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Peat Swamp and Lowland Forests of Sumatra (Indonesia)

Forest location and brief description

With an area of some 470,000 km², Sumatra is Indonesia's largest island, and the world's sixth largest, supporting 40 million people.

The lowland forests cover approximately 118,300 km² of the eastern part of the island. These rainforests are characterized by large, buttressed trees dominated by the Dipterocarpaceae family, woody climbers and epiphytes. Figs are also common in the lowland forests. There are more than 100 fig species in Sumatra.

According to the SPOT Vegetation 2006 data, the Sumatran peat swamp forests total approximately 33,600 km². These forests are located on Sumatra's eastern coast and boast the deepest peat in Indonesia. Over 30 per cent of Sumatra's peat are over 4 metres deep. Most of the peat are in the Sumatran province of Riau (56.1 per cent of its total provincial area).

Unique qualities of forest area

Sumatra's lowland forests are home to a range of species including: Sumatran pine, *Rafflesia arnoldii* (the world's largest individual flower, measuring up to 1 metre wide), *Amorphophallus spp.* (world's tallest and largest inflorescence flower measuring up to 2 metres tall), Sumatran tiger, orang utan, Sumatran rhinoceros, Sumatran elephant, Malayan tapir, Malayan sun bear, Bornean clouded leopard, and many birds and butterflies.

Although Sumatra's peat swamp forests do not support an abundant terrestrial wildlife, they do support some of the island's biggest and rarest animals, such as the critically endangered Sumatran tiger, and the endangered Sumatran rhinoceros and Asian elephant. There are also a number of rare bird species found here, such as the Hooked-Bill Bulbul.

Sumatra's peat swamps also play a major role in regulating global climate. Together with other peat swamps in Indonesia, they act as "carbon sinks", storing more carbon dioxide (CO₂, the main gas responsible for climate change), per unit area than any other ecosystem.

Deforestation data

Deforestation in Indonesia, particularly in Sumatra, has been extensive. Land-use change and deforestation are estimated at 2 million hectares per year. Of the 108 million hectares of forest area left in the country, almost half is in poor and degraded condition.

Forest Area Key Facts & Carbon Emissions from Deforestation

- The forest sector accounts for 85 per cent of Indonesia's total annual greenhouse gas emissions. The main sources of emissions within this sector are: deforestation, illegal logging and forest fires.
- Every year, Indonesia emits 6.5 times as much CO₂ from degraded peat swamps as it does from the burning of fossil fuels. In Sumatra's Riau Province, nearly half of the 4 million hectares of peat swamp is already deforested, drained, decomposing or burning.
- The peat swamp forests of Riau is estimated to store the largest amount of carbon in Indonesia - 16.9 billion tonnes. If all of this is released into the atmosphere, it will amount to roughly two-thirds of the world's total CO₂ emissions from fossil fuels in 2004.

Biofuel production poses risks to forests

Indonesia is expanding biofuel production for domestic use, and for export to meet strong global demand, particularly in Europe. Many local governments have pledged to support this move by allocating more land for oil palm plantation concessions.

By 2009, biodiesel from palm oil in Indonesia is projected to reach 700 million litres, or 2 per cent of diesel consumption, and requiring about 200,000 hectares of oil palm plantations. Demand for biodiesel is expected to increase in 2025, reaching 4,700 million litres, or 5 per cent of total diesel consumption. This will require 1.4 million hectares of oil palm plantations, about 2.5 times the size of the Indonesian island of Bali. The risks of deforestation have not been thoroughly assessed.

Yet, in June 2006, the Jakarta Post reported the Minister of Agriculture as saying that Indonesia will have an additional 3 million hectares of oil palm plantations by 2010.

(Source: PEACE, Indonesia and Climate Change: Current Status and Policies, 2007)



Approximately 25-40 per cent (40-60 million hectares) of Indonesia's forest cover have been lost over the last 50 years, with more than half of this loss occurring over the past two decades. Satellite imagery analyzed in 2004 revealed that between 1990 and 2000, Indonesia lost over 21 million hectares of forest, including 8 million hectares in Sumatra. In the lowland tropical forests of Sumatra alone, between 65-80 per cent of the forest have already been lost to agriculture and logging.

Vast areas of Indonesia's peat swamp forests have also been lost, mainly burned, and less than one-half of these forests remain. Of the remaining 22.5 million hectares of peat swamp, 9 million are drained, decomposing or burning. In Sumatra's Riau Province, nearly half of the 4 million hectares of peat swamp is already deforested, drained, decomposing or burning. The World Bank has predicted that if present trends continue, these forests will disappear soon after 2010.

Key threats

Sumatra's lowland forests are particularly threatened by agriculture (for example, oil palm plantations) and logging. On the flat lowlands of southern Sumatra, for example, the vast stands of ironwood have been almost entirely destroyed from logging.

In Sumatra's peat swamps, large areas have been cleared and drained for settlements, and large-scale development projects. This drainage dries neighbouring areas, increasing the prevalence of fires. WWF-Indonesia's analysis indicates that 67 per cent of the fire hotspots in Riau province occurring during the 2001-06 period were on peatlands. In July 2006 alone,

56 per cent of Riau's fire hotspots were on peatlands.

