathery leaves. The correlation between this physiognomic feature, crop failure and nutrient shortage seemed so obvious that no one collected data on soil nutrients. Only in 1958 were soil samples collected and analysed which showed that the soil in heath forests was not much poorer in nutrients than soil from other lowland rainforests.³²

They are, however, inherently poor in bases, highly acidic, commonly coarsely textured and free draining and are often described as white sand soils. It is believed that toxic phenols - abundant in the soil through plant leaves and litter - could be responsible for inhibiting the uptake of nutrients. Once heath forest is felled and burned, the soil very quickly degenerates. As a result the surface humus layer erodes, burns or oxidises. This results in the small amount of clay in the soil being washed away to leave almost pure silica sand to which nutrients cannot attach.³³

Heath forests have distinct structural and vegetation characteristics, with trees generally much smaller than those occurring in mixed rainforests. Heath forests have a low, uniform single-layered canopy formed by the crowns of large saplings and small poles. In Bako National Park in Sarawak canopies as low as 4.5-9 meters have been recorded.

In general, heath forests are poorer in species than other lowland forests, though far less diverse than temperate forests. In a one-ha research plot, 123 tree species were recorded compared to 214 in a neighbouring lot of dipterocarp forest.

The ground flora in heath forests is sparse, though inhabited by some remarkable plants such as the insectivorous pitcher plants *Nepenthes*, sundews *Drosera*, and bladderworts *Utricularia*. These plants obtain their nutrients from insects through a carnivorous habit that was probably developed in response to the scarcity of available nitrogen.³⁴

The plant genera *Hydnophytum* and *Myrmecodia* are well known for their swollen, tube-like organs, which

³² Whitmore T.C.: *An Introduction to Tropical Rainforest*; Oxford University Press, 1990

³³ Whitmore T.C.: *An Introduction to Tropical Rainforest*; Oxford University Press, 1990

³⁴ MacKinnon K., Hatta G., Halim H. and Mangalik A.: *The Ecology of Kalimantan*; Oxford University Press, 1997

are inhabited by ants. The ant colonies live in special chambers and pack their tunnels with their waste material, therefore supplying nutrients to the tree.³⁵

Fewer plant species means less food and therefore heath forests are also less rich in animal species. In Sarawak heath forests there are no turtles, less than half the number of frog species, lizards and snakes to be found in dipterocarp forests. There are also fewer endemic species.³⁶

The original area of Borneo that was covered with heath forests is estimated at 6,688,200 ha and in 1986 only 48% of that was still intact.³⁷ Since then, its area has continued to shrink and today it is estimated that the heath forests of Kalimantan may disappear entirely by 2010, because forests rarely recover after clearing and the fire risk in the residual acid scrub is extremely high. Thus, within a decade or so, most of the remaining forests in Kalimantan will be confined to the hills and mountains.³⁸

1.2.2 Fauna

Just like the flora of the island, Borneo's rich animal life reflects the geological and climatic history of the area. However in relation to its size, Borneo's fauna is less diverse than on the neighbouring smaller island of Sumatra, largely because Borneo is situated further away from mainland Asia. Nevertheless Borneo has a higher number of endemic mammals (44) than its neighbour. Germany for example does not have a single endemic mammal. Between 1994 and 2004 at least 361 new species have been found on Borneo. Apart from 50 plant species there were 260 insects, 30 freshwater fish, 7 frogs, 6 lizards, 5 crabs, 2 snakes and a hitherto unknown species of toad. This is almost certainly a conservative estimate, since many new species have not yet been publicised in the scientific literature or press. In addition, whole groups of animals remain scarcely studied, including bats (which make up 40-50% of

³⁵ MacKinnon K., Hatta G., Halim H. and Mangalik A.: *The Ecology of Kalimantan*; Oxford University Press, 1997

³⁶ MacKinnon K., Hatta G., Halim H. and Mangalik A.: *The Ecology of Kalimantan*; Oxford University Press, 1997

³⁷ MacKinnon K., Hatta G., Halim H. and Mangalik A.: *The Ecology of Kalimantan*; Oxford University Press

³⁸ The World Bank: *Indonesia: Environment and Natural Resource Management in a Time of Transition*, February 2001

tropical mammal fauna) and other small mammal groups, which are particularly difficult to survey due to nocturnal habits and cryptic (i.e. predator-avoiding) behaviour. Each scientific expedition generates new discoveries or re-discoveries of species and sub-species (this is particularly true of Borneo's freshwater fish and amphibians).³⁹ In addition there are at least 37 endemic birds on the island. A symbol for Borneo are the hornbills. Hornbills are remarkable because of their large beaks, that often have a helmet or horn shaped growth on them, and because of their nesting habits. Males seal the females in tree holes during the nesting period. Eight species are found on Borneo, among them the helmeted hornbill (*Rhinoplax vigil*), one of the few birds with a solid casque. Another species, the rhinoceros hornbill (*Buceros rhinoceros*), is the symbol of Sarawak.

There are 13 different primates on Borneo as well as several large mammals such as the banteng (*Bos javanicus*, a species of wild cattle), Sumatran rhinoceros (*Dicerorhinus sumatrensis*) and the Asian elephant (*Elephas maximus*). While Borneo also has its share of carnivores and omnivores such as the clouded leopard (*Neofelis nebulosa*) and the sun bear (*Helarctos malayanus*), most of the endemic mammals are bats and rodents, which play an important role in the island's ecology by being predators and by dispersing seeds throughout the forests.

Orang-utan

See map section, "Orang-utan Distribution over time 1930, 1990, 2004", pp. 10-11.

The orang-utan (translates as "the man of the forest") has today become a symbol for many of the problems connected to deforestation on the island of Borneo and is without doubt one of the most endangered species in the Borneo rainforests.

Orang-utans are an integral part of the forest habitats in which they live. A large proportion of the orang-utan's diet is fruit, ranging from large, hard-shelled varieties containing big seeds such as wild durians, to small, soft-fleshed fruits with small seeds, such as figs. By eating fruits and excreting or spitting out the seeds,

³⁹ WWF: *Borneo's Lost World: Newly Discovered Species on Borneo*; written by Pio D. and D'Cruz R. (ed) for WWF, April 2005

orang-utans help to spread various plant species. In addition, studies have indicated that the passage of seeds through the gut of the orang-utan may facilitate germination in some species. Insects are a good source of protein for the apes, particularly for pregnant females, and when orang-utans harvest caterpillar blooms they play a role in controlling the spread of insects which damage the young leaves of forest trees. Orang-utans help to maintain the equilibrium of the rain forest ecosystems in which they live.⁴⁰

Current populations:⁴¹

During much of the Pleistocene period, orang-utans inhabited the land all the way from Southern China to the island of Java. But within the last few thousand years a rapid contraction of the species' habitats has occurred and the evidence suggests that this is largely the result of human activities. Today, the two species are restricted to scattered parts of the island of Borneo (*Pongo pygmaeus*) and to the northern part of the island of Sumatra (*Pongo abelii*).⁴²

Borneo Orang-utan (*Pongo pygmaeus*)

Due to its larger and more fragmented distribution, the status of the Borneo orang-utan has been more difficult to assess than that of the Sumatran orang-utan. Population estimates vary tremendously, both over time and between studies. Using the data from the Population Habitat Viability Assessment for orang-utans, conducted in Jakarta in 2004, combined with an aerial survey of orang-utan nests in Sabah, Malaysia, the current estimate is that 54,900 – 56,100 orang-utans remain in numerous subpopulations on Borneo.

The orang-utan is known to inhabit primary and secondary forest and is typically found in lowland dipterocarp, freshwater and peat swamp forests. They have also been encountered in hill forests up to an

⁴⁰ WWF, 2005: *WWF's Species Action Plan for the Conservation of Orang-utans (*Pongo pygmaeus* and *Pongo abelii*) in the Wild*. Unpublished draft version presented at WWF's Species Working Group, Cape Town, January 2005

⁴¹ WWF, 2005. *WWF's Species Action Plan for the Conservation of Orang-utans (*Pongo pygmaeus* and *Pongo abelii*) in the Wild*. Unpublished draft version presented at WWF's Species Working Group, Cape Town, January 2005

⁴² Lackman-Ancrenaz I., Ancrenaz M. and, Saburi R.: *The Kinabatangan Orang-utan Conservation Project (Kocp)*; undated

altitude of about 1500 m, although in much lower population densities than in other habitats. Even without widespread habitat destruction, orang-utan populations are naturally vulnerable. This is due to low reproductive rates caused by slow progress towards sexual maturity (up to 12 years) and the long pregnancy intervals (typically 8 years).⁴³ It is believed that the number of orang-utans alive today is about one percent of its prehistoric population level.⁴⁴

There are eight main factors leading to the extinction of orang-utan populations: illegal logging, forest conversion, poaching, fire, fragmentation, peat land drainage, mining and bad forest management.⁴⁵ Today over 40,000 orang-utans survive in Kalimantan, with Central Kalimantan having the highest concentration.

A study conducted in 2003 came to the conclusion that Kalimantan has lost at least 39% of its orang-utan habitat over the last decade (1992-2002).⁴⁶ This study was part of an international effort to establish the orang-utan population sizes and densities in Borneo and Sumatra. This *Population and Habitat Viability Assessment (PHVA)* estimated that there are between 50,000 and 60,000 orang-utans left in the world. Around 7,500 live in Sumatra while the vast majority are on Borneo. 13,000 orang-utans are left in Sabah, making it the main habitat for the subspecies *morio* on Borneo. Interestingly enough, 60% of these populations are found outside the protected areas, in Commercial Forest Reserves exploited for timber.⁴⁷ This shows that orang-utans are able to adapt to significant changes within their habitat.

⁴³ Morrogh-Bernard H. et al.: *Population status of the Bornean orang-utan (Pongo pygmaeus) in the Sebangau peat swamp forest, Central Kalimantan, Indonesia*; Biological Conservation 110 (2003), pp 141–152, 2003

⁴⁴ Bennet E.L.: *The Natural History of Orang-Utan*; Natural History Publications (Borneo), 2002

⁴⁵ Singleton I., Wich S., Husson S., Stephens S., Utami Atmoko S., Leighton M., Rosen N., Traylor-Holzer K., Lacy R. and Byers O. Eds.: *Orang-utan Population and Habitat Viability Assessment: Final Report*. IUCN/SSC Conservation Breeding Specialist Group, Apple Valley, MN., 2004

⁴⁶ Husson S. et al: *The Status Of The Orang-utan In Indonesia*; Report to the Orang-utan Foundation, UK, 2003

⁴⁷ Singleton I., Wich S., Husson S., Stephens S., Utami Atmoko S., Leighton M., Rosen N., Traylor-Holzer K., Lacy R. and Byers O. Eds.: *Orang-utan Population and Habitat Viability Assessment: Final Report*. IUCN/SSC Conservation Breeding Specialist Group, Apple Valley, MN., 2004

The good news in this assessment is that there are many more orang-utans than the previous study showed. However, this number does not reflect positive population growth. Rather, the previous studies have proven how difficult orang-utan population surveys are. They simply underestimated the numbers. In fact the recent results only prove that, since there are more orang-utans than previously thought, there are also more that are endangered.

The study also found that orang-utan populations restricted to habitats capable of supporting only about 50 animals can persist for a considerable number of years, but are unstable and vulnerable to extirpation. Habitats capable of supporting more than 250 orang-utans are necessary to ensure good demographic and genetic stability.

Geographic variations reflected in the genetic make up of Borneo orang-utans have led to a further designation of three subspecies: *Pongo pygmaeus morio*, the North-eastern Borneo orang-utan, *Pongo pygmaeus wurmbii*, the Central Borneo orang-utan and *Pongo pygmaeus pygmaeus*, the Northwest Borneo orang-utan.

North-western Borneo Orang-utan (*Pongo pygmaeus pygmaeus*)

Found in north-west Kalimantan, north of the Kapuas River and in Sarawak. The status of the North-western Borneo orang-utan is of concern. Population estimates are in the range of 3,000 animals. Important populations remain largely in the Batang Ai / Lanjak Entimau areas of southern Sarawak and in the area around and between southern Betung Kerihun and Danau Sentarum in West Kalimantan.

Central Borneo Orang-utan (*Pongo pygmaeus wurmbii*)

Found in South-west Kalimantan, south of the Kapuas River and west of the Barito River. The central subspecies is the most common of the Borneo subspecies (around 38,000 individuals) with an extensive, yet increasingly fragmented distribution in the swamp and lowland dipterocarp forests of central Kalimantan. Sizeable populations of the Central Borneo orang-utan are found in Tanjung Puting National Park, the Sebangau and Mawas areas of central Kalimantan, Gunung Palung National Park in West Kalimantan and the forests that stretch along the border between the two provinces of West Kalimantan and Central Kalimantan.

North-eastern Borneo (Orang-utan *Pongo pygmaeus morio*)

Found in Sabah and East Kalimantan south to the Mahakam River. The North-eastern Borneo orang-utan has its stronghold in the Upper Kinabatangan and Segama catchments in Sabah and the Gunung Gajah, Berau region of East Kalimantan. The total population size is estimated at 14,000 of which 11,000 are estimated to live in Sabah. Of these about half occur in the heavily logged lowland dipterocarp forests around the Danum Valley Conservation Area, an area managed by the Sabah Foundation. It has been clear in Sabah since WWF-Malaysia surveys in the 1980s and recent assessments by HUTAN that orang-utans here can adapt to logged and degraded forests – providing illegal hunting and agricultural conversion are controlled.⁴⁸ Their high population density here seems to be related to soils as much as forest condition. Funds are needed to help restore the forests of Malua and Ulu Segama Forest Reserves, so that they can continue to be managed in a long term for both orang-utan conservation and timber production by natural forest management.⁴⁹

The once large population in Kutai National Park has decreased in size but may still be significant enough to warrant increased protection.

The most concerning result of the Population Assessment are the calculations for the future of the orang-utans if deforestation in Borneo is not reduced. It is predicted that even populations that are currently very large could be driven to extinction within the next 50 years – less than the potential life span of a single orang-utan.

Just how badly affected the population of orang-utans in Kalimantan is, can be seen by comparing a list of habitats that were researched in 2002 with older findings from 1992 and 1994



Figure 4: Orang-utans, Central Kalimantan © WWF / A. Compost

⁴⁸ Ancrenaz M., Gimenez O., Ambu L., Ancrenaz K., Andau P., Goossens B., Payne J., Sawang A., Tuuga A. and Lackman-Ancrenaz, I.: *Aerial surveys give new estimates for orang-utans in Sabah, Malaysia*. Plos Biol 3(1): e3, 2005 and John Payne, WWF Malaysia, pers. comment

⁴⁹ John Payne, WWF Malaysia, pers. comment

Tab. 1: Habitat units for Kalimantan that existed in the orang-utan range in Kalimantan in 1994-1997, which had disappeared, been fragmented or seriously reduced by 2002:⁵⁰

No.	Subspecies	Orang-utan Presence ca 1992	Orang-utan Presence 2002	Nature of major change
A	West Kalimantan			
1	Sambas	Yes	Yes	Badly fragmented
2	Mempawah	Yes	No	Nearly gone
3	Gunung Niut	Yes	Yes	Badly fragmented
10	Kapuas swamps	Yes	Yes	Badly fragmented
11	Sukadana-Kendawangan	Yes	Yes	Badly fragmented
B	Central Kalimantan			
12	Jelai-Lamandau-Arut	Yes	Yes	Badly fragmented
14	East Pembuang-Seruyan	Yes	Yes	Southern half nearly gone
15	W. Sampit floodplains	Yes	Yes	Nearly gone
16	Katingan floodplains	Yes	Yes	Northern half nearly gone
20	Sebangau-Kahayan	Yes	Yes	Some 30% remains, fragmented
22	Kapuas Murung-Barito plains	Yes	Yes	Northern and southern ends converted
28	Bandang East	Yes	No	Probably ecologically extinct due to hunting
29	Upper Dusun	Yes	No	Probably ecologically extinct due to hunting
30	Busang Hulu	Yes	No	Probably ecologically extinct due to hunting
C	East Kalimantan			
31	Liangpran	Yes	No	Probably ecologically extinct due to hunting
32	Boh Catchment	Yes	No	Probably ecologically extinct due to hunting
33	Pari-Sentekan	Yes	No	Probably ecologically extinct due to hunting
34	Belayan-Kedankepala	Yes	No	Probably ecologically extinct due to hunting
35	West Muara Kaman	Yes	Yes	Nearly gone, mainly burned
36	Coastal Kutai	Yes	Yes	Nearly gone, mainly burned
38	Tinda-Hantung Hills	Yes	Yes	Southern half nearly gone

⁵⁰ Husson S. et al: *The Status Of The Orang-utan In Indonesia, 2003*; Report to the Orang-utan Foundation, UK, 2003

Sun bear

A unique species that only thrives in the lowland forests and has not been observed in logged areas of Borneo is the sun bear (*Helarctos malayanus*).⁵¹ With adults only between 110 cm and 140 cm long, they seldom weigh more than 50kg. The sun bear is the smallest of the eight bear species and little is known about its behaviour. Sun bears can be easily identified by a chest patch of white to reddish hair, usually shaped like a “U”.⁵² Especially remarkable is the long tongue, up to 25 cm in length. It is thought that they are solitary animals (with the exception of mothers with cubs) that don't need to hibernate due to the year-round availability of food items. Sun bears are believed to be nocturnal, and they are excellent climbers who mainly feed on fruits, berries, insects, termites, eggs and small vertebrates. They will readily climb trees, using their long tongue to extract honey from beehives. Originally, the habitat of the sun bear extended as far as parts of China, Tibet and India, where the species is now assumed extinct. With humans ceaselessly encroaching on its habitat, the sun bear can still be found in Southeast Asia from Burma, eastward through Laos, Thailand, Cambodia, Vietnam and Malaysia, as well as on the islands of Sumatra and Borneo.⁵³ While no one knows how many sun bears are left in the forests, it is generally agreed that commercial logging activities are fragmenting the habitats and lead to increased mortality rates.

Now extinct in Bangladesh, the species has been listed under the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES) as an Appendix II species since July 1975 and was put on Appendix I in 1979.⁵⁴ As such, international trade with these animals or by-products is prohibited without proper permits, but breaches have been documented.

⁵¹ Te Wong S.: *The Ecology of Malayan Sun Bears (Helarctos malayanus) in the Lowland Tropical Rainforest of Sabah, Malaysian Borneo*; University of Montana, 2002

⁵² Servheen C., IUCN: *Sun Bear Conservation Action Plan*, http://www.iucn.org/themes/ssc/actionplans/bears/bearsAP_chapter11.pdf , undated

⁵³ Servheen C., IUCN :*Sun Bear Conservation Action Plan*, http://www.iucn.org/themes/ssc/actionplans/bears/bearsAP_chapter11.pdf , undated

⁵⁴ UNEP-WCMC: *UNEP-WCMC Species Database: CITES-Listed Species*; [http://sea.unep-wcmc.org/isdb/CITES/Taxonomy/tax-common-](http://sea.unep-wcmc.org/isdb/CITES/Taxonomy/tax-common-result.cfm?source=animals&displaylanguage=eng&Common=12248&tabname=all) accessed 3 February 2005

Live sun bears and their body parts are commonly sold in most countries where they occur, further decreasing the population of this most mysterious species of bear.⁵⁵

Today the number of sun bears is believed to be below 25% of the original population.⁵⁶

While being officially protected in most countries, the species receives little conservation attention within these countries. This lack of effort stems from the fact that the sun bear is uncommon, rarely seen, and competes for attention with major species of conservation interest in its range, such as the Sumatran rhinoceros, tigers, Asian elephants, orang-utans and several smaller primate species.⁵⁷ The sun bear has been listed on the threatened species list by the IUCN (World Conservation Union) since 1996, but there is not enough data available to assess how close to extinction the species is.⁵⁸

Proboscis monkey

The proboscis monkey, with its large pendulous nose and potbelly, is a peculiar animal. It is endemic to Borneo, occurring over much of the island, except for central Sarawak and possibly northeast Kalimantan. As with so many other species in the forests of Borneo, little is known about the proboscis monkey.

After being declared vulnerable for the first time in 1986, with the biggest threats being the ongoing logging and land conversion as well as hunting, the monkey is now categorised as endangered, facing a very high risk of extinction.⁵⁹ In 1975 it was listed on Appendix I of the CITES convention.⁶⁰

⁵⁵ Kemf, E., Wilson A. and Servheen C.. *Bears in the Wild- a WWF species status report*. WWF; Gland, Switzerland, 1999

⁵⁶ Servheen C., IUCN :*Sun Bear Conservation Action Plan*, http://www.iucn.org/themes/ssc/actionplans/bears/bearsAP_chapter11.pdf , undated

⁵⁷ Te Wong, S.: *The Ecology of Malayan Sun Bears (Helarctos malayanus) in the Lowland Tropical Rainforest of Sabah, Malaysian Borneo*; University of Montana, 2002

⁵⁸ IUCN Bear Specialist Group 1996: *Helarctos malayanus*. In: IUCN 2004: *2004 IUCN Red List of Threatened Species*, <www.redlist.org>, accessed 03 February 2005

⁵⁹ Eudey, A. & Members of the IUCN Primate Specialist Group 2000: *Nasalis larvatus*. In: IUCN 2004. *2004 IUCN Red List of Threatened Species*. <www.redlist.org>., accessed 03 February 2005.

⁶⁰ UNEP-WCMC. 3 February, 2005. *UNEP-WCMC Species Database: CITES-Listed Species*; <http://sea.unep-wcmc.org/isdb/CITES/Taxonomy/tax-common->

While mainly living in coastal forests, proboscis monkey populations are still present on upstream reaches of Borneo's rivers. Because of the small numbers observed inland, it appears that proboscis monkeys are most frequent in coastal areas, with the possible exception of the inland swamps surrounding the Danau Sentarum and Mahakam lakes.⁶¹

Proboscis monkey habitat, i.e. riverside and coastal forest, is the most threatened of all vegetation types in Borneo, owing to conversion into agricultural land and logging. However, another threat to their survival is hunting, which is conducted not only for food, but to scavenge the highly valued bezoar stones which are sometimes found in the intestines of these animals. The decrease in abundance occurred within the past 10 to 35 years, coinciding with guns and outboard motors becoming available to local people. The combination of these threats has reduced populations of the proboscis monkey in Sabah, Sarawak and East Kalimantan and the findings suggest that other populations elsewhere in Borneo are also threatened. Only if sufficiently large areas of habitat can be protected and persistent law-enforcement ensured, will this unique species survive. There are several well-protected populations of this species in Sabah, notably in the lower Kinabatangan, where there are several hundreds. Eco-tourism in this area since around 1990 has helped to ensure that both the habitat and species are protected. If eco-tourism is effectively organised and disturbance levels kept low, the measures could even serve as an example for many protected wetland sites.⁶²

Clouded leopard

In 2002 the clouded leopard was added to the red list of the IUCN, after having been declared vulnerable (facing a high risk of extinction) 16 years earlier.⁶³ In 1975 it was listed in Appendix I of the CITES convention.

result.cfm?source=animals&displaylanguage=eng&Common=16731&Country=&tabname=all

⁶¹ Meijaard E. and Nijman V.: *Distribution and conservation of the proboscis monkey (Nasalis larvatus) in Kalimantan, Indonesia*; Biological Conservation 92 (2000) pp15-24, 2000

⁶² Meijaard E. and Nijman V.: *Distribution and conservation of the proboscis monkey (Nasalis larvatus) in Kalimantan, Indonesia*; Biological Conservation 92 (2000) pp15-24, 2000

⁶³ IUCN Cat Specialist Group 2002. *Neofelis nebulosa*. In: IUCN 2004. *2004 IUCN Red List of Threatened Species*. <www.redlist.org>, accessed 03 February 2005

The clouded leopard is named after its distinctive markings - ellipses partially edged in black, with the insides a darker colour than the background colour of the pelt and sometimes dotted with small black spots. Clouded leopards are intermediate in size between large and small cats: wild adults can weigh between 11-20 kg. While being agile climbers, these beautiful animals use trees mainly for resting, before hunting during the night. Its main food sources are believed to be birds and small mammals, as well as larger prey, such as porcupines, deer, and wild boar. Especially in Borneo, the clouded leopard has also been observed feeding on primates.

These cats are elusive and secretive animals. Not having been sighted in Nepal since 1863, four animals turned up in different areas of the country in 1989 after more than a century's absence from the records.⁶⁴

Its shyness makes the clouded leopard very difficult to study. Although its known range reaches from southern China, the foothills of the Himalayas, through most of Southeast Asia to Sumatra and Borneo, very few surveys have been conducted. The clouded leopard is now believed to be extinct in Bangladesh, Singapore and Taiwan, and elsewhere sightings seem to be becoming fewer.⁶⁵ Borneo is likely to have the healthiest population of clouded leopards. In 1982, on average one animal was detected per four square kilometres of research area. Since deforestation is thought to be the main threat to this species (though it has also been sighted in secondary and logged forests), a similar study might well find reduced numbers today.⁶⁶

Borneo Elephant

See map section, "Bornean Pygmy Elephant", p. 15

Sacred but exploited, the Asian elephant has been worshipped for centuries. Even today it is utilised for ceremonial and religious purposes. Not only is it revered for its role within Asian culture and religion: it

⁶⁴ IUCN Cat specialist Group 1986, <http://lynx.uio.no/catfolk/nebul01.htm>, accessed 03 February, 2005

⁶⁵ Cat Specialist Group 2002. *Neofelis nebulosa*. In: IUCN 2004. *2004 IUCN Red List of Threatened Species*. <www.redlist.org>. Downloaded on 03 February 2005.

⁶⁶ IUCN Cat specialist Group 1986, <http://lynx.uio.no/catfolk/nebul01.htm>, accessed 03 February, 2005

is also a key biological species in the tropical forests of Asia.

It is the largest terrestrial animal in Asia and despite there being thousands of domesticated elephants in Asia, the wild populations are rapidly decreasing.

Elephants have a very limited distribution on Borneo, being restricted to approximately 5% of the island in the extreme northeast. There are no historical records of elephants outside of this range.

Until 2003 it was generally believed that the current population descended from elephants presented to the Sultan of Sulu in 1750 by the East India Trading Company, or that they were introduced via the active elephant trade in Sumatra and peninsular Malaysia. Only through modern DNA testing has it become clear, that the small population of elephants on Borneo derive from a native species that was isolated from other Asian elephants at least 18,000 years ago.⁶⁷

Their new status has profound implications for the fate of Borneo's largest mammal. Wild Asian elephant populations are disappearing as expanding human development disrupts their migration routes, depletes their food sources and destroys their habitat.

