

# **UNDERLYING CAUSES OF DEFORESTATION AND FOREST DEGRADATION IN INDONESIA; A CASE STUDY ON FOREST FIRES**

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## **INTRODUCTION**

For several months starting in July 1997, smog covered an area of South-East Asia stretching from Thailand and Philippines to Malaysia and Irian Jaya. The smog was caused by vast forest fires burning on the main islands of Indonesia, which created ecological, social and economic problems. For humans, the smog caused illnesses and deaths from respiratory diseases, along with hunger, shipping accidents and misery for the 70 million people living in the affected areas.

This paper will first look at the ecological, economic, and social impacts of the forest fires, and the intermediate, secondary and underlying causes. It will then discuss the links between forest fires and the underlying causes of deforestation and forest degradation in Indonesia.

## **AN OVERVIEW OF THE INDONESIAN FOREST**

Indonesia possesses one of the largest areas of tropical forest in the world. In fact, Indonesia possesses very rich bio-diversity in its forest cover, with over a dozen major forest formations. The natural diversity and distribution of forest formations in Indonesia are a function of the primary factors: rainfall regime, elevation, and soils (Dick, 1991). The Indonesian islands have a tropical maritime climate that is strongly controlled by the Indian Ocean to the west and south and the Pacific Ocean to the north and east. Mountains over 2500 m are common in most regions, and Irian Jaya boasts the highest point between the Himalayas and the Andes (Mt. Puncak Jaya at 5002 m). At the local level, the most important influence on vegetative cover is the nature of the soil. The physical and chemical properties of a soil depend largely on the characteristics of the parent materials from which it was derived, the local climate, and its age as a function of the length of time it has been exposed to the destructive weathering actions of climate. These environmental factors have combined to produce a rich Indonesian forest mosaic, ranging from evergreen rainforests to savanna woodlands, and tidal mangrove to sub-temperate mountain and sub-alpine forests.

## **A OVERVIEW OF FOREST LAND USE POLICY**

Since gaining independence, all Indonesian natural resources have been controlled by the State (The Constitution of 1945, Article 33). Referring to the Basic Law, the Basic Forestry Act No. 5/1967 stated that all Indonesian forests are claimed as State Forest Land. Following the Basic Forestry Act, the Forest Land Use Policy (referred to as TGHK) was established under Government Regulation No. 33 in 1970 and formalized in a set of Minister of Agriculture Decrees in 1980 and 1981. The deadline for completing Forest Land Use Policy (TGHK) designations was 1985.

The Bureau of Planning of the Ministry of Forestry declared the size of Indonesian state forests was 140 million hectares, comprised of 113.8 million hectares of permanent forests and 26.6 million hectares of convertible forests.

Based on the Forest Land Use Policy, the permanent forest was categorized into:

- 1) production forest (64.3 million hectares);
- 2) protection forest (30.7 million hectares);
- 3) natural conservation area and nature preserved forest (18.8 million hectares);
- 4) convertible forest (26.6 million hectares).

But as of 1997, forested permanent forests measure 91.7 million hectares, comprised of 51.3 million hectares of production forest, 24.8 million hectares of protection forest, 15.3 million hectares of nature reserve, and 19.8 million hectares of convertible forest (Ministry of Forestry, Directorate General of Forest Protection and Natural Conservation, 1997).

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## INDIGENOUS COMMUNITY-BASED FOREST RESOURCE MANAGEMENT SYSTEMS

Indonesia's forests have been well managed and protected by local communities for millennia through strong traditional community-based forest resource management, which use traditional knowledge and traditional law systems. Many researchers have found that the practice of indigenous community-based forest resource management systems in Indonesia has existed for centuries among people who live near the forests.

They continue to exist today in Central and East Kalimantan where swidden agriculture farmers of Dayak manage *Simpukng* fruit agroforests, rattan agroforests areas, and *Lembo* agroforests areas (in East Kalimantan) that mimic the natural forest; in West Kalimantan where the Dayak manage Tembawang (Dipterocarp agroforests); in Lampung, Sumatra where Krui people manage damar agroforest areas that also mimic the natural forest; in Bali where Tenganan people manage mixed protection and production agroforests area; and in West Java where Badui and Kasepuhan people manage their mixed protection and production tree-gardens through traditional agroforestry systems. These practices are different from management by government agencies or industrial firms by being generally smaller-scale, more decentralized, and oriented towards a diverse mix of consumption, market and cultural needs.