The biggest threats to Riau's peat swamp forests are the rapidly expanding pulp and paper and palm oil industries. According to WWF and data from the Indonesian Palm Oil Commission, Riau Province is covered with more commercial pulpwood and oil palm plantation concessions than any other province in Indonesia.

Riau Province is home to two of the world's largest pulp mills – Asia Pulp and Paper (APP) and Asia Pacific Resources International Holdings (APRIL). WWF estimated that about 170,000 ha of natural forests were cleared to feed the two mills in 2005 alone. This number accounts for close to the entire 200,000 ha of forest loss detected on satellite images between 2004-05.

But the worse is not over. According to the latest draft of Riau's new provincial land-use plan, 60 per cent of the remaining natural peat swamp forests, or about 880,000 ha were scheduled to be cleared in 2006, most for conversion to pulp plantations, and the rest to oil palm. Most of the yet-to-be-cleared forests are on top of peat soil of more than 2 metres, thereby protecting a huge carbon store.

Protection status

Remaining areas of intact lowland rainforest are found primarily in central Sumatra. There are several protected areas here, which include about 9 per cent of the region. However, encroachment, widespread illegal logging, and fires in these protected areas are significant.

Tesso Nilo: One of the largest remaining lowland forest blocks in Sumatra

Tesso Nilo forest located in Riau province, Sumatra, is one of the island's last havens for elephants and tigers. It has one of

the highest levels of lowland forest plant biodiversity known to science, with over 4,000 recorded plant species, and many more yet to be discovered. Tesso Nilo is also one of Sumatra's largest remaining lowland forest blocks. Only two decades ago, the forest totalled half a million hectares. Today, only 155,000 hectares remain.

Peat Swamps – Why they matter

Peatlands – rich densely packed soils made up of dead organic matter, mainly plants – are known as ‘carbon sinks’ for their ability to store more carbon per unit area than any other ecosystem – 30 times more carbon than the forests above them. Covering only 3 per cent of the earth’s land area, peatlands store up to 528,000 Megatonnes of carbon – equivalent to 70 times the current annual global emissions from fossil fuel burning. Furthermore, peatlands can absorb 25-30 per cent of the world’s carbon dioxide, thereby helping to reduce the amount of greenhouse gas in the atmosphere.

Loss and degradation of peatlands, through deforestation, drainage and burning, can result in massive carbon emissions. Deforestation and drainage of peatlands speed up their decomposition, exposing them to fire, leading to large amounts of greenhouse gas emissions. When peat forests are cleared and the soil is drained, the dried peat catches fire easily and is almost impossible to extinguish. Fires on peatland produce much more smoke and carbon emissions than fires on other soil types. Haze from Indonesian fires has caused major health and economic problems in the country as well as neighbouring Malaysia and

Large areas of peat swamp in Sumatra have been drained, making this a highly vulnerable ecoregion. There are 13 protected areas totalling 4,730 km² (5 per cent) of the area. However, many of the protected areas are proposed, and the official status is still uncertain.

Carbon emissions from deforestation

Indonesia is the world’s 3rd largest global greenhouse gas emitter (after the USA and China), largely due to the significant release of carbon from deforestation.

The forest sector accounts for 85 per cent of Indonesia’s total annual greenhouse gas emissions. The main sources of emissions within this sector are: deforestation (largely from land-clearing for agriculture and timber plantations), illegal logging, and forest fires. It is estimated that during the 1997/98 forest fires, one of Indonesia’s biggest, between 0.8-2.5 Gigatonnes (1 Gt = 1 billion tonnes) of carbon were released to the atmosphere. This is equivalent to between 13-40 per cent of the annual global carbon emissions from fossil fuels.

Forest degradation, particularly that of peat forests, is another source of emissions. While peat forests have the ability to absorb CO₂, thus helping to reduce the amount of greenhouse gas in the atmosphere, degradation of these forests can result in massive carbon emissions. Every year, Indonesia emits 6.5 times as much CO₂ from degraded peat swamps as it does from the burning of fossil fuels. According to Wetlands International, on average, around 1,400 Megatonnes (Mt) of carbon is released during the annual burning season and 600 Mt is released each year from the decomposition of dry peat – more than the annual greenhouse gas emissions of Japan or Germany.

The potential for increased emissions from deforestation is massive. The State Ministry of Environment reports that there is over 24 billion tonnes of carbon stock stored in Indonesia’s vegetation and soils, and that approximately 80 per

Tesso Nilo is also of vital importance to the people who live in the area, many of whom derive subsistence from dry land paddy cultivation, rubber tapping, and river fishery in the forest.

Source: www-indonesia





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cent of this is stored in standing forest. The peat swamp forests of Riau is estimated to store the largest amount of carbon in Indonesia – 16.9 billion tonnes.

WWF Forest Activities

WWF works to mitigate the negative impacts of forest conversion in Sumatra in many ways, including:

- Working with palm oil, pulp and paper companies, and the government to identify and protect High Conservation Value Forests (HCVFs);
- Promoting best practices for sustainable palm oil production; and,
- Promoting and training communities, companies, and government on best practices to maintain wildlife corridors and mitigate human-wildlife conflict.

WWF has proposed the establishment of a national park in one of the four peatland forest blocks where it has been working to protect – the Kuala Kampar National Park, totalling 450,000 hectares – and an extension of the Tesso Nilo National Park.

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