Recognizing these elephants as native to Borneo makes their conservation a high priority and gives biologists important clues about how to manage them.⁶⁸

According to a WWF study from the year 2000 on the status of wild elephants in Asia, there are currently five main concentrations of elephants in Borneo: Tabin Wildlife Reserve (120,000 ha); Lower Kinabatangan Wildlife Reserve (78,700 ha); Deramakot Forest Reserve (55,000 ha); Danum Valley Conservation Area (43,800 ha) in Sabah; and Ulu Sembakung proposed Nature Reserve (500,000 ha) in East-Kalimantan. The present elephant population in Sabah is estimated at roughly 1,000 animals, which inhabit a total area of about 300,000ha. Given the remoteness of the area and

⁶⁷ Prithiviraj Fernando et al.: *DNA Analysis Indicates That Asian Elephants Are Native to Borneo and Are Therefore a High Priority for Conservation*; PLoS Biol. 2003 October; 1(1): e6. doi: 10.1371/journal.pbio.0000006. Published online 2003 August 18. <http://www.plosbiology.org/plosone/?request=get-document&doi=10.1371/journal.pbio.0000006> accessed 03 February 2005

⁶⁸ *Borneo Elephants: A High Priority for Conservation*, PLoS Biol. 2003 October; 1(1): e7. doi: 10.1371/journal.pbio.0000007. Published online 2003 August 18. <http://www.pubmedcentral.nih.gov/articlerender.fcgi?artid=176547>; accessed 03 February 2005

the difficulty of the terrain, the elephant population on Borneo, estimated to be between 1,000 and 1,500 animals, represents one of the most important in Southeast Asia, provided its habitat remains intact.⁶⁹

Borneo Rhinoceros

See map section "Eastern Sumatran Rhinoceros", p. 15

Asian rhinos are amongst the most critically endangered species in the world. 50 million years ago rhinos were still hornless. 30,000 years ago they were objects of early human cave art and there is even evidence that their horns were used by emperors to detect poison in their drinks in the fourth century BC.⁷⁰ Only very recently has human activity pushed this ancient and unique species to the brink of extinction. Today there are five species of rhinos left. Two of them are in Africa and three are in Asia. One of the African species, the white rhino, is now considered to be one of the greatest conservation success stories. Starting from a single population of barely 20 animals in 1885, conservation efforts led to the recovery of the species.⁷¹

Of the more than 11,000 white rhinos that can be found today, the vast majority (over 10,000) live in South Africa.⁷²

The critical situation for Asian rhinos is emphasized by the fact that the number for all three Asian species combined is approximately equal to or perhaps slightly lower than for the rarer of the two African rhino species, the black rhino, which has received much more publicity over the last decade.⁷³

Today the rhinoceros of Borneo (*Dicerorhinus sumatrensis harrissoni*, a subspecies of the Sumatran rhino and the smallest of all rhinos) is in the same

⁶⁹ Kemf, E. & Jackson, P. 1995. *Wanted Alive: Asian Elephants in the Wild*; WWF-World Wide Fund for Nature: Gland.

⁷⁰ WWF: *Asian Rhinos in the Wild*; A WWF Species Status Report, 2002

⁷¹ Emslie R. and Brooks M.: *African Rhino. Status Survey and Conservation Action Plan*. IUCN/SSC African Rhino Specialist Group, Gland, Switzerland and Cambridge, UK. ix + 92 pp, 1999

⁷² International Rhino Foundation: *Provisional 2003 Continental African Rhino Totals* <http://www.rhinos-irf.org>, accessed 26 April 2005

⁷³ Foote T.J and van Strien N. (eds): *Asian Rhinos – Status Survey and Conservation Action Plan*, IUCN, Gland, Switzerland, and Cambridge, UK, 1997

situation as the white rhino was more than a hundred years ago. While there are believed to be only a few hundred Sumatran rhinos, their subspecies on Borneo is even more depleted:

At the beginning of the 20th century, the Borneo variety of the Asian two-horned rhinoceros, also known as the Eastern Sumatran rhinoceros, was fairly widespread and common throughout Borneo. However, the rhino has since suffered a serious decline in distribution and numbers. In the past few decades, poaching and loss of habitat have reduced the population of the Eastern Sumatran rhino. There are fewer than 50 individuals left in Sabah. This species of rhino is now no longer confirmed to exist in Sarawak or Kalimantan.⁷⁴ As in Africa, poaching for horn is the major threat to Asian rhinos. The primary demand for the horn is generated through its use in traditional Chinese medicine, throughout the Far East. Asian rhino horn also seems to be a speculator's commodity in several consumer states. Habitat degradation is also a significant threat, even more so than for the African rhinos, since two of the Asian species are denizens of tropical rainforests which continue to decrease. Forest habitat is being destroyed through unsustainable exploitation of timber and conversion of land to agriculture and other human uses.⁷⁵ The Eastern Sumatran rhinoceros was added to Appendix I of the CITES convention in 1977⁷⁶ and is considered critically endangered by the IUCN.⁷⁷ Attempts to breed the Sumatran rhinoceros (Bornean and other races) in captivity over the past 18 years have almost all failed. The reason remains unknown, but a dietary factor is suspected to play a key role. If this species is to survive, immediate action needs to be taken to repeat the success achieved in saving the African white rhino.

⁷⁴ International Rhino Foundation: *Eastern Sumatran Rhino*; <http://www.rhinos-irf.org/rhinoinformation/sumatranrhino/subspecies/eastern.htm>; accessed 03 February 2005

⁷⁵ Foose T.J and van Strien N. (eds): *Asian Rhinos – Status Survey and Conservation Action Plan*, IUCN, Gland, Switzerland, and Cambridge, UK, 1997

⁷⁶ UNEP-WCMC. 4 February 2005: *UNEP-WCMC Species Database: CITES-Listed Species*

<http://sea.unep-wcmc.org/isdb/CITES/Taxonomy/tax-species-result.cfm?displaylanguage=eng&Genus=Dicerorhinus&Species=sumatrensis&source=animals&Country=&tabname=all>

⁷⁷ IUCN Asian Rhino Specialist Group 1996. *Dicerorhinus sumatrensis* ssp. *harrissoni*. In: IUCN 2004. *2004 IUCN Red List of Threatened Species*. <www.redlist.org>, accessed on 03 February 2005

1.3 People and politics

As late as the middle of the nineteenth century, over 95 % of the land area of Borneo was still covered in forest. Early European travellers who climbed to high places gave descriptions of “ranges of hill and valley everywhere, covered with interminable forest, with glistening rivers winding among them.”⁷⁸

1.3.1 The Early Days

It is unknown how long humans have inhabited the island of Borneo. Charcoal found near a skull in the now famous caves by Niah was dated back 40,000 years, but it is plausible that relatives of the “Java man”, whose remains are more than a million years old, could one day also be discovered on Borneo. Today anthropologists think that the indigenous people of Borneo were replaced by a race of migrants from Asia, the so-called Austronesians, some time after 4,000 BC. The newcomers brought with them the idea of cultivating crops, which resulted in a massive societal change from the previous hunter-gatherer lifestyle.⁷⁹ New tools revolutionised agriculture and allowed the people of the time to clear forests for crops much more easily than before. In the 3rd and 4th centuries AD Chinese Buddhist pilgrims started to visit India and it is assumed that they stopped in Borneo on the way. Over time, trade relations between Borneo and China developed.⁸⁰

There were two main groups of people on the island. There were the rice farming and fishing lower-riverside and coastal Muslim people who spoke mutually intelligible dialects of Malay. And inland there were shifting cultivators and hunter-gatherers -the Dayak- who were mainly animist (the belief that personalized supernatural beings or souls inhabit all objects and govern their existence), tribally organized and spoke a variety of languages.⁸¹

⁷⁸ Brookfield H., Potter L., and Byron Y.: *In Place of the Forest: Environmental and Socio-economic Transformation in Borneo and the Eastern Malay Peninsula*; United Nations University Press, 1995

⁷⁹ Payne J., Cubitt G., Lau D. and Langub J.: *This is Borneo*; New Holland, 2001

⁸⁰ Ibid.

⁸¹ Brookfield H., Potter L., and Byron Y.: *In Place of the Forest: Environmental and Socio-economic Transformation in Borneo and the Eastern Malay Peninsula*; United Nations University Press, 1995

Both the coastal and interior peoples of the region utilised a great variety of forest products as well as mangrove and other marine products that were in demand overseas. Malay rulers established trading posts and sometimes agents at the mouth of each tributary stream. At the coast and at riverine ports, produce was exchanged with seagoing traders (who traditionally were mostly Chinese, later also Indian and sometimes Arab) for a range of manufactured imports. Brunei, which has existed at locations close to the present area for over 1,400 years, dominated the trade of most of northern Borneo and the southern Philippines between about A.D. 1000 and 1350 B.C., and remained important until the nineteenth century. It was through the coastal ports that Islam entered the region, beginning perhaps in the fourteenth century and becoming dominant by the sixteenth.⁸²

1.3.2 The Europeans arrive

The first European visitor to Borneo might have been Ludocio de Varthema from Italy, but the earliest detailed record of European contact comes from Antonio Pigafetta, the Italian chronicler of Magellan's Spanish fleet who visited Brunei in 1521, after Magellan's death. By 1526 a regular trade between Brunei and Portugal had developed.⁸³ It is from these early European contacts that the whole island became known as Borneo, which was a corruption of the name Brunei.⁸⁴

In 1641 the Dutch invaded Brunei. Portugal and Spain (which led a number of attacks on Brunei) stopped laying claims on Borneo. Over the next decades the Dutch used violence and aggression to strengthen their trading position and installed a Dutch vassal as the supreme ruler of Borneo. However, the virtual trading monopoly of the Netherlands was broken when the treaty of Paris opened Southeast Asia to ships from all nations. As a result the Dutch East India Company was on the brink of bankruptcy and they abandoned their settlements. The last such settlement, Fort Tatas near

Banjamasin was abandoned in 1809.⁸⁵ Instead the Dutch negotiated treaties with the local Sultans and in 1840 began to assert their sovereignty in large parts of Borneo (south-east and west). This was done after the British had established themselves in the north of Borneo, where the region of Sarawak was ceased by the British adventurer James Brooke, whose family subsequently became known as the "White Rajahs of Sarawak".⁸⁶

During the years of colonial expansion, there were many attacks by indigenous people on the European intruders, but because there was only a small population of foreigners these attacks were limited. Prior to the Japanese invasion of Borneo in 1941 there were never more than 8,000 Europeans on the island. During the invasion, many Europeans were captured and killed and when the Japanese surrendered to Australian forces in 1945, European supremacy was lost. Indonesia declared itself an independent nation in 1945 and resistance to the Dutch rulers led to international recognition of independence in 1949. The British however continued to rule over Sarawak and northern Borneo until 1961 when the first Prime Minister of Malaya invited the Borneo states to join him in forming an enlarged federation of Malaysia. Indonesia opposed the plan and British and Australian troops were deployed in the border regions, where Jungle warfare erupted. Nevertheless in 1963 Sabah and Sarawak achieved independence through Malaysia while Brunei chose to remain a British protectorate until 1984 when it became independent.⁸⁷

1.3.3 Modern society

Brunei

Today Brunei is a Malay Muslim monarchy in which accession to the throne, (the sultan is also Prime Minister and Minister of Defence) is inherited. Because of the enormous wealth this small state has gained from oil production the standard of living in Brunei is higher than anywhere else in Southeast Asia.

⁸² Brookfield H., Potter L., and Byron Y.: *In Place of the Forest: Environmental and Socio-economic Transformation in Borneo and the Eastern Malay Peninsula*; United Nations University Press, 1995

⁸³ Saunder G.: *A History of Brunei*; Oxford University Press, Kuala Lumpur, 1994

⁸⁴ MacKinnon K., Hatta G., Halim H. and Mangalik A.: *The Ecology of Kalimantan*; Oxford University Press, 1997

⁸⁵ Saunder G.: *A History of Brunei*; Oxford University Press, Kuala Lumpur, 1994

⁸⁶ MacKinnon K., Hatta G., Halim H. and Mangalik A.: *The Ecology of Kalimantan*; Oxford University Press, 1997

⁸⁷ Payne J., Cubitt G., Lau D. and Langub J.: *This is Borneo*; New Holland, 2001

Malaysia

Sabah and Sarawak are two of the thirteen states of the Malaysian federation. Malaysia's king is elected by the hereditary Malay rulers from the nine peninsular states.

However, neither Sabah nor Sarawak has hereditary rulers. Instead, the heads of these states are appointed by the king. The powers of the king and local heads of states are limited under the constitution and by democratically elected governments on national and state levels. The states' governments have significant powers since, under the constitution; they have control over vital matters such as land and forests.

However, real power in Malaysia lies with the prime minister. Between 1981 and 2003 the country was led by Dr. Mahathir Mohamad, whom many considered the father of Malaysia's development towards a globally competitive economy. He retired in October 2003 and Abdullah Ahmad Badawi became his successor.

The United Nations Online Network on Public Administration and Finance describes Malaysia's system of politics and governance, combining authoritarian controls with democratic procedures, as what can broadly be termed a semi-democratic regime.⁸⁸

The official religion of Malaysia is Islam but the constitution guarantees freedom of religion.

Indonesia

In the republic of Indonesia, the central government exerts strong control over this enormous and widely scattered nation. The parliament has two houses some of whose members are elected democratically while others are appointed representatives from the armed forces, the cabinet and local government authorities. Before the fall of president Suharto, all major policy decisions came from central government, which therefore had the major influence on the long-term development of Borneo. Since October 2004 Susilo Bambang Yudhoyono has been president of Indonesia and as such both the chief of state and the head of government.

The transformation of the Indonesian political system since the downfall of former President Suharto in May

⁸⁸ United Nations Online Network on Public Administration and Finance: *Countries at a Crossroads: Malaysia*; 2004

1998 included the radical overhaul of the role of the regions and the re-structuring of the relationship between the centre (national government), and the governmental bodies at provincial and local level. While political rhetoric always underlined the right of the regions for *otonomi daerah* (regional autonomy), the passing of two laws on regional governance and fiscal balance between the centre and the regions, turned the idea of decentralisation and regional autonomy into reality.⁸⁹

Regional autonomy is based on five fundamental principles: democracy, people's participation and empowerment, equity and justice, recognition of the potential and diversity of regions and the need to strengthen regional legislatures.

The local level has responsibility for all governmental matters except: foreign affairs, defence and security, justice, monetary and fiscal affairs, religion and other matters. These "other matters" are fiscal equalisation, public administration, economic institutions, human resource development, natural resource utilisation, strategic technologies, conservation, and national standardisation. Local responsibilities, which local governments have to fulfil, include public works, health, education and culture, agriculture, transport, industry and trade, investment, environment, land matters, co-operatives and manpower.⁹⁰

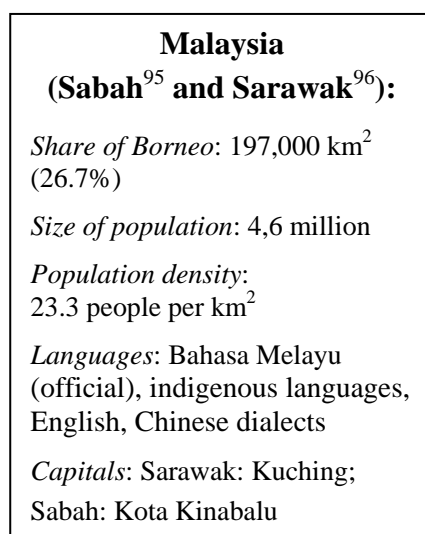
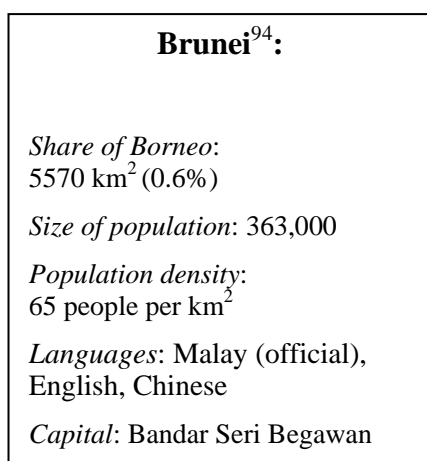
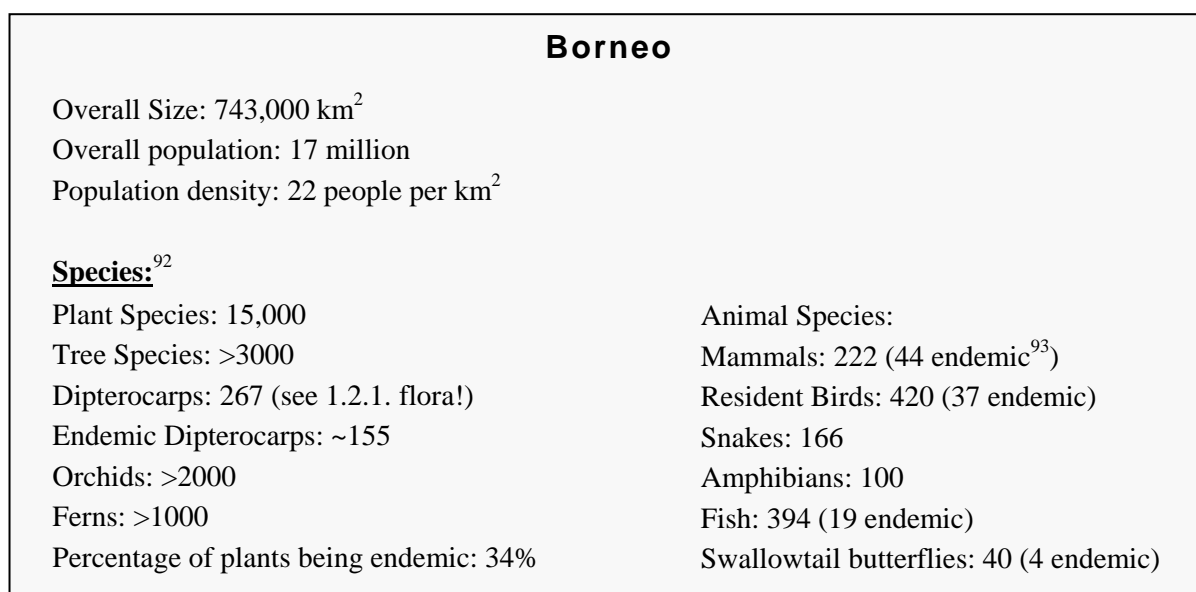
The World Bank stated that the removal of central control over natural resources, biased and limited though it had been before the change of government, led to there being virtually no control at all. Illegal logging and mining became rampant. Environmental expenditure, already low compared to neighbouring countries, fell at a faster rate than GDP and overall government spending and dropped more steeply than in other East Asian crisis countries.⁹¹

⁸⁹ Deutsche Gesellschaft für Technische Zusammenarbeit: *Decentralisation in Indonesia since 1999*

⁹⁰ Deutsche Gesellschaft für Technische Zusammenarbeit: *Decentralisation in Indonesia since 1999*;

⁹¹ The World Bank: *Indonesia: Environment and Natural Resource Management in a Time of Transition*, February 2001

1.4 Borneo in numbers: 2005



⁹² MacKinnon K., Hatta G., Halim H. and Mangalik A.: *The Ecology of Kalimantan*; Oxford University Press, 1997

⁹³ Endemic: A species native or confined naturally to a particular and usually very restricted geographic area or region

⁹⁴ The World Factbook 2004

⁹⁵ Government of Sabah: <http://www.sabah.gov.my>

⁹⁶ Government of Sarawak: <http://www.sarawak.gov.my>

⁹⁷ University of Utrecht: *Population Statistics*, <http://www.library.uu.nl/wesp/populstat/Asia/indonesp.htm> accessed February 7, 2005

2. The People of Borneo

"Now all my contemporaries are dead, and I am the only one of them who is still here today to tell you of what life was like in the past. If you want to know the story of our origins here, I can tell you everything. Everything I say is the truth. I do not lie. I will not deceive you. I am not boasting. Everything I tell you is true. My name is Wé Salau. There is no one older than myself. There is no one else who knows the things that I know."

Wé Salau, an old headman⁹⁸

"The little explored island is for its major part covered by forests. Primitive mountain tribes still inhabit the interior. In former times they were feared a lot for being headhunters. From the frequent fights with other tribes they brought back the heads of their enemies to their villages. The coastal areas export rubber and oil."

A German schoolbook of 1966 about Borneo⁹⁹

2.1 Overview

The cultural diversity of Borneo is as distinct and varied as the animal and plant life which exists on the island. In Kalimantan alone it is believed that 142 different languages are still in use today.¹⁰⁰

The current population of Borneo is estimated to be around 16 million inhabitants, up from around 9 million in 1980, with Brunei having a population density almost three times that of the other states. While accurate numbers are difficult to obtain, it is estimated that about 66% of the total population of Borneo is Muslim (mainly coastal riverside and urban based), 29% non-Muslim indigenous (mainly inland farmers and former nomads, plus urban workers and government employees) and five percent Chinese, who are often Buddhists. Only a very small percentage is still nomadic. These overall percentages can however

conceal local variations. For example, over 25% of the population in Sarawak are Chinese,¹⁰¹ while in Kalimantan, indigenous Dayaks and Malays each make up about 40 percent of the population. Ethnic Chinese, holders of much of the region's wealth, add up to about 12 percent of the population, while Madurese settlers (from recent transmigration programmes) constitute about 8 percent.¹⁰²

Before the use of iron and other metals spread to Borneo and allowed people to exploit the tropical rainforest environment, settlements were restricted to the coastal areas.

These areas later became the main trading posts with China and India and today Borneo's population is still at its densest in coastal zones. While these coastal areas are predominantly Muslim, shared religion and frequent intermarriage of coastal people from different groups has lessened the ethnic and linguistic differences in the population, a trend which has accelerated over the last decades with the development of modern infrastructure. The coastal and riverside Muslims of Kalimantan and Sarawak have long been regarded as "Malay" and only peripherally consider themselves to belong to a specific ethnic or linguistic group. Their ancestry is a mixture of local indigenous populations (originally early non-Muslim immigrants from Java and Sumatra, converted to Islam by traders) and relatively recent (over the past 500 years) Muslim immigrants. There are some Muslim groups however, that have retained and nurtured their distinct cultural identity, in particular those of Sabah and parts of Sarawak.¹⁰³

The native farming population of Borneo is usually referred to collectively as "Dayak". While the origins of the term are not clear, it became widespread in the 19th century when it was increasingly used by Europeans to refer to the pagan indigenous population. Yet Dayak is a rather imprecise term, since it covers a multitude of very distinct peoples.

⁹⁸ Wade D. et al. Nomads of the Dawn: The Penan of the Borneo Rainforest; Pomegranate Artbooks, 1995

⁹⁹ Seydlitz Band 3: Afrika, Asien, Australien; Ferdinand Hirt/Hermann Schroedel Verlag, Kiel/Hannover 1966

¹⁰⁰ Ethnologue – Languages of the World <http://www.ethnologue.com/> accessed 12 February 2005

¹⁰¹ Payne J., Cubitt G., Lau D. and Langub J.: This is Borneo; New Holland, 2001

¹⁰² The Jakarta Post: A glimpse of the Madurese and Dayaks in Kalimantan, http://www.thejakartapost.com/special/os_sampit_dayak.asp; accessed February 12, 2005

¹⁰³ Payne J., Cubitt G., Lau D. and Langub J.: This is Borneo; New Holland, 2001

The seven main groups include: The Iban (previously known as Sea Dayak); the Bidayuh (Land Dayak); the Kayan-Kenyah group; the Maloh; the Barito; the Kelabit-Lun Bawang group; and the Dusun-Kadazan-Murut group.¹⁰⁴

All together the term Dayak encompasses hundreds of different ethnic groups, each of them with a distinct culture, social organisation and language.

By and large the Dayak live in the interior, though there are also some coastal populations. Religious conversion in the past resulted in the reclassification of some Dayak as Malay (a process referred to as *masuk melayu* - "to become Malay" or "to enter into Malaydom").¹⁰⁵

The term Dayak is sometimes used inaccurately to refer to the nomadic people of the interior - the Penan, in various sources also referred to as Punan. There are scholars who assert that the Penan have a different origin and are therefore a separate population. Others suggest that the differences are less fundamental and have been shaped purely by environmental and economic factors.¹⁰⁶

Many formerly nomadic groups have become farmers and have "joined" the Dayak and the groups that live mostly in the central mountainous regions of Sarawak, Brunei, East Kalimantan and the interior parts of West and Central Kalimantan. These groups are not generally encountered in Sabah or south of the Equator.¹⁰⁷

In the mid 1990s there were believed to be over three million Dayak, with a population density of 14 people per square kilometre.¹⁰⁸ Today there are estimated to be about 4 million Dayak on Borneo.¹⁰⁹

¹⁰⁴ Payne J., Cubitt G., Lau D. and Langub J.: *This is Borneo*; New Holland, 2001

¹⁰⁵ King V.T.: *The Peoples of Borneo* Blackwell Publishers, Oxford, 1993

¹⁰⁶ Sellato B.: *Nomads of the Borneo Rainforest*; University of Hawaii Press, Honolulu. 1994

¹⁰⁷ Payne J., Cubitt G., Lau D. and Langub J.: *This is Borneo*; New Holland, 2001

¹⁰⁸ Alcorn, J.B. and Royo A.G., eds.: *Indigenous Social Movements and Ecological Resilience: Lessons from the Dayak of Indonesia*. Washington, DC: Biodiversity Support Program, 2000

¹⁰⁹ Djuweng S.: *Are the Dayak on the Way to Extinction?* ; published in The Jakarta Post, October 10, 1997

There are also significant numbers of Chinese and, to a much lesser extent, Indian immigrants on Borneo. The Chinese are especially prominent in the trading and commercial sectors and the majority are urban based. While some long established communities exist, the vast majority of the settlements were founded within the last 200 years.¹¹⁰



Figure 5: Kenyah Dayak people: Chief with his wife, Long Alango Village © WWF-Canon / A. Compost

2.2 The Dayak

2.2.1 Origins & History

While there is evidence of human habitation of Borneo reaching back 40,000 years, the ancestors of today's Dayak only began to settle there around 4,500 years ago.

The Austronesian languages still spoken today link the Dayak to migrations from the Philippines and there are a number of theories as to how Borneo came to be inhabited by Austronesians.

The most compelling theory argues that the origins of the Austronesians lie in the southern mainland of China. From there, they migrated to Taiwan around 4,000 BC and to the Philippines around 3,000 BC before finally reaching Borneo about 2,500 BC. The Pacific Islands are believed to have been colonised some time around 1,500 BC, while Java and Sumatra were not inhabited by Austronesians for a further 500 years.¹¹¹

It is now generally assumed that the people who lived on Borneo before the Dayak, were linked to the

¹¹⁰ King V.T.: *The Peoples of Borneo* Blackwell Publishers, Oxford, 1993

¹¹¹ King V.T.: *The Peoples of Borneo* Blackwell Publishers, Oxford, 1993

indigenous peoples of Australia and Papua Guinea and were displaced or assimilated by the Austronesians.

2.2.2 Trade & Commerce

While Dayak communities were self sufficient in food, with some producing their own tools from locally obtained iron, they traded goods to meet other needs. Products such as ceramics, beads, cloth, marine produce and metal tools were all in high demand. In return for these products, the Dayak traded rattan, tree resins such as camphor (which is used in Chinese traditional medicine), seeds and nuts. Other valuable trading commodities included: gutta-percha (a latex from Palaquium trees, widely used in the 19th century for coating telegraphic and electrical wires), Gaharu fragrance (incense wood found in trees of the genus Aquilaria and until today much prized as raw material for fumigating sticks), perfume and Asian traditional medicine.¹¹²

Another early trade product was bee's wax that was shipped to Manila and China for use in the manufacture of candles. Most of the bee's nests are found in the branches of Borneo's largest tree, the Mengaris, which can reach a height of up to 85 meters. To reach the nests, the collectors would make bamboo ladders that were permanently attached to the trees. Today the scars from the ladders can still be found on many Mengaris trees and the honey from the bees' nests is still used by local people.¹¹³

In the 1820s it was reported that 150 tons of beeswax were obtained annually from one region in Borneo alone and one local Dayak chief was reported to have nearly a thousand men employed in the procurement of bees wax. The Mengaris tree (*Koompassia excelsa*) is listed on the threatened species list by the IUCN.¹¹⁴

2.2.3 Agriculture

Trade is not the only thing that connected many of the Dayak tribes. Even today, rice cultivation is practised by virtually all of the Dayak. In some Borneo

languages the word for food translates as rice. For growing this sacred crop, the Dayak used (and still do so today) systems of shifting or swidden agriculture ("slash and burn").

This approach to agriculture reflects the Dayak vision of prosperity, which holds that river, land, and forest are all essential to the Dayak identity. That same vision is reflected in the shifting mosaic land-use pattern that the Dayak create in the forest ecosystems in which they live.