### FOREST FIRES IN INDONESIA

Fires were burning out of control on several Indonesian islands during 1997 and still continued in 1999.

The main centers of the disaster were in Kalimantan (Indonesian Borneo), Sumatra and Irian Jaya. Others were reported from Sulawesi and Java. Up to two million hectares of forest and non-forest land have been burnt.

Table 6-1. Forest Fire in Indonesia

Forest Fires (main reas)	Year	Affected area in ha
Kalimantan/Sumatra	1982/83	3.5 – 3.7 million
Sumatra/Kalimantan	1986	~ 1 million ha
Kalimantan/Sumatra	1991	~ 500.00 ha
Kalimantan/Sumatra	1994	300.000 ha
Kalimantan/Sumatra/ IrianJaya/Java/Maluku/Sulawesi	1997	1.7 – 2 million ha
East Kalimantan	1998	so far 283.000 ha

Source : Bobsien & Hoffmann (1998).

The fires are not a new problem for Indonesia. There was a big forest fire on the island of Borneo, which burned for several months in 1983. It was at the time thought to be the biggest forest fire in history. The combined effects of fire and drought destroyed 25,500 km<sup>2</sup> of primary and secondary forest and a further 7,500 km<sup>2</sup> of settlement areas. Kutai National Park was virtually destroyed by the fire, and in some Dipterocarp forest areas left unburned by the fire, 70 percent of the bigger trees died of drought (Leighton, M and N. Wirawan, 1986). Since then, the cycle of forest fires in Borneo appears to be increasing and fires were reported to be larger than ever before during 1994, creating such a smoke haze that flights out of Kalimantan had to be cancelled for long periods.

#### 1. Impacts of the Fires

The fires had an enormous series of side effects on ecology, economy and socio-culture on a local, regional and global scale.

According to Bobsien and Hoffmann (1998), besides the immediate impacts, there are many follow-up impacts which will only unfold their full effects in the medium and long-term (see Table 2 after discussion on social impacts).

## **Ecological Impacts**

Misuse and over-use of fire as a cheap method of land clearing has caused massive changes to the vegetation of large areas in Indonesia.

Fires in forests non-adaptable-to-fire can result in long-term or permanent changes of vegetation cover. Even more forest can be lost altogether and replaced by other vegetation. In Kalimantan, in many places the original dipterocarp forests have been replaced by alang-alang grasslands through repeated burnings (Bobsien and Hoffmann, 1998). The total size of alang-alang grasslands in Indonesia has been estimated to be around 11 million hectares (Mudhyarso, pers. comm., 1998). These phenomena emerged due to all the environmental media in forests, such as vegetation, soil, water and areas affected by forest fires, which then leads to the situation where ecosystem functions are seriously affected.

Forest biodiversity is endangered or lost as an immediate impact of forest fire. The number of tree species is likely to decline after a fire. In total, approximately five percent of trees in Indonesia are already currently classified as globally threatened (WWF, 1997). Indonesia, as one of six countries in the world with mega-biodiversity, has a comparatively high amount of endemic plant and wildlife species, and faces the problem of increasingly threatened species due to the over-exploitation of forest resources. Species extinction will furthermore increase through the forest fires. The fires damaged wildlife habitat, feeding grounds and roaming areas (the case of Muara Kaman Nature Reserve, East Kalimantan). Fires also caused changes in wildlife behaviour (the case of *Nasalis larvatus* (Bekantan) of Muara Kaman Nature Reserve), and accelerated the rate of loss of the highly endemic Black Orchid species in Kersik Luay Nature Reserve, East Kalimantan (Telapak, 1998).

One million hectares of peat forest, which are being converted into rice-fields under the Government's One-Million Rice-Fields Project may already be on fire in Central Kalimantan. CIFOR identified the main fire problem in Indonesia as coming from a one million-hectare area of peat forest being drained for a government rice-planting project. It is also predicted that the 1983 fires are still burning deep in the peat (WWF, 1997). Fires in these peat forests are dangerous, because the fires can go deep underground and can continue to burn, uncontrolled and unseen, for months. The contribution of tropical peatlands to the global carbon cycle is higher than those of most of the temperate zones and about 15 % of the global peatland carbon may reside in tropical peatland (RAMSAR, 1997). Fires in peatlands can make future regeneration more difficult as they kill tree roots and destroy seed banks. South East Asian countries, particularly Malaysia and Indonesia, hold over 60 % of global peatland resources (around 20 million ha). Five percent of the regional total was on fire at the end of 1997 (WWF, 1997).