In a typical Dayak land use mosaic there are patches of natural forest, cultivated forest, rotating swidden/fallow and permanent fields suited to the ecological conditions in the mountains, wetlands and river valleys of a particular community's territory. Permanent wet rice fields are the only non-forest areas.

It is sometimes argued that shifting cultivation has major negative consequences for natural forests. While there is no doubt that the traditional shifting nature of agriculture has, to some extent, impacted the rainforests, research shows that this impact was limited compared to that of industrial deforestation.

It is estimated that 30,000 households of shifting cultivators in Sarawak are clearing about 72,000 ha of land, far less than through logging. More importantly, only 5% of the clearing from shifting cultivation is done in primary forests, with the vast majority taking place on fallow land.¹¹⁵ In Kalimantan alone more than 700,000 ha of forest are lost every year, with only a fraction of that attributed to shifting cultivation.¹¹⁶

Moreover, while shifting agriculture has been commonplace for hundreds of years, it is only since the emergence of monoculture cash crops and industrial logging that forest depletion and soil erosion have become serious problems.

In the Dayak culture rice is a sacred crop and the cultivation of rice is considered to be as much a religious as an economic activity. It is the link between the human and the supernatural worlds.

¹¹² Payne J., Cubitt G., Lau D. and Langub J.: This is Borneo; New Holland, 2001

¹¹³ Payne J., Cubitt G., Lau D. and Langub J.: This is Borneo; New Holland, 2001

¹¹⁴ Asian Regional Workshop Conservation & Sustainable Management of Trees, Viet Nam 1998. *Koompassia excelsa*. In: IUCN 2004. and 2004 IUCN Red List of Threatened Species. www.redlist.org. Downloaded on 13 February 2005.

¹¹⁵ Sellato B.: *Nomads of the Borneo Rainforest*; University of Hawai Press, Honolulu, 1994

¹¹⁶ Holmes, D.A.: Indonesia - *Where have all the forests gone?* Environment and Social Development East Asia and Pacific Region. World Bank Discussion Paper. Written 2000, published June 2002

In traditional belief and knowledge systems rice and its cultivation is conveyed to humans by the gods and through rituals can bring spiritual blessings into this world for the benefit of humans. Dayak therefore believe that, with the exception of processing, rice should not be struck, abused or discarded. If it is harmed a ritual of apology and forgiveness must be performed.¹¹⁷

2.2.4 Society & Culture

The Dayak developed agro-ecosystems adapted to their tropical forest environment, based on the farming techniques introduced into Borneo by the Austronesians.

These agro-ecosystems - and the behaviour of the people who apply them - are governed by indigenous institutions: rules created and enforced by community consensus through community-based political processes. Dayak institutions evolved in harmony with the ecosystems they manage.¹¹⁸

Some authors have described Dayak society as anarchic, based on the observation that in some groups where no individual has overall authority, it is difficult for anyone to assert control. These Dayak groups classless societies with no true chiefs. Where a headman does exist, his authority is based solely on the consent of the group he leads.¹¹⁹ It is through the assertion of the group that he is allowed to govern and it is the group which determines the extent of his authority.

The societies of the Dayak can be split into those that follow egalitarian principles and those that follow hierarchical ones.

The Kayan-Kenyah group

The most dominant group of Dayaks in central Borneo are the Kayan whose language is considered the lingua franca in that area. In the mid 1990s they numbered

¹¹⁷ King V.T.: *The Peoples of Borneo* Blackwell Publishers, Oxford, 1993

¹¹⁸ Alcorn, J.B. and Royo A.G., eds.: *Indigenous Social Movements and Ecological Resilience: Lessons from the Dayak of Indonesia*. Washington, DC: Biodiversity Support Program, 2000

¹¹⁹ Geddes W.R., *Nine Dayak Nights*; Oxford University Press, Melbourne, 1957

about 270,000 and were spread widely in East and West Kalimantan as well as in Sarawak.¹²⁰

Their society was stratified with classes of nobles (from which the village chiefs were chosen), commoners and slaves. The one or two classes of commoners (the largest class) were obliged to provide free labour and goods for the higher classes, who in turn were responsible for ensuring the protection and spiritual welfare of the community. Originally from the Apo Kayan region in East Kalimantan, they split and spread in all directions during the 18th and 19th centuries. Older Kayan women usually have pierced earlobes that are distinctly stretched from wearing heavy metal earrings.¹²¹

The Kenyah have very close ties to the Kayan and follow a similar hierarchical social system. Often these tribes are neighbours.¹²² It is known that the Kenyah initially lived in the mountainous area between what is now part of the Bahagian Belaga and Bahagian Baram in Sarawak and the Iwan River area in East Kalimantan. Like the Kayan they live in longhouses and it is possible that they were still hunters and gatherers prior to the arrival of the Austronesians and did not grow crops.

Although many Kenyah groups once populated the remote and inaccessible areas of the Apau Kayan, many have now migrated, primarily in the vicinity of urban areas where access to basic necessities such as salt and clothing is easier.

The old beliefs of the Kenyah were manifested in all social activities, including choosing the location of settlements. Bird omens (amen-amen) were always used and people did not hesitate to abandon a settlement if the signs were unfavourable, even if village construction was nearing completion.

The sound and the direction of passage of several types of animals and birds - the isit bird and the pengulung (a type of owl), the deer, the Brahminy kite, the cobra, and others - were believed to influence human life and were interpreted as auspicious or inauspicious signs.

¹²⁰ King V.T.: *The Peoples of Borneo* Blackwell Publishers, Oxford, 1993

¹²¹ Payne J., Cubitt G., Lau D. and Langub J.: *This is Borneo*; New Holland, 2001

¹²² King V.T.: *The Peoples of Borneo* Blackwell Publishers, Oxford, 1993

Some Kenyah tribes conducted ceremonial rites in order to protect their villages. The mamat festival, for example, always involved human skulls from headhunting (ngayau). If an epidemic spread to a village and left many dead, it was necessary to hold the tepo ceremony which required the blood of a sacrificed human in order to protect the village.¹²³

The Kelabit-Lun Bawang group

The Kelabit are a group usually found in the region which has as its centre the meeting zone of Sarawak, Sabah, Brunei and East Kalimantan.¹²⁴

There were about 40,000 people in these tribes in the mid 1990s. Although they also practise shifting cultivation, they engage in irrigated rice production and raise cattle.

What makes them very distinct is their use of stone monuments, which may in fact be a long established tradition on Borneo.

In contrast to most other Dayaks, the Kelabit are much more oriented to the land than to the rivers, probably a result of their adaptation to the high tablelands of interior Sarawak.¹²⁵

The Iban

The Iban (previously referred to as Sea-Dayak) are the largest group within the Dayak population. The original territory of the Iban is located in the region of the Kapuas River and the coastal regions of West Kalimantan from where they slowly spread into Sarawak. During their expansion they assimilated other, smaller, Dayak as well as a number of hunter-gatherer groups. In the mid 1990s there were between 500,000 and 550,000 Iban. The Iban are best known for their egalitarian society and placing a very high value on individual determination.¹²⁶

Although Iban society is classless, it is a very status-conscious and competitive society in which personal

achievement is important for attaining status and prestige in the community. The acquisition of wealth and the production of consistently good rice crops are the main criteria for success. The institution of pejalai (bejalah), in which young men travel to distant areas to gain wealth and experience, is an old and important part of Iban life. To return with valuable items is the object of the trip and his numerous tattoos testify to a man's travels.

Iban religion revolves around augury, omens and rice. There are a great number of gods and spirits. Petara, who some think is derived from the Hindu religion, is the main deity. Ancestor worship is important, but securing a good rice crop is the principal function of the religion. Rice is believed to have a soul and it must be treated respectfully and propitiated in order to provide a good yield. In a number of areas, Christianity has been adopted in addition to (rather than in place of) the old faith. It is viewed as another method of bringing good luck.¹²⁷

The Bidayuh

The Bidayuh people are sometimes referred to as Land Dayak. Their numbers throughout Borneo could be as high as 230,000.¹²⁸

Like the Iban they have an egalitarian society, but one that traditionally places much less importance on ostentation and militarism. Instead, their defining feature is quiet pragmatism. They live in small longhouses as well as closely spaced accommodation in some villages. Unlike the Iban, Bidayuh communities often feature a central community building known as baruk. This is used by the male population for discussion, story telling, entertaining, trading ceremonies, dispute setting and the making and repairing personal possessions.¹²⁹

¹²³ Liman Lawai: *A history of the Kenyah Leppo' Tau in Kayan Hulu Subdistrict, Apau Kayan*, in Eghenter, C.; Sellato, B.; Devung, G.S.; eds.: *Social Science Research and Conservation Management in the Interior of Borneo: Unravelling past and present interactions of people and forests*. Bogor, Indonesia, CIFOR, 2003

¹²⁴ Payne J., Cubitt G., Lau D. and Langub J.: *This is Borneo*; New Holland, 2001

¹²⁵ King V.T.: *The Peoples of Borneo* Blackwell Publishers, Oxford, 1993

¹²⁶ Ibid.

¹²⁷ Centre for Social Anthropology and Computing: *Society-Iban* http://lucy.ukc.ac.uk/EthnoAtlas/Hmar/Cult_dir/Culture.7847, University of Kent at Canterbury, undated

¹²⁸ King V.T.: *The Peoples of Borneo* Blackwell Publishers, Oxford, 1993

¹²⁹ Payne J., Cubitt G., Lau D. and Langub J.: *This is Borneo*; New Holland, 2001

The Barito

The population of the shifting cultivators of the Barito group is estimated to be in the range of 350,000 and covers much of the southern part of the island. As is the case with most Dayak they subdivided and named themselves according to the river along which they live.

Some subgroups live in hierarchical societies in multi-family great houses built on stilts instead of longhouses. There are also Barito communities of coastal Muslims who were originally Barito-speaking Dayak but have since converted to Islam. The religion of the Barito, known as Kaharingan is officially recognised by the Indonesian government alongside Islam, Christianity, Buddhism and Hinduism. They are also well known for their elaborate secondary funeral rites called gombok: the corpse is temporarily laid to rest and after a suitable period, but before the flesh is completely decomposed, the remains are ritually treated. Sometimes they are cremated and at other times the bones are cleaned and placed in a receptacle, jar or wooden ossuary.¹³⁰

The Dusun-Kadazan-Murut

This group inhabits the north-eastern part of Borneo and numbers around 400,000 people. Dusun is a Malay-derived term used by coastal people to refer to farmers. It carried pejorative connotations and referred to backward, coarse country folk. Some sub-groups also practised jar burial, headhunting, headhouses and body tattoos.¹³¹

Amongst the Dusun and the Kadazan, individual houses had already replaced longhouses at the time of European contact, while for the Murut longhouses were still normal until recent decades. None of the Dusun-Kadazan-Murut societies is stratified and they do not revere ostentatious material objects, although many communities traditionally put a high value on ancient Chinese stoneware jars and brass gongs.

The Penan

The origin of the Penan is contentious. Three possible explanations are usually given.

The first account sees the Penan's hunter-gatherer existence as a remnant of the development of farming practices on Borneo. This theory argues that the Penan were left behind when all the other groups made the transition to agriculture. Supporters of a second theory argue that their nomadic culture is completely independent from the culture of farmers. A third hypothesis describes the Penan way of life as "devolutionary", arguing that the Penan descended from groups that already possessed knowledge and tools of agriculture prior to their arrival in Borneo, but decided to live in the primary forests for political (such as warfare) or economic (hunting-gathering being easier to live off) reasons.¹³²

Regardless of their origin, the Penan are few in numbers. In the mid 1990s it was believed that in Sarawak, less than four percent of the roughly 10,000 Penan were still entirely nomadic.

Like thousands of years ago, the Penan are still dependent on a healthy forest ecosystem for their daily subsistence. A typical Penan domain is surrounded on all sides by the lands of the farming peoples which means the Penan live in an enclave of primary forests, typically in river basins upstream from the farming communities, though rarely above 1,000 meters altitude. Yet it is important to mention that travelling Dayak frequently use Penan territories and that the Penan are not cut off from other peoples of Borneo and indeed engage in trade with other groups.¹³³

The subsistence of the Penan depends on a small number of species of sago palms, whose trunk contains pith that is rich in starch. From this they extract a type of flour high in energy value. The Penan only cut one or two stems in a grove, thereby ensuring that the plant does not die and will produce new stems to provide food for future generations. In the event that the trees do not flower, the leaf buds, which contain protein and carbohydrates, are eaten instead of the pith.¹³⁴

The movements of a group of Penan in the forest are therefore dependent on the availability of the sago palms as they move from one grove to the next. In

¹³² Sellato B.: *Nomads of the Borneo Rainforest*; University of Hawaii Press, Honolulu, 1994

¹³³ Sellato B.: *Nomads of the Borneo Rainforest*; University of Hawaii Press, Honolulu, 1994

¹³⁴ Payne J., Cubitt G., Lau D. and Langub J.: *This is Borneo*; New Holland, 2001

¹³⁰ Ibid.

¹³¹ King V.T.: *The Peoples of Borneo* Blackwell Publishers, Oxford, 1993

addition to the sago palms there are about fifty types of fruit that are considered edible as well as numerous leaves, ferns and flower buds.

The other main ingredient (though not as important as plants) in the diet of a typical nomadic Penan tribe of 25 to 50 people is meat from wild pigs, which are hunted with blowpipes or spears. The territories of the Penan are delineated by natural features such as mountain ranges and rivers and only change very slowly. The individual bands usually do not make any territorial claims within their ethnic domain but there have been feuds between Dayak groups of different ethnic domains.¹³⁵

One of the main traits all Penan have in common is the long-term sustainable use of their food sources. Being so completely dependent on the natural environment they live in means having to live with it rather than dominating it. For a Penan a forest is not just a natural resource, but also a home, a history and a way to survive.



Figure 6: Kenyah Dayak woman and child in Long Alango / Malinau District / East-Kalimantan © WWF / T. Bangun

2.3 Radical transformations

2.3.1 Sustainable land use and deforestation

Borneo has changed significantly over the last few hundred years and this change has undoubtedly affected the social and economic life of the indigenous people. The rate of it has accelerated dramatically over the last

thirty to fifty years however and this process is increasingly directed from the outside.

For thousands of years the rainforest has provided the means for survival of plant and animal species. Humans have also lived from the products of the forests for many centuries and the early adoption of agricultural techniques such as forest clearance was compatible with the natural environment. Although the indigenous people or colonial forces have always exploited the natural environment, the industrial destruction of the rainforest is a fairly recent phenomenon.

The intactness of the water systems and forests prior to the formation of Indonesia and Malaysia as independent states is proof that the local management of the land by the indigenous people was successful in preserving their natural resources and way of life.

Only with the recent commodification and commercialisation of the rainforest, have we started to witness a serious threat to the sustainable use of the forests. Never has the transformation of the Dayak been so radical.

Today, no activity is more threatening to the lifestyle of the indigenous people of Borneo than deforestation through logging and conversion.

Of the many threats facing the cultures and societies of the indigenous peoples, which can be attributed, at least in part, to deforestation, the most notable are:

Globalisation and economic development: although more visible in coastal regions, the extraction of timber and the exploitation of the forest has brought with it the economic transformation of traditional rural communities. This has resulted in an increased dependency on the modern market and engendered economic insecurity. A further consequence has been an increase in individualism, which has undermined traditional forms of reciprocity and responsibility towards family and community.

Transport and communication: modern communication and transport routes have expanded well into the interior, mainly through logging roads, but also through faster boats. While this has resulted in an increase in local mobility, it has also served to undermine village solidarity and the close-knit nature of local societies and economic relationships.

Religion: Christianity and Islam are becoming increasingly influential. The spread of these religions into the interior, aided by the development of logging

¹³⁵ Sellato B.: *Nomads of the Borneo Rainforest*; University of Hawaii Press, Honolulu, 1994

roads and the consequent increase in mobility, has resulted in the erosion of traditional rituals and ceremonies such as funeral and agricultural rites and the observance of ritual practices and taboos. Oral history, through which the tribal worldview is typically conveyed, is also being eroded and the spread of Christian values has resulted in the abandonment of traditional clothing and adornment, such as loincloths, tattoos and copper earrings.¹³⁶

2.3.2 Governance

Another root cause of change in Dayak society is the influence from centralised governments.

To govern successfully, central governments try to relocate scattered communities into more accessible locations so that they can be better administered. The more homogenous populations are, the easier they are to govern.

Prior to the emergence of such governments, the various tribes were able to make their own decisions concerning mobility, within the matrix of other ethnic groups. Centralised governments are often based on general policies that are applied indiscriminately across a large section of the population and as such fail to take into account ethnic and cultural differences amongst the population.

On Borneo, with its hundreds of ethnically distinct populations, this problem is particularly acute and is further amplified by the special distance of the central governments of Malaysia and Indonesia.

2.3.3 Indigenous resistance

Like other post-colonial states in South and Southeast Asia, Indonesia inherited the doctrine of state control over 'waste' land and forests from its erstwhile colonial rulers. Over 70 percent of the country's entire terrestrial area is designated as forested land and is thus subject to direct state control.

The Basic Agrarian Law (BAL) of 1960 was the first major legislation enacted in Indonesia since independence and the 1945 constitution was an attempt to create a new uniquely Indonesian framework for managing land and natural resources.

¹³⁶ King V.T.: *The Peoples of Borneo* Blackwell Publishers, Oxford, 1993

The law is based on Article 33 of the constitution, which states that land in Indonesia has a 'social function' and that the earth, water, air and natural riches are controlled by the State of Indonesia as the representative authority of the people. Land is seen as the fundamental provider of food, shelter and clothing – rights that are guaranteed in the constitution and national philosophy *Pancasila*. This notion is perceived to be in direct opposition to the Western concept of land as a factor of production, as a commercial commodity to be bought and sold in a market economy with financial gain as the main consideration.

Indigenous peoples have institutions, rights, and obligations that differ from mainstream groups within the country. The 1945 Constitution of Indonesia recognizes the existence of traditional political entities, derived from the cultural heritage of the indigenous peoples of Indonesia. This includes indigenous institutions, as well as organisations, mechanisms, laws, rights and obligations within the institutional system of the indigenous peoples.¹³⁷

Article 18, Part II of Indonesian Constitution 1945 states that: "Within the Indonesian territory were found more or less 250 self-governing regions and village communities such as Desa in Java and Bali, Negeri in Minangkabau, Dusun and Marga in Palembang and so on. Those territories possess their own indigenous structures; therefore, they can be considered as special territories. The Republic of Indonesia respects the territories and any state's regulations related to the territories will take into account their original rights."

Still, a number of laws were introduced later that undermined the land rights of the indigenous people in Indonesian Borneo. Fifteen years after independence, the Central Indonesian Government introduced Basic Agrarian Law No. 5, 1960. This law marginalises the rights of the indigenous peoples of Indonesia. Seven years later, after Suharto came to power, his administration introduced Basic Forestry Law No. 5, which enabled domestic and international investors to exploit the forests. In 1968, the Suharto administration

¹³⁷ Alcorn, J.B. and Royo A.G., eds.: *Indigenous Social Movements and Ecological Resilience: Lessons from the Dayak of Indonesia*. Washington, DC: Biodiversity Support Program, 2000

issued Mining Law No. 11, giving the government full control over all mines, making the Dayak powerless to stop pollution caused by mining operations. Furthermore, in 1979, the Suharto administration imposed the Law on Village Government No. 5, which does not recognize the roles of *adat* (traditional leaders) in indigenous communities, nor does it recognize *adat* governance.¹³⁸

The turbulent events in Indonesia during the closing years of the 20th century prompted the reopening of public discussion on many long-standing issues of social and economic reform. Land reform is one of many agendas that preoccupied policy makers, scholars and activists as the nation attempted to reinvent itself in the wake of the collapse of the 32-year New Order Government of ex-President Suharto. Voices from different sectors of society and from within the state, question whether Indonesia's 40-year-old agrarian laws and new regional and village autonomy laws are appropriate in addressing the persistent and growing problems of social welfare and injustice.¹³⁹

In Malaysian Borneo, similar processes that diminished indigenous land rights have occurred. In Sarawak, under the 1957 Sarawak Land Code, the Dayak's rights to land are recognised and protected by law, yet in practice these rights are not enforced, which benefits forestry sector industries. The Brooke and subsequent British Colonial Administration introduced statute law to Sarawak about 150 years ago. During the early days of colonial occupation, the administration recognised native customs and peoples' usufruct rights to land and the resources upon it. But the colonial authority tended to ignore rights over fallow farming land and hunting territories, with the aim of weakening customary land-right claims. The Forest Ordinance of 1953, for example, classified large areas of forests as Permanent Forests, which abolished native rights in certain areas and strictly controlled native activities in general. Native rights were non-existent in 'Forest Reserves'. The aim of this legislation was to curtail shifting

cultivation and to reserve the forest lands for timber extraction.¹⁴⁰

Under current practices, when the Sarawak state government issues a licence for logging or for a plantation scheme, the government takes the view that Native Customary Land is restricted to the areas cultivated at the time, excluding areas which are part of the shifting cultivation cycle. More recently, the state government has refused to recognise Native Customary Rights on any land that is not continuously cultivated.¹⁴¹

There have been increasing protests of Dayak and Penan communities against deforestation activities.

Sarawak:

For many years the Dayak and Penan have protested that their dependence on the forest, their native customary land rights, and their practices of sustainable forest use were ignored when large logging concessions were given to international companies.

In 1987 Penan, Kayan, and Kelabit communities blocked roads at twenty-three different sites in the Baram and Limbang Districts in Sarawak. In all, some 2,500 Penan from twenty-six settlements took part in the protest. The blockades were maintained for eight months and gained worldwide support. A number of smaller blockades followed.¹⁴²

On September 10, 1989, indigenous peoples in nineteen communities in the Upper Limbang and Baram, erected twelve new barricades. On October 5th, eleven Iban longhouse communities blockaded roads in the Bintulu District. By the end of the fall of 1989, an estimated 4,000 Dayaks had joined the protest, shutting down logging operations in nearly half of Sarawak.¹⁴³

After the indigenous people felt that the government did not fulfil the promises that led them to abandon the

¹³⁸ Alcorn, J.B. and Royo A.G., eds.: *Indigenous Social Movements and Ecological Resilience: Lessons from the Dayak of Indonesia*. Washington, DC: Biodiversity Support Program, 2000

¹³⁹ Thorburn C.C.: *The Plot Thickens - Decentralisation and Land Administration in Indonesia*; Program in International Development and Environmental Analysis (IDEA), Monash University Clayton, Victoria, Australia, 2003

¹⁴⁰ World Rainforest Movement and Forests Monitor Ltd: *High Stakes: The Need to Control Transnational Logging Companies: A Malaysian Case Study*, 1998

¹⁴¹ World Rainforest Movement and Forests Monitor Ltd: *High Stakes: The Need to Control Transnational Logging Companies: A Malaysian Case Study*, 1998

¹⁴² Davis W., Mackenzie I., Kennedy S.: *Nomads of the Dawn*, Pomegranate Artbooks, 1995

¹⁴³ Davis W., Mackenzie I., Kennedy S.: *Nomads of the Dawn*, Pomegranate Artbooks, 1995

blockades in 1990, protests started again in 1996 and continue until today in many areas of Sarawak.

Environmental Non Governmental Organisations (NGOs) began appearing in Indonesia during the late 1970s and continually ‘pushed the envelope’ of public discourse. Resource conservation, environmental and social justice and sustainable development were prevalent NGO targets. One particular focus of NGOs and indigenous communities was Law No. 5 of 1979 on Village Government. The Indonesian government responded to protests with a mixture of repression, concessions and co-optation.¹⁴⁴

Starting in 1993 many indigenous peoples’ organizations became more active in organizing, networking and lobbying in Kalimantan, working towards the recognition and respect of indigenous peoples. Some of the previous laws have been removed after years of advocacy. These laws have generated more respect for indigenous peoples’ rights—especially concerning natural resource management and *adat* structures. The Basic Forestry Law No. 5, 1967 was changed into Law No. 41, 1999 and the Law on Village Government was replaced by Local Government Law No. 22.

In addition, projects mapping the customary lands of villages based on oral history, traditional knowledge, sketch maps, and global positioning systems have been carried out. These projects, when accepted by the authorities, are important for strengthening the rights of the indigenous people and fostering constructive discussions between indigenous peoples and local governments.¹⁴⁵

Kalimantan

While in Sarawak largely peaceful blockades were used as a means of protest, there have been several violent attacks by Kalimantan Dayak against Madurese communities who were resettled from the island of

Madura (close to Java's north-eastern coast) in the wake of the government’s transmigration programs.

The violence in Sampit, Central Kalimantan, started on the night of February 17-18, 2001 when a Dayak house was burned down. Rumour spread that an ethnic Madurese was responsible. Immediately, a group of Dayaks went into a Madurese neighbourhood and began burning houses. In the ensuing violence, a Dayak and a Madurese were killed. The conflict escalated and in a matter of days the violence had spread to Kualakayan, a subdistrict 110 km north of Sampit, and to Palangkaraya, the provincial capital of Central Kalimantan, some 220 km away. Between 200 and 600 people were killed.¹⁴⁶

The true origins of the violence are a subject of hefty debates. Some think it was caused by a small number of violent Dayak gangs, while others see it as a result of transmigration and the subsequent loss of Dayak culture and identity, as well as the erosion of traditional Dayak territory through deforestation.



Figure 7: Women in Kayan Mentarang National Park area, East-Kalimantan © WWF / T. Bangun

¹⁴⁴ Thorburn C.C.: *The Plot Thickens - Decentralisation and Land Administration in Indonesia*; Program in International Development and Environmental Analysis (IDEA) Monash University Clayton, Victoria, Australia, 2003

¹⁴⁵ Sirait M. et al: *Mapping Customary Land In East Kalimantan, Indonesia: A Tool For Forest Management - Spatial information and ethnoecology : case studies from Indonesia, Nepal, and Thailand*. Honolulu : East-West Center, 1994, pp. 1-14

¹⁴⁶ Human Rights Watch: *Indonesia: The Violence in Central Kalimantan (Borneo)*, Press Backgrounder, <http://www.hrw.org/backgrounder/asia/borneo0228.htm> accessed February 28, 2005

3. Land Use in Borneo

“Failure to institute transparent and equitable land use solutions will lead to the irreversible ecological degradation of Borneo’s terrestrial ecosystems. Effective frontier governance and sound regional-use planning are critical to protecting even uninhabited and remote protected areas from regional, and increasingly international, market forces.”

L.M Curran et al¹⁴⁷

3.1 The history of land use in Indonesia¹⁴⁸

Traditionally, areas for human settlement were chosen with view to the fertility of the soil and the ease of producing food. The fertility of the volcanic soils of Java and Bali is the reason for the high population density of these “inner islands” and ultimately led to Java becoming the seat of government for the Indonesian archipelago. Kalimantan and Borneo, by comparison, generally have less fertile soils and therefore, less dense human populations.

The areas in the region that had denser populations reached an advanced stage of deforestation long before the 20th century. A description of the Toba highlands of North Sumatra in 1824 showed that there had already been extensive deforestation and that degraded grasslands were widespread. In Borneo unfavourable climatic conditions and unhealthy environment (i.e. swamps) often discouraged intensive settlement and subsequent deforestation. The earlier settlements especially were river and coastal based, while the elevated areas retained a forest cover intact through to the modern era.

It was only the advent of rubber as a major source of revenue that triggered the process of deforestation on Borneo. “Jungle rubber” established itself as the predominant product for smallholders, at least in the western part of Kalimantan. But even in the mid-1980s,

¹⁴⁷ Curran L.M., Trigg S.N., McDonald A.K., Astiani D., Hardiono Y.M., Siregar P., Caniago E. and Kasischke E.: *Lowland Forest Loss in Protected Areas of Indonesian Borneo*; Science, 13 February 2004; VOL303: 1000-1003

¹⁴⁸ Holmes, D.A.: *Indonesia - Where have all the forests gone?* Environment and Social Development East Asia and Pacific Region. World Bank Discussion Paper. Written 2000, published June 2002

North Sumatra was still the Indonesian province with the largest area of estate crops.

Traditional methods of agriculture, while smaller than today’s industrial conversion, still had significant impact. Large tracts of West Kalimantan’s Kapuas basin for example lost its original forest cover a long time ago.

While Indonesia has long supported the timber industry, it was during the 1970s that the systematic logging of the less populated areas began, in the process also providing the access that facilitated spontaneous settlement, with logging roads replacing rivers as the main means of access into the more remote areas.

During this period transmigration was becoming the primary engine for new, larger settlement in Kalimantan. This was not a new concept, because the large rubber plantations usually obtained most of their manpower as indentured labour from Java. In the early 1900s however, the government introduced transmigration as a deliberate policy. The World Bank, initially offering an unrealistic 5 ha per family, funded the transmigration schemes. Unfortunately the concept was based on a number of false premises, such as the idea that the land that was settled would be suitable for large scale sustained food production, with fertilisers providing the nutrients necessary for growth and that such land was almost limitless on the “outer islands”. A further assumption was that forested land was free from existing claims. These major misconceptions made Indonesian Borneo a target for transmigration schemes.



Figure 8: Traditional fishing © WWF / T. Bangun

Fact Box 1: Transmigration

Indonesia's population density varies greatly from island to island. Out of 218 million people (2002), more than 120 million live on Java, which has excellent soils, but only about 7 percent of the nation's land. Densely crowded Java has small agricultural holdings and growing numbers of landless people are swelling its towns and cities. The outer islands have a large share of Indonesia's natural resources, less dense populations and higher rural incomes, on average, than Java.

Between 1903 and 1990, the Transmigration Program resettled more than 3.6 million people in the outer islands at government expense. They received houses, land for farming and a subsistence and production package during their early settlement years. Most applicants for transmigration were young landless agricultural workers and their families from Java and Bali.¹⁴⁹ With transmigration came the conversion of forests to farmland. As much as 300,000 ha of forests were converted in Kalimantan until 1998 for this purpose.¹⁵⁰

Although transmigration started at the beginning of the century, the numbers sent to Kalimantan were relatively small prior to the establishment of the Suharto government in 1966-67. Under this government transmigration increased substantially. Between 1971-1980 more than 100,000 migrants came to Kalimantan. After 1980, the national transmigration program was expanded with the number of migrants in Central Kalimantan reaching almost 180,000 per decade. In 2000, transmigrants amounted to 21 % of the population of Central Kalimantan. In Kalimantan, as in many areas where this policy was practiced, the large numbers of transmigrants exacerbated ethnic tensions between the new and existing populations and changed the demographics of the region considerably.¹⁵¹

During the last two decades, the groups that arrived in Borneo included Madurese, Javanese, Banjarese, and ethnic Chinese from Java, Madura, Bali, Sulawesi and Sumatra. Additionally, more Muslim Malays have settled in Kalimantan.¹⁵²

The rate of transmigration reached its peak in the mid 1980s, but it is still doubtful whether this was the main reason for deforestation. The encroachment by "pioneer farmers" along the forest boundaries continued to escalate due to population growth and increased mobility.

It was around the same time that the government introduced its policy of promoting the diversification for *non-migas* commodities outside the oil and gas

sector. In Malaysia, oil palms were planted on a large scale much earlier.

The development of oil palm plantations in Malaysia has several origins and policy bases. The Federal Land Development Authority (FELDA) commenced planting oil palm in the 1960s, partly as a means to bring rural subsistence farmers in Peninsular Malaysia into the emerging diversified economy. In that sense, the idea succeeded, as families who were subsistence farmers in the 1960s entered FELDA oil palm schemes and then saw many of their children and grandchildren educated and then moving from rural areas into towns. Even in the early 1980s, FELDA and national level planners realized that the world market for vegetable oils would grow, in particular with the economic expansion of China and other developing nations. This thinking was also adopted in Sabah in the 1980s and Sarawak in the 1990s, as it became clear that palm oil would bring in more profits than long-term timber production from natural forests. Another reason why Sabah established large scale oil plantations relatively early was that eastern Sabah soils and rain saturation are ideal for oil

¹⁴⁹ The World Bank Group: *Transmigration in Indonesia*: <http://wbIn0018.worldbank.org/oed/oeddoclib.nsf/0/4b8b0e01445d8351852567f5005d87b8?OpenDocument> 1994, accessed March 7, 2005

¹⁵⁰ Global Forest Watch, Global Forest Watch Indonesia, World Resources Institute: *The State of the Forest, Indonesia*, 2002

¹⁵¹ Program on Humanitarian Policy and Conflict Research: Building Human Security in Indonesia, http://www.preventconflict.org/portal/main/maps_kalimantan_resources.php accessed March 8, 2005

¹⁵² Ibid

palms. Therefore, the yield of fruit per hectare, per year in eastern Sabah is amongst the highest in the world.¹⁵³

Currently, Sabah does not allow oil palm planting in forest reserves, except that the government led Sabah Foundation has special permission to develop about 80,000 hectares of oil palm plantations within its 100 concession areas. Apart from the Sabah Foundation case, forestry and forest licensing in Sabah is not linked to oil palm plantations. Most land areas suitable for oil palm plantations in Sabah, outside forest reserves, have already been converted to plantations. However, as long as low cost migrant labour is available from outside Malaysia, it is expected that more plantations will be developed in certain areas e.g. non-forest and very degraded forests in accessible areas and on poor soils where palm oil yields are low but where alternative crops and forestry are not viable. In Sabah, it also happens that in areas where palm fruit processing mills are established by private companies, many small-scale landowners plant oil palms (typically a few to several tens of hectares) where previously they would not have planted this crop. This reflects the fact that - apart from the mill being a guaranteed buyer of the fruits - oil palm is a robust crop, requiring low maintenance even on marginal soils. Also, other agricultural crops in Sabah (and on Borneo generally) are difficult to market due to small and scattered human populations.¹⁵⁴

In Sarawak the situation is different. Its soils are only moderately to marginally suitable for oil palms. Unlike Sabah, Sarawak is linking oil palm development to forestry in the sense that contiguous land areas under a single management regime may have timber production from natural forests as well as oil palm plantation development. Also in Sarawak, unlike Sabah, there are schemes whereby land held under native customary tenure is developed with large plantations and profits are shared by the customary landowners and plantation developer. Much of lowland Sarawak is peat swamp and it remains uncertain whether the bulk of this land will be developed with oil palm plantations.¹⁵⁵

3.2 Land use management today

3.2.1 Sabah

Sabah has a total landmass of 7.37 million ha of which, according to the State Environmental Conservation Department (ECD), about 60 % remains under some form of forest cover. The areas designated for logging consist mainly of the Commercial Forest Reserves which are used for wood production and state land forests, most of which will eventually be used for permanent agriculture.¹⁵⁶

The Sabah Forestry Department divides its forest reserves into seven categories (rounded to 1,000):¹⁵⁷

Class I: Protection (342,000 ha): Forest conserved for the maintenance of essential climatic, watershed and other environmental factors. These areas cannot be logged.

Class II: Commercial (2,685,000 ha): Forest which can be logged to supply timber and other products. Most often lowland and hill dipterocarp forest, including forest up to about 800 meter.

Class III: Domestic (7,000 ha): Forest for supplying timber and other forest products for local consumption only.

Class IV: Amenity (21,000 ha): Forest providing recreational sites, especially near to access roads. Exotic species are often planted to enhance the amenity value of these areas.

Class V: Mangrove (316,000 ha): Forest for the supply of mangrove timber and other produce. *Rhizophora* species are the most commonly harvested of the mangrove trees, with products ranging from firewood to fishing stakes. The commercial harvesting of all mangrove wood products is controlled by the Forestry Department.

Class VI: Virgin Jungle (90,000 ha): Forest conserved intact for research purposes that cannot be logged.

Class VII: Wildlife (133,000 ha): Forest conserved primarily for the protection of wild animals. There are presently only two such reserves in Sabah, both in the Dent Peninsula on the east coast.

¹⁵⁶ Sabah Forestry Department: *Forests Resource in Sabah*; http://www.sabah.gov.my/htan/data_1/a_toppage_main/frame_s.htm accessed February 22, 2005

¹⁵⁷ Sabah Forestry Department: *Forests Resource in Sabah*; http://www.sabah.gov.my/htan/data_1/a_toppage_main/frame_s.htm accessed February 22, 2005

¹⁵³ John Payne WWF Malaysia, Personal Communication

¹⁵⁴ Ibid

¹⁵⁵ Ibid.

Of the 3.6 million ha of this *Permanent Forest Estate*, 2.7 million ha are classified as Commercial Forest Reserve and are divided into 27 Forest Management Units. In 1997, the Sabah government introduced a new sustainable forest management system, which also involved the allocation of Forest Management Units (FMUs) to 10 companies under a Sustainable Forest Management License Agreement (SFMLA). These agreements give a license holder the right to manage a Unit for a period of 100 years according to a management plan approved by the Forestry Department.

Forests outside the Permanent Forest Estate on *state land* (0.496 million ha) and *alienated lands* (1.888 million ha) may be harvested with a timber cutting license. However, clearing forests on these lands, without utilising the timber, does not require a timber-cutting permit. State and alienated lands are more usually situated in coastal areas and along major rivers (comparatively flat, lower elevation land).¹⁵⁸

If one considers categories I, IV, VI and VII as being protected from extraction, 586,000 ha of forests are protected. This is the equivalent of about 16% of the total forest estate.

The Sabah Forest Forestry Department does not give an exact figure for how much of the forest it wants protected in the long term or how much of the land should be part of the Permanent Forest Estate. Instead its strategy is rather vague. Its stated goals are:

- To identify sufficient areas to be included in the Permanent Forest Estate (PFE)
- To ensure that no part of the PFE is de-gazetted, except in extreme circumstances (in which case the excised area should be replaced)
- To specify State land areas which are suitable for inclusion into the PFE¹⁵⁹

The SFMLA concept is visionary, yet there are still some risks. One of the threats to its success is the fact that under the SFMLA system no significant amounts of raw material can be produced for the hundreds of timber processing companies in Sabah. Log shortages will become increasingly problematic as the Malaysian

authorities have also vowed to clamp down on illegal log imports from Indonesia. The large local and foreign markets for logs and timber products and the lack of cash flow among FMU-holders may lead some to argue that the system is impractical and unprofitable. They may state that alternative or shorter term land uses such as industrial monoculture plantations and mining bring in more and quicker profits, which could be reason for relaxing SFMLA regulations. The FMU holders also face a lack of revenues for a long period of time. The lack of a perspective on income within the first 10 years has led many FMU holders to propose the conversion of part of the FMU into fast growing tree plantations. Although these conversions appear to be located mostly in burned and very heavily degraded forest areas, the lack of incentives for natural forest regeneration may in the next years lead to further conversion of natural forests that still hold timber yield potential and biodiversity value.

See map section, “*Forest Status of Sabah*”, p. 17

3.2.2 Sarawak

According to the Sarawak government, more than 67% or 8.22 million ha of Sarawak’s land is under natural forest cover. The rest is made up of secondary forests, agricultural and urban lands.

It considers forestry as one of the strategic backbones of the economy in terms of deriving revenue from export earnings. With regard to long-term land use planning Sarawak has a 6:6:1 policy (6 million hectares agriculture and settlements, 6 million hectares commercial forest, 1 million hectares protected areas).¹⁶⁰

Recently, the Sarawak Forestry Corporation was set up as a private company, wholly owned by the Sarawak State Government and is the principal management company of the Sarawak Forest Conservation Statutory Body. Sarawak Forestry’s 1,400-strong workforce is active in the six key business units that make up the Forestry Corporation.¹⁶¹

The basis of today’s forest management is still the Forests Ordinance from 1958, which requires the

¹⁵⁸ State Environmental Conservation Department (ECD): *Environmental Impact Assessment (EIA) Guidelines for logging and forest clearance activities*; January 2002

¹⁵⁹ Sabah Forestry Department: *Forests Resource in Sabah*; http://www.sabah.gov.my/htan/data_1/a_toppage_main/frame.s.htm accessed March 7, 2005

¹⁶⁰ Presentation of Melvin Gumal, Wildlife Conservation Society, at Heart of Borneo Workshop Singapore, November 3, 2003

¹⁶¹ Sarawak Forest Department: *Permanent Forests Estate* <http://www.forestry.sarawak.gov.my/forweb/sfm/pfe.htm> accessed February 23, 2005

establishment of three categories of permanent forests:¹⁶²

Forest Reserves: A forest reserve is part of the Permanent Forest Estate, which will normally be a productive forest, designated as the principal permanent source of the state's supply of timber.

Protected Forests: In Protected Forests, the Forests Ordinance of 1958 permits the people of Sarawak to take forest products for their own domestic use. They are also allowed to hunt, fish and raise cattle. A Protected Forest may be established if the primary purpose is the general protection of soil and water and the terrain or vegetation is of such, that intensive use as a productive forest is unlikely to be practicable. They can also be established if an extensive Permanent Forest is situated in little-known territory, where the correct use of all the land cannot yet be determined.

Communal Forests: A Communal Forest will be designated only where it is clearly the desire of a settled community to set aside a convenient area of woodland to provide forest products for domestic needs. Communal Forests are designed to be just large enough for the domestic needs of the community living in it, while allowing for a reasonable increase in population. Exceptions can be made when the necessity of preserving forests for protective reasons is coupled with the need for domestic supplies of forest products.

It is the policy of the Government of Sarawak:

1. To reserve permanently for the benefit of present and future inhabitants of the country forest land sufficient...
 - ...for securing sound climatic and physical conditions of the country; the safeguarding of soil fertility and of supplies of water for domestic and industrial use, irrigation and general agricultural purposes; the prevention of damage by flooding and erosion to rivers and to agricultural land;
 - ...for the supply in perpetuity and at moderate prices of all forms of forest produce that can be economically produced within the country and that are required by the people for agricultural, domestic and

industrial purposes under a fully developed national economy.

2. To manage the productive forests of the Permanent Forest Estate with the object of obtaining the highest possible revenue compatible with the principle of sustained yield and with the primary objects set out above.
3. To promote, as far as may be practicable, the thorough and economical utilisation of forest products on land not included in the Permanent Forest Estate prior to the alienation of such land.
4. To foster, if compatible with prior claims based on local demands, a profitable export trade in forest produce.

3.2.3 Kalimantan¹⁶³

See map section, "Forest Status of Kalimantan", p.16

Virtually all forests in Indonesia are state-owned and administratively defined forest lands are quite accurately mapped by the government in terms of their intended function and use. The Ministry of Forestry is responsible for land under Permanent Forest Status. This includes land that has been allocated for use as conservation forest, protection forest, limited production forest or production forest. **However, these administrative definitions of forest land use usually do not correspond with the actual situation.** Thus the actual size and state of Indonesia's remaining forests are difficult to establish from official statistics.

Conservation Forest: Forest that is designated for wildlife or habitat protection, usually found within national parks and other protected areas. It includes both terrestrial (about 4.6 million ha) and marine protected areas (77,000 ha).

Protection Forest (6.4 million ha): Forest intended to serve environmental functions, typically to maintain vegetation cover and soil stability on steep slopes and to protect watersheds.

Production Forest (14.2 million ha): Forest that falls within the boundaries of a timber concession (under a so called HPH license) and is managed for timber production. Under good management, harvesting levels

¹⁶² Sarawak Forest Department: *Permanent Forests Estate* <http://www.forestry.sarawak.gov.my/forweb/sfm/pfe.htm> accessed February 23, 2005

¹⁶³ Global Forest Watch, Global Forest Watch Indonesia, World Resources Institute: *The State of the Forest, Indonesia*, 2002 and Laporan Pusat Pengukuhan dan Penatagunaan Kawasan Hutan, March 2005 for the area data.

are determined by planting and re-growth, so that the forest will continue to produce wood indefinitely. In practice, forests within timber concessions are often heavily logged and sometimes cleared.

Limited Production Forest (10.6 million ha): Forest allocated for low-intensity timber production. Typically, limited production forest is found in mountainous areas where steep slopes make logging difficult.

Conversion Forest (5.1 million ha): Forest that is designated (under an IPK license) for clearance and permanent conversion to another form of land use, typically a timber or estate crop plantation.

In the period from 1967 to 1999, production forest was managed by licensees:¹⁶⁴

IPK (*Ijin Pemanfaatan Kayu*): A license to clear land for the purposes of establishing industrial timber plantations, agricultural plantations (for example oil palm), transmigration sites, or other development schemes. Although the ostensible purpose of IPKs is to establish plantations, they are sometimes more highly valued for the roundwood yield derived through land clearance. Wood harvested from IPKs makes up a major share of total roundwood supplies in Indonesia.

HPH (*Hak Pengusahaan Hutan*): A license that is granted for the selective harvesting of natural forests over a given period, typically 20 years, and is renewable for a further period, typically a further 20 years. The licenses are intended to maintain the forest as permanent production forest.

Not strictly part of the Permanent Forest are the **HTI (*Hutan Tanaman Industri*)** - the industrial fast-wood plantations, since in theory they are only to be planted on vaguely defined “degraded land” and not on forested land.

HTI are licenses to grow industrial forests for industrial fibre, usually pulpwood, for 35 years plus one rotation period (typically 8 years for pulpwood.) The license may be renewed for a further 35 years. Licensees are allowed to clear 100 percent of the land area but are required to plant only 25 percent. This limited planting

requirement is not always met. Industrial forests are supposed to be established on degraded land, but in practice they are sometimes established after clearing natural forests.

However in 1999 a new forestry act was passed. The HPH and HTI licenses were renamed Forest Product and Non-Forest Product Utilisation licenses respectively. In Indonesia they are known as *Ijin Usaha Pemanfaatan Hasil Hutan Kayu* (IUPHHK) and *Ijin Usaha Pemanfaatan Hasil Hutan Non Kayu* (IUPHHNK). The new licenses are issued for 55 years for natural forests and for 100 years for plantations. In accordance with Indonesian decentralisation policy, these licences are now issued by the district heads (Bupati) at district level. Trans-district licenses are issued by the governor and the Minister of Forestry now only issues trans-provincial licenses.¹⁶⁵

3.3 Oil Palm Plantations

See map section, “Oil Palm Plantations Kalimantan”, p. 19; Oil Palm Plantations West Kalimantan”, p. 19

3.3.1 Introduction

Oil palm plantations cover a huge area of Borneo. The governments of Malaysia and Indonesia actively encourage the setting up of such plantations. Despite their short history as commercial crops, palm plantations have had a severe impact on the forests of the island.

Oil palms (*Elaeis guineensis*) originally came from Africa and were first planted in Indonesia in 1848. The ideal habitat for this plant is the tropical region from the equator to 12 to 15 degrees north and south where the average annual rainfall is between 2,000 and 2,500 millimetres. Since the harvest declines during the dry season, it is important that there are no lengthy dry spells during the year in order to grow the crop successfully. Humidity also needs to be high (80 to 90 %). The temperature, which affects the flowering period and the maturing of the fruit, needs to lie between 29 and 30 degrees. Therefore oil palms can only be cultivated in a limited number of regions. Tropical forest areas are ideal because rainfall is plentiful and temperatures and humidity are high.

¹⁶⁴ Global Forest Watch, Global Forest Watch Indonesia, World Resources Institute: *The State of the Forest, Indonesia*, 2002 and Laporan Pusat Pengukuhan dan Penatagunaan Kawasan Hutan, March 2005 for the area data.

¹⁶⁵ Bambang Supriyanto, Heart of Borneo National Coordinator, WWF Indonesia, personal communication

Tropical monsoon regions with distinct dry and rainy seasons and savannahs are not suitable for the cultivation of oil palms.¹⁶⁶

Malaysia is predicted to remain the biggest producer until around 2012, after which Indonesia is likely to

become the leading producer. Between 2016 – 2020 the projected production by Indonesia is 18,000 million tonnes, or 44% of the world production of 40,800 million tonnes, while Malaysia’s estimated output will be 15,400 million tonnes or 37.7%.¹⁶⁷

Tab. 2: Mature* oil palm area (million ha):¹⁶⁸

Mature* area (mill ha)	1998	1999	2000	2001	2002	2003	Avg. annual growth
Malaysia	2.54	2.70	2.91	3.05	3.11	3.32	+5.6%
Indonesia	1.65	1.81	2.21	2.47	2.73	2.94	+12.4%

*Plantations older than 4 years

When this report is published the total oil palm plantation area in Indonesia (mature and immature) will be more than 5 million hectares.¹⁶⁹

Today, the conversion to oil palm plantations can be considered one of the biggest threats to the remaining forests on Borneo.

Palm plantation areas in all states of Borneo have grown dramatically during the last few years. In Malaysian Borneo the average annual growth rate was nearly eight percent between 1998 and 2003

and about 1.6 million ha of oil palms are now grown in Sabah and Sarawak, the latter growing about half the amount of Sabah. In Kalimantan the area covered by palm plantations grew by 11.5 % to nearly a million ha in 2003.

¹⁶⁶ Okamoto S.: *The Growth Of Oil Palm Plantations And Forest Destruction In Indonesia*; Japan NGO Network on Indonesia (JANNI), undated

¹⁶⁷ Teoh Cheng Hai: *Land Use And The Oil Palm Industry In Malaysia* Abridged report produced for the WWF Forest Information System Database; WWF, November 2000

¹⁶⁸ Mielke S. and Mielke T. (eds): *Oil World Annual 2000 and 2003*

¹⁶⁹ Indonesian Palm Oil Commission (IPOC): *Impact Assessment on Oil Palm Development*; prepared for International Roundtable on Sustainable Palm Oil, 5 October 2004 in Jakarta. Accessible at http://www.sustainable-palmoil.org/RT2.htm#RT2_Proceedings

Tab. 3: Oil Palm plantations areas (ha):¹⁷⁰

Province	Oil Palm Area 1984	Oil Palm Area 1998	Oil Palm Area 2003	Growth (1998-2003)	Avg. Annual growth (1998-2003)
W. Kalimantan	13,044	279,535	415,820	48.8%	8.3 %
C. Kalimantan	53	110,376	222,034	101%	15.0 %
S. Kalimantan	0	93,902	139,634	48.7%	8.3 %
E. Kalimantan	44	78,938	192,146	143%	19.5 %
Tot. Kalimantan	13,140	562,751	969,634	72.3%	11.5 %
Sabah	160,507	842,496	1,135,100	34.7%	6.1 %
Sarawak	26,237	248,430	464,774	87.1%	13.3 %
Tot. Borneo Mal.	186,744	1,090,926	1,599,874	46.7%	7.9%
Borneo Grand Total	199,884	1,653,671	2,569,508	55.4%	9.2%

Fact Box 2: Palm oil in numbers:¹⁷¹

- It is thought that palm oil will become the leading oil in the world around 2016.¹
- Oil palm, with the highest per ha yield (4-8 tons) of all edible oils, is predicted to become the most important vegetable oil in the world. In 2002 palm and palm kernel oil accounted for approximately 23% of world production and 51% of global trade in edible oils. The same year Malaysia and Indonesia accounted for 84% of palm oil production.
- With a total of 2.3 million tons, the Netherlands is the world's largest importer of palm oil products, after India (3.5 million tons) and China (2.8 million tons). Germany is the second largest European importer of palm oil products from Malaysia and Indonesia.
- Loders Crocklaan, owned by IOI from Malaysia, will build the largest palm oil refinery in the world on the Maasvlakte in Rotterdam.

More on oil palm development as a threat to forest: see chapter 4.2

¹⁷⁰ Sources for Kalimantan: The World Bank: *Indonesia: Environment and Natural Resource Management in a Time of Transition*, February 2001; and Summary of WWF-Indonesia's 1st Report on Oil Palm Plantations in West Kalimantan (prepared by Fitriani Ardiansyah and Purwo Susanto, WWF Indonesia, March 2005. Internal WWF report) Source for Malaysia: Malaysian Oil Palm Statistics 2003. Economics & Industry Development Division Malaysian Palm Oil Board http://161.142.157.2/home2/home/stac03_area1.htm, accessed February 2, 2005

¹⁷¹ AIDEnvironment: *Fact-sheet on Palm Oil Production in Southeast Asia*; prepared for WWF Switzerland Workshop on Palm Oil and Soy Bean, Zürich, 18-20 October 2000

3.3.2 Malaysia

Although commercial planting of oil palms began in 1917 on Tennarmaram Estate, large-scale cultivation only commenced in the 1960s following the Government's crop diversification programme, designed to reduce the country's dependence on rubber. The last decade has seen rapid expansion in oil palm planting in Sabah and Sarawak, while in Peninsular Malaysia it slowed because of a shortage of suitable land and lack of manpower. Further development of new oil palm areas is expected to continue in East Malaysia, where there is greater land availability.¹⁷²

Malaysia is the world's largest producer and exporter of palm oil. The expansion of oil palm planting has been immense: the area utilised for plantations grew from 60,000 ha in 1960 to over three million ha in 2001.¹⁷³

In 2004 over 30 % of Malaysia's oil palm plantations were in Sabah, while Sarawak accounted for just over 13 % of palm oil production. However, in relation to the size of the province, Sarawak produces significantly less palm oil, with only 4% of the province allocated for this purpose. In Sabah, more than 16% of the land was utilised for oil palm plantations.

Tab. 4: Sabah and Sarawak plantation area (ha)

Year	Sabah			Sarawak		
	Land area	Oil Palm Estate ¹⁷⁴	% of land	Land area	Oil Palm Estate	% of land
1984	7,250,000	160,507	2.2	12,445,000	26,237	0.2%
1994	7,250,000	452,485	6.2	12,445,000	101,888	0.8%
2004	7,250,000	1,165,412	16.1	12,445,000	508,309	4.1%

In Sabah and Sarawak the private sector developed most of the oil palm area with 73% and 75% respectively.¹⁷⁵ The government owns 12% of palm plantations in Sabah but only five percent of the plantations in Sarawak. On the other hand state (as opposed to central government) schemes are responsible for nine percent of the plantations in Sabah and for 17% in Sarawak.

Smallholder palm plantations make up six percent and three percent of the plantation area in Sabah and Sarawak respectively and thus have the least impact.

The biggest importers of Malaysian Palm oil are China, India, Pakistan, the Netherlands, Egypt, Singapore, Japan, United Arab Emirates, Turkey and Bangladesh. The Netherlands is the biggest importer of palm kernels and palm kernel meal.¹⁷⁶

¹⁷² Teoh Cheng Hai: *Land Use And The Oil Palm Industry In Malaysia* Abridged report produced for the WWF Forest Information System Database; WWF, November 2000

¹⁷³ Jan Marteen Dros: *Accommodating Growth: Two scenarios for oil palm production growth*; Advice and Research for Development and Environment, 2003

¹⁷⁴ Department of Statistics, Malaysia : 1975 to 1984 at <http://econ.mpob.gov.my/economy/annual/stat2004/Area2.htm>

¹⁷⁵ Teoh Cheng Hai et al: *Balancing the Need for Sustainable Oil Palm Development and Conservation: The Lower Kinabatangan Floodplains Experience*; ISP National Seminar 2001: Strategic Directions for the Sustainability of the Oil Palm Industry, Kota Kinabalu, Sabah, Malaysia, 11-12 June 2001

¹⁷⁶ GAIN Report: *Malaysia Oilseeds and Products Annual 2005*, USDA Foreign Agricultural Service, March 2004

3.3.3 Indonesia

While the growth of the oil palm sub-sector in Indonesia has conferred economic benefits, it has posed an increasing threat to Indonesia's natural forest cover. The large-scale oil palm plantations have also displaced local communities and spawned social conflicts.