The combined impacts of large-scale deforestation and forest fires may also contribute to ecological changes on a national, regional, as well as global scale. Immediate transboundary effects such as acid rain and air pollution is one problem. Another problem is that Indonesia and neighboring countries may likely be hit by regional droughts more frequently and with greater intensity.

Bobsien and Hoffmann (1998) explained the regional and global effects as follows: "The regional climate, including the hydrological cycle, is closely linked to the global hydrological cycle and to global atmospheric circulation, which is the key determinant of the position and movements of tropical high-pressure areas. Large-scale biomass burning creates conditions in which future burnings is more likely, creating a spiral of further destruction. El Nino effects are likely to occur more often and more intensely. Haze reduces the sun radiation needed for primary production of plants, so the agricultural sector will suffer production losses."

"Carbon dioxide (a major greenhouse gas) generated by the 1997 fires equaled that for the whole of Europe in one year. Such rapid destruction of carbon dioxide sinks and emission of greenhouse gases are likely to intensify the effect of the El Nino weather conditions and speed up global warming. According to Dr. Harger, Intergovernmental Oceanic Commission of UNESCO, who has evaluated available climatic data from Indonesia since the beginning of climate data recording in the last century, El Nino has already increased its frequency and intensity. Some decades ago El Nino occurred only every 4-8 years and was less intense, however, in the last two decades the frequency of El Nino increased to 2-4 years. There is ample evidence that El Nino could, in the future, occur every year. However, El Nino also amplified by local drought conditions."

## **Economic Impacts**

Meanwhile, the forest fires in 1997 caused economic losses of between US\$3.5 and US\$7 billion from ecological impacts and losses in the hotel, tourism, transportation, health and plantation sectors (Elfian, 1998). A

study conducted by the Singapore-based Economy and Environment Program for Southeast Asia and WWF Indonesia in October 1997 estimated financial losses - based on conservative estimates - at some US\$1.4 billion in Indonesia, Malaysia and Singapore. This estimate did not include the tremendous loss of forest resources and damage to biodiversity. According to D. Glover, Director of the Economy and Environment Program for South East Asia, Indonesia's forest fires could cost the region US\$5 to US\$6 billion in short-term health-care, plus losses in industrial production, tourism, timber and plantations (Jakarta Post 18.3.98).

Forest fires in 1981 that damaged 60,000 hectares of forests were calculated to have caused losses of US\$951,000 and needed at least US\$25.5 million to recover. Those figures did not include economic losses on ecological values, such as hydrological values, etc. (Elfian, 1998). However, in 1982/1983 the great 'Borneo' forest fires produced economic losses of US\$5.5 billion (Lennertz & Panzer, 1983 in Bobsien and Hoffmann, 1998).

### **Social Impacts**

The smoke contains high concentrations of particulate matter and numerous chemicals that are harmful to health, especially when exposure continues over several months. In Padang, West Sumatra, the head of the local health office reported that the haze in his region not only caused over ten thousand cases of respiratory tract ailments but thousands of others complained of eye irritation and infections due to sulphur dioxide. The World Health Organization office in the Philippines estimated that hospital visits for upper respiratory type problems were up 2 to 3 times the usual levels when the smog was at its worst in Indonesia (WWF, 1997). In Malaysia and Singapore the effect on human health was well documented when the limit of the so-called PSI (Pollutant Standard Index) was exceeded 800 PSI and more, with 100 PSI regarded as the unhealthy limit and 300 as the hazardous limit. Altogether, up to 70 million people in six Asian countries were affected by the haze. However, this is only a rough estimation since Indonesia has no sufficient pollution monitoring equipment (Bobsien and Hoffman, 1998).

The situation became worse for many people in East Kalimantan province due to the effects of drought and water scarcity. The author was in Samarinda, East Kalimantan for ten days in September 1997 and personally experienced the serious water scarcity of the city, which then led to other various health problems.