In the 2003/2004 season, the ten biggest importers of Indonesian palm oil were India (which bought more than 2.5 million metric tonnes (nearly three times as much as the next biggest importer), China, Netherlands, Malaysia, Pakistan, Singapore, Jordan, Bangladesh, Germany and Tanzania. The Netherlands was the biggest importer of palm kernel meal and palm kernels.¹⁷⁷

Smallholder palm plantations account for approximately 30% of total area in Indonesia. On these plantations productivity remains low, as the farmers do not have access to credit, hybrid seedlings, and receive only minimal extension services.

State owned operations make up 20 % of palm plantations and private companies account for the remaining 50 %. The private plantations produce the highest yields, which are close to those of Malaysia.¹⁷⁸ In Kalimantan in the late 1990s the government owned 9 % of the total oil palm estate while smallholders and private investors owned 39% and 52% respectively.



Figure 9: Oil palm fruit © WWF-Canon / H. Jungius

¹⁷⁷ GAIN Report: *Indonesia Oilseeds and Products Annual 2005*, USDA Foreign Agricultural Service, February 2005

¹⁷⁸ GAIN Report: *Indonesia Oilseeds and Products Annual 2005*, USDA Foreign Agricultural Service, February 2005

3.4 Timber Growing Plantations

See map section, "Timber plantations Kalimantan & Sabah", p. 18

In the mid 1980's there was clearly visible evidence in the Indonesian forestry sector of an upcoming timber crisis due to over-logging. At that time industrial plants in some parts of Sumatra already suffered from raw material shortages and in 1990 timber shortages also occurred in Kalimantan. In order to resolve the dilemma, the government seemed to rely on timber estates (HTI, *Hutan Tanaman Industri*) as a way of providing alternative sources of wood. For this reason, three types of timber estates were proposed: a) HTI *pertukangan*, hardwood plantations to relieve supply shortages of construction and woodworking raw materials; b) HTI *kayu energy*, timber estates to supply raw material for fuelwood and charcoal production; and c) HTI *kayu serat*, timber estates to support the pulp, paper and rayon industries.¹⁷⁹

The third type of timber estate, pulp and paper plantation, received the most attention and investment by the private sector and government since the pulp and paper business is the most profitable. Despite the government's originally purported goal to use timber plantations to counter hardwood shortages, in practice the thrust of the timber estate scheme is creating fast-growing tree plantations to support the development of the pulp and paper industry. In 1990, the Ministry of Forestry started granting Industrial Timber Plantation Rights (HPHTI) that allow concessionaires to plant and harvest plantation timber in so-called unproductive areas of permanent production forest. Various government ministers stated at the time that Indonesia was aiming to become the greatest supplier of paper pulp and palm oil in the world.¹⁸⁰

Timber plantation entrepreneurs are eligible for various government subsidies, including loans on generous terms from the "Reforestation Fund", which is collected from logging concession holders. HTI

¹⁷⁹ World Rainforest Movement: *Underlying Causes of Deforestation and Forest Degradation: Asia*, <http://www.wrm.org.uy/deforestation/Asia/Indonesia.html>, accessed March 7, 2005

¹⁸⁰ World Rainforest Movement: *Underlying Causes of Deforestation and Forest Degradation: Asia*, <http://www.wrm.org.uy/deforestation/Asia/Indonesia.html>, accessed March 7, 2005

concessions are granted for production of both pulpwood and non-pulpwood (usually sawn wood for construction). They can be established independently or in conjunction with existing HPH logging concessions.¹⁸¹

A special category was created for HTI concessions, linked to transmigration sites (HTITrans) where the transmigrants work on the plantations. HTI-Trans concessions usually produce wood for non-pulp uses. According to official figures, some 7.9 million ha had been allocated for all three types of HTI concession development by the end of 2000. Yet, only 23.5 % of that area had actually been planted in Indonesia.¹⁸² In Kalimantan of a total of 3.3 million ha allocated to HTIs by the end of 2000, only 800,000 ha or 25% had been planted.¹⁸³

There are a number of reasons for the lack of replanting on land that has been cleared:¹⁸⁴

- HTI concessions have frequently been established on still-productive forest land. In 1998, 22 % of land managed as HTIs had been productive natural forest prior to plantation establishment.
- Establishing plantations on truly degraded lands is more expensive because it often requires considerable investment in land preparation to rehabilitate the soil.
- HTI concessions include the right to obtain Wood Utilization Permits (IPKs), essentially licenses to clear and use remaining standing timber. When HTIs are established in areas with considerable standing timber, the IPK provision furnishes the company with a large supply of essentially free timber.
- In addition, many HPH concession holders find it economically advantageous to convert degraded

areas of their concessions to HTIs. As a World Bank study noted in 1998, “logging operations can degrade a site with little risk of serious penalty and in the process set themselves up to receive a license to convert the site so damaged into an HTI or tree crop estate.” Forestry Ministry data published in 1998 revealed that more than 2.7 million ha of HPH concessions had been converted to HTI concessions.

In 1998, 40 % of Indonesia’s legal supply of timber came from land clearing and the output from this source had doubled between 1995 and 1997. Out of ten million cubic metres of timber from land conversions in 1997/98, 3.44 million were from East Kalimantan and 1.6 million from Central Kalimantan.



Figure 10: Acacia plantation © WWF / M. Radday

¹⁸¹ Global Forest Watch, Global Forest Watch Indonesia, World Resources Institute: *The State of the Forest, Indonesia*, 2002

¹⁸² Global Forest Watch, Global Forest Watch Indonesia, World Resources Institute: *The State of the Forest, Indonesia*, 2002

¹⁸³ Global Forest Watch, Global Forest Watch Indonesia, World Resources Institute: *The State of the Forest, Indonesia*, 2002

¹⁸⁴ Global Forest Watch, Global Forest Watch Indonesia, World Resources Institute: *The State of the Forest, Indonesia*, 2002

Tab. 5: Allocation and Planting of industrial timber plantations (this) in Indonesia up to December 2000¹⁸⁵

Province	HTI Area Allocated (ha)	HTI Area Planted (ha)	% of allocated Area planted
HTI-Pulp			
W. Kalimantan	735,306	42,785	5.8
C. Kalimantan	185,511	0	0
S. Kalimantan	268,585	86,259	32.1
E. Kalimantan	793,237	325,517	41.0
Total	1,982,638	454,561	22.3
HTI-Sawn			
W. Kalimantan	152,780	45,497	29.8
C. Kalimantan	79,000	5,000	6.3
S. Kalimantan	77,575	26,608	34.3
E. Kalimantan	439,719	105,020	23.9
Total	749,074	182,125	24.3
HTI-Trans			
W. Kalimantan	217,930	33,698	15.5
C. Kalimantan	132,495	61,625	46.5
S. Kalimantan	41,040	20,943	51.0
E. Kalimantan	183,989	75,934	41.3
Total	575,454	192,200	33.3
Grand Total	3,307,257	828,886	25.1

See map section, “Industrial Timber Plantations West Kalimantan, p. 18

Between 1985 and 1997 the total forest loss in Kalimantan amounted to 8.5 million ha, only 2.1 million ha of which could be accounted for through the establishment of fast growing timber and palm

plantations. 6.3 million could not be accounted for and it is likely that a large part of that is from areas designated for fast growing timber plantations and palm oil plantations that have been logged for the timber but not replanted.

¹⁸⁵ Global Forest Watch, Global Forest Watch Indonesia, World Resources Institute: *The State of the Forest, Indonesia, 2002*

Tab. 6: Results of Forest Conversion (ha)¹⁸⁶

Province	Forest Loss (1985-1997)	Development of cleared land					
		Large investors			Smallholder estate crops	Total tree crops	Balance of cleared land
		HTI	Oil palm	HTI+HGU			
W. Kalimantan	1,987,574	148,733	266,491	470,000	214,794	684,794	1,302,780
C. Kalimantan	1,714,400	102,006	110,324	260,000	105,254	365,254	1,349,146
S. Kalimantan	796,718	208,420	93,902	330,000	46,975	376,975	419,743
E. Kalimantan	3,975,100	497,103	78,894	610,000	100,275	710,275	3,264,825
Tot. Kalimantan	8,473,792	956,262	549,611	1,670,000	467,298	2,137,298	6,336,494

Definition:

HTI: Industrial tree crop estate

HGU: Application for plantations

HTI+HGU: All large investors (includes timber estates, oil palm, rubber, cocoa, sugarcane etc.)

Smallholder estate crops: areas listed by DG Estates, showing growth between 1984 and 1997

3.5 Protected Areas

See map section, “Forest Protected Areas of Borneo”, pp. 24-25)

Despite the devastating impact of logging and the conversion to plantations, there are a number of ecologically significant land areas that have been protected on Borneo. However, at the moment only 6.9% of Borneo is protected in National Parks (not including other protected areas).

It is important, however, to note that National Parks are only one element in conservation of forests and biodiversity on Borneo. Sarawak for example calls some areas national parks but they are established under state legislation. Sabah uses the term State Park, and State Parks come under state legislation. This is because in Malaysia, land and forests fall under the jurisdiction of state governments, not the national government. In Sarawak and Sabah, “protected forests” and “protection forest reserves” as well as “virgin jungle reserves” have a status equal to State Parks and National Parks.¹⁸⁷

Currently two UNESCO World Heritage sites (Kinabalu and Gunung Mulu) can be found on Borneo, both are located within the Malaysian part of the island.

In Kalimantan about 9 % of the total land mass is under some form of protection. Kalimantan currently has ten national parks, four nature reserves and five wildlife reserves.¹⁸⁸

Around 8 % or 1.03 million ha of the total landmass in Sarawak has been designated as Totally Protected Areas. These areas include National Parks Nature Reserves and Wildlife Sanctuaries. Collecting forest produce, fishing and hunting is prohibited in these areas.

In theory visitors to these habitats are prohibited from damaging or taking out plants or wildlife in any form. All together there are 15 national parks, two wildlife rehabilitation centres and three wildlife reserves in Sarawak. In addition there are five nature reserves.¹⁸⁹

According to statistics from the government of Sabah, around 14% of its land mass has some form of

¹⁸⁶ The World Bank: *Indonesia: Environment and Natural Resource Management in a Time of Transition*, February 2001

¹⁸⁷ John Payne, WWF Malaysia, personal communication

¹⁸⁸ Indonesian Nature Conservation Database: *The protected Areas of Kalimantan* <http://www.nature-conservation.or.id/kalimantan/index.html> accessed February 25

¹⁸⁹ Forest Department Sarawak: *Totally Protected Areas* <http://www.forestry.sarawak.gov.my/forweb/sfm/tpa1.htm> Accessed February 24, 2005

protection.¹⁹⁰ There are six national parks (three of them marine parks), six wildlife sanctuaries and a number of smaller protected forest reserves. Together this area encompasses close to 1.25 million ha.¹⁹¹

In Brunei over 100,000 ha of land are protected as historical sites, wildlife sanctuaries, protection and conservation forests as well as Ulu Temburong National Park, which accounts for nearly half of the overall protected area.¹⁹²

However, looking at the numbers of and sizes of protected areas, it is important to realise that sometimes the criteria for defining a protected area can be confusing. Moreover, on Borneo, illegal logging, agricultural encroachment and conversion to plantations as well as illegal wildlife trade often do not stop at the borders of protected areas. In addition government numbers might not be accurate when it comes to the actual size of forested lands. For example: In Indonesia only 82% of what is designated as protection forest is actually still forested.¹⁹³ To make matters worse, from 1985 to 2001 Kalimantan's protected lowland forests declined by more than 56 %. In 14 out of 18 surveyed concessions, loggers illegally expanded their operations into protected areas in 2001. About one in ten of these operations were processing the wood for international markets.¹⁹⁴

A good example of the continuing impact of industrial activities on protected areas is Kutai National Park. In 1936 it was designated as a wildlife sanctuary covering

306,000 ha. The current protected area encompasses 198,629 ha.

- 1969: 100,000 ha were excised from Kutai for logging and oil exploration.
- 1971: the logged-over area was reinstated but a further 106,000 ha were excised for logging.
- 1982: Kutai was declared a national park, but it continues to be seriously degraded by fire, agricultural encroachment, wildlife poaching, and illegal logging.
- 1996: timber worth US\$157 million (€117 million at March 2005 rates) was illegally extracted from the park.
- 1997–98: fire damaged 92% of the area.
- 2000: the Kutai District government allocated 15,000 ha for settlement, leading to aggressive encroachment by settlers. The district now proposes that the zone along the settlement road be excised and the park divided into two blocks.

Current opinion is that it is too late to save Kutai National Park and recently scientists classified this reserve as “lost.”¹⁹⁵

Gunung Palu National Park has similar problems. Between 1988 and 2002, more than 70 % of the lowland forests within the 19 km buffer zone around the Park were deforested. Less than 9 % of the buffer zone is now covered in lowland rainforest (an altitude of less than 500 meters has been used in the study to define lowland rainforest). Within the National Park 38 % of lowland forest has disappeared due to logging.¹⁹⁶

Protected areas can only serve their purpose if the deforestation within their borders ceases. They need to be stringently protected from logging, agriculture and wildlife poaching. In addition, more protected areas will need to be established to ensure the survival of the forests and the species that inhabit them.

¹⁹⁰ Sabah Forestry Department: *Forests Resource in Sabah*; http://www.sabah.gov.my/htan/data_1/a_toppage_main/frame.s.htm accessed February 22, 2005

¹⁹¹ Government of Sabah http://www.sabah.gov.my/jhl/ProtectedAreas_main.htm accessed February 24, 2005

¹⁹² Edwards David S.: *Opportunities for Transboundary Conservation in Borneo: a National Perspective from Brunei Darussalam*; Presented at the Seminar “Heart of Borneo – Three countries, one conservation vision”, Bandar Seri Begawan, Brunei Darussalam, April 5th – 6th 2005

¹⁹³ Holmes, D.A.: *Indonesia - Where have all the forests gone?* Environment and Social Development East Asia and Pacific Region. World Bank Discussion Paper. Written 2000, published June 2002

¹⁹⁴ Curran L.M., Trigg S.N., McDonald A.K., Astiani D., Hardiono Y.M., Siregar P., Caniango E. and Kasischke E.: *Lowland Forest Loss in Protected Areas of Indonesian Borneo*; Science, 13 February 2004; VOL303: 1000-1003

¹⁹⁵ Jepson P. et al. *A Review of the Efficacy of the Protected Area System of East Kalimantan Province, Indonesia*; Natural Areas Journal 22:28–42, 2002

¹⁹⁶ Curran L.M., Trigg S.N., McDonald A.K., Astiani D., Hardiono Y.M., Siregar P., Caniango E. and Kasischke E.: *Lowland Forest Loss in Protected Areas of Indonesian Borneo*; Science, 13 February 2004; VOL303: 1000-1003

Tab. 7: National Parks on Borneo¹⁹⁷

Kalimantan		
Name of the park	Size (ha)	Gazetted
Sebangau	568,700	2004
Muller Schwart	860,000	2004
Meratus	18,350	2004
Danau Sentarum	132,000	1999
Kayan-Mentarang	1,360,500	1996
Kutai	198,629	1995
Betung Kerihun	800,000	1995
Bukit Baka-Bukit Raya	181,090	1992
Gunung Palung	90,000	1990
Tanjung Puting	400,000	1982
Total	4,609,269	

Sabah		
Name of the park	Size (ha)	Gazetted
Crocker Range	139,919	1984
Bukit Tawau	27,972	1979
Pulau Tiga (marine)	15,864	1978
Turtle Island (marine)	1,740	1977
Tunku Abdul Rahman (marine)	4,929	1974
Kinabalu	75,770	1964
Total (excl. marine)	243,661	

Sarawak		
Name of the park	Size (ha)	Gazetted
Gunung Buda	6,235	2001
Rajang Mangroves	9,374	2000
Maludam	43,147	2000
Bukit Tiban	8,000	2000
Talang Satang	19,414	1999
Tanjung Datu	1,379	1994
Loagan Bunut	10,736	1991
Batang Ai	24,040	1991
Kubah	2,230	1989
Gunung Gading	4,104	1983
Similajau	7,064	1975
Lambir	6,949	1975
Niah	3,138	1975
Gunung Mulu	52,865	1974
Bako	2,727	1957
Total	201,402	

Brunei		
Name of the park	Size (ha)	Gazetted
Ulu Temburong	46,210	1991
Total	46,210	

**Grand Total: 5,100,542 ha
(6.9% of all of Borneo)**

¹⁹⁷ Government of Sabah http://www.sabah.gov.my/jhl/ProtectedAreas_main.htm accessed February 24, 2005;

Indonesian Nature Conservation Database: *The protected Areas of Kalimantan* <http://www.nature-conservation.or.id/kalimantan/index.html> accessed February 25;

Forest Department Sarawak: *Totally Protected Areas* <http://www.forestry.sarawak.gov.my/forweb/sfm/tpa1.htm> Accessed February 24, 2005

Brunei Department of Forestry, <http://www.forestry.gov.bn/> accessed February 24, 2005

The World Database on Protected Areas (WDPA), <http://sea.unep-wcmc.org/wdbpa/>

3.5.1 Sabah

Kinabalu World Heritage Site

Kinabalu Park in Sabah was established in 1964, following the passing of the Sabah National Parks Ordinance in 1962. Mount Kinabalu and its surrounding area became a park as a consequence of the infamous "Sandakan-Ranu Death March": In September 1944 the Japanese moved 2,400 Australian and British prisoners of war from Sandakan to Ranau, a distance of 240km. Only six prisoners survived. One of the survivors profoundly affected by the experience, Major Carter, founded the Kinabalu Memorial Committee with the aim of preserving Kinabalu as a monument to human decency and a facility for the

benefit of all of Sabah. Following two expeditions to explore the mountain and its flora, the idea of preserving the area was further reinforced.¹⁹⁸

The Park is dominated by Mount Kinabalu (4,095 m), the highest mountain between the Himalayas and New Guinea. It exhibits a wide range of habitats, from rich tropical lowland and hill rainforest to tropical mountain forest, sub-alpine forest and scrub on the higher elevations. It has been designated as a Centre of Plant Diversity for Southeast Asia and is exceptionally rich in species, with some flora more typical of the Himalayas, China, Australia, Malaysia, as well as pan-tropical flora.¹⁹⁹

The site has a diverse biota and high endemism. The altitudinal and climatic gradient, from tropical forest to alpine conditions, combine with precipitous topography, diverse geology and frequent climate oscillations, to provide conditions ideal for the development of new species. The Park contains high biodiversity with representatives from more than half the families of all flowering plants. The majority of Borneo's mammals, birds, amphibians and invertebrates (many threatened and vulnerable) occur in the Park.²⁰⁰

There are believed to be 1,000 orchid species, including at least five species of slipper orchid that are considered endangered. Other important plants occurring in the park include 608 fern species, 9 *Nepenthes* species (pitcher-plants, including 4 species that are endemic to Kinabalu), 24 *Rhododendron* species (5 species are endemic to Kinabalu), 78 *Ficus* species (over 50% of all the species found on Borneo), 52 palm species, 6 bamboo species and 30 ginger species.²⁰¹

¹⁹⁸ UNEP World Conservation Monitoring Centre: http://www.wcmc.org.uk/protected_areas/data/wh/kinabalu.html accessed February 23, 2005

¹⁹⁹ UNESCO World Heritage Centre: *Kinabalu Park* http://whc.unesco.org/pg.cfm?cid=31&id_site=1012 accessed February 23, 2005

²⁰⁰ UNESCO World Heritage Centre: *Kinabalu Park* http://whc.unesco.org/pg.cfm?cid=31&id_site=1012 accessed February 23, 2005

²⁰¹ UNEP World Conservation Monitoring Centre: http://www.wcmc.org.uk/protected_areas/data/wh/kinabalu.html accessed February 23, 2005

Kinabalu Park has a rich fauna as well. Approximately 90 species of lowland mammals have been recorded and 22 montane mammal species. Notable among these categories are, sun bears, orang-utans, Borneo gibbons, grey-leaf monkeys, red-leaf monkeys and the Bay Cats.²⁰²

3.5.2 Sarawak

Gunung Mulu World Heritage Site

Gunung Mulu National Park was first constituted on 3 October 1974 under Gazette Notification No. 2852 of the National Parks Ordinance (1956). The park opened to the public in 1985.²⁰³

Important both for its high biodiversity and for its karst features, Gunung Mulu National Park is the most studied tropical karst area in the world. The 52,864 ha park contains seventeen vegetation zones, exhibiting some 3,500 species of vascular plants. The park is dominated by Gunung Mulu, a 2,377-metre high sandstone pinnacle. At least 295 km of spectacular (explored) caves are home to millions of cave swiftlets and bats. The Sarawak Chamber, which measures 600 m by 415 m and 80 m in height, is the largest known cave chamber in the world.²⁰⁴

On the Gunung Massive, multi-storied mixed lowland dipterocarp forest occurs up to an altitude of 800 metres. Within three plots covering a total area of 1.2ha, 284 tree species have been recorded. On the Melinau Limestone Formation, examples of limestone forest occur. This includes limestone scree forest, limestone cliff vegetation, lowland limestone montane forest, upper montane limestone forest and limestone cave vegetation. Many endemic species occur in this area and the limestone flora is one of the most diverse and best preserved in Southeast Asia. Gunung Mulu National Park is considered to be one of the richest sites in the world for palms, with approximately 111 species and 20 genera recorded. Of particular

²⁰² UNEP World Conservation Monitoring Centre: http://www.wcmc.org.uk/protected_areas/data/wh/kinabalu.html accessed February 23, 2005

²⁰³ UNEP World Conservation Monitoring Centre: http://www.wcmc.org.uk/protected_areas/data/wh/gunung_mulu.html accessed February 23, 2005

²⁰⁴ UNESCO World Heritage Centre: *Kinabalu Park* http://whc.unesco.org/pg.cfm?cid=31&id_site=1013 accessed February 23, 2005

significance is the wild sago palm *Eugeissona utilis*, which occurs on the steep slopes of Gunung Mulu. In addition 4,000 species of fungi have been recorded.²⁰⁵

A diverse range of faunal species have been recorded within the area, including 81 mammalian species, 270 species of birds, 20,000 species of invertebrates, 55 reptile species, 76 species of amphibians and 48 species of fish. This is only a small proportion of the estimated total number of species. Important mammal species such as the Malayan Pangolin, 28 species of bats, two species of endemic Borneo squirrels, the tufted ground squirrel and the plain pigmy squirrel have been identified in the park. The smallest mammal in the world, the Savi pigmy shrew, *Suncus etruscus*, weighing only 2 grams, is also found. Cave fauna including many troglobitic species is also abundant, with over 200 species recorded. Many of the cave fauna species are endemic, with 41 on the endangered species list. Several million cave Swiftlets have been recorded in one cave formation, the largest colony in the world. Many invertebrates, including cave fauna, are endemic to the nominated World Heritage Site. Lepidoptera are particularly well represented. 80 % of Borneo species are found here.²⁰⁶

The Lanjak-Entimau Wildlife Sanctuary and the trans-boundary conservation area

(Nominated as UNESCO World Heritage Areas)

A trans-boundary conservation area of almost a million ha was established on Borneo in 1994. It covers some vital habitats, remaining as natural forest in an area otherwise almost wholly transformed into timber concessions and oil palm plantations. Its remaining intact is essential for the survival of the wildlife of the island. Joint management of the watershed and surrounding catchments constitutes a major conservation opportunity. The protected areas are:

- Lanjak Entimau Wildlife Sanctuary: Sarawak, Malaysia (IUCN Category IV, 168,758 ha)
- Batang Ai National Park: Sarawak (IUCN Category II, 24,040 ha) (adjacent to Lanjak

²⁰⁵ UNESCO World Heritage Centre: *Kinabalu Park* http://whc.unesco.org/pg.cfm?cid=31&id_site=1013 accessed February 23, 2005

²⁰⁶ UNEP World Conservation Monitoring Centre: http://www.wcmc.org.uk/protected_areas/data/wh/gunung_mulu.html accessed February 23, 2005

- Entimau and recently added to the trans-boundary initiative, bringing the total area to 1.1 million ha)
- Betung Kerihun National Park: West Kalimantan, Indonesia (800,000 ha). Out of these Betun Kerihun is the largest habitat for the orang-utan.²⁰⁷

According to the Sarawak Forestry Department, more than 95% of the Lanjak Entimau Wildlife Sanctuary area is still covered in virgin rainforest. Vegetation diversity is related to soil conditions and altitudes, ranging from rich alluvial forests to mixed dipterocarp forests on steep slopes, to mossy montane forests on the summit of Bukit Lanjak (1299m above sea level). This sanctuary supports the only viable population of wild orang-utans in Sarawak, providing a habitat for approximately 400 orang-utans. Borneo gibbons, maroon and white fronted langurs, long tailed and pig tailed macaques can also be found. There are also bearcats, barking deer, bearded pigs and clouded leopards. Seven species of hornbills are found in the sanctuary. Over 214 species of birds have been recorded to date. The area supports a large number of bird species unique to Borneo, such as the Bornean Blue Flycatcher, Hose's Broadbill, Bulwer's Pheasant and Bornean Bristlehead. The Sanctuary has an extremely rich herpetofauna which is broadly distributed throughout. The high diversity of herpetofauna appears to be the result of the complex topography and the mosaic of forest types and ages. A total of 51 amphibians, 17 lizards, 27 snakes (approximately 31% of terrestrial herpetofauna of Sarawak) are found in the sanctuary. Betung Kerihun contains about 50% of the remaining protected lowlands in the province but both its buffer and the park itself are currently being logged.²⁰⁸

3.5.3 Kalimantan

Gunung Muller proposed World Heritage Site

Currently, local initiatives have been launched, proposing additional protected areas. They advocate that Gunung Muller and Gunung Lumut be declared World Heritage Sites. Both areas are located in Central Kalimantan. An expedition by the Indonesian Authority

²⁰⁷ IUCN Global Transboundary Protected Area Network: *Cross border protection in Borneo* http://www.tbpa.net/case_02.htm accessed February 23, 2005

²⁰⁸ Curran L.M., Trigg S.N., McDonald A.K., Astiani D., Hardiono Y.M., Siregar P., Caniago E. and Kasischke E.: *Lowland Forest Loss in Protected Areas of Indonesian Borneo*; Science, 13 February 2004; VOL303: 1000-1003

of Sciences (LIPI) in 2002/2003 concluded that Gunung Muller is ecologically important enough to be managed as a National Park and meets World Heritage criteria. The area is considered a prime example of an ecosystem reflecting major stages of the earth's formation, such as the development of living organisms as well as the geomorphic and geological history of the planet. These phenomena constitute a habitat that is rich in biodiversity, including a number of threatened plant and animal species.²⁰⁹

RAMSAR²¹⁰ Protected Wetland Danau Sentarum:

From a conservation point of view, the reserve is of tremendous value. It is the last large area of primary freshwater swamp forest remaining in Kalimantan and is possibly the last such remnant for all of the Greater Sunda Islands (The islands of Borneo, Sumatra, Java, and Sulawesi). Its flora is unique and a number of specimens collected in the area in the 1860s have not been found anywhere else. Its fish fauna is very rich. About 218 species have been recorded (among them 11 new ones) including the rare and valuable Asian Arowana. Other important species include the largest known inland population of Proboscis Monkey, as well as Orang-utan, False Gavial, Estuarine Crocodile, deer, wild pigs and birds.

Sentarum wetlands are able to absorb up to 25% of the peak flows of the Kapuas River, while in dry season, up to 50% of the downstream river discharge originates from the wetlands. In this way, the wetlands diminish peak flows and increase low flows.²¹¹

A seasonally fluctuating human population also lives in this area, depending for its livelihood on fisheries which provide 3,000 wet tonnes annually. Other human activities include cultivation and traditional harvesting

of forest products.²¹² This is the only RAMSAR protected area on Borneo.



Figure. 11: Palms in the forest of Kayan Mentarang National Park © WWF-Canon / A. Compost

4. Destruction or Conservation

“The illegal logging in Indonesia has global relevance but no simple solution. The scientific community, the conservation movement, industry, and the Indonesian and donor governments must move from apparent complacency to vigorous action at local levels. This is a time to unite to combat this unprecedented forest loss, with its predictably dire consequences for local communities, livelihoods, and biodiversity. In the face of this global emergency, we must move from empty rhetoric and debate on biodiversity and climate change to positive action to protect Indonesia's forests.”

Paul Jepson et al ²¹³

*“Oh Friend, in very deep sleep,
Slumbering so heavily.
The day is far advanced”*

Dayak morning song²¹⁴

²⁰⁹ Bambang Supriyanto, National Heart of Borneo Coordinator, WWF Indonesia, personal communication

²¹⁰ The Convention on Wetlands, signed in Ramsar, Iran, in 1971, is an intergovernmental treaty which provides the framework for national action and international cooperation for the conservation and wise use of wetlands and their resources. There are presently 144 Contracting Parties to the Convention, with 1421 wetland sites, totalling 123.9 million ha, designated for inclusion in the Ramsar List of Wetlands of International Importance.

²¹¹ Wetlands International – Indonesia Program: *Danau Sentarum* <http://www.wetlands.or.id/kal04.htm> accessed February 23, 2005

²¹² The Annotated Ramsar List of Wetlands of International Importance: *Indonesia* http://ramsar.org/profiles_indonesia.htm accessed February 23, 2005

²¹³ Jepson P., Jarvie J.K., MacKinnon K., Monk K.A.: *The End for Indonesia's Lowland Forests? Science*, Vol 292, Issue 5518, 859-861, 4 May 2001

²¹⁴ From Geddes W.R.: *Nine Dayak Night*; Oxford University Press, Melbourne 1957

4.1 Threats and outlook

According to the United Nation's Food and Agriculture Organisation (FAO), Indonesia has experienced the greatest destruction of forests of any country in the Asia Pacific region. The World Bank has predicted that in Kalimantan there will be no lowland rainforests left outside protected areas by 2010 if current destruction rates continue.²¹⁵

Obviously, deforestation is the biggest threat to the survival of forest ecosystems and their inhabitants, but it is more difficult to assess which factors are responsible for the destruction of specific habitats. Road-building, logging, conversion to plantation, transmigration, forest fires and illegal wildlife trade need to be seen as interlinked.

It all started with industrial road construction. The biggest impact of modern technology on Borneo came with the introduction of two simple machines in the 1950s: The chainsaw and the caterpillar tractor. With these, roads can be constructed fairly rapidly on almost any kind of terrain, and massive trees can be felled in a matter of minutes. This was the beginning of an era where virtually no place on Borneo was off limits to trade and industry. Since then, the development of roads has been a key factor, changing the face of Borneo. Roads allow for logging, for settlers, hunters and speculators. Agriculture spreads to previously inaccessible areas. Before the emergence of roads, people would either not go to many of these areas, or they were only able to reach them by foot (to an extent also by boat) and could only harvest small quantities of forest products.²¹⁶

See map section: "Road Network of Borneo", p.20

Today the most obvious forest-related problem remains the high rate of deforestation. 860,000 ha of forest have disappeared every year in Borneo between 1985 and 1997. For the period from 1997 to 2000 this accelerated in Indonesian Borneo to 1.21 million ha per year.²¹⁷

²¹⁵ The World Bank: *Indonesia: Environment and Natural Resource Management in a Time of Transition*, February 2001

²¹⁶ Payne J., Cubitt G., Lau D. and Langub J.: *This is Borneo*; New Holland, 2001

²¹⁷ Indonesia Ministry of Forestry website, <http://www.dephut.go.id>, 2005 and personal communication with the Ministry of Forestry.

Formerly the Government tended to blame deforestation on "shifting cultivators," but commercial development (especially oil palm plantations) was mainly responsible for accelerating deforestation in the 1990s. Large-scale land conversion was also the largest single cause of the 1997-98 fires (discussed in more detail later in this chapter).

Forestry practices by concessionaires fall far short of the goal of sustainable management of production forests. Illegal log and pulpwood production was estimated at nearly three times the official harvest in 1998, and it affected protection forests and national parks as well as production forests.

Thus four major interlinked factors pose a threat to Borneo's forests and their species:

- Conversion to other land uses
- Illegal logging
- Bad forest management
- Forest fires

Environmental impacts caused by large scale industrial projects and hunting are other factors leading to forest loss and species extinction in specific areas.

The underlying causes of these threats are even more complex and differ from country to country:

- For both the Indonesian and the Malaysian part of Borneo the fundamental conflict between traditional (customary) land use rights of the local population and the government claim on the land has never been solved satisfactory.
- Borneo has to deliver, but gets little in return. The economic development is driven by industries which rely almost completely on the extraction of natural resources. These are not sustainable and only a tiny portion of the profits is reinvested in the long-term management of these resources. This aspect also touches on the responsibility of consumers in Indonesian and Malaysian export markets, the majority being in industrialized countries.

For Kalimantan the ongoing decentralisation process leads to new threats for the forests. Many of the former prerogative rights of the central government are now claimed by regional governments, mainly by the districts. However, the new regional governments in Kalimantan do not always use their new powers wisely and may be unable to cope with the complexity of their new tasks and the speed of developments. In many areas this has, for example, led to the issuing of

hundreds of new small-scale timber extraction licenses or road construction through sensitive areas. Widespread corruption is fuelling the process.

Today the majority of Borneo's forests are under some form of forest management. Radical encroachments on natural habitats result in changes in plant and animal communities. In pristine forests, less than two percent of sunlight reaches the forest floor. In recently logged forests this can increase to 90%, which in turn increases temperature and reduces humidity.²¹⁸

Still, where forests are selectively logged and not further disturbed, they retain much of their biodiversity. Which species survive and in what numbers, will depend on the extent and structure of remaining forest, the length of time since logging and the specific requirements of the species. The species' most affected by forest clearance are those with very localised distributions, those with specialised diets, and territorial species. While they exhibit similar species diversity to primary forests, the species composition changes. Some species may be able to move into adjacent undisturbed habitats, but if these habitats are already sustaining populations at carrying capacity, they will not be able to absorb more individuals.²¹⁹

Studies have shown that terrestrial insectivores and forgivers react particularly strongly to timber harvest practices, whereas herbivores and omnivores were more tolerant or even benefited from logging. Selective logging has fewer negative consequences for many vertebrate species than is sometimes assumed. It certainly affects certain groups of species, like terrestrial insectivorous birds and mammals, which suffer from reduced ground cover. This may primarily be caused by the slashing of ground cover and lianas, which is currently required by law. Some species, though, such as deer and banteng, appear well adapted to, and can multiply, in the more open habitats that follow logging.²²⁰

²¹⁸ MacKinnon K., Hatta G., Halim H. and Mangalik A.: *The Ecology of Kalimantan*; Oxford University Press, 1997

²¹⁹ MacKinnon K., Hatta G., Halim H. and Mangalik A.: *The Ecology of Kalimantan*; Oxford University Press, 1997

²²⁰ Meijaard E., Sheil D., Nasi R., Augeri D., Rosenbaum B., Iskandar D., Setyawati T., Lammertink M., Rachmatika I., Wong A., Soehartono T., Stanley S. and O'Brien T.: *Life after logging: Reconciling wildlife conservation and production*

See map section: "Timber Plantations", p.18



Figure 12: Drainage in oil palm plantation in Sabah © WWF / S. J. Yorath

4.2 The impacts of oil palm plantations

Generally, the large investors in plantation crops are acknowledged to be the principal agents of deforestation. They have also been held primarily responsible for the forest fires that got out of control and burned huge tracts of land in 1997-98.²²¹

The establishment of oil palm plantations poses a threat to critical habitats for a number of reasons:

- In situations where land development for oil palm results in fragmentation of natural habitats, particularly habitats for large mammals, the well-being and survival of these animals become a cause for concern. A case in point is in the Lower Kinabatangan floodplain in Sabah where the development of contiguous blocks of oil palm has impeded the movement of elephants.²²²
- Future expansion is expected to be concentrated in areas known to have high conservation requirements. The Indonesian government's policy is to give incentives to developers to establish large-scale plantations in Kalimantan. As available

forestry in Indonesian Borneo; Bogor, Indonesia: CIFOR, 2005

²²¹ Holmes, D.A.: *Indonesia - Where have all the forests gone?* Environment and Social Development East Asia and Pacific Region. World Bank Discussion Paper. Written 2000, published June 2002

²²² Teoh Cheng Hai: *Land Use And The Oil Palm Industry In Malaysia* Abridged report produced for the WWF Forest Information System Database; WWF, November 2000

land in Sumatra becomes limited, the pressure on Borneo will increase.²²³

- Large-scale fires have been linked to the land clearing practices of plantation companies. The use of this method to clear land is one of the reasons forest fires caused such damage in 1997 and 1998. Following this disaster, the Indonesian government imposed restrictions on the use of fires for clearing land, but it is doubtful whether these restrictions will be adhered to. In May 2001, the former Indonesian Minister for the Environment, Sonny Keraf, claimed that five plantation companies had been sued for allegedly starting forest fires on the islands of Kalimantan and Sumatra. However, only one lawsuit was actually followed through. The Indonesian Forum for the Environment (WALHI) has recently sued 20 companies over the forest fires in Riau because the Indonesian government seems unlikely to prosecute those thought to be responsible for the fires.²²⁴
- If fire is not used to clear land, it simply means that large amounts of herbicides will be used instead, and oil palm plantations require enormous amounts of agricultural chemicals anyway. Unfortunately, the plantation policies of the government ignore pollution of ecosystems and the environment due to use of agricultural chemicals.²²⁵
- In the monocultures that result from current oil palm management, forest clearing results in the loss of 80% of plant species. When complete removal of stocks of native species of plants and animals is combined with intensive use of pesticides and herbicides on large estates, there is little hope of biodiversity rehabilitation.²²⁶
- Research has shown that the conversion of forests into oil palm plantations leads to the complete loss of 80-90% of mammals, reptiles and birds in the area. Plantations infringe on the habitat of many endangered species such as orang-utan, elephant, tiger and proboscis monkey. The animals are often killed or forced to relocate.
- These companies do not have to worry about sustainable forest management because the land has been allocated for full-scale conversion. At a time when long-term investment is risky, companies would rather walk away with the profits obtained through forest clearing, than invest in tenuous oil palm plantations that will not yield profits for another eight years.
- Moreover, oil palm plantations established in the vicinity of forests may cause further forest conversion, which is difficult to detect. This is because large oil palm plantations often displace local people, who may migrate to forested areas to obtain land and forest products.
- Drainage systems required by large-scale oil palm plantations may also lower water tables and impact neighbouring forests.²²⁷
- Oil palm development contributes to deforestation both directly and indirectly. About half (3.3 million ha) of all presently productive plantations were established in secondary forests and bush areas in Malaysia and Indonesia. Another 4 million ha may already have been cleared, or are about to be cleared, in the next few years.
- When timber and oil palm operations are in the hand of a single company, the establishment of oil palm plantations is sometimes simply an excuse for extracting timber. It has been reported that large areas have been cleared, ostensibly under license for conversion to tree crops, but in reality, the primary purpose is to meet the raw material needs of plywood and pulp mills. Such land presumably lies idle, although nominally under concession. This may be true of several million ha in Indonesia.²²⁸

²²³ Anne Casson: *Oil Palm, Soybeans & Critical Habitat Loss*; A Review Prepared for the WWF Forest Conversion Initiative, August 2003

²²⁴ Anne Casson: *Oil Palm, Soybeans & Critical Habitat Loss*; A Review Prepared for the WWF Forest Conversion Initiative, August 2003

²²⁵ Sachie Okamoto: *The Growth Of Oil Palm Plantations And Forest Destruction In Indonesia*; Japan NGO Network on Indonesia (JANNI), undated

²²⁶ Anne Casson: *Oil Palm, Soybeans & Critical Habitat Loss*; A Review Prepared for the WWF Forest Conversion Initiative, August 2003

²²⁷ Anne Casson: *Oil Palm, Soybeans & Critical Habitat Loss*; A Review Prepared for the WWF Forest Conversion Initiative, August 2003

²²⁸ Holmes, D.A.: *Indonesia - Where have all the forests gone?* Environment and Social Development East Asia and Pacific Region. World Bank Discussion Paper. Written 2000, published June 2002

- In Malaysia, 86% of all deforestation can be attributed to oil palm development in the period from 1995 - 2000.

In 1997/98, plantation expansion was one of the main causes of the rampant forest fires and subsequent haze that spread from plantations into adjacent natural forests. 6.5 million ha of land were burned in Kalimantan alone, nearly half of which was forest covered.

4.3 The impacts of illegal logging

4.3.1 The industry

Sabah

In the past, the timber industry in Sabah has been the main economic backbone of socio-economic development of the state. In the year 2000, the forestry sector contributed approximately 28 percent of the State's total revenue, while employment opportunities for some 65,000 people were created. In the past, this contribution generated more than 50 percent of the State's total revenue.²²⁹

Sarawak

The Sarawak forest and forest industry sector plays a very important part in Sarawak's economy, as well as in Malaysia as a whole. The timber sector contributed 21 percent of the states total external earnings. The Sarawak Timber Sector contributed approximately 37 percent of total Malaysian timber export earnings.²³⁰

Kalimantan

Kalimantan is estimated to encompass about 30% of Indonesia's forest area and around 50% of Indonesia's production forests (forests designated by the government for timber extraction).²³¹

In 2002, exports of wood-related products (pulp and paper, wood and wooden furniture) accounted for \$7.6 billion, or 13 percent of Indonesia's total exports,

second only to oil.²³² In 1998, 32% of the forest product exports of Indonesia came from Kalimantan.²³³

In 1985 the Government of Indonesia embarked on a policy for forest product exports that accelerated the growth of the local wood manufacturing industry. Since then, the sawn-timber industry has dominated the market. However, lack of control in the implementation of this policy resulted in industries deficient in resources.²³⁴ According to the Forest Ministry the timber demand of the wood processing industry reaches up to 58.2 million m³ a year in 2000. Yet, production forests can only supply 25.4 million m³.²³⁵ The resulting gap of nearly 33 million m³ is considered to be one of the main factors encouraging illegal logging.



Figure 13: Illegal clearing Kapuas Hulu district © WWF / J. Jonkman

4.3.2 The Problem

In the last few years Indonesia received a great deal of attention, as evidence of illegal logging and corruption accumulated. A study concluded that in 1997/1998 illegal timber harvesting in Indonesia amounted to 33 million cubic meters. This was more than the official production of 29.5 million cubic meters. Thus, more than half the forest harvest was illegal. This can be estimated to have cost the government 3.5 billion USD per year (2.6 billion Euros at March 2005 rates) in the

²²⁹ Sabah Forest Department; http://www.sabah.gov.my/htan/data_1/a_toppage_main/frames.htm accessed February 25, 2005

²³⁰ Sarawak Forest Department <http://www.forestry.sarawak.gov.my/forweb/industry/wbi/wood.htm> accessed February 25, 2005

²³¹ Smith J. et al.: *Illegal Logging, Collusive Corruption And Fragmented Governments In Kalimantan, Indonesia*, International Forestry Review 5(3), 2003

²³² United States Department of Agriculture, Foreign Agricultural Service: *Forest Products Market News*; August 2003

²³³ Bambang Supriyanto, WWF Indonesia, personal communication

²³⁴ Bambang Supriyanto, WWF Indonesia, personal communication

²³⁵ Pusat Data dan Perpetaan, Baplan, 2000

mid nineties, or one third of the potential revenue from timber harvesting. Research also shows that 84 percent of timber concessionaires violated numerous laws and that systematic illegal logging even took place in some of Borneo's most important national parks, such as Tanjung Puting, Kutai and Betung Kerihun. A large proportion, perhaps as much as 40 percent, of the large pulp and paper industry wood supplies came from undocumented sources.²³⁶ The area affected by illegal logging today is unknown, but a rough approximation is possible. In 2001, given an illegal harvest of about 50 million cubic metres and assuming a harvest rate of 20 cubic metres per ha, illegal logging affected at least 2.5 million ha of forest in Indonesia.²³⁷

In 2002 it was calculated that 5,000 ha of Indonesia's forests had been lost to illegal logging every day for the previous five years.²³⁸

East Kalimantan alone is believed to lose over 100 million USD (75.5 million Euros at March 2005 rates) a year in lost business tax revenue due to illegal logging and unreported timber processing. 3.3 million cubic meters of timber is being processed without any taxes being paid to the provincial government in the province, while the official quantity of log production from natural forest in East Kalimantan has been around 2.1 million cubic meters per year.²³⁹

The problem seems to be slightly less severe, though still widespread, within Malaysia. One third or more of forest exports were illegal in the early nineties. 40 percent of forest products exported to Japan in the early 1990's were undeclared. Several Malaysian companies were involved in a number of corruption cases in the Solomon Islands. In 1996 a Malaysian firm was reportedly exporting some 30,000 cubic meters of illegally obtained logs from Cameroon.²⁴⁰

Illegal logging within Malaysian Borneo is still rampant. In Sarawak, in the year 2000, the seizure of 290 cases of illegal logs (amounting to 92,000 cubic meters) was just the tip of the iceberg. In another case, in February 2002, one thousand illegally cut logs - 25,000 cubic meters - were found.²⁴¹

Malaysia is an important entry point for illegal Indonesian timber. An estimated three to five million cubic metres of illegal Indonesian timber enters the country every year through ports in Peninsular Malaysia, Sarawak and Sabah, and across the land border with Kalimantan. Over the last years, illegal Indonesian wood, including Ramin, has been documented entering Malaysia at Sematan, Lubok Antu and Tebedu in Sarawak, as well as in numerous locations on the west coast of Peninsular Malaysia - often with official complicity.²⁴²

There are a number of routes for illegal timber between Kalimantan and Malaysian Borneo:

West Kalimantan to Sarawak: Timber theft along the West Kalimantan and Sarawak border is rampant. Field investigations carried out in the Indonesian district of Kapuas Hulu recorded up to 80 trucks carrying illegal timber into Sarawak every day. Much of the timber comes from the protected forests of Lake Sentarum and Betung Kerihun. As Sarawak does not allow the import of logs, Sibu-based businessmen have set up sawmills along the road from Lanjak to Badau on the Indonesian side of the border. They produce rough-sawn blocks, which are then moved across the border by truck. Local sources claim that Indonesian customs officials at Badau accept payments to allow illegal timber to cross the border. In August 2000 around 50 companies paid 30 million Rupiah (2,400 Euros at March 2005 rates) every month to the authorities.²⁴³

²³⁶ Contreras-Hermosilla A.: *Forest Law Enforcement*, Paper prepared for the World Bank, 2001 and 2005

²³⁷ Tacconi L., Obidzinski K., Agung F.: *Learning Lessons to Promote Forest Certification and Control Illegal Logging in Indonesia*; CIFOR, 2004

²³⁸ Reuters: *Indonesia says permanent log export ban in place* June 26, 2002

²³⁹ CIFOR: *East Kalimantan loses US\$ 100 million annually in timber revenue*
http://www.cifor.cgiar.org/docs/_ref/publications/newsonline/35/east_kalimantan.htm accessed February 24, 2005

²⁴⁰ Contreras-Hermosilla A.: *Forest Law Enforcement*, Paper prepared for the World Bank, 2001 and 2005

²⁴¹ MC Wong: *Environmental Governing -- A Decade of Reaction to the Call for Saving the Forest Community and Forest of Sarawak*; Presented at the Forest Symposium: The Life of Forest Peoples and Our Consumption Earth Day, Tokyo and Osaka, 20/21 April 2002 IDEAL (Institute for Development of Alternative Living), Sibu, Sarawak, Malaysia

²⁴² Environmental Investigation Agency (EIA) and Telapak: *Timber Traffickers: How Malaysia and Singapore are reaping a profit from the illegal destruction of Indonesia's tropical forests*; May 2003

²⁴³ Environmental Investigation Agency (EIA) and Telapak: *Timber Trafficking: Illegal Logging in Indonesia, South East Asia and International Consumption of Illegally Sourced Timber*, September 2001

East Kalimantan to Sabah: Following an operation against illegal logging in East Kalimantan, the then Secretary-General of the Forestry Ministry claimed that Malaysian military personnel are involved in the cross-border timber trade. He claimed that between 80,000 and 100,000 cubic metres of illegal timber moves through the port of Tarakan and into Sabah every month. Around one million cubic metres of timber stolen from East Kalimantan entered Sabah every year. In total, timber smuggling from Kalimantan into Malaysia is estimated to have cost the Indonesian government at least 580 million USD in the 1990s (432 million Euros at March 2005 rates).²⁴⁴ Illegal timber trafficking has also been observed from Kalimantan to Singapore and to Peninsular Malaysia.²⁴⁵ Recently, illegal logging has been linked to the drying up of several rivers in the state of Sabah.²⁴⁶

4.3.3 The Causes

There are plenty of reasons for illegal logging on Borneo:

- Illegal logging has been an institutionalised practice in Indonesia for decades. The Suharto regime was interested in the economic benefits generated by forest exploitation, but it also used the allocation of forest concessions to gain political support and to fund off-the-record projects. The extent to which the political establishment and public administration (including national and local governments, the Armed Forces and the political parties) in the post-Suharto era still rely on revenues from illegal activities is uncertain, but there is evidence indicating that these factors still perpetuate illegal logging in Indonesia.²⁴⁷
- Processes that take account of societal preferences for forest management - including concerns about

the potential environmental harm caused by illegal logging - are not well developed. If citizens and administrators regard logging, even illegal logging, as beneficial to the community, they may not seek the enforcement of legislation.²⁴⁸

- On an institutional level, there is evidence that local government officials often support logging activities to increase local revenues and even 'legalize' illegal timber to achieve this objective.²⁴⁹
- The financial benefits derived from illegal logging are more lucrative than from legal logging. This simple truth means that little progress can be made without efficient law enforcement. In Indonesia, the estimated cost to a large forest concessionaire to deliver legal wood (including 'informal' taxes of 20%) to the mill door is 85 USD/m³, whereas the cost of illegal timber is 32 USD/m³ (63 and 24 Euros respectively). A small concession holder faces costs of 46 USD/m³ (34 Euros) to deliver wood to the mill. It costs a small-scale illegal harvesting operation just 5 U.S. USD/m³ (3.7 Euros) to deliver wood to the roadside (URS Forestry 2002).^{250,251}
- Corruption does appear to be an underlying cause of illegal logging in Indonesia, but whether it is the main cause and how it may be related to other causes, is unclear.²⁵² Indonesia is currently listed as the eighth most corrupt country in the world.²⁵³
- It is clear that considerable quantities of timber stolen from Indonesia's forests are destined for the wood industries in Sarawak, Sabah and Peninsular

²⁴⁴ Environmental Investigation Agency (EIA) and Telapak: *Timber Trafficking: Illegal Logging in Indonesia, South East Asia and International Consumption of Illegally Sourced Timber*, September 2001

²⁴⁵ Environmental Investigation Agency (EIA) and Telapak: *Timber Trafficking: Illegal Logging in Indonesia, South East Asia and International Consumption of Illegally Sourced Timber*, September 2001

²⁴⁶ Daily Express News: *Illegal logging rampant in Sabah*; 27 August, 2004

²⁴⁷ Tacconi L., Obidzinski K., Agung F.: *Learning Lessons to Promote Forest Certification and Control Illegal Logging in Indonesia*; CIFOR, 2004

²⁴⁸ Tacconi L., Obidzinski K., Agung F.: *Learning Lessons to Promote Forest Certification and Control Illegal Logging in Indonesia*; CIFOR, 2004

²⁴⁹ Anne Casson: *Decentralisation of policies affecting forests and estate crops in*

Kotawaringin Timur District, Central Kalimantan. Center for International Forestry Research, Bogor; 2001

²⁵⁰ Tacconi L., Obidzinski K., Agung F.: *Learning Lessons to Promote Forest Certification and Control Illegal Logging in Indonesia*; CIFOR, 2004

²⁵¹ all conversion at March 2005 rates

²⁵² Tacconi L., Obidzinski K., Agung F.: *Learning Lessons to Promote Forest Certification and Control Illegal Logging in Indonesia*; CIFOR, 2004

²⁵³ Transparency International (TI): *Corruption Perceptions Index 2004* <http://www.transparency.org/cpi/2004/cpi2004.en.html#cpi2004> accessed February 25, 2005

Malaysia. The big problem in the Malaysian states of Borneo is the large capacity of the wood processing industry that cannot be covered with local timber anymore. In the past, the timber industry in Sabah has been the main motor of socio-economic development. In the year 2000, the forestry sector contributed approximately 28 % of the State's total revenue, while some 65,000 jobs were created. In the past, this contribution amounted to more than half the state's total income.²⁵⁴

- In the early 1990s Malaysia's domestic log production stood at 40 million cubic metres annually, but by 1999 it had almost halved, to 22 million cubic metres. Yet, while log supply has fallen, the country's wood processing industry has maintained a capacity of 40 million cubic metres a year, with over 1,000 sawmills still in operation.²⁵⁵
- The dwindling supply of logs is also the reason why companies like Rimbunan Hijau, Malaysia's largest timber company, have moved to other countries including Papua New Guinea, Gabon, Cameroon and Equatorial Guinea. Illegal logging is also a serious problem in many of these countries.²⁵⁶

4.3.4 Steps taken against illegal logging

Even though there have been some recent measures taken by the governments to counteract illegal logging, it remains to be seen whether these measures will be enough to stop illegal logging and protect national parks and forest reserves.