Social life was also seriously affected when schools, factories, and even airports had to close down for weeks. In February 1998, the airport in Samarinda, East Kalimantan was closed for 17 days. In March 1998, airports in Central Kalimantan and North-Sumatra also had to cease operations temporarily. The risk of accidents with all kinds of transport increased. On September 25 1997, a Garuda airliner carrying 222 people crashed shortly before landing at a north Sumatran airport after the pilot got confused in dense smoke, resulting in Indonesia's worst-ever air disaster. On September 27, two ships collided in the Straits of Malacca, due to the smog, with 29 people lost. On October 19, a further collision between a passenger boat and a tug left four people dead and a reported 21 missing, and soon afterwards a collision in thick fog on the Barito River resulted in 29 people drowning when a ferry sank.

Indigenous communities who live inside and around forest areas suffered most from the fires. Before the fires, they already had problems with access to their long-standing swidden fields, which have naturally regenerated, but were claimed as state forest land and managed by private concessionaires. The fires destroyed most of the Dayak's (East Kalimantan indigenous people) income sources including rattan gardens, fruit gardens, mixed rice and crop fields, and communal forest areas, which provided timber and non-timber forest products. That situation brought them to a serious food crisis. It became worse due to the incredible high price of food coming from other areas, because smoke affected the transportation system.

The cultural life of the Dayak people was also affected by damage to their community-based forest resource management system, since the system is integrated into their strong socio-cultural tradition.

Table 6-2. Impacts of Forest Fires (Overview)

Impact Scale/ Category	Ecology	Economy	Society
Local	<p>Vegetation :</p> <ul style="list-style-type: none"> <li>■ Forest destruction</li> <li>■ Loss of biodiversity (flora)</li> <li>■ Change to fire dependent ecosystem</li> </ul> <p>Wildlife :</p> <ul style="list-style-type: none"> <li>■ Habitat destruction</li> <li>■ Loss of biodiversity (fauna)</li> </ul> <p>Soil :</p> <ul style="list-style-type: none"> <li>■ Erosion</li> <li>■ Loss of soil-fertility</li> </ul> <p>Hydrology :</p> <ul style="list-style-type: none"> <li>■ Watershed destruction</li> <li>■ High siltation of ponds and river/decline of water quality &amp; quantity</li> <li>■ Higher risk of floods</li> </ul> <p>Micro/Meso Climate</p> <ul style="list-style-type: none"> <li>■ Change of micro/meso climate (drier and holter)</li> <li>■ Acid rain</li> <li>■ Air pollution</li> </ul> <p><i>Desertification*</i></p>	<p>Financial losses of forest destruction</p> <ul style="list-style-type: none"> <li>■ loss of timber</li> <li>■ loss of non-timber forest products income(e.g. honey, gahru, fruits, medical plants, rattan)</li> <li>■ loss of swidden agriculture fields (producing rice and annual crops)</li> <li>■ loss of gratis ecological function of forests</li> <li>■ destruction of national parks (tourism)</li> </ul> <p>Financial losses of industrial disruption</p> <ul style="list-style-type: none"> <li>■ production losses</li> <li>■ damages</li> </ul> <p>Financial losses of transport disruption</p> <ul style="list-style-type: none"> <li>■ accidents</li> </ul> <p>Local tourism</p> <p><i>Increased costs for food production and water supply*</i></p>	<p>Disruption of daily life</p> <p>Disruption of cultural life of Indigenous communities</p> <p>Disruption of education system</p> <p>Industrial disruption</p> <p>Transport disruption :</p> <ul style="list-style-type: none"> <li>■ higher risks of traffic accidents</li> </ul> <p>Public health impacts</p> <ul style="list-style-type: none"> <li>■ conjunctivitis, skin and eye ailments, asthma, cronchitis, eczema and nausea, <i>cancer, chronic disease</i></li> </ul> <p>Water Scarcity</p> <p>Harvest Failure</p> <p>Threat of Food <i>Security</i></p>
National/ Regional	<p>Air Pollution</p> <p>Acid rain</p> <p>Increase of frequency of El Nino</p>		<p>Disruption of daily life</p> <p>Disruption of education system</p> <p>Industrial disruption</p> <p>Transport disruption :</p> <ul style="list-style-type: none"> <li>■ higher risks of traffic accidents</li> </ul> <p>Public health impacts :</p> <p>conjunctivitis, skin and eye ailments, asthma, cronchitis, eczema and nausea, <i>cancer, chronic disease</i></p>
Global	<p>Climate Change</p> <p>- increase in CO2 emissions</p>	<p>Influence on international trade and business</p> <p>Tourism industry</p> <p>Financial Aid</p>	<p>Social and public dissatisfaction</p> <p>Political repercussions</p> <p>Sanctions</p>