Recent initiatives:

- In June 2002 Indonesia reinstated a permanent log export and wood chips export ban²⁵⁷

²⁵⁴ Sabah Forest Department; http://www.sabah.gov.my/htan/data_1/a_toppage_main/frames.htm accessed February 25, 2005

²⁵⁵ Environmental Investigation Agency (EIA), *Telapak: Timber Trafficking: Illegal Logging in Indonesia, South East Asia and International Consumption of Illegally Sourced Timber*, September 2001

²⁵⁶ Arnoldo Contreras-Hermosilla: Law Compliance in the Forestry Sector; May 2004 <http://www.worldbank.org/devforum/files/overview.doc>

²⁵⁷ Reuters: *Indonesia says permanent log export ban in place*; June 26, 2002

- In July 2002 the Indonesian Minister for the Environment, Nabeli Makarim, announced the formation of a special *illegal logging team* made up of investigators, lawyers and judges. The Minister of Trade and Industry has also teamed up with the Ministry of Forestry to fight illegal logging.²⁵⁸
- In 2004 Indonesia banned the export of all sawn timber²⁵⁹
- Sarawak has restricted the entry of sawn timber to four designated/gazetted points at Tebedu, Lubok Antu, Batu Lintang and Semantan along the border.²⁶⁰
- Malaysia imposed a total ban on the import of Indonesian round logs in June 2002 and in June 2003 extended the ban to include square logs.²⁶¹

4.4 The impacts of large-scale industrial projects

4.4.1 The Mega Rice Project

A good example of how centralised decision-making can negatively impact local environments and peoples is the Mega Rice Project (known in Indonesian as *Proyek Lahan Gambut* or PLG).²⁶²

In 1985 President Suharto was honoured with a medal by the United Food and Agriculture Organisation for his plans to restore Indonesia's self sufficiency in rice cultivation. When about one million ha of rice paddy on Java were sold for commercial and urban development, counteracting plans for self-sufficiency, he decreed that an equivalent area should be made

²⁵⁸ Environmental Investigation Agency and *Telapak Above the Law: Corruption, Collusion, Nepotism and Fate of Indonesia's Forests*; January 2003

²⁵⁹ Forest Conservation Portal Indonesian Govt Bans Exports Of Sawn Timber <http://forests.org/articles/reader.asp?linkid=35393> accessed February 25, 2005

²⁶⁰ Malaysian Timber Council Malaysia is living up to her CITES Commitments, http://www.mtc.com.my/illegal/cites_commitments.htm accessed February 25, 2005

²⁶¹ Malaysian Timber Council Malaysia is living up to her CITES Commitments, http://www.mtc.com.my/illegal/cites_commitments.htm accessed February 25, 2005

²⁶² McCarthy J.F.: *Decentralisation and Forest Management in Kapuas District, Central Kalimantan*; Center for International Forestry Research, 2001

available for rice cultivation in the peat swamp forests of Central Kalimantan.²⁶³

Peatlands cover about 3% of the earth's surface and contain 20-35% of the carbon in the terrestrial ecosphere/soils. They support a very high diversity of habitats and species from polar through to tropical regions. In countries like Indonesia, peatlands are vital in providing forest habitats for species such as orang-utans. The peatland forests in Kalimantan are typically uninterrupted expanses of terrain that extend great distances from the interior through to coastal regions. The flat (or depression) topography of these peat lands impedes drainage. While these peatland forest areas are vast, the underlying build-up of peat is also immense. In Indonesia it can be tens of meters in depth. The Kalimantan peatland forests provide many upland and riparian habitats. Some of the better-known mammals that use these habitats include sun bears, long tailed macaque and orang-utans.²⁶⁴

Until a decade ago there were still 2.5 million ha of peat swamp forests in Malaysia and 25 million ha in Indonesia. Most of this was part of the commercial forestry estate in both countries. This area has now been reduced to around one million ha in the former and 17 million ha in the latter. The land has mostly been converted to plantation - mostly oil palm - use.²⁶⁵

The concept for the Mega Rice Project was based on the supposed success in peat reclamation by the PT Sambu Group in Riau. The Project proposal included a plan to settle 316,000 transmigrant families, each having 2.25 ha. The gross area was 1.7 million ha, with a planned development area of 796,000 ha. However, the environmental assessment conducted by Bogor Agricultural University recommended that only 586,700 ha should be developed for agriculture (491,000 ha. for rice), while 115,400 ha should be retained as river reserves and 755,000 ha as conservation areas (including peat with depth >3 m, as well as black water areas, quartz sands, and

²⁶³ Rieley R.: *Kalimantan's peatland disaster*; Inside Indonesia, Jan-March 2001

²⁶⁴ Wiken E. et al.: *Restoration Of Orang-utan Habitats In The Peatland Forests Of Indonesia*; Wildlife Habitat Canada Prepared for Presentation at the 16th Annual Conference of the Society for Ecological Restoration, 2004

²⁶⁵ Rieley J.: *Kalimantan's peatland disaster*; Inside Indonesia, Jan-March 2001

mangroves). No proper cost-benefit or sensitivity analysis appeared to have been carried out.

The government not only disregarded widespread and informed criticism of the project on grounds that it was not ecologically feasible and would have serious, unavoidable environmental impacts. It also proceeded with the project before the environmental assessment was completed. Up to May 1998, at least 1.5 trillion Rupees were spent on the project, over half of which was expenditure on primary canals, which now cannot be used because they were built over deep peat that subsequently (and predictably) subsided.²⁶⁶ In the end, 4,600 kilometres of irrigation channels were built. In the area between the Kahayan and Kapuas rivers alone, 15,000 ha of peat swamp forest collapsed after being drained by a 45km long canal that passed directly through the centre of the peat dome.²⁶⁷

Suharto's successor, President Habibie, stopped the project and handed over the land to be managed by the forestry ministry and the Central Kalimantan provincial government.²⁶⁸

No rice was ever grown on the land of the mega rice project, but the loss of biodiversity and natural resource functions is irreversible.

The destruction did not stop with the end of the project. Studies showed that land clearing continued after the government had officially halted the scheme. Satellite images showed a rapid conversion of Peat swamp forests mostly into un-used fallow land. Roads and the irrigation system of the Mega Rice Project now allow loggers and farmers unprecedented access into otherwise highly inaccessible forests. Illegal logging occurs all over the area, with a strong increase of 44% since the onset of the Asian economic crisis. Even when commercially viable trees had already been cut, illegal loggers took smaller trees of only 1 cm to 20cm

²⁶⁶ Holmes, D.A.: *Indonesia - Where have all the forests gone?* Environment and Social Development East Asia and Pacific Region. World Bank Discussion Paper. Written 2000, published June 2002 and The World Bank: *Indonesia: Environment and Natural Resource Management in a Time of Transition*, February 2001

²⁶⁷ Singleton I., Wich S., Husson S., Stephens S., Utami Atmoko S., Leighton M., Rosen N., Traylor-Holzer K., Lacy R. and Byers O. eds.: *Orang-utan Population and Habitat Viability Assessment: Final Report*. IUCN/SSC Conservation Breeding Specialist Group, Apple Valley, MN., 2004

²⁶⁸ Rieley J.: *Kalimantan's Peatland Disaster*; Inside Indonesia, Jan-March 2001

in diameter. Selective logging, though required by law, was hardly observed. Countless floats transported timber over black-water lakes and along channels and rivers. Huge areas of ecologically damaged peat landscape were visible in air and satellite pictures. Logging and the drainage of peat swamp drastically increased the fire hazard. Draught and low water tables in peat areas caused trees to die and made the forests even more susceptible to fire.²⁶⁹



Figure 14: Planting of wet rice in Malinau district, East Kalimantan © WWF / T. Bangun

In 2001 the Director of the Kalimantan Tropical Peat Swamp Forest Research Project concluded: “Five years after the Mega Rice Project commenced one million ha of wetland landscape lie in ruins, a wasteland testimony to human greed and stupidity. The peat swamp forest is either gone or in terminal decay. The 60,000 settlers who were transferred to part of the area can grow neither rice nor enough substitute crops to exist. Disease and poverty are rife. Many have reverted to despoiling the nearest remaining forest for firewood. Others have joined the legion of illegal

loggers, who are financed by a new generation of crooks replacing the Suharto cronies in raping this sensitive landscape.”²⁷⁰

4.4.2 The Bakun Dam

The Bakun dam is another controversial project that has drawn a lot of criticism. The dam, conceived over twenty years ago, has a rocky history.

Originally proposed in the 1980s to supply power to peninsular Malaysia, the project was cancelled in 1990 due to its high cost and a concerted campaign by local communities. The project was revived three years later only to be cancelled again in 1997 during the Asian economic crisis and amidst growing concerns over the project’s finances. At that time, undersea cables were proposed to transmit the power to peninsular Malaysia. In 1999, undeterred by criticism of the project, Prime Minister Mahathir Mohamad announced the revival of the dam at a scaled-down 500-MW capacity. The government proceeded with resettlement and construction of the project’s diversion tunnels. In February 2001, the prime minister announced that the project would now be extended on the basis of the originally planned 2,400-MW capability. The diversion tunnels were completed shortly thereafter.

The 2.4 billion USD (1.8 billion Euros at March 2005 rates) Bakun Dam is being constructed on the Balui River in the remote interior of the Malaysian state of Sarawak. The project comprises the construction of a 2,400-MW hydroelectric dam, electricity transmission lines and related infrastructure including access roads, a new township and an airport.

It will be a 205 meter high Concrete Face Rockfill Dam (CFRD), with a crest length of 740 meters, a base width of 560 meters and a crest width of 12 meters. This makes it one of the highest rockfill dams in the world. It will flood 69,640 ha of land, an area bigger than Singapore. Its catchment area is over 1.5 million ha of mainly primary forest, even though some 16 percent of Sarawak’s total log production is currently situated this area. Fifty-one percent of the land of the reservoir area is Native Customary Land (meaning it is legally owned by indigenous communities).²⁷¹

²⁶⁹ Boehm H.: *Ecological Impact of the One Million Ha Rice Project in Central Kalimantan, Indonesia, Using Remote Sensing and GIS*; Presented at the 22nd Asian Conference on Remote Sensing, November 2001, Singapore

²⁷⁰ Rieley J.: *Kalimantan’s Peatland Disaster*, Inside Indonesia, Jan-March 2001

²⁷¹ Tony Allison: *Malaysia’s Bakun project: Build and Be Damned*; Asia Times online, October 28, 2000,

Although the project's future is still uncertain, about 10,000 local people have already been forced from their ancestral lands and are living under difficult conditions at Sungai Asap, a government-sponsored resettlement site. Tens of thousands more, living downstream, have been excluded from the planning process and face serious impact on their livelihoods.²⁷²

Most are now subsistence farmers, with some supplementing their income through cash crops or jobs with timber companies.

A few hundred kilometres from the Bakun site is the smaller Batang Ai dam, completed in 1985. For that project, 3000 people were relocated to an area lacking adequate farmland or jobs, even before their new homes were ready. Many have not yet received fair compensation and almost half have returned to places near their original homeland. Bakun relocation planners do not appear to have learnt the lessons from this disaster: The time frame for completing the resettlement was criticised as unrealistically short and the plans make little provision for the preferences of those affected. While many would prefer to move to higher ground within the catchment area, the plans foresee a move to an area with poorer land and fewer prospects.²⁷³

Criticism and opposition to the dam has been ongoing since the beginning of the project.

- There was the perception that the official projections of Bakun's electricity output were wildly optimistic. The project was based on a number of assumptions regarding, for example, efficiency of the dam, rainfall, stream flow, sedimentation rates, likelihood of earthquakes, maintenance costs, speed of construction, and downstream effects. Miscalculating any one of these factors would cast doubt on the viability of the project.
- The planning of the dam was conducted with no public access to vital feasibility studies, no process of public feedback on the Environmental Impact Assessment (EIA) process and limited

consultation procedures with the indigenous peoples.

- Feasibility studies and reports commissioned by the government on the Bakun project have been classified under the Official Secrets Act, making it a criminal offence for anyone to see or use their information.
- Not all of the appendices, interim and final reports, of the EIAs have been made accessible to the public. Project proponents have refused to meet critics in any open discussion.²⁷⁴
- At one stage the Malaysian High Court even declared the project void. It ruled that the decision to implement the project had not been reached through any form of public participation. The government's reaction was to dismiss the Court decision as "technical".²⁷⁵

Construction of the dam is currently underway.

4.5 The impacts of forest fires

Unfortunately the impact of the mega rice project was not limited to the immediate ecological destruction from the clearing and the draining of the land.

While fires play an important role in forest ecosystems in many areas of the world, tropical rainforests have by and large been spared, prior the rise of widespread unsustainable management practices.

Normally, tropical rainforests will not burn, due to dampness. The dense canopy usually keeps everything underneath it humid, even in times of drought. In addition, biological material decomposes very quickly in the damp climate. As a result, that very little flammable material covers the ground. The trees in wet tropical climate zones are not adapted to forest fires. They have a thin bark, compared to the much thicker, fire resistant, bark of trees in monsoon or more temperate climates.²⁷⁶

Large-scale fires and smoke are an increasing problem in Indonesia and surrounding countries. For example: Major fires during the El Niño years 1982/1983, 1987,

²⁷⁴ Tony Allison: *Malaysia's Bakun project: Build and Be Damned*; Asia Times online, October 28, 2000,

²⁷⁵ Tony Allison: *Malaysia's Bakun project: Build and Be Damned*; Asia Times online, October 28, 2000,

²⁷⁶ Siegert F.: *Brennende Regenwälder*; Spektrum der Wissenschaft, February 2004

²⁷² International River Network *Bakun Dam: Economic Boondoggle, Human Rights Violations*; August 2001

²⁷³ Stephen Bocking: *The Power Elite: The Politics and Ecology of Malaysia's Bakun Dam*, Alternatives Journal 23:2

1991, 1994, and 1997/1998 devastated large areas of forest and caused significant economic damage in Indonesia, where most of the fires occurred, as well as in neighbouring countries.²⁷⁷

As early as 1982/83 fires in Borneo were caused largely by deforestation and conversion of the natural forest cover. It is believed that peat fires contributed to the fires of the early 80s, just like in the 1997/98 disaster²⁷⁸.

Indonesian territory devastated by the 1997/98 fires is estimated at 9.7 million ha of forest and non-forest land (an area nearly twice the size of Switzerland), with some 75 million people affected by smoke, haze, and the fires themselves. The disaster caused damage to health, loss of life, destruction of property and reduced livelihood options. The economic costs were estimated to exceed 9 billion USD. Carbon emissions were so high, that Indonesia attained the dubious status of being one of the largest polluters in the world.²⁷⁹ For all of Indonesia it is estimated that between 0.8-2.5 Gt of carbon were released to the atmosphere during the fires. This is the equivalent to 13-40 % of the mean annual global carbon emissions from fossil fuels. The fires on Borneo contribute significantly to this. Of the total burnt area in 1997/98 over 6.5 million where affected in Kalimantan, the vast majority of the area having been agricultural land and lowland forests. It is unknown how many animals were killed and displaced during the fires. Just for orang-utans, the estimates range from hundreds to thousands killed during the disaster. At the height of the catastrophe, satellites detected about one 1000 new fires in Indonesia within a

two-week period²⁸⁰. The smoke over Borneo covered an area measuring 2,000 by 4,000 kilometres.²⁸¹

The causes of this largest catastrophe for forests worldwide are a mixture of deforestation, the lowering of the water tables in peat lands and an unusually strong El-Nino effect during that year. The related drought period led to a drying of litter and other organic material in natural forest and plantations. Wherever forests are already under management, the drying process is accelerated due to lack of cover. Fires traditionally used for shifting agriculture, as well as the fires laid by plantation companies to clear land, quickly got out of control and spread to the adjacent forests and plantations. Some entrepreneurs even facilitated the spread of the fires, welcoming them as a profitable opportunity to clear land for new plantations.

See map section: "Burnt Areas during Fire Season 1997 – 1998", p.22



Figure 15: Burning the forest for food crops inside Kutai National Park, East Kalimantan(c) WWF-Canon / A. Compost

Tab. 8: Spatial damage from the 1997-1998 fires in Kalimantan (ha)²⁸²

Province	Montane forest	Lowland forest	Swamp forest and peat	Scrub and grass	Timber plantation	Agriculture	Estate crops	Total
Kalimantan		2,375,000	750,00	375,000	116,000	2,830,000	55,000	6,501,000

²⁷⁷ Applegate G. et al: *The Underlying Causes and Impacts of Fires in Southeast Asia*, CIFOR, March 2001

²⁷⁸ Goldammer J.G.: *Feuer in Waldökosystemen der Tropen und Subtropen*; Birkhäuser, Basel, Boston, Berlin, 1993

²⁷⁹ Applegate G. et al: *The Underlying Causes and Impacts of Fires in Southeast Asia*; CIFOR, March 2001

²⁸⁰ Food and Agriculture Organisation: *Global Forest Fire Assessment 1990-2000*, Rome 2001

²⁸¹ Siegert F.: *Brennende Regenwälder*; Spektrum Der Wissenschaft, February 2004

²⁸² The World Bank: *Indonesia: Environment and Natural Resource Management in a Time of Transition*, February 2001

4.6 Poaching and illegal trade

Smuggling of protected animals in Indonesia is a business estimated to be worth 1.1 billion Euros a year, with Jakarta topping the list with 1.1 million Euros per day (more than 400 million Euros per year).²⁸³

A number of threatened species in Borneo are illegally traded. They include the sun bear and the clouded leopard as well as the orang-utan, one of the most highly priced animals in the illegal wildlife trade.

Sun Bear

The trade in sun bears as pets, or body parts such as gall bladders for traditional Chinese medicine, is still widespread, contributing to the demise of the species. After visiting several areas in Indonesia in recent years, Animal Conservation for Life (KSBK) found strong evidence to suggest that the Malayan sun bear is still widely hunted. They are traded as live animals, killed and stuffed, or butchered for parts. KSBK found 14 live bears kept as pets and traded in bird markets. They also found bearskins, gall bladders, canine teeth, skulls, claws and stuffed bears. Items for trade included 110 bear claws (with prices ranging from 0.8 to 5.1 Euros), 47 canines (1.7 to 8.4 Euros), around 10 other bear teeth, 4 bear paws (with a maximum price of 8.4 Euros) and 37 bear gall bladders.²⁸⁴

Clouded Leopard

This species is also widely hunted for their teeth, decorative pelt and for bones used in traditional Asian medicine. This happens despite the fact that there are bans on hunting leopards in many countries, including Indonesia and Malaysia. A black market trade survey found that Clouded leopard pelts were the most commonly available feline pelts in south-eastern China. Clouded leopards also feature in menus of restaurants in Thailand and China, which cater to wealthy Asian tourists.²⁸⁵

²⁸³ *Protected Animals Smuggling Reaches \$547.5m Annually*; Jakarta Post: 28/3/2003

²⁸⁴ Kurniawan D. and Nursahid R.: *The Illegal Trade In Bear Products, Bear Parts, And Live Malayan Sun Bears In Indonesia*; published by Animal Conservation for Life (KSBK), October 2002

²⁸⁵ IUCN Cat Specialist Group 2002: *Neofelis nebulosa*. In: IUCN 2004. 2004 IUCN Red List of Threatened Species. <www.redlist.org>. Downloaded on 03 February 2005.

Gibbon

Among Borneo's illegally hunted primates Gibbons feature strongly, even though Indonesian law theoretically protects them since the beginning of the last century. The distribution of gibbons is larger than of the orang-utans, making the hunting of this primate more widespread. As with orang-utans, throughout Borneo's interior, they are hunted by both the different Dayak tribes and the Penan. In a 2003/2004 survey for TRAFFIC Southeast Asia it was found that, especially in Central and West Kalimantan, gibbons were present in almost every village or hamlet, as well as in most of the larger towns²⁸⁶.

Orang-utan

Even without widespread habitat destruction, orang-utan populations are naturally vulnerable because of their low reproductive rate resulting from slow development towards sexual maturity (up to 12 years) and a long interbirth interval (typically 8 years).²⁸⁷ The impacts of hunting are most severe in low quality habitats, as the potential population growth is low or even negative in these areas. Owing to the naturally slow breeding rate of orang-utans, hunting as few as 1% per year could destabilize and threaten even large populations living in extensive areas of habitat. Even in the best habitats, orang-utans cannot "compensate" for hunting at rates of 2% or higher. This extremely low mortality tolerance, combined with increasing rates for hunting and/or live removal, make poaching and illegal trade with orang-utans the most significant threat to the survival of the species, after habitat loss. The current numbers of orang-utans estimated to be captured annually, or killed to obtain infants as pets, is much higher than would be sustainable. Killing orang-utans for food or other purposes would further accelerate the decline.²⁸⁸

²⁸⁶ Nijman V.: *An Assessment of Trade in Gibbons and Orang-utans in Kalimantan, Indonesia*; A TRAFFIC Southeast Asia report (unpublished draft), February 2005

²⁸⁷ Morrogh-Bernard H. et al.: *Population status of the Bornean orang-utan (Pongo pygmaeus) in the Sebangau peat swamp forest, Central Kalimantan, Indonesia*; Biological Conservation 110 (2003) 141–152, 2003

²⁸⁸ Singleton I., Wich S., Husson S., Stephens S., Utami Atmoko S., Leighton M., Rosen N., Traylor-Holzer K., Lacy R. and Byers O. eds.: *Orang-utan Population and Habitat Viability Assessment: Final Report*. IUCN/SSC Conservation Breeding Specialist Group, Apple Valley, MN., 2004

Illegal killing for meat and medicinal purposes is the main factor leading to extinction in several parts of Sabah. With the elimination of headhunting on Borneo, some communities hunted orang-utans as trophies, to substitute the cultural significance of human skulls. Hunting is thought to be responsible for local extinctions in parts of Sarawak and Kalimantan (Rijksen & Meijaard 1999)²⁸⁹ and may partly account for the scattered distribution of the species in general.

An additional threat to orang-utan conservation, which became evident in the middle of the 20th century, is the capture of live animals for the pet industry and the entertainment and tourism market. Performing orang-utans are very popular in Southeast Asia, and the likeness of baby orang-utans to human babies increases their appeal as pets. Former key markets for live orang-utans, such as Taiwan, were abolished in the 1990s. However, new markets such as Thailand and Indonesia have emerged and their demand for live orang-utans poses a constant threat to the survival of this species. This industry is especially damaging, as adult females are slaughtered to obtain the “charismatic” youngsters. Although there is a lack of hard data, it is estimated that anywhere between one and six orang-utans are killed for each baby. Considering the slow reproductive rate, these mortality figures have a dramatic effect on the populations’ demography and age structure. WWF/TRAFFIC observations indicate an increase in baby orang-utan trade over the last ten years, which might be related to the economic crisis in Indonesia. During a one-month survey in 2003, TRAFFIC counted around 30 confiscated Borneo orang-utans in five wildlife centres on Java.²⁹⁰ It should be noted, that wildlife trade is often interwoven with other illicit business practices, such as the illegal timber trade, and can be considered a by-product of other destructive operations, such as forest conversion. When animals are confiscated, the owners/traders are rarely prosecuted. As orang-utans move through the trade chain from capturer to dealer, prices increase from 60 to 80 USD to several thousands of USD per animal. The prices paid for orang-utans near the point of

capture are often ten times lower than in markets on Java or Bali, let alone abroad.

Poaching and trade is widespread throughout Kalimantan. They occur particularly in areas where orang-utans have traditionally been hunted and in areas where there has been a recent increase in accessibility (for example through the construction of logging roads). Essentially all forest-dwelling people know the value of an infant orang-utan. Law enforcement is lacking and there is no moral obligation not to kill or capture an orang-utan. Thus, when the opportunity arises to obtain an infant or juvenile orang-utan, few will resist. As such, a young orang-utan represents money and can be traded as a commodity. In villages, many keep an orang-utan as a ‘pet’, at one time or another, not necessarily because there is a great fondness towards the animal (though that may occasionally be the case), but because it represents something that can be sold or bartered.²⁹¹

It has been shown that even low rates of hunting (between 1% and 2% of a population per year) can destabilize and threaten the persistence of initially even large orang-utan populations in extensive areas of habitat. The impacts are most severe when hunting occurs in lower quality habitats, where the potential population growth rate is low. But even in the best habitats, the slow breeding rates of orang-utans cannot compensate for hunting at rates of 2% and higher. Higher rates (e.g., 3% per year) are unsustainable, no matter where, and can lead to extinction of local populations.

²⁸⁹ Rijksen, H.D. and Meijaard, E. 1999. Our vanishing relative - the status of wild orang-utans at the close of the twentieth century. Kluwer Academic Publishers, Dordrecht.

²⁹⁰ Nijman V.: *An Assessment of Trade in Gibbons and Orang-utans in Kalimantan, Indonesia*; A TRAFFIC Southeast Asia report (unpublished draft), February 2005

²⁹¹ Nijman V.: *An Assessment of Trade in Gibbons and Orang-utans in Kalimantan, Indonesia*; A TRAFFIC Southeast Asia report (unpublished draft), February 2005



Figure 16: Captured orang-utan © WWF / A. Compost

5. The Future of Borneo's Forests

5.1 Deforestation in Borneo

5.1.1 Kalimantan

There are several studies investigating the loss of Kalimantan's forests over recent decades. Most notably two reports by the World Bank²⁹², a comprehensive report by Global Forest Watch²⁹³ as well as a more recent article on Conservation Biology by Douglas Fuller et al.²⁹⁴ In addition, there is data released by the Indonesian Ministry of Forestry. However, all these reports come to different conclusions as regards the degree and speed at which the forests of Kalimantan are disappearing. Sometimes these differences are significant.

It is probable that the differences in forest cover estimates stem from the different interpretations of satellite images and varying techniques (such as MODIS, SPOT and Landsat, that feature different image resolutions and image types).

For this report, the images and data from the year 2000 were reinterpreted, while for 1985 and 1991 government statistics were used. For 1997 the data by Holmes was chosen and for 2002 information from the article by Fuller was used. Depending on the methods used, other reports might come to different conclusion concerning the extent of forest cover loss in Kalimantan.

Between 1985 and 2002 Kalimantan lost over 13 million hectares of forest. This is an area roughly three times the size of Switzerland. The annual deforestation rate in Kalimantan between 1985 and 1997 was

²⁹² Holmes D.A.: Indonesia - *Where have all the forests gone?* Environment and Social Development East Asia and Pacific Region. World Bank Discussion Paper. Written 2000, published June 2002 and The World Bank: *Indonesia: Environment and Natural Resource Management in a Time of Transition*, February 2001

²⁹³ Global Forest Watch, Global Forest Watch Indonesia, World Resources Institute: *The State of the Forest, Indonesia*, 2002

²⁹⁴ Fuller D.O, Jessup T.C and Salim, A.: *Loss of Forest Cover in Kalimantan, Indonesia, since the 1997-1998 El Niño*. Conservation Biology, pp.249-254 Volume 18, No1, February 2004

approximately three times greater than the rate reported for Southeast Asia as a whole.²⁹⁵

While the long-term annual deforestation was about 780,000 ha, over the last two decades it increased to over 1.2 million ha a year between 2000 - 2002.

In 1985 forests covered three quarters of the landmass of Kalimantan, but this number fell to just over 50% in 2002. In these 17 years, Kalimantan has lost 34% of its forests and within the last two years alone Kalimantan lost 8.5 % of its forest cover.

Tab. 9: Forest cover loss Kalimantan (ha):

Province	Total Land Area	RePPPOT (1985) ²⁹⁶		MoF (1991) ²⁹⁷		MoF (1997) ²⁹⁸		Landsat (2000) ²⁹⁹		MODIS(2002) ³⁰⁰	
		Forested	%	Forested	%	Forested	%	Forested	%	Forested	%
W. Kalimantan	14,546,318	8,700,600	59.8	8,117,980	55.8	6,713,026	46.1	6,736,261	46.3	-	
C. Kalimantan	15,249,222	11,614,400	76.2	11,492,050	75.4	9,900,000	64.9	9,320,771	61.1	-	
S. Kalimantan	3,703,550	1,795,900	48.5	1,749,360	47.2	999,182	27.0	647,612	17.5	-	
E. Kalimantan	19,504,912	17,875,100	91.6	17,584,260	90.2	13,900,000	71.3	12,477,309	64.0	-	
Total	53,004,002	39,986,000	75.4	38,943,650	73.5	31,512,208	59.5	29,181,953	55.1	26,700,000	50.4

The total land area in the data sets for 1985 and 1991 was slightly higher than the one given here. It was adjusted in this table to today's size. The forest cover for these years was not adjusted. This alteration is not believed to be significant for the deforestation rate. For 1997 there are areas for which the satellite images did not yield useable data (due to cloud cover for example). Holmes estimated a percentage of the no data area as being forested.