\* Medium/Long-Term follow-up impacts. Developed by the Author based on Bobsien and Hoffmann (1998)\*

## **Forest fires as a result of deforestation and forest degradation in Indonesia**

Most of the fires were set deliberately, often illegally, by commercial interests in Indonesia. Most happened in commercial plantation areas, transmigration land-clearing projects, One Million Rice Field Project areas converted from peat-swamp forests, over-logged forests, secondary forests in production forest areas managed by concessionaires, and industrial timber estate areas (commercial plantation). The fires also occurred in secondary forests of protection forest, nature reserves and wildlife sanctuaries, recreation forest, national parks and grand forest parks.

The picture shows that forest fires in Indonesia happened in areas where deforestation and forest degradation existed since the starting period of forest exploitation for economic and political purposes. It can be said that forest fires also resulted from deforestation and forest degradation in Indonesia. A discussion of the causes of the forest fire in the following paragraphs will give clearer picture.

### **2. Forest Fire Causes**

In a discussion paper, the World Wide Fund for Nature distinguishes three categories of causes that created the forest fires in Indonesia (WWF, 1997):

- 1) Immediate causes include deliberately started fires, set mainly by plantation concessionaires.
- 2) Secondary causes include logging and conversion to more flammable species, which increase the likelihood of fire, coupled with a severe El Nino climatic effect, which itself may be intensified as a result of global climate change.
- 3) Underlying causes include national land use policies and failure of government intervention.

#### **Intermediate Causes**

The Government of Indonesia has said that about 80 percent of the fires were started by commercial plantation owners, industrial estates and transmigration land-clearing projects. The Government, for the first time, publicly identified suspected culprits. So far, 176 plantation timber and construction companies and the transmigration scheme have been named as possible users of fire to clear land. These include a reported 43 Malaysian companies.

#### **Secondary Causes**

Fire risk is increased dramatically by the conversion of natural forests to rubber, oil palm and timber plantations, and by the logging of natural forests, which opens the canopy and dries out the ground cover. Plantations are drier and trees are more spaced than natural tropical moist forest, thus supporting circumstances for fire to spread. Fires burned more easily in secondary forest. Selective logging destroys much of the moist undergrowth and the closed canopy that reduces the likelihood and impact of forest fires in natural forests. Drainage for agriculture, such as for the one million hectare rice field project, also increased the risks of fire.

#### **Underlying Causes**

All the above secondary causes that increase fire risks, such as forest land clearing for large rice field areas, commercial plantations, and logging, are caused by the national forest land use policy which allocated certain amounts of forested lands for production forest and convertible forest.

Widespread corruption has caused and encouraged widespread illegal practices in the Indonesian timber and plantation industry. Structural collusion between government officials and companies is one reason for high transaction costs for companies, which then leads to breaking the law by forest companies, such as doing illegal logging and manipulating forest assessment reports for the purpose of forest land use change, etc.

Government intervention failed by encouraging timber estate development and inefficient domestic pulp and paper industries with subsidies. The intervention led to the clearing of massive forest lands for timber estates using deliberate fires. Since newly established timber estates are still premature in term of providing raw material for domestic pulp and paper industries, it has led to the increased illegal logging and illegal re-logging of over-logged areas, which increased fire risks.

### **3. Forest fires and underlying causes of deforestation and forest degradation in Indonesia**

Deforestation and forest degradation can be attributed to many different causes. Some causes operate directly on the forest itself and are often easily recognizable in the field. These are referred to as “direct causes”. Behind these direct causes, however, may lie a whole sequence of causes, each more indirect or remote than the one which precedes it. These are referred to as “underlying causes” (CSD, 1996). It has been identified that some of the direct causes of deforestation and forest degradation in Indonesia are commercial plantations, transmigration, infrastructure development, mining, logging and fire. Previous discussion in this paper regarding ecological impacts showed the contribution of fire as a direct cause of deforestation and forest degradation. The following sub-chapter focuses on the linkages of some underlying causes of deforestation and forest degradation in Indonesia, which are forest-land use policies including logging, timber plantation, and conversion into large-scale agro-industry land, transmigration, and mining.

#### **Indonesian Forest Land Use Policy - The Way towards Forest Fire**

Primary undisturbed rainforests do not usually burn due to high moisture content. There are no natural causes for forest fires such as lightning. Indigenous forest dwellers have sophisticated land-use and forest resource management skills, which are highly adapted to the sensitive environment. But when primary rainforests are greatly altered by activities such as logging, mining, conversion into large-scale agricultural land (e.g. agro-industry land), plantations, and settlement areas, these land-use changes influence many ecological characteristics. Many aspects of the misuse and mismanagement of rainforests in Indonesia have been the subject of research, NGO campaigns, and public and political debate, but the results are quite far from success concerning the goal of achieving better protection of indigenous communities and rainforest ecosystems. International conventions, scientific programs and public/political debate excluded the issue of increased risk of forest fires. The 1997 Indonesian forest fires should be used as ample evidence of the misuse and mismanagement of tropical rainforests, which led to deforestation and forest degradation in Indonesia. Underlying causes of deforestation and forest degradation in Indonesia, clearly linked with the forest fires issue, need to be analyzed. For that purpose, it might be useful to divide Indonesian forest politics into three phases.

##### **1) Logging Phase (1967 - now)**

The year of 1966 was an event of political change when Soeharto - a long-time power holder until May 1998 - took the power of the nation from his predecessor, Soekarno, first president of Indonesia. Under Soeharto's leadership, the New Order began in 1967. It was also a new era of forest resource management through the establishment of The Basic Forestry Law of 1967, which was influenced by a national development policy affected by financing foreign debts. The Basic Forestry Law of 1967 constituted a legal instrument facilitating commercial access to and development of income streams from the legal rights to forest resources. Article 5 of The Basic Forestry Law states all forest areas within the boundary of Republic of Indonesia, including natural resources in the areas, are authorized by the government. The Basic Forestry Law was then used as a mechanism to legitimize state claims of ownership over forest resources and to arbitrarily sanction the removal of local control from forest communities, including indigenous ones (Moniaga, 1993). Following the Basic Forestry Act, the Forest Land Use Policy (referred as TGHK) was established under Government Regulation No. 33 in 1970 and formalized in a set of Minister of Agriculture Decrees in 1980 and 1981. The deadline for completing Forest Land Use Policy (TGHK) designations was 1985. Based on the Forest Land Use Policy, the permanent forest was categorized into: 1) production forest (64.3 million hectares); 2) protection forest (30.7 million hectares); 3) natural conservation area and nature preserved forest (18.8 million hectares); 4) convertible forest (26.6 million hectares).

Until 1966, some 75 % (144 million ha) of Indonesia was covered with tropical rainforest. The common prevalence of the prized tree species, Dipterocarpaceae, in Kalimantan and Sumatra made Indonesian rainforests some of the most valuable in world. Large-scale logging of forests began as a follow up to the establishment of the Basic Forestry Law in 1967 when all Indonesian forests were declared state property. The Basic Forestry Law also followed by opening up opportunities for foreign investment in logging activities. All policies enacted during that period supported the exploitation of the Indonesian rainforest as part of a national development policy, mainly to finance foreign debts. During the timber boom in the 70's, with the help of well-connected foreign companies, Indonesia became the world's biggest raw log exporter. Timber became the second biggest earner after oil and gas

in the Indonesian economy after the oil price drop in 1982. By 1983, 560 logging concessions had been granted on 65.4 million hectares, more than the total area of Indonesia's production forests stated in the Forest Land Use Policy. Before the designation completion of Forest Land Use Policy (TGHK) in 1985, which included forest lands demarcation, it was commonly known that logging companies operated within unclear demarcation areas. Over-logged areas within conservation areas (national parks, nature reserves) is evidence of the mismanagement.