Tab. 10: Annual forest loss in Kalimantan (ha)

Time frame	Total loss	Annual loss
1985-1991	1,042,350	173,725
1991-1997	7,431,442	1,238,574
1997-2000	2,330,255	776,752
2000-2002	2,481,953	1,240,977
1985-2002	13,286,000	782,000*

* rounded to a full thousand ha

In addition to the already high overall deforestation rate, the vast majority of the forests that were lost recently could well have disappeared from ecologically important areas. Fuller reports

that, of all the forests lost between 1997 and 2002 in Kalimantan, nearly 79% were within the boundaries of designated or proposed protected areas.³⁰¹

²⁹⁶ Indonesian Ministry of Forestry based on RePPPOT data 1985 published at <http://www.dephut.go.id/INFORMASI/INTAG/Peta%20Tematik/DEF98/LOSTFORE.XLS>, accessed in May 2005

²⁹⁷ Indonesian Ministry of Forestry via Bambang Supriyanto, WWF Indonesia, personal communication

²⁹⁸ Holmes D.A.: Indonesia - *Where have all the forests gone?* Environment and Social Development East Asia and Pacific Region. World Bank Discussion Paper. Written 2000, published June 2002

²⁹⁹ Compiled by Martin Hardiono for WWF Germany based on Landsat 2000 analysis

³⁰⁰ Fuller D.O, Jessup T.C and Salim, A.: *Loss of Forest Cover in Kalimantan, Indonesia, since the 1997-1998 El Niño*. Conservation Biology, pp.249-254 Volume 18, No1, February 2004

²⁹⁵ Fuller D.O, Jessup T.C and Salim, A.: *Loss of Forest Cover in Kalimantan, Indonesia, since the 1997-1998 El Niño*. Conservation Biology, pp.249-254 Volume 18, No1, February 2004

³⁰¹ Fuller D.O, Jessup T.C and Salim, A.: *Loss of Forest Cover in Kalimantan, Indonesia, since the 1997-1998 El Niño*. Conservation Biology, pp.249-254 Volume 18, No1, February 2004

Lowland forest loss prediction

In February 2001 the World Bank predicted that all lowland rainforests in Kalimantan would disappear by 2010³⁰². The WB analysis was based almost entirely on a remarkable study written by the late Derek A. Holmes in 2000. Holmes analysed long-term trends in land use change in Indonesia and data on loss of forest cover during the period 1985-1997. He noted: "Assuming the continuation of present trends, it is predictable that non-swamp lowland forest will become extinct in Sumatra by 2005 and in Kalimantan soon after 2010". And: "...the extinction of the swamp forests could follow about five years later". Holmes also concluded that the heath forests of Kalimantan will be gone entirely soon after 2005, as these are the most fire-prone forest ecosystems and are mostly already degraded beyond regeneration potential.

Holmes differentiated between "swamp forests" and "non-swamp lowland forests" because he concluded that the major forest loss will take place in lowland areas below 300 m (above sea level: asl) which are not regularly flooded or swampy. Peat-swamps, for example, contain less valuable commercial timber per ha and timber extraction is difficult. In rainy seasons, major parts of these forests become inaccessible due to flooding. Therefore the timber companies will concentrate on the "drier" lowland forests first. Holmes also defined the 300 m asl elevation as an approximate boundary to up which the loggers operate. In mountainous regions logging, road construction and timber extraction become too difficult.

In ecological terms, the forests that may vanish by 2010 in Kalimantan are the most rich and diverse on Borneo and represent a unique heritage for the entire world.

Was Holmes right?

Unfortunately, Holmes specific calculations can not be replicated today. His data was based on a unique classification of land-use systems conducted 15 years ago by RePPPProT³⁰³. The RePPPProT study provided breakdowns of vegetation cover for all major islands of

Indonesia. It used remote sensing imagery collected between 1983 - 1987 and Holmes compared these with new satellite imagery of 1995-1997. The botanical classification of the RePPPProT study only classifies forest units with large differences in altitudes and fails to provide information on the probability that these forests be used for timber extraction and conversion. For example, lowland forest is defined with an upper limit of 1000 m asl. In general, a 300 m level is regarded as upper limit for forest extraction by the timber industry in Kalimantan.

To check whether Holmes prediction is still valid, an alternative and straightforward calculation has been made for this report. It considers two different scenarios: a conservative (optimistic) and a more pessimistic prediction. They are based on the following assumptions:

A) Conservative Projection until 2010:

- Protected forested areas like National Parks can be adequately protected and are therefore still there in 2010.
- Forest loss outside protected areas occurs only below 300m asl.
- Areas of the category "Conversion Forest" remain forested.
- As Holmes predicted, the peat swamp forests below 300m will experience an average rate of 2% forest loss per year until 2010.
- A long-term average (1985 - 2002 figure) on forest loss is used for the prediction: 781,529 ha per year.

B) Pessimistic Projection until 2010:

The assumptions are the same as in A) except that:

- Lowland forest in protected areas below 300m cannot be adequately protected and will therefore experience the same forest loss rate as forest outside protected areas
- A more recent annual forest loss figure (2000 - 2002) is used for the prediction: 1,240,000 ha per year.

Landsat ETM7 imagery from the year 2000 was used to determine total forest cover, Shuttle Radar 90 meter resolution for topography, the RePPPProT land system classification of 1985 was used to determine major occurrence of peat swamp forest sites in Kalimantan. Landsat images were used to adjust the RePPPProT classification to the situation in 2000.

³⁰² The World Bank: *Indonesia: Environment and Natural Resource Management in a Time of Transition*, February 2001

³⁰³ RePPPProT, Regional Physical Planning Programme for Transmigration. Final report dated 1990. Prepared for the Ministry of Transmigration Republic of Indonesia and the Land Resources Division of the Overseas Development Administration, Government of UK

Tab. 11: Lowland* forest loss in Kalimantan

	2000 lowland forest cover outside PAs **	2000 lowland forest cover in PAs	Total forest loss 2000 - 2010 - lowland forest - (peat swamp)	2010 lowland forest cover in PAs	2010 lowland forest cover outside PAs
A) Conservative Scenario	13,735,265	595,000	7,370,000 (445,000)	595,000	6,365,000
B) Pessimistic Scenario	13,735,265	595,000	11,814,000 (586,000)	103,000	2,391,000

* Lowland = all forest < 300m asl without peat swamp forests

** PAs = Protected Areas

Both scenarios give reason for concern. Even by calculating with a long-term average rate for forest loss, the extermination of the drier lowland forests in Kalimantan can be expected for 2018. If the most recently observed rate of destruction continues unhampered, Holmes' prediction will become reality in 2012. The occurrence of an extreme El Niño year like the one which struck Southeast Asia in 1997/98 would make any optimistic projection futile and wipe out what is left of the lowland forests.

Still the "where" of this deforestation can be disputed. In scenario A) the optimistic view is expressed that increased efforts will lead to a better protection of the forests in protected areas. This view does not reflect observations of the recent past. Studies from Fuller 2004³⁰⁴ and Curran 2004³⁰⁵ show that significant

amounts of illegal logging take place in protected areas. Satellite analysis illustrates that more than two-third of the deforestation since the El-Niño events from 1997/98 occurred in proposed and existing protected areas. In this period of time, medium-sized protected areas in Kalimantan experienced deforestation rates of up to 50%.

See map section, "Future of Lowland Forest in Kalimantan", p.9

³⁰⁴ Fuller D.O, Jessup T.C and Salim, A.: *Loss of Forest Cover in Kalimantan, Indonesia, since the 1997-1998 El Niño*. Conservation Biology, pp.249-254 Volume 18, No1, February 2004

³⁰⁵ Curran L.M., Trigg S.N., McDonald A.K., Astiani D., Hardiono Y.M., Siregar P., Caniago E. and Kasischke E.: *Lowland Forest Loss in Protected Areas of Indonesian Borneo*; Science, 13 February 2004; VOL303: 1000-1003

Tab. 12: Forest cover loss Sabah and Sarawak (ha)

	Total Area	1985 ³⁰²		2003 ³⁰³		Total Loss	Annual loss
		Forested	%	Forested	%		
Sabah	7,371,000	4,604,700	62.5	4,350,000	59.0	254,700	14,150 (32,000 ^{**})

^{**} estimation when oil palm plantation development included

	Total Area	1995 ³⁰⁴		2003 ³⁰⁵		Total Loss	Annual loss
		Forested	%	Forested	%		
Sarawak	12,315,600	8,499,600	69.0	8,096,000	65.7	403,600	50,450

5.1.2 Sabah and Sarawak

For the Malaysian provinces of Borneo there is even less data than for Kalimantan. Official statistics exist, but seem to underestimate forest loss.

At least for Sabah, the figures do not appear to correspond with the reality of oil palm plantation expansion.

The rate of conversion into oil palm estates in Sabah between 1985 and 2003 was more than 54,000 ha per year. Assuming – as has been suggested - that at least

60 %³¹⁰ of that area is established on forest land, the forest loss in Sabah would amount to at least 32, 000 ha annually. Additional conversion to oil palm estates is likely to take place on rubber, cocoa or coconut plantations and on bushland.

For Sarawak even less public data is available. And no data was provided by official sources. Therefore this report relies on the official figure of 50.000 ha of forest loss per year.

Tab. 13: Oil palm plantations Sabah (ha):³⁰⁹

Sabah	Total	Oil Palm Estates	%	Total increase	Annual increase
1985	7,371,000	161,500	2.2		
2003	7,371,000	1,135,100	15.4	973,600	54,089

³⁰⁶ Sabah Forestry Department, Annual Report 1985

³⁰⁷ Sabah Forestry Department quoted in Department of Statistics, Sabah, Yearbook of Statistics 2004

³⁰⁸ Forestry Department of Sarawak quoted in Department of Statistics Sarawak, Yearbook of Statistics 2004

³⁰⁹ Forestry Department of Sarawak quoted in Department of Statistics Sarawak, Yearbook of Statistics 2004

³¹⁰ Wakker E.: *Greasy Palms, The social and ecological impacts of large-scale oil palm plantation development in Southeast Asia*, Research Report for Friends of the Earth. March 2004

³¹¹ Department of Statistics, Malaysia: 1975 to 1984 at <http://econ.mpob.gov.my/economy/annual/stat2004/Area2.htm>

5.1.3 Borneo

See map section, “Forest Cover 1950 – 2020, pp. 6-8

As it is the case with the individual provinces, it is difficult to obtain reliable data for overall forest loss on Borneo.

Tab. 14: Borneo’s Forest Cover (mill ha)

	Forest Cover			
	Kalimantan	Sabah & Sarawak	Total	Percent of total land area
1985	39,986,000	13,608,800	53,594,800	73.7
2000	29,181,953	12,639,800	41,821,573	57.5
2005	24,355,413	12,281,100	36,636,513	50.4
2010	20,447,768	11,868,850	32,316,618	44.4
2020	12,632,478	11,044,350	23,676,828	32.6

For Sabah, the official annual forest loss has been used for past projections. The higher adjusted estimate has been used for projection from 2003 onwards, as oil palm development continues unhampered. For Kalimantan, the more optimistic long-term annual forest loss (0.781 mill ha/a) has been used for the prediction from 2002 onwards. A total land area of 72,690,602 ha has been used as basis (excluding Brunei)

Borneo’s forests are disappearing quickly. While in the mid 1980s forests still covered nearly three quarters of the island, by the time this report goes to print only 52% of Borneo is still forested. The current deforestation rate for Borneo has been calculated on a long-term basis at a minimum of 860.000 ha per year.

In the last twenty years the island has lost over 30% of its forest cover (based on the long-term deforestation rate). Applying the long-term deforestation rate, just under one third of Borneo would remain forested in 2020. However, if the forests were to disappear at the same rate as between 2000 and 2002, only 23% of Borneo would be covered in forests in 2020.

There are very few studies examining the overall loss of forests on Borneo. A relatively recent study was carried out by Stibig and Malingreau 2003.³¹² Comparing the data from their article with the conclusions in this report suggests that the numbers presented here might even be too optimistic, though they broadly correspond with Stiebig and Malingreau.

³¹² Stibig H.-J. and Malingreau J.-P.: *Forest Cover of Insular Southeast Asia Mapped from Recent Satellite Images of Coarse Spatial Resolution*; *Ambio* Vol. 32 No 7, Nov. 2003, Royal Swedish Academy of Sciences, 2003

From the accumulated data above, assuming a linear continuation of deforestation, the following estimate with regard to Borneo’s forest cover can be made:

Tab. 15 Borneo’s Forest Cover (mill ha) comparison:

	Forest Area	
	Stibig & Malingreau ³¹³	WWF
mid 1980s	53,009,000	53,594,800
2000	39,792,000	41,821,573
2005	35,386,333	36,636,513
2010	30,980,666	32,316,618
2020	22,169,333	23,676,828

Despite the difficulties in obtaining reliable data and assessing the forest cover of Borneo, it is clear that deforestation has been continuing at a highly unsustainable rate over the last twenty to thirty years. The impact the continuation of this trend will have is irreversible in terms of the effects on forest ecosystems, on the species that inhabit them, as well as on the people who live sustainably from and in the forests.

³¹³ Stibig H.-J. and Malingreau J.-P.: *Forest Cover of Insular Southeast Asia Mapped from Recent Satellite Images of Coarse Spatial Resolution*; *Ambio* Vol. 32 No 7, Nov. 2003, Royal Swedish Academy of Sciences, 2003

5.2 WWF Activities in Borneo

Having been active in the region for many years, WWF is well suited to help initiate projects to ease the pressure on the forests of Borneo. Already there are a number of initiatives in Borneo that WWF manages:



Figure 17: Nursery for local community established by WWF Kayan Mentarang NP project © WWF / T. Bangun

Sebangau National Park project:

WWF has been active in Sebangau, a peat swamp forest (encompassing nearly 600,000 ha) in the south of Borneo, since 2001. By protecting Sebangau, WWF is making an important contribution to the survival of the orang-utan. The area is home to an estimated 6,900 orang-utans, the largest orang-utan population in the world.

Even though Sebangau had still not acquired protection status at the beginning of 2004, the Indonesian government expressed its intention to turn Sebangau into a National Park. The preparation of a good management plan for such a park and the development of sustainable economic activities for the local inhabitants are the key goals for the project over the coming years.

Assessing orang-utan populations for long-term survival in logged forests:

This project looks at the possibilities of orang-utan survival in forests that have been cleared. In Sabah, most orang-utans live in unprotected areas. The aim of the research is to understand how orang-utans cope with changes to their habitat. The results of the research should ultimately lead to the creation of better protection measures. This project is being carried out by the NGO 'HUTAN', which is also managing the Kinabatangan Orang-utan Conservation Project (KOCP). This NGO has been operational in Sabah since 1998.

Kinabatangan floodplain project:

The Kinabatangan project is part of the Partners for Wetlands Project (PfW), protecting important wetlands across the entire globe. In the initial phase of the project, much time was invested in obtaining the status of 'protected area'. This lobbying finally resulted in turning Kinabatangan into a 'Gift to the Earth'. The project has three main components:

- Restoring the Lower Kinabatangan floodplain
- Developing eco-tourism
- Compiling and collecting information about the region.

The 26,000 hectares floodplain is known for its tremendous variety of natural habitats, such as oxbow lakes, riverside forest vegetation and dry lowland dipterocarp forest. It is also home to elephants, proboscis monkeys, orang-utans, gibbons, crocodiles, freshwater rays and sharks, as well as a wide variety of birds. The rare Oriental darter, the threatened Storm's stork and all eight species of hornbills recorded on Borneo are just some of the 200 species of birds found here.

Kayan Mentarang National Park:

The park lies in the interior of Borneo, on the border between East Kalimantan and the Malaysian states of Sabah and Sarawak. Encompassing 1.4 million ha this is the largest national park in Southeast Asia. This region is part of the proposed Heart of Borneo project area. In the nineties, WWF was mostly involved in assessing and registering the needs and customs of the local population. In this time period, for example, field posts were set up and WWF - together with researchers, government representatives and the local Dayak population - developed the necessary zoning of the park by participatory mapping, at that time a very innovative approach to community work in Indonesia. The measure specified traditional use-zones as well as priority protection areas. The current priority is to implement an operational management plan in which the local inhabitants and the government both have a say. An information centre was completed in 2004 and serves to inform people from local villages about agricultural micromanagement. New Emphasis is being given to the support of eco-tourism. Kayan Mentarang is the first and, so far, the only national park where the government has officially approved a plan for "collaborative park management".

Betung Kerihun National Park:

The 800.000 ha of Betung Kerihun are also part of the envisioned Heart of Borneo. The largest river on Borneo, the Kapuas, has its source in the park, the second largest national park on Borneo, providing a habitat for approximately 1,200 orang-utans. WWF initiated a project in the park in 1995, in cooperation with the International Tropical Timber Organisation (ITTO) and the Government, represented through the National Park Authority on District level. As in Kayan Mentarang the project initially entailed gathering information about the area, data necessary to establish harmonized zoning and recommendations for a long-term management and monitoring programme. The larger programme also contains so-called „micro-projects“ that shall support local communities in generating additional incomes and helps them preserve their traditional forests. Another component is cooperation with protected areas (Batang Ai National Park and Lanjak Entimau Wildlife Reserve) in neighbouring Sarawak.

In 2005 the focus of the work will be on combating illegal logging and destructive gold mining in the rivers of the parks, establishing an eco-tourism programme with the local population, as well as the implementation of a long-term orang-utan monitoring project.

AREAS = Asian Rhino and Elephant Action Strategy:

Rhinos and elephants are both priority species for WWF. In 1998, 13 locations were earmarked as priority regions for the protection of rhinos and elephants. Protection in Malaysia is part of the AREAS programme. The AREAS Sabah project was launched in 2000. Currently the focus of the project is to promote proper forest management. As such, assistance in developing guidelines for sustainable forest management in Forest Management Units (the units with which the government of Sabah works) is now seen as top priority.

Likas Wetlands Nature Education Centre:

The Likas Wetlands were designated as a Bird Sanctuary in 1996. This small area, located near the state capital Kota Kinabalu, is one of the 20 most important wetlands of Sabah. WWF has helped develop a good management plan and finances an education centre. The area is now called the Kota Kinabalu City Bird Sanctuary and covers 24 ha. Currently much importance is placed on involving the local population in protecting and managing the region.

Community-based plant and habitat conservation in Ulu Padas, Sabah:

This region (covering a total of 160,000 ha) is included in the proposed Heart of Borneo programme and borders Kayan Mentarang National Park. It is supported by ASEAN (Association of South East Asian Nations), and by the European Commission. A great deal of effort is invested in training and in increasing botanical knowledge. Two botanical expeditions were organised and the local population received its own herbarium. This is intended to help the younger generations to identify important and useful plants. In the end, the acquired knowledge is intended to lead to the introduction of Plant Conservation Areas (PCA) and generate knowledge about how to manage these areas. Ultimately, these PCAs should become self-sufficient.

The Sabah orang-utan landscape project:

This project encompasses an area of 376,000 ha and is situated in the upper catchments of the Kinabatangan and Segama rivers. With the exception of the rainforests in the protected Danum Valley Conservation Area (43,000 ha) deforestation in the area has been rampant over the last few years. With approximately 5,000 animals, these catchments are home to the last continuous population of the Borneo orang-utans, where they share their habitat with the Sumatra rhinoceros and the Asian elephant. The goal of the Sabah orang-utan landscape project is to maintain the forest cover at 2004 levels and to protect these large mammals by introducing truly sustainable forestry. To this end, forest inventories are being conducted and support is given to the concessionaries to develop their management plans. The long-term goal is to reforest the logged area to improve the orang-utan's habitat and to ensure that illegal wildlife trade and poaching do not pose threats to the survival of the species. This goal will be achieved through patrols and involvement of the local population.

5.3 The way forward: The Heart of Borneo Initiative

It has become clear that the current network of protected areas - especially since they are being continually deforested - will not be enough to save the rainforests of Borneo. The current regime, under which parts of the Borneo forest are protected and managed, is insufficient and the currently protected areas are too

fragmented and too vulnerable to illegal logging, illegal wildlife trade and forest fires to ensure the survival of the forests. The full diversity of these ecosystems cannot be maintained if they are reduced to a patchwork. Forest conservation requires the maintenance of very large blocks of inter-connected forests, without which thousands, or even millions, of species become extinct. These forests are invaluable because of the diversity of their unique array of plants and animals, including majestic species such as elephants, rhinos and orang-utans. Equally important: They are a vital part of the people's prized natural heritage and valued for the goods and services they provide.

A new approach is urgently needed to address these problems. New protected areas will need to be created and, most importantly, the deforestation of currently protected areas needs to cease rather than accelerate as forecast.

There is only one place on the planet where the Indo-Malayan forests of Southeast Asia could be conserved on such a scale. It straddles the transboundary highlands of Indonesia and Malaysia and reaches out through the foothills into adjacent lowlands and parts of Brunei. This area has been called the *Heart of Borneo*. It would be one of the last bastions of Southeast Asian rainforest, protected on a large enough scale to be permanently viable.

Here, in the Heart of Borneo, WWF seeks to help conserve more than 22 million ha of inter-connected rainforest through a network of protected areas and well-managed, productive forests. This will help ensure the survival of Borneo's unique biodiversity. The initiative will help to provide water security, food security and cultural survival for the people of Borneo and help to alleviate poverty. In the long term, it will save the island from the ultimate threat of deforestation and increased impacts from droughts and fires.

The programme will engage the governments of Brunei, Indonesia and Malaysia at national and local levels, to ensure the protection and sustainable use of the forests and water-catchments in these areas. Working within the framework of this pan-Borneo initiative, WWF seeks to establish active technical and financial partnerships with the international community, especially NGOs and multilateral and bilateral agencies, to ensure that Borneo's forests may

be conserved in perpetuity, for the benefit of the people of Borneo, the region and the rest of the world.

WWF will link technical expertise, stakeholder involvement, national and international policy advocacy and business and industry initiatives, into a successful programme.

The total proposed area for the Heart of Borneo is approximately 25% of the island's landmass. Around 60% of the area will be within the administrative boundaries of Indonesia, close to 40% will be located in Malaysia and less than 1% in Brunei.

The crucial first step towards turning the Heart of Borneo initiative into reality has already been taken. At a two-day workshop in early 2005 hosted by the Brunei Government in Bandar Seri Begawan, and attended by over 150 representatives from the government and non-government agencies of Brunei, Indonesia and Malaysia, a consensus was reached on a Vision and an Action Plan to promote the declaration of the Heart of Borneo.

The Action Plan recommended the establishment of an International Working Group, led by Brunei, to facilitate the progress towards a declaration on the Heart of Borneo. To keep the momentum it was agreed that a formal declaration would preferably be issued by May 2006. Encouragement was also given to use existing multilateral agreements to achieve a regional consensus. The Brunei Government as hosts, agreed to formally report to the Governments of Malaysia and Indonesia and seek an expression of commitment to the process leading to a declaration on the Heart of Borneo.³¹⁴

This is an important first step but to turn this unique opportunity to conserve pristine tropical rainforests on a huge scale, i.e. a quarter of the world's third largest island. But the forests of Borneo are still disappearing at an alarmingly fast rate. As the Vision for the Heart of Borneo initiative states "It is now or never".

³¹⁴ Heart of Borneo Workshop: *Three Countries – One conservation Vision*; Bandar Seri Begawan, Brunei Darussalam, 5/6 April 2005

Table of acronyms and abbreviations

AREAS	Asian Rhino and Elephant Action Strategy (a WWF transregional conservation programme for Asian rhinos and elephants)
ASEAN	Association of Southeast Asian Nations
asl	above sea level
AVHRR	Advanced very high resolution radiometer. The AVHRR is a satellite radiation-detection imager that can be used for remotely determining cloud cover and the surface temperature.
BaPlan	<i>Badan Planologi</i> (Indonesia - Forestry Planning Agency, Ministry of Forestry, formerly <i>Dirjen Intag</i>)
CFRD	Concrete Face Rockfill Dam
CIFOR	Center for International Forestry Research
CITES	Convention on International Trade in Endangered Species of Wild Fauna and Flora
Dirjen Intag	<i>Direktur Jenderal Inventarisasi dan Tata Guna Tanah</i> – Departemen Kehutanan (Indonesia - Directorate for Inventory at the Ministry of Forestry, since 2003 renamed <i>BaPlan</i>)
ECD	Environmental Conservation Department of the Ministry of Tourism, Environment, Science and Technology, Sabah
EIA	Environmental Investigation Agency
ERS-2	European Radar Satellite -2-
ETM+	Enhanced Thematic Mapper Plus (a sensor of Landsat satellites)
FAO	Food and Agriculture Organization of the United Nations
FELDA	Federal Land Development Authority (Malaysia)
FKKM	<i>Forum Komunikasi Kehutanan Masyarakat</i> , since 1998 (Indonesia - Community Forestry Communication Forum)
FMU	Forest Management Unit (Malaysia - sub-unit within the classification 'Commercial Forest Reserve')
GDP	Gross Domestic Product
Gt	Giga tonne
Ha	hectare
HGU	<i>Hak Guna Usama</i> (Indonesia – certificate of right to cultivate land)
HoB	Heart of Borneo
HPH	<i>Hak Pengusahaan Hutan</i> (Indonesia - forest timber concession permit; a license granted for the selective harvesting of natural forest in Indonesia, since 1999 renamed IUPHHK)
HPHTI	<i>Hak Pengusahaan Hutan Tanaman Industri</i> (Indonesia - industrial timber plantation permit)
HTI	<i>Hutan Tanaman Industri</i> (Indonesia – industrial fast-wood plantations)
IPK	<i>Ijin Pemanfaatan Kayu</i> (Indonesia – timber use permit; to clear forest and use remaining standing timber)
ITP	Industrial Timber Plantation
ITTO	International Tropical Timber Organisation
IUCN	The World Conservation Union

IUPHHK	<i>Ijin Usaha Pemanfaatan Hasil Hutan Kayu</i> (Indonesia - license for forest timber product utilization, formerly HPH)
IUPHHNK	<i>Ijin Usaha Pemanfaatan Hasil Hutan Non Kayu</i> (Indonesia – license for non-forest product utilisation, formerly HPHTI)
KOCP	Kinabatangan Orang-utan Conservation Project
Landsat	A series of remote sensing satellites used to acquire high resolution images of the land's surface and surrounding coastal regions.
MODIS	Moderate Resolution Imaging Spectroradiometer. MODIS is a key instrument aboard the Terra (EOS AM) and Aqua (EOS PM) satellites.
MoF	Indonesia - Ministry of Forestry (until March 1998 and after Dec.2000)
MoFEC	Indonesia - Ministry of Forestry and Estate Crops (March 1998 – August 2000). In August 2000 MoFEC was merged with the Ministry of Agriculture and renamed the Ministry of Agriculture and Forestry. This lasted just 3 months, when the name reverted to Ministry of Forestry.
NFI	National Forest Inventory – Program 1996 by MoF and FAO
NGO	Non Governmental Organisation
NOAA	National Oceanic and Atmospheric Administration. An agency under the US Federal Commerce Department, NOAA conducts research and gathers data about oceans, atmosphere, space, and sun.
NP	National Park
PCA	Plant Conservation Areas
PfW	Partners for Wetlands Project
PHVA	Population and Habitat Viability Assessment
PLG	<i>Proyek Lahan Gambut</i> (Indonesian – Mega Rice Project in Central Kalimantan)
RePPPProT	Regional Physical Planning Programme for Transmigration (Indonesia)
SFMLA	Sustainable Forest Management License Agreement (Sabah - a long term contract between selected FMU holders and the Sabah Forestry Department)
SPOT	Système Probatoire d'Observation de la Terre. A series of European satellites launched by the Ariane rocket. Used in much the same way as Landsat, SPOT can completely cover the Earth surface in a 26-day cycle.
SSC	Species Survival Commission of the IUCN
TGHK	<i>Tata Guna Hutan Kesepakatan</i> (Indonesia - Forest Land-use Use Consensus)
TI	Transparency International
TRAFFIC	Trade Records Analysis of Flora and Fauna in Commerce
UNEP	United Nations Environment Programme
UNESCO	United Nations Educational, Scientific and Cultural Organization
WALHI	<i>Wahana Lingkungan Hidup Indonesia</i> (Indonesian Forum for the Environment)
WB	World Bank



WWF is one of the world's largest and most experienced independent conservation organizations, with almost 5 million supporters and a global network active in more than 100 countries.

WWF's mission is to stop the degradation of the planet's natural environment and to build a future in which humans live in harmony with nature, by:

- conserving the world's biological diversity,
- ensuring that the use of renewable resources is sustainable
- promoting the reduction of pollution and wasteful consumption.

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