In 1980, the government changed its forest policy by introducing a ban on raw log exports, and began promoting the development of the plywood industry. By the late 80's, Indonesia was the world's largest plywood-producer, and has achieved a 75 percent market share in the mean time. However, overestimation of forest resources, poorly managed large-scale operations, non-compliance of concessionaires to the principles of sustainable forestry, a lack of law enforcement, an over-capacity in the plywood industry, and meager reforestation efforts resulted in the rapid exploitation of primary forests (Hurst, 1990). After continuous short-term and profit-oriented timber exploitation, forest coverage in Indonesia had decreased to 119.3 million ha (62 %) in 1982 (RePPProt 1990) and 92.4 million ha (48,6 %) in 1983, including plantations and vast logged-over secondary forests (Bobsien and Hoffmann, 1998). WALHI, a strong environmental group, stated that only 53 million ha (37 %) primary forest are left in 1998. The deforestation rate for the time period between 1982 and 1993 reached an incredible 2.4 million ha/year. In comparison: FAO in 1990 stated that the annual deforestation rate of tropical forests worldwide is 987 million ha (Bobsien and Hoffmann, 1998).

## 2) Timber Plantation Development Phase

The overall macroeconomic situation and the specific situation in the relevant policy fields created a large need for policy change. Since Indonesia's oil resources will be depleted soon (~ 2005), and the country will then not only lose oil export revenues but will become an oil importer, the national development planners like to boost the economic performance of other sectors. Amongst other promising businesses, pulp and paper, as well as agrobusiness (especially tree crops), were identified to be further potential export revenues. On the other hand, in the mid 80's there was clearly visible evidence in the forestry sector of an up-coming 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 emerged in Kalimantan. In the initial stage, the government tried to solve the problems by establishing a timber estates program, referred to as HTI, *Hutan Tanaman Industri*. In order to resolve the dilemma, the government seemed to settle on timber estates as a scheme for 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 industry.

The third type of timber estates, pulp and paper plantations, received the most attention and investment from the private sector and the government, since the pulp and paper business is the most profitable. Despite the originally purported goal of the government to use timber plantations to counter hardwood shortages, in practice, the thrust of the timber estate scheme was to create 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), which allow concessionaires to plant and harvest plantation timber on so-called unproductive areas of permanent production forest. Various government ministers stated that Indonesia is aiming to become the greatest supplier of paper pulp and palm oil in the world. Thus, in the 90's, an enormous program is underway to convert primary forest into timber, as well as rubber and oil palm plantations in Indonesia.

## 3) Large-Scale Oil Palm Plantation Phase

Another ambiguous governmental development program to increase export revenues is the development of tree-crop (oil palm, coffee, cocoa and pepper) plantations. Plantation development also serves the government's long standing goal of relocating people from the densely populated island of Java to the outer islands (referred to as the transmigration program). Official incentives include low-cost financing for estates where 80% of the land belongs to smallholder transmigrants and 20% to the company. Some 35 companies are developing plantations in conjunction with transmigration, however, only the big conglomerates can afford the investment costs of setting up transmigration sites.

There is a recent trend with Malaysian businessmen seeking land for establishing new plantations in Indonesia. Some of the reasons are: a) Malaysia's over-aged rubber plantations and decreasing oil-palm



production; b) Indonesian land can be cleared more easily, owing to the lack of control and the Indonesian counterparts freely take out the remaining trees (Bobsien and Hoffmann, 1998).

Until 1996, Indonesia exports of palm oil products had increased 32% over the previous five years, and were worth more than US\$1 billion. Government plans call for the production of 7.2 million tons of crude palm oil by the year 2000, with the plantation area move at 2 million hectares. The Ministry of Agriculture has announced that an additional 1.5 million hectares will be added in 1998 as part of a new policy to address the monetary crisis (CIFOR, 1998). With respect to the present economic crisis, the palm oil business is very attractive, because investment needs and operation costs are in Rupiah, but export sales will return investments in dollars. The government then lifted its export ban on palm oil on April 22 1998. The integration of Forestry and Plantations into one Ministry in 1998, which supports "one-roof" authorization of forest lands conversion into plantations, can be used as evidence of the government's ambiguous plan on plantations.

Some measures of the IMF package directly concern the palm oil sector. For example, Point 39 requires Indonesia to remove "all formal and informal barriers to investment in palm oil plantation" - a requirement which is clearly detrimental to environmental concerns, because it will highly increase additional pressure from international investors to convert forest land. Point 50 of the IMF catalogue requires the government to "reduce land conversion targets to environmentally sustainable levels by the end of 1998" - a requirement, which is contradictory to the first one, and the timing is ill-fated to prevent major forest fires in 1998.

#### **4) Logging, Timber Plantation, Oil Palm Plantation and Forest Fires Relationship**

##### **a. Logging Case**

Official reports of the local government office of East Kalimantan stated that total areas in 1998 on fire since January 1998 are at least 489,280 ha, which includes 299,846 ha of logging company areas (60 %) and 85,803 ha of industrial timber estates (18 %) (Telapak, 1998).

Logging activities in Indonesia basically have opened up forest canopies and resulted in widespread forest roads, clear-cuts and degraded secondary forests. Poor logging practices in the absence of enforcement of logging regulations caused severe damage to primary forests. The ecological impact of logging alone is severe enough to result in a significant increase of fire risk, especially in times of periodically occurring El Nino droughts. In 1982/83 some 3.5 million hectares of Indonesian forests burned, including some 378,000 ha in East Kalimantan, an event that remained widely uncovered by the media. At the time, logging activities was at its highest peak. Meanwhile, timber plantation development was not a major issue in the national development planning agenda (Bobsien and Hoffmann, 1998).

##### **b. Plantation Case**

The role of the timber plantation and tree-crop plantation businesses as major and immediate causes of the forest fires in 1997 was officially stated by the Indonesian government. The Minister of Environment stated that about 80% of the fires were started by plantation owners, industrial estates and transmigration land-clearing projects (see table 3). Indonesia has, for the first time, publicly identified suspected culprits. So far, 176 plantations, timber and construction companies and transmigration projects have been named as possible users of fire to clear land, despite a ban on burning during the unusually long dry season.

The large-scale establishment of pulp and paper estates (~150,000 ha each) or tree crops (some of them 100 - 100,000 ha) inevitably requires bigger scale burnings. It is important to note that the monoculture softwood plantations dramatically increase the fire risk. By using fire to establish, for example, Eucalyptus plantations or Acacia plantations, such plantation themselves will hold a huge fire potential in future. It is because the plantations are drier and trees are more evenly spaced than natural tropical moist forest.

Many oil palm plantations were also identified as using fire for land-clearance in 1997. Fires were also sometimes used to deliberately blur the boundary of concessions and to acquire more lands. From 176 companies named as possible users of fire, 43 were reported to be Malaysian companies.

## **CONCLUSION**

Excessive forest fires are a direct cause of deforestation and forest degradation in Indonesia. But evidence suggests that forest fires also resulted from deforestation and forest degradation. National forest land use policies, government intervention failures in encouraging (by subsidies) the development of timber estates, as

well as the domestic pulp and paper industry, and widespread structural corruption can also be referred to as some of the underlying causes of deforestation and forest degradation in Indonesia.

Table 6-3. Areas affected by fire during July-September 1997 and during January - April 1998

Forest Type	July-Sept. 1997	July-Sept. 1997	Jan. – April 1998
Production Forests (Logging)	578,000 ha (33.7 %)	37 %	105,900 ha (42 %)
Conservation area	45,000 ha ( 2.6 %)		75,600 ha (30 %)
Plantation area	798,000 ha (46.55%)	43 %	71,000 ha (28 %)
Peat Swamps area	260,000 ha (15,20%)	12 %	
New Transmigration area	30,000 ha ( 1,70%)		
Swidden Agriculture area	3,000 ha ( 0,2 %)	9 %	
Total	1,714,000 ha (100%)	100 %	252,500 ha (100%)

Source: Bobsien & Hoffmann (1998)

### RECOMMENDATION

It is strongly recommended that actions should be taken by the government of Indonesia immediately on addressing the underlying causes of the forest fires, which directly relate to addressing some of the underlying causes of deforestation and forest degradation. Otherwise, the remaining forest resources of Indonesia will continue to be depleted, and high losses of ecological values and mounting socio-economic costs could harm the current economic situation and worsen the financial crisis faced by Indonesia.